Государственное образовательное учреждение
высшего профессионального образования
**«Томский государственный университет
систем управления и радиоэлектроники»**

ТЕМАТИЧЕСКИЙ РЕФЕРАТИВНЫЙ СБОРНИК № 24-2/1

“Ground Penetrating Radar”
(«Подповерхностная радиолокация»)

Публикации в трудах конференций

Источник: *Digital Library IEEEXplore*
Язык: *английский*
Глубина поиска: *2007 – 2011 гг.*
Дата формирования: *март 2011 г.*
Составитель: *В.И. Карнышев*

Томск – 2011

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"A Novel Image Based Multi-Channel SAR-GMTI Algorithm"

A novel three-channel SAR-GMTI algorithm based on the compressed image rather than the azimuth-uncompressed raw data is proposed, which employs the classical DPCA technique and FrFT. The chirp characteristics of DPCA signal of the moving target in the SAR image domain is investigated for the first time in this paper. The scheme introduce FrFT to detect the moving target and estimate the position, velocity and radial acceleration, which lead to a more overall description on motion parameters than that of the majority of estimation algorithms. The excellent anti-noise ability of FrFT and the ideal clutter cancellation of DPCA technique results in great GMTI performance during a clutter-rich and low SNR environment. The simulation results indicate the efficiency and availability of the novel algorithm. [C1]

"Mathematical analysis of interpolation step of Omega-K Algorithm for GPR and its implementation"

GROUND-penetrating radar (GPR) is a mature remote sensing technique employed by engineers and scientists to obtain information from subsurface structures. These structures range from manmade objects, such as buried utilities, pavements, and unexploded ordnance, to geological formations. GPR data collection may be viewed as a mapping from the object space (x,y,z), characterized by the object's spatial location and reflectivity, to the image space. The image space may be viewed in the space-time domain (x,y,t), where the recorded scattered signals are displayed as a function of lateral position and time, or in the Omega-K domain (kx,ky,f), where the two image sets are related by spatial-temporal Fourier transforms (FTs). Additionally, data may be recorded in the space-frequency domain (x,y,f), as would be the case with a frequency-domain GPR. Fourier transforms allow easy conversions between the three image domains. [C2]

"Disposable stepped-frequency GPR and soil measurement devices"

Some geophysical and geotechnical scientists would wish to non-invasively measure the electromagnetic properties of soils using inexpensive, even disposable, technology. They may even wish to develop inexpensive and compact low-power GPR equipment for such uses as teaching and mitigation of construction risks during excavation. To this end, a heuristic comparison is made between a commercial Vector Network Analyser (VNA) and two very low cost VNAs sourced from the amateur radio community. The results are used to illustrate the potential for technology transfer from amateur communications to the GPR community, in order that a wider range of technologies be available for inexpensive implementation in GPR and soil spectroscopy studies. It will be shown that even very low-cost gain and phase detection semiconductor devices can be used to develop simple GPR and soil measurement systems capable of being used in the field to compliment GPR survey interpretation, as well as for standalone soil monitoring. [C3]

"2D and 3D GPR imaging and characterization of a carbonate hydrocarbon reservoir analogue"

We tested and adapted seismic attributes techniques on a 2-D and 3-D multi frequency GPR dataset to image the network of stratigraphic joints and fractures, the lithological variations and to characterize the rock mass based on the response to the radar wavefield measured in an abandoned limestone quarry. We applied semi-automatic horizon mapping techniques using manually picked seeds (control points) on selected attributes and automatic extrapolation both on inline and crossline, starting from seed positions. The results were integrated and validated with direct outcrop measures and allowed to image an hydrocarbon reservoir analogue in 3-D up to a depth of over 10m below the topographic surface. [C4]

"Real-time object detection using dynamic principal component analysis"

In this work, we contribute to the real-time detection of buried objects, with special emphasis on explosive ones, using the ground penetrating radar (GPR). When the buried objects have explosive substance, the moment of detection becomes vital. Therefore, we start the detection process right after the very first GPR signals begin to

return from the buried objects. For this purpose, we adopted the studies focusing on the online process monitoring methods using principal component analysis (PCA), and adapted them to the dynamic conditions of the ground. Different objects with varying dielectric properties are buried in the test environment and used for the evaluation of the proposed method. With the observed results, it is validated that, the proposed method is employable towards the real-time object detection. [C5]

"Freshwater ground penetrating radar the significance of seasonal temperature variation"

Relatively high temperatures cause an increase in molecular motion as a result of weaker hydrogen bonding and a reduction in the tetrahedral geometry which in turn leads to depolarisation. Therefore a reduction in temperature aids the radar efficiency in several ways, increases the dielectric constant, reduces the velocity of the EM wave and reduces the effect of molecular vibration as a result of stronger bonds causing a reduction in depolarisation i.e. more efficient polarisation. [C6]

"Multiple suppression in GPR image for testing back-filled grouting within shield tunnel"

In this study, Ground penetrating radar is used to detect the quality of back-filled grouting in a shield tunnel. A simulated GPR record shows that the steel bars in lining segments usually generate strong scattering and multiples, thereby obscuring the reflections from objects and making it difficult to locate the objects. Various filtering methods for multiple suppression (i.e., predictive deconvolution, f-k multiple attenuation, and Karhunen-Loeve transformation) were applied to the GPR record of a typical grouting defect model. The `wave field prediction and removal method' is proposed, which involves predicting propagation of the GPR wave field in the lining segment. By subtracting the predicted wave field from the raw GPR record, reflections from objects are precisely abstracted. Application of the method to a synthetic GPR record revealed that the proposed method achieves better results than those obtained using existing methods. [C7]

"Influence of pipe filling, geometry and antenna polarisation on GPR measurements"

The number of buried cables and pipes in urban areas has increased tremendously over the last decades. As the precise documentation of their layout is often missing, damage occurs frequently during construction work. Consequently there is urgent need for non-destructive methods providing reliable and fast prediction of their location. The Applied Geophysics Section of Frankfurt University takes part in the DETECTINO Project(Hildesheim, Germany) which aims at the development of an all-inclusive utility locating tool. The appraisal of GPR reflection patterns requires profound knowledge of the underlying physical processes. This is best achieved by deploying the locating tool on well defined objects, such as the Frankfurt utility detection test site providing a large variety of pipes and cables in different geotechnical settings. The exact knowledge of the geotechnical data allows the comparison of theoretical and observed data by adequate modelling. In this contribution we present modelled and measured data for pipes with varying depth, diameter and filling, for parallel and perpendicular source polarisation. [C8]

"Exploration of geological structures with GPR from helicopter and on the ground in the Letzlinger Heide (Germany)"

Geological structures and the water table were detected by GPR measurements in the sandy area of Letzlinger Heide (Germany). The glacial sediments consist of clayish lenses in sand and the water table is at a depth of more than 40 m. The strong lateral heterogeneity is known from boreholes. Different frequencies from 25 MHz to 200 MHz on the ground were used to detect these structures. The same area was used to test two helicopter-borne GPR systems operating at 30 and 100 MHz center frequency. The results of these measurements are discussed and the capabilities of the methods are shown. [C9]

"Processing stepped frequency continuous wave GPR systems to obtain maximum value from archaeological data sets"

Stepped frequency continuous wave ground penetrating radar (GPR) systems allow highly detailed data sets to be collected across a wide bandwidth using multi-element array antenna, such as the 3d-Radar GeoScope system. Although the final presentation of results is similar to time domain systems, the correct processing of the initial frequency domain data acquired in the field is essential to obtain the maximum information from the site. Consideration of the variation of bandwidth with depth, reduction of noise and background subtraction to minimise loss of data quality is required. This paper explores these themes with relation to data from archaeological sites and also considers the data processing challenges presented by high density (e.g. 0.075m Ч 0.075m) multi-hectare surveys. [C10]

"Non-destructive technique to investigate an archaeological structure: A GPR survey in the Domus Aurea (Rome, Italy)"

The discovery and touristic fruition of the Domus Aurea (Latin for "Golden House"), and the heavy rain led to the arrival of moisture, starting the slow and inevitable process of decay and collapse. Furthermore, inside the Domus Aurea, there are a lot of parts not yet excavated, attracting a continuous and archaeological interest. In order to properly plan the restoration of this building and detect buried archaeological features, a non-destructive technique, like Ground Penetrating Radar (GPR), is extensively and profitably used for its rapid data collection and its high resolution images of contrasting subsurface structural or archaeological materials. The results show not only the presence of internal lesions and detachments of the wall and vault structure, but also the existence of buried archaeological targets; these preliminary results allow future restoration plans in order to prevent the rapid degradation of this important building. [C11]

"Salt dome exploration by directional borehole radar wireline service"

3 D borehole radar, a standard logging method? This was the title of the paper, DMT contributed to the GPR conference 2000. Now this question can be answered. Since more than seven years DMT is applying directional borehole wireline services for salt dome exploration up to depths of 2000 m. The salt dome investigations can be carried out in boreholes or caverns. [C12]

"The effect of coupling on the determination of time zero for radar antennae"

The a priori knowledge of time zero of radar antennae is essential for an accurate GPR data processing. Indeed, an overevaluation of this parameter can induce inaccuracies in the estimation of the physical and geometrical characteristics of auscultated media from delay picking. This paper proposes experimental methodologies to obtain a stable estimation of Time Zero position through a parametric study based on picking of time signals. The experimental processing results are used to evaluate the effect of antennae coupling and the effect of variations in dielectric parameters on the calculation accuracy of the Time Zero position for various configurations of antennae. [C13]

"Background removal from GPR data using Eigenvalues"

A GPR radargram of an underground scan has reflections not only from the target but many unwanted objects known as clutters. Additionally, the signal is corrupted by the direct wave and coupling effect of the antennas and background noise. In order to successfully extract the target signature, these extra noise effects need to be eliminated. Though the clutters cannot be totally removed from the data, background removal techniques suppress their effect to quite an extent. Usually mean subtraction is used as a background removal technique but the results are just satisfactory and further improvements can be made. In this paper an Eigenvalue based background removal technique in collaboration with mean subtraction is presented. This proposed method decreases the effect of clutters and the output is much more refined. Even though this method takes slightly more time than the traditional background removal methods, the output eliminates major portion of the clutter therefore the segmentation and classification stages in an automated GPR data processing system would be much more efficient hence reducing the overall time consumption for near real time GPR data processing. The method has been implemented on a number of different data sets and the results indicate that the proposed method gives significant improvement in background removal over the existing background removal methods. [C14]

"Subsurface sensing at sub-terahertz and terahertz frequencies"

Development of millimeter and sub-millimeter wavelengths technologies is of great interest lately, especially for application in terahertz imaging due to bringing high resolution. In our paper we consider a tomography approach for obtaining 3-D imaging in frequency range from 100 GHz up to 325 GHz. We applied the method which we developed earlier for low frequency sub-surface tomography, for extremely high frequencies. The considered method may be used for 3D imaging in non-destructive testing. In the paper we present a theoretical model, experimental method and the comparison of results obtained at terahertz and sub-terahertz frequencies. [C15]

"Electromagnetic dispersion estimated from multi-offset, ground-penetrating radar"

Exploiting the dispersion of electromagnetic surface waves as a variational indicator for various physical and hydric states of concretes requires an optimization of its extraction techniques. The validation of these techniques in homogeneous materials is fundamental before data processing of concretes at various water and chloride contents, which is the final aim of our research projects. In the first part, this paper proposes a study of one of the extraction techniques of the direct wave dispersion validated by ground penetrating radar measurements

carried out in homogeneous materials such as granite and limestone. The second part is devoted to the study of a physical approach allowing to quantify the evolution of dispersion results between waveguide propagation (multiple reflexions in a slab) and dispersive wave propagation (direct wave in a slab). Finally the last part concerns the dispersion sensitivity to the different parameters related to the experimental device, in particular for the calculation uncertainties in low frequencies. The validation of this parametric study was entirely carried out by finite difference time domain simulations. [C16]

"Wave parameter analysis of dielectric anisotropy in maritime pine timber using GPR"

The dielectric behaviour of timber in an electrical field depends on many factors, and one of the most important is the direction of the fiber. This work analyses the wave parameter variations of the dielectric response of timber according to the direction of an electrical field applied by ground penetrating radar (GPR) with a 1.6 GHz antenna. Two types of tests were performed on samples of maritime pine timber (Pinus pinaster Ait.). After the acquisition process the propagation velocities, amplitudes, and spectra variations were compared for the studied fiber directions. Interesting differences were found between these parameters when the field was propagated in a parallel direction or perpendicularly to the fiber. [C17]

"On the variants of Jonscher's model for the electromagnetic characterization of concrete"

The objective of this paper is twofold. Firstly, we carry out a comparison on measurements of the dielectric permittivity of concrete among the different variants of Jonscher's model found in the literature. Each of these variants considers only a limited number of parameters (two or three) based on certain material-dependent and/or bandwidth-related simplifying assumptions. Hence, they affect the inherent "universality" of the model by imposing a tradeoff between representability and practicability. This effect becomes more pronounced for concrete mixtures with high moisture content. Secondly, we propose a computationally efficient, two-step procedure for the estimation of the four model parameters. The proposed procedure filters the linear parameters that contribute to the deviation of the model from the frequency power law by employing the Kramers-Krojnig relations. Therefore, only two parameters need to be estimated numerically, whereas the filtered parameters are estimated in closed form as the solution of a simple linear least-squares problem. All the variants are applied to various concrete mixtures and evaluated by their goodness of fit. The obtained results show that accounting for the whole parameters of the model via the proposed procedure provides the lowest fitting error, and thus enhances the interpretation of data. [C18]

"Evaluation of concrete water content and other durability indicators by electromagnetic measurements"

In order to use non destructive techniques (NDT) for the survey of reinforced concrete structures, it is important to show their ability to measure the cover concrete characteristics related to durability, in particular the concrete water and chloride contents. For this purpose, tests with two electromagnetic methods (GPR and capacitive probes) and impact echo method were carried out on 81 slabs of 9 different concrete mixes. Concrete porosity was ranging between 12.5 and 18%. Measurements were carried out at five different water contents. A real structure was also tested in situ. The NDT results are compared to concrete performance indicators such as porosity and water content, as well as chloride profiles. The comparisons show the complementarity of the methods to perform a pertinent diagnosis of concrete structures. [C19]

"GPR as an imaging device: Some problems & potential solutions"

Ground Penetrating Radar (GPR) is an invaluable tool in a wide range of applications. In each sphere of activity to which the technology is applied, however, there is a tension between gaining meaningful information and the time and resources committed to data collection, processing and interpretation. In the light of the current world economic crisis, this is not likely to ease. [C20]

"Influence of feed line on DOA estimation with dipole array antenna for directional borehole radar"

In this paper, we investigate the influence of the feed lines on the radar signals in the dipole array antenna fed by coaxial cables for directional borehole radar. In this investigation, we utilize a model of dipole antenna elements in circle near a conducting cylinder in a borehole. The criterion proposed in this paper is calculated, and quantifies the influence of the conducting cylinder. This criterion is tested with the data obtained in experiments in air, and we verified that the criterion represents the influence of the cylinder on the direction estimation. We made the directional borehole radar system with the dipole array antenna, which was fed by semi-rigid cables. With this system, we conducted field experiments in granite. We confirmed that we can estimate direction of arrival after processing the array signals with the band-pass filter, which was designed optimally with the criterion. [C21]

"Mapping thermal tufa deposits using GPR"

Tufa (freshwater calcareous) deposits can provide excellent targets for GPR exploration due to low clay content and low salinity. Widespread tufa deposits occur at the surface and in the shallow subsurface of Heber Valley, an alluvium-filled basin located in the Rocky Mountains of northern Utah (USA). A set of 200-MHz GPR profiles provides an unprecedented view of the internal structure of a tufa mound and its immediately surrounding platform. Our results indicate that features such as unconformities, caverns, disruptions due to voids, and "seismic" stratigraphic on-lap patterns can be mapped at high resolution. These patterns may be used to constrain interpretations of the episodic growth of a tufa system over geologic time. [C22]

"Deployment of GPR system ALIS for humanitarian demining in Cambodia"

ALIS is a hand-held dual sensor developed by Tohoku University, Japan since 2002. Dual sensor is a general name of sensor for humanitarian demining, which are equipped with metal detector and GPR. ALIS is only one hand-held dual sensor, which can record the sensor position with sensor signals. Therefore, the data can be processed after data acquisition, and can increase the imaging capability. ALIS has been tested in some mine affected courtiers including Afghanistan (2004), Egypt(2005), Croatia(2006-) and Cambodia(2007-). Mine fields at each country has different conditions and soil types. Therefore testes at the real mine fields are very important. ALIS has detected more than 30 AP-Mines in evaluation test in Cambodia held in 2009. [C23]

"Integrated prospecting in the Crypt of the Holy Spirit in Monopoli (Southern Italy)"

In this contribution we show the results obtained in relationship with GPR and ultrasonic investigations carried out in the Crypt of the Holy Spirit in Monopoli. The exploitation of integrated techniques has allowed to have a meaningful insight of the presence of interesting buried anomalies under the floor and has provided important information about the state of preservation of the columns. [C24]

"Detection and classification of landmines using AR modeling of GPR data"

In this paper we present some results on detection and classification of low metal content anti personnel (AP) landmines using a modified version of the Auto Regressive (AR) modeling algorithm presented in. A statistical distance is computed between the AR coefficients of the measured GPR time signal and the AR coefficients of a reference database (containing the AR models of the mines of interest) and a detection is declared if this distance is below a given threshold. [C25]

"High power variable nanosecond differential pulses generator design for GPR system"

High power variable nanosecond differential pulses generators based on avalanche transistor and Marx Bank are investigated theoretically and experimentally. The circuit employs six avalanche transistors with charging and discharging circuitry for differential pulses generation and step recovery diode, Schottky diode for pulse shaping. The pulse width can be varied from 1ns to 4ns. The pulses amplitude varies from ±30V@1ns pulse width to ±58V@2ns pulse width. The repetition frequency can reach as high as 500kHz. This variable nanosecond differential pulses generator can be used in pulsed GPR system as transmitter and strobe generator in sequential sampling receiver circuit. [C26]

"Rebars and defects detection by a GPR survey at a L'Aquila school damaged by the earthquake of April 2009"

After the earthquake of L'Aquila (Abruzzo Region, Italy) occurred on the 6th April 2009, Ground Penetrating Radar investigations of public infrastructures were performed in order to provide an early damage assessment about structural elements such as beams and pillars. In particular, here we present the results of a 1500 MHz GPR survey on a cracked beam of a public building of L'Aquila to verify the goodness of a restoration work by means of epoxy resin injections. First a classical processing routine has been performed in order to focus the rebars hyperbolas and possible reflections coming by the injections; a data volume was built and several depth-slices are here presented. The survey allowed to check the rebars geometry and the reliability of the intervention based on the epoxy resin injections. Limitations of the classical data processing approach are a great complication in imaging the scene also due to the risk of introducing subjectiveness elements in the data by the operator and to the poor resolution achieved for the deeper rebar layer. The possibility of repeating the measurements on the opposite face of the beam in order to detect the second rebar layer was here adopted as a solution of the problem; however this way of operating becomes unacceptable during an earthquake post-crisis phase. The possibility of overcoming these drawbacks was offered by the microwave-tomography (MT) technique. The MT technique were first tested by processing one of the collected profiles acquired on the joist

and the result confirmed the ability of the technique to achieve good focusing also of the deeper layer of rebars. [C27]

"Complex permittivity of common minerals and one soil at low water contents"

The complex permittivity of quartz, feldspars, calcite, and non-crystalline gypsum at 4%-7% volumetric water content shows low conductivity and low-frequency dispersion. At similar water contents, montmorillonite, gypsum crystallites, and a desert soil all show unusually strong and broad low-frequency dispersion, and strong attenuation rates above 100 MHz. The desert soil contained 80% quartz, 10% feldspars, and 10% gypsum, with the gypsum appearing as crystallites and crustations on the quartz particles. Despite insignificant salt or clay mineral content, the dispersion and attenuation rates of the soil exceed those of its constituents and are similar to that of montmorillonite, with a rate exceeding 100 dB m-1by 1 GHz. We attribute this to a Maxwell-Wagner type of relaxation, likely caused by polarization resulting from surface charge and from the charge separation caused by dielectric and conductivity contrasts between the gypsum and quartz. The conductivity contrasts were likely enhanced by ions dissolved from the gypsum and feldspars into free water within, and water adsorbed on the quartz surfaces. [C28]

"Modified bowtie antenna for GPR applications"

This paper presents a novel antenna for Ground Penetrating Radar (GPR) applications. It consists of two crossed bowtie antennas loaded with an annular ring. Numerical and experimental results are reported demonstrating that the proposed antenna exhibits both a broadband impedance bandwidth and very good radiation properties. [C29]

"The contribution of GPR analysis to knowledge of the cultural heritage in Apulia (southern Italy)"

The present article describes two examples of GPR studies addressed to gain a better knowledge of cultural heritage sites in Apulia, southern Italy. [C30]

"A 900MHz shielded bow-tie antenna system for ground penetrating radar"

A back-cavity shielded bow-tie antenna system working at 900MHz center frequency for ground-coupled GPR application is investigated numerically and experimentally in this paper. Bow-tie geometrical structure is modified for a compact design and back-cavity assembly. A layer of absorber is employed to overcome the back reflection by omni-directional radiation pattern of a bow-tie antenna in H-plane, thus increasing the SNR and improve the isolation between T and R antennas as well. The designed antenna system is applied to a prototype GPR system. Tested data shows that the back-cavity shielded antenna works satisfactorily in the 900MHz GPR system. [C31]

"Adaptive linear prediction based buried object detection with varying detector height"

In the GPR underground inspection problem, received GPR signal is notably dependent on the height of the detector head. A great deal of the former research in this area assumes constant detector height, as absence of this constancy will result in undesired change in the returning signal, which will reduce the success of the detection and identification stages. In this study, we propose a buried object detection method which removes the deforming effect of the variable sensor height. In our approach, adaptive one-sided linear prediction is utilized in a specific manner. The proposed algorithm is causal, which makes it convenient for real time buried object detection applications. [C32]

"GPR-PRO: A MATLAB module for GPR data processing"

GPR-Pro, is a flexible and user friendly module developed in MATLAB for processing mainly GPR data. This module can handle the most common GPR data formats. It provides a large number of signal processing algorithms including Principal Component Analysis, FK filtering, data manipulation (matrix algebra), attributes analysis as well as toolboxes for data classification and interpretation. The user can apply different flows on the data keeping always the control of the intermediate and final results. One can easily compare sections and choose the most appropriate flow. [C33]

"GPR data time varying deconvolution by kurtosis maximization"

Stochastic and deterministic deconvolution methods encounter difficulties in increasing the temporal resolution of GPR data. Statistical approaches, such as predictive or spiking deconvolution are not effective when the wavelet is non-minimum phase, which is the case for GPR data. Wavelet deconvolution is not successful due to the non-

stationarity of the GPR trace. Here, prior deconvolution, we apply a spectral balancing method in t-f domain which efficiently reduces the non-stationarity. The proposed methodology involves correction for phase residuals using the maximum kurtosis method. The effectiveness of this methodology is demonstrated on synthetic and real GPR data. [C34]

"Quantitative interpretation of RASCAN holographic radar response from inclined plane reflectors by a theoretical model"

Holographic radar of RASCAN type provides an output signal that is amplitude-modulated by the phase variation between transmitted and received signals. In this work RASCAN radar response is compared with a model by several experiments performed in air with a 4GHz probe scanning a planar metallic reflector inclined at different angles. The radar response shows a series of dark and light stripes with spacing dependent on signal frequency and velocity, and reflector inclination angle. The model is used to interpret the amplitude variations as a function of probe position. [C35]

"Sparsity enhanced fast subsurface imaging with GPR"

Sparsity of a signal starts to become very important in many applications. In subsurface imaging, generally potential targets covers a small part of the total subsurface volume to be imaged, thus the targets are spatially sparse. Under this assumption it is shown that the subsurface imaging problem can be formulated as a dictionary selection problem which can be solved quickly using basis pursuit type algorithms compared to previously published convex optimization based methods. Spatial sparsity also indicates that the number of measurements (spatial or time/frequency) that GPR collects can be reduced, decreasing the data acquisition time. Orthogonal matching pursuit algorithm is used for reconstructing sparse subsurface images. Results show that the proposed method reduces time both in data acquisition and processing compared to previous methods with similar performance. [C36]

"Expedient GPR survey schemes"

Practical GPR survey schemes based on a geometrical migration algorithm are implemented and tested: (1) random GPR data collection from water surface along a tangled path and interpolation to a regular grid for bottom reconstruction; (2) double-pass B-scan with different antennas offset for estimation of the upper ground layer thickness and permittivity. [C37]

"Radar signatures of complex buried objects in ground penetrating radar"

The evaluation of radar signatures of buried objects for three experimental ground penetrating radar setups will be addressed in this paper. The contribution will present corresponding results and experiences. The performance of the imaging capabilities of the designed radar system will be assessed by reconstruction of complex shaped test objects, which have been placed within the ground. The influence of system parameters of the ground penetrating radar have been varied systematically in order to analyze their effects on the image quality. Among the modified parameters are the step size in transverse plane, height of the antenna over ground, frequency range, frequency points, antennas and varying instrument settings. A signal processing technique based on synthetic aperture radar has been applied on the measured raw data. The focus radius around a specific target has been analyzed concerning the compromise between image quality and processing time. The experiments demonstrate that the designed ground penetrating radar systems are capable for detection of buried objects with high resolution. [C38]

"Focused algorithms for ground penetrating radar imaging"

The paper describes the simulation results for a ground penetrating SAR radar. As a simulation model of SAR system the pulse radar with LFM (Linear Frequency Modulation) signal has been applied. The aim of the experiment was to test ability of the SAR system to obtain fully focused image of the underground targets. Simulation results presented in the paper are the first step of realization of the project of GPR (Ground Penetrating Radar) demonstrator which is conducted by Przemysłowy Instytut Telekomunikacji S.A. in cooperation with Warsaw University of Technology. In the next step, the real data measurements are planned to be performed. During measurement campaign the GPR SAR demonstrator mounted on the rails wagon will be used to generate radar motion. [C39]

"Performance evaluation of a GPR system for mine detection using a 3D-SAR algorithm"

Within the "International Test & Evaluation Program" (ITEP) a measurement campaign (ITEP project 2.4.2.13) was held in Oberjettenberg, Germany, to evaluate novel evaluation procedures for the test and evaluation of

dual sensor (DS) mine detection devices (metal detector MD and ground penetrating radar GPR). FHR contributed with a UWB GPR sensor and a novel radar data processing algorithm. The improvement of the application of a near field 3D-SAR algorithm compared to standard GPR data processing is shown in terms of the receiver operating characteristics (ROC) curve. [C40]

"Detection of subsurface non-metallic objects using stepped frequency continuous wave ground penetrating radar"

In the paper, several aspects of using stepped frequency continuous wave signal in a ground penetrating radar were discussed. Radar was operating in 750-3000 MHz bandwidth, with 563 frequency steps. Test objects included non-metallic object made from wood and plastic, as well as soil with different value of permittivity, all buried at 10-15 cm. [C41]

"The use of high speed FIFO chips for implementation of a noise radar"

An ultra wide band spread spectrum radar (a noise radar) can be built using a system that generates two wide band spread spectrum (pseudo-random) waveforms. One waveform is transmitted by the system and one waveform is used to correlate against the received signals. Because of system dispersion, propagation channel dispersion and radar target dispersion, it is often appropriate for the receive correlation waveform to be of a different form than that of the transmitted waveform. Thus a noise radar often needs to be able to generate two different wide band waveforms with controlled differential delay time. This paper will discuss the implementation of such a system using commercially available FIFO microchips. [C42]

"Comparison of methods of the resolution increase in GPR for the short range targets"

This paper describes different approaches for high resolution short range 3D imaging with ground penetrating radar (GPR) based on research performed at the Radar R&D (Tomsk). Radar R&D is active in the field of GPR technology and its applications more than 15 years. Ultra-wide operational bandwidth in GPR can be used to obtain high-resolution images of targets. In this paper, different approaches to highresolution imaging with UWB radars are discussed and compared. As a rule, in existing software of the industrial radar the high-frequency filtration of signals is used that essentially limited efficiency of GPR investigation. It is described that methods of restoration for distorted signals have advantages compare filtration. Possibilities of wavelet transformation for resolution increase of short range targets are discussed. The analysis is carried out on the test images and illustrated by experimental examples. [C43]

"Software for simulation of electromagnetic waves propagation through the soil with buried objects"

The software for simulation of electrmagnetic waves propagation through the soil layered structure with shallow buried objects has been described in the paper. The simulation is based on the finite difference time domain (FDTD) method and allows to define ten layers of soil and four buried cubicoid objects. Such virtual ground penetrating radar (GPR) system seems to be useful for test of targets detection level for different soil structure configurations as well as different transmitted radar signals and scanning methods. [C44]

"One Example of classing and extracting information from GPR images for the archeology"

Ground penetrating radar (GPR) techniques are based on the possibility of sending electromagnetic pulses and registering of the signals back-scattered by the interface between propagation media of different dielectric permittivity. They had been successfully using to examine structures and materials from inside. In the studying, GPR sounding is practically used for detection and reconstruction of the fortification objects. The software for increase of efficiency of archeological researches and reduction of expenses was developed. The GPR method is practically approved for the undersurface environment monitoring for the archeology-interested zones by results of experimental and practical investigations. The estimation of GPR efficiency at monitoring researches, time and expenses on engineering-archeological works were carried out. As a result of researches, contours of fortifications sites are restored. Contours of the stone bases under dwellings are found out and restored. The investigation aims at expounding some preliminary results drawn by specific algorithms for automatically interpreting, classing and extracting explicit information from radar images. [C45]

"Algorithm of data processing in GPR"

Special algorithms and methods of data processing have built into the software are usually used to increase the efficiency of subsurface radar sounding with a ground penetrating radar (GPR). They are intended to improve SNR and to present results of a survey of the subsurface in a convenient for operator form. A number of different signal processing algorithms for subsurface probing are developed. Basic attention of this article is

concentrated on the algorithm of automatic search for local objects using the Hough transform. Hough transform allows finding defined analytically plane curves, for example, straight lines, circles, ellipses, etc. in the monochrome image. The monochrome image is the image consisting of points of two types which are background points and points of interest. The task of Hough transform is separation the curves formed by points of interest. An example of algorithm of search for hyperbole in GPR image is discussed in the work. [C46]

"Signal processing algorithms in stepped frequency continues wave ground penetrating radar"

Broad use of underground sensing led to development of a new signal processing algorithms which can extract much more information about soil and underground objects physical characteristics. These algorithms require information about how specific attenuation is dependent upon frequency, about phase velocity of radio waves in soil or about signals phase structure in cases when underground objects are present or absent. This kind of information can be easily obtained when using probinging signal with stepped change of a carrier frequency. Radar systems with this kind of sensing signals are called Stepped Frequency Continues Wave (SFCW) GPR. [C47]

"Based on embedded intelligent vehicle system"

On account of the existing vehicle for using the platform of integration is limited. Besides, computing speed is not fast enough, power-hungry, and the machine's functions are not plentiful. Many of the features which the customer need for the existing car can not be achieved on the basis of machine. With the rapid development of embedded systems applications, this paper designs a chip based on the ARM9 AT91SAM9260 new smart car system. In this design of Intelligent vehicle systems firstly introduces the main features and hardware architecture to achieve, and then analyzes the GPS, GPRS and other modules, the hardware composition and theory, and finally gives the system's software program. [C48]

"MUSO: An M-learning & University Student Organizer platform"

Mobile devices nowadays are widespread and provide great multimedia capabilities, which make the delivery of mobile learning a more realistic approach since it can provide just in time learning on the move. Currently, students in some universities can watch live lectures or tutorials on their university website after a registration process. Some students who face difficulties in attending their lectures or tutorials due to living in remote areas would like to watch missed lecture/tutorial by downloading lecture/tutorial videos for their mobiles. This paper describes an M-learning and University Student Organizer (MUSO) application which offers solutions to these problems. MUSO is developed using Java 2 Micro Edition (J2ME) which is supported by most available mobile handsets. This application uses the internet through GPRS or WiFi connections. MUSO uses the concept of client-server architecture which gives the ability to have large data sets and decreases the computation processes on the mobile phones. This paper presents a test case for MUSO on a real university. [C49]

"Design and implementation of an integrated high resolution imaging ground penetrating radar for water pipeline rehabilitation"

Accurate and timely detection of leaks in water supply pipes is a significant environmental issue. Development of efficient non-invasive methods would lead into significant water saving and prevention of health hazards introduced by water leakage. This paper shows the ability to use a High Resolution Ground Penetrating Imaging Radar (GPIR), to be used as an instrument for water pipeline rehabilitation situations, parallel to the existing industrial equipment. In the framework of the European research initiative WATERPIPE, a Decision Support System (DSS) for the rehabilitation management of the underground water pipelines has been developed, parallel to the implementation of the GPIR. This paper briefly presents the system design, the basic principles of the algorithms' implementation and some indicative results from the initial use of the GPIR system. [C50]

"Microwave visualization of layered dielectric half-space using range profiling of phase"

A novel method of subsurface radar data processing based on independent determination and representation of amplitude and phase profiles is described. As the phase of the reflected signal depends on dielectric properties of buried target, the proposed technique is suitable for target discrimination. The amplitude and phase information is merged in the common image by governing intensity and color of the image. The amplitude profile of the reflected signal is obtained using a standard inverse Fourier transform of the frequency domain data whereas the phase profile associated with the reflection act at the given depth is derived using a special data processing technique. Some numerical and experimental examples illustrating the method performance are presented. [C51]

"GPR signal phase structure aplication for estimation of distribution of soil electrical properties on depth"

The mathematical algorithms for reconstruction of the soil layers electrical characteristics using the estimated dependency of radio waves attenuation per unit length on frequency or similar dependency on phase velocity are described in [1, 2]. To perform this reconstruction we used a well known Kramer-Kronig equation, which is then lead to a nonlinear singular integral equation for the unknown functional dependence of the soil conductivity on the frequency. Then the equation is solved by a numerical iterative method, with evaluated dependencies of conductivity and permittivity on the frequency in a range of probing signal carrier frequency as a result. The main difficulty here is an attempt to assess the functional dependence of attenuation per unit length or the phase velocity on frequency. The first method uses filtering of signal that corresponds to specific soil layer on the output of georadar receiver phase detector. Then the frequency dependence of the phase velocity of radio waves in this layer is estimated using the displacement of the object image in depth when using low-frequency and high frequency parts of the probe signal spectrum. Both the first and second algorithms do not allow obtaining highly accurately estimated electrical characteristics, so it is impossible to estimate accurately the frequency dependence of attenuation per unit length or the phase velocity of radio waves propagation in the layers of the soil. [C52]

"Ultra-wideband sensing: The road to new radar applications"

Research on ultra-wideband topics started about 50 to 60 years ago driven by needs in radar and communication technology as well as to emulate EMPs of nuclear explosions. Meanwhile, ultra-wideband sensing opens new perspectives for radar applications. Small and cost effective devices, high resolution and sensitivity, as well as low exposition by radio waves will give this radar technology access to new applications in industry, non-destructive testing, medical engineering and health care, surveillance, search and rescue, and many others more. High peak power devices will be limited to special applications and a low number of devices due to their radio interference and mostly only military interest. Therefore, this paper only deals with some aspects of high-resolution short-range sensing giving new perspectives for a wider community. [C53]

"Inference of vertical soil moisture distribution using high-frequency CMP and reflection traveltime analysis"

High-frequency ground-penetrating radar (GPR) surveys were used to investigate temporal water content variations in a vertical soil column characterized by stratified clean sand deposits over multiple annual cycles. Reflection profiling and common-midpoint (CMP) soundings were coincidently performed using 900 MHz antennas across a 2 m intensive monitoring profile. Our ability to identify fixed reflection events along a vertical soil profile permits inference of soil water flux across defined soil intervals in a non-invasive manner. Soil moisture contents were estimated from two-way traveltime measurements between seasonally coherent stratigraphic interfaces in the upper 2-3 m of soil. Interval thicknesses between stratigraphic interfaces were estimated from normal-moveout velocity analysis of coincidently collected CMP soundings. Interval traveltimes from reflection profiles were then converted to wave velocity using the interval thickness estimates and a volumetric water content estimate using an appropriate petrophysical relationship. The GPR effectively characterized long (e.g., seasonal trends) and short-period (e.g., distinct wetting events) variations in vertical soil moisture distribution. [C54]

"A novel OFDM based ground penetrating radar"

This paper proposes a novel GPR system based on the Orthogonal Frequency Division Multiplexing (OFDM) technique. The selection of the major system parameters for the OFDM based GPR are considered. An example system configuration is simulated. Target positions can be determined with high accuracy, even when in the presence of noise. Finally, the potential benefits of using OFDM for GPR are presented. [C55]

"Shaping the future of GPR soils research"

Workshops were held at the GPR08 and IWAGPR09 conferences with the intention of developing closer links between GPR users and soil spectroscopy researchers, including developing an improved understanding of the associated research needs. Both workshops were well attended and provided a useful forum that identified elements central to greater interchange of information between the two disciplines. This paper will detail the outcomes of the IWAGPR09 workshop (the GPR08 workshop having been reported on there), providing full information on the perspectives of relevant stakeholders. Included will be details of invited presentation, panel discussion and general discussion sessions. Also, full details of the outcomes of the associated questionnaire, which sought to prioritise the main concerns of stakeholders identified at the GPR08 workshop, will be provided. In conclusion, this paper will consider ways in which those concerns can be addressed, including in terms of

standardisation, delivery of research needs, and data sharing. In so doing, the paper is intended to provide GPR and soil spectroscopy stakeholders with an ongoing record of their workshops in order to facilitate debate, discussion and future action. [C56]

"Effects of iron pipe corrosion on GPR detection"

Many studies into the use of GPR to detect targets assume that the targets are ideal reflectors. In reality most targets have been in the ground for many years and have settled and suffered some contamination or corrosion. Iron pipe in particular can be hard to find with GPR. Some possible corrosion processes suggest that a varying conductivity and permittivity profile may be established around a pipe. The consequences of such corrosion induced profiles are that the radar return may be greatly diminished in the classic look-down GPR mode of operation. The analysis shows that the novel look through GPR mode of operation is affected far less by the corrosion induced profiles. [C57]

"Integrated road pavement survey using GPR and LFWD"

Ground Penetrating Radar is frequently used for inspection the road pavement. Many applications are carried out: from pavement's layer thickness estimation, to damage detection and diagnosis, from the evaluation of geotextile effectiveness to the assessment of the bridge decks. Here we propose to integrate GPR survey with the Light Falling Weight Deflectometer. LFWD is a portable instrument that is used for measuring the Young Modulus through the analysis of the propagation of elastic waves in the pavement structure. The point of strength of this approach is that it is possible to correlate geometrical and some physical characteristics, in this case dielectric constant, of pavement layers, extracted from the GPR maps, to the mechanical properties, such as young modulus, measured using LFWD. It is well known that from a GPR stand alone survey is not possible to have directly any information about the mechanical characteristics of the structure. Otherwise, following this integrated method it is possible to reach a more comprehensive description of the road pavement. This diagnostic tool for pavement damage investigations seems absolutely very promising, cost effective and efficient in its implementation. Finally two case studies are presented: the first over about 3000 m of a real pavement the second over an unpaved airport strip. [C58]

"An ultrawideband time reversal-based RADAR for microwave-range imaging in cluttered media"

This work presents a new RADAR prototype built for the purpose of imaging targets located in a cluttered environment. The system is capable of performing Phase Conjugation experiments in the ultrawideband [2-4] GHz. In addition, applying the D.O.R.T. method to the inter-element matrix allows us to selectively focus onto targets, hence reducing the clutter contribution. We aim to experimentally explore the use of this focusing wave into an inversion algorithm, in order to improve its robustness against noise. Before testing this idea, we show here the first results validating the prototype separately in the frame of selective focusing via the DORT method and of multistatic-multifrequency inversion. [C59]

"Novel short-time MUSIC in non-linear FMCW GPR signal analysis"

A novel windowed FFT MUSIC (W-MUSIC) algorithm is presented in the context of using ground penetrating radar (GPR) to detect closely spaced targets under noisy conditions. It is seen to give a better indication of targets than stand-alone FFT and MUSIC algorithms. Distorted signals are analysed, and with the MUSIC algorithm the reported target positions suffer high degrees of error, with the FFT the main lobe broadens making it difficult to recognise closely spaced targets. The use of the Short-Time Frequency-Transform (STFT) algorithm is examined. A novel Short-Time MUSIC approach is presented, it can be used to obtain higher time-frequency resolution than STFT method. [C60]

"GPR Signal processing in frequency domain using Artificial Neural Network for water content prediction in unsaturated subgrade"

Basing on the recent outcomes of an investigation on the water content evaluation from processing the GPR signal in the frequency domain, an accurate model for the prediction of the frequency spectrum of the reflected GPR signal as the moisture content changes is proposed. This method uses an Artificial Neural Network approach. After the training, the ANN is reasonably able to predict the frequency spectrum for a water content in a specific soil (the error in the spectrum generation computed on a validation set, after 105 training epochs, is about or less than 10% for the same soil, if the ANN is used for all kinds of soil the error increases to about 15-20%). Of course this method can be inverted generating with the trained ANN a catalogue of different spectra for different values of the soil water moisture. Using this inverse approach it is possible to predict the water content of a specific soil just comparing the real current spectrum of the reflected GPR signal with the spectra of the catalogue. This method has been successfully tested on experimental data. [C61]

"Evaluation of the influence of a scanning method on the resulting quality of the GPR images"

This paper evaluates the results of experimental 3D Ground Penetrating Radar (GPR) measurements on a physical model with a focus on reinforcement detection. It compares changes in the quality of GPR scans depending on line direction and antenna orientation. This aspect of measurement has an immense effect on the quality of results and on the ability to detect the position of reinforcement inside an investigated concrete structure. [C62]

"A real-time replenishment system for vending machine industry"

This paper outlines the needs of the vendor-machines information network for automating the selling operations in a low operating cost. Besides, the architecture framework of real-time transmission of the selling information is determined for analyzing and providing decision support effectively. [C63]

"Qualitative monitoring of the water content evolution in an inhomogeneous soil column"

A microwave imaging problem is considered where a soil column is surrounded by a metallic circular enclosure. This system is presently being developed to demonstrate the potentiality of non-invasive microwave imaging systems for volumetric water content monitoring. The final goal is to retrieve soil moisture information as it is an important parameter for understanding fluid flows in the soil as well as the water uptake by plant roots. Here, we address the qualitative part of the problem with the help of a rapid and rather robust sampling methods: the Linear Sampling Method (LSM) and the MUSIC method. These methods are tested for the following configuration: one water source diffuses in a heterogeneous background. We show that, to a certain extent, the evolution of the soil water content can be qualitatively monitored with the LSM. Moreover, we propose a quick way for detecting the position of the water source inside the soil column. [C64]

"A CMOS ultra-wideband transmitter with bi-phase modulation for 22-29 GHZ vehicular radar application"

This paper presents the design and simulation of a CMOS ultra-wideband transmitter using TSMC 0.13μm CMOS technology. The operating frequency band of the transmitter is from 22 to 29 GHz for the application of UWB vehicular short-range radar (SRR). The proposed transmitter has a pulse-modulated carrier-based architecture with bi-phase modulation. The simulation results show that the power spectral density of the transmitter output complies with the FCC regulation, and has a center frequency of 25.2 GHz and a -10 dB bandwidth from 22.9 to 27.6 GHz. [C65]

"Design of an analog correlator for 22-29GHz UWB vehicular radar system using improved high gain multiplier architecture"

An analog correlator for ultra-wideband (UWB) vehicular short-range radars (V-SRR) is presented. The correlator is designed for operation at 22-29GHz using the IBM 90nm RFCMOS process. The correlator consists of a multiplier, a Gm-C integrator, and a post amplifier. A novel four-quadrant transconductance multiplier (FQTM) is proposed to achieve high gain, and a Gm-C integrator is designed to improve the holding time of the correlator. Simulations show that the proposed FQTM has 9.54dB gain increase, and the correlator achieves 2.3ns of holding time and uses 15 mW of power. [C66]

"Comparing electromagnetic induction and ground penetrating radar techniques for estimating soil moisture content"

Previous studies have demonstrated the capacity of electromagnetic geophysical methods for estimating soil moisture content. In this study, electromagnetic induction (EMI) and ground-penetrating radar (GPR) measurements were coincidently collected along a fixed survey line to evaluate temporal changes in apparent electrical conductivity and electromagnetic direct ground wave velocity, respectively; surveys were collected at three sites (i.e., sand, sandy loam and silt loam) during the course of a complete annual cycle of soil conditions. These two geophysical data sets correlated well during the course of the annual cycle at the silt loam site. Correlation between the two data sets was not as strong at the other two sites, with the sand site showing the lowest correlation values. Further, the geophysical data and gravimetric water content measurements obtained from the upper 0.5 metres indicate higher correlation estimates at the finer grained silt loam site relative to the sand and sandy loam sites. [C67]

"4D GPR tracking of water infiltration in fractured high-porosity limestone"

Three thousand liters of water were infiltrated from a 4 m diameter pond to track flow and transport inside fractured carbonates with 20-40 % porosity. Sixteen time-lapse 3D Ground Penetrating Radar (GPR) surveys with repetition intervals between 2 hrs and 5 days monitored the spreading of the water bulb in the subsurface. Based on local travel time shifts between repeated GPR survey pairs, localized changes of volumetric water content can be related to the processes of wetting, saturation and drainage. Deformation bands consisting of thin subvertical sheets of crushed grains reduce the magnitude of water content changes but enhance flow in sheet parallel direction. This causes an earlier break through across a stratigraphic boundary compared to porous limestone without deformation bands. This experiment shows how time-lapse 3D GPR or 4D GPR can non-invasively track ongoing flow processes in rock-volumes of over 100 m3. [C68]

"A comparison of 1D vertical models of biogenic gas content within a northern peatland from common mid-point and cross-borehole GPR"

Surface-based ground penetrating radar surveys are non-invasive and fast while cross-borehole methods have the potential to be more accurate and repeatable, though time consuming. In order to assess the variation between common mid-point and cross-borehole surveys as a tool for estimating free-phase gas volume in peat soils, we compared the modeled gas content results from surface-based multiple-offset data to down-hole zero-offset profiles. Accuracy of each method was also evaluated using reciprocal measurements and statistical methods. Both common mid-point and cross-borehole methods yielded repeatable measurements and resulted in a similar range of gas content estimates. Variations in gas content estimates ranged from <;1%-16%, though the common mid-point measurements underestimated the gas content compared to the cross borehole measurements. [C69]

"Resolution-improved microwave tomography by means of hyperspectral analysis tools"

In microwave tomography, the underlying scattering phenomenon is often linearized to retrieve the associated induced currents maps. These maps are then summed together to provide a good estimation of the target position. This qualitative reconstruction scheme is robust with noise but has a spatial limitation linked to the bandwidth of the radiation operator. We will show that the result of this inverse source problem can be considered in a different way by storing, incidence after incidence, the reconstructed induced current maps. As in hyperspectral imaging, this hypercube can be formalized as several views of the same scene. In hyperspectral imaging, the wavelength is the varying parameter. In harmonic microwave tomography, the incidence angle is the varying parameter. By applying image processing techniques such as principal component analysis, we will show that we can improve the spatial resolution of the qualitative maps. Synthetic results in an aspect-limited configuration will be presented. [C70]

"Automatic classification of GPR signals"

Ground penetrating radar has been widely used in many areas. However, the processing and interpretation of acquired signals remains a challenging task since it requires experienced users to manage the whole operations. In this paper, we propose an automatic classification system to categorise GPR signals based on magnitude spectrum amplitudes and support vector machines. The system is tested on a real-world GPR data set. The experimental results show that our system can correctly distinguish ground penetrating radar signals reflected by different materials. [C71]

"Applications of GPR in mineral resource evaluations"

Since the commercialisation of ground penetrating radar (GPR) in the 1970s, radar technology has been employed for niche applications in the mining industry. Although reliant on electrically resistive environments, GPR has gained acceptance in recent years as a standard exploration method for a number of deposit types, ranging from paleochannel delineation to iron ore mapping and kimberlite imaging. Numerous case studies have been published on GPR's applications to specific mineral exploration projects. Provided herein is an overview of commercialised GPR applications for surface mineral resource evaluations, covering examples of alluvial channels, nickel and bauxitic laterites, iron ore deposits, mineral sands, coal, kimberlite and massive sulphide examples. [C72]

"From Pseudo-3D to full-resolution GPR imaging in archaeology: A complex Roman site in Lugo, Spain"

This case study demonstrates how extra effort on data acquisition can beneficiate advanced interpretation of 3D GPR data over a complex Roman site situated in a semi-urban area. Two 250 MHz surveys during May 2007 and July 2008 were accomplished after Roman wall remains had been found by chance during soil remove

works at Agro da Ponte (Lugo, NW Spain). First campaign covered the whole area by using a pseudo-3D strategy which was only enough for defining the areas of interest and some archaeological features. According to those results, next campaign was focused on a smaller area and based on an ultra-dense grid strategy which eventually revealed full-resolution images of walls, apses and chambers of a Roman villa. [C73]

"Constructing hydrocarbon reservoir analogues with rapid acquisition long-range GPR"

The bounding surfaces of dunes have long been known to impart significant permeability contrasts to aeolian sequences. The resulting permeability contrasts can affect hydrocarbon flow in subsurface aeolian reservoirs, the impact of which often increases later in the life of a hydrocarbon field. In order to optimally manage petroleum reservoir development, the spatial arrangement of bounding features needs to be incorporated into subsurface models. However, adequate models cannot be obtained directly from the reservoir as no high-resolution imaging techniques exist for the inter-well area. At best, indirect inferences from an ensemble of remote data can be used to broadly constrain major features. However, many spatial parameters remain poorly constrained, particularly in 3D. GPR (Ground Penetrating Radar) has been shown to provide direct 3D imagery of near-surface deposits at a relevant scale and resolution. The resulting models may not be directly transferable to a specific subsurface scenario, but the generic spatial information can be a useful guide to reservoir engineers. Discussed herein is a case study from southern Libya employing the use of a custom long-range rapid-acquisition GPR system to develop 3D volumes over large areas. [C74]

"Recent deformation of Quaternary sediments in the northwest Canterbury Plains, New Zealand, as inferred from GPR and seismic data"

A high-resolution seismic reflection survey in the northwest Canterbury Plains, New Zealand, has revealed a network of interconnected faults and folds underneath the seemingly undisturbed flat surface. Known rates of background seismicity in the larger area suggest ongoing deformation in the Plains, despite a lack of convincing surface expression. Ongoing deformation would be seen as disturbance of the uppermost Quaternary sediments. Unfortunately, the resolution of the seismic reflection data falls short in adequately imaging these uppermost sediments. Accordingly, we have collected > 31 kilometers of 50 MHz GPR data to provide complementary images of the uppermost Quaternary sediments. Final images show GPR-facies over the full depth range, indicative of braided river sediments. GPR images together with seismic refraction tomographic images also reveal locations where the youngest Quaternary sediments are deformed. Youngest deformation is observed only where folded Cretaceous-Tertiary and Permian-Triassic units come close to the surface. [C75]

"A stepped frequency radar for use on Horizontal Directional Drills"

Horizontal Directional Drills (HDDs) are used to install utilities underground. However, the use of drills in urban environments carries the risk of striking and damaging pre-existing utilities. This paper describes the development and testing of an SFCW radar designed to be installed on the HDD head to determine the presence of obstacles in or nearby the boring path. Transmit and receive antennas are mounted on the drill shaft, behind the drill head spade, and transmit both ahead and to the side of the drill head. Data can be collected at up to 50 traces per second, and all processing and display is done in real time. Special algorithms were developed to enhance the data, and aid in obstacle detection. [C76]

"GPR for large-scale estimation of groundwater recharge distribution"

The Gnangara Mound, north of Perth, Western Australia, has been investigated using Ground-Penetrating Radar (GPR). Several hundred line-kilometers of GPR of common offset data have been acquired over an area of approximately 800 km2. The acquisition of these datatasets was performed at two different center frequencies (50 and 250 MHz) in order to better resolve the complexity of the hydrogeological targets of interest which are water retentive layers found above the water table. These layers impede the recharge of the surficial aquifer and may have important impact on local ecosystems but also on the management of the ground water resource. The data presented here-in demonstrate the successful imaging of the regional water table and of these water retentive layers. For the first time, these data provide insight into the spatial distribution and the continuity of these water retentive layers and provide important information to be included in the flow modeling of the ground water in this region of the world. [C77]

"GPR reflection and dispersion analysis methods for water content: Multi-year study of GPR estimates and soil core measurements of water content"

A multi-year series of ground penetrating radar (GPR) measurements, complemented by contemporaneous soil cores, were collected at a single location in south-eastern New England, USA. The shallow subsurface is

characterized by a 0.9 m thick sandy soil layer which overlies a gravelly-sand layer. Over a number of months, and different soil moisture conditions, 30 common midpoint (CMP) soundings were collected, and on each of the days, co-located soil cores were taken for analysis and comparison with the soil water content from the GPR velocities. GPR velocities were estimated using two independent methods: standard normal moveout (NMO) analysis of reflected traveltimes, and the analysis of frequency-dependent velocity dispersion of shallow GPR waveguide modes. A comparison of GPR estimated water content in the field versus gravimetrically measured water content in the lab provides a site-specific Topp-like empirical basis for predicting soil water conditions from GPR data. Although such site-specific relations may be useful, we find that for our site comparing the results of this study with the conventional Topp relation reconfirms the continuing utility of the latter. [C78]

"A controlled experiment for water front monitoring using GPR technology"

We use a stepped frequency continuous wave (SFCW) radar and an impulse radar to monitor a water flood experiment in a sand box. The SFCW system operates in the bandwidth from 800 MHz to 2.8 GHz. The impulse radar system is bi-static and works with a central frequency of 1 GHz. The sand box is a meter-scale cylinder partially filled by sand and the water is injected gradually from the bottom of the box. We investigate the ground coupled antenna configuration for both radars. The results demonstrate that the present configuration is useful for monitoring water front movement, but that to have a field application in an oil field environment a quantitative analysis is necessary. This can be done by antenna calibration and inverse modeling. [C79]

"GPR of a timber structural element"

GPR of timber structural elements is not yet very common in practise but the technique has the potential for condition evaluation of timber material. In this laboratory investigation, a high frequency (2.3 GHz) radar antenna has been employed for detailed investigation of a historic timber beam from a roof structure. The GPR non-destructive diagnostic of the spruce beam was aimed at obtaining material information with a structural relevance, such as presence of knots, their position and depth, cracks, dimensional variations of geometry and extension of areas of decay, The radar scan was carried out along the beam length. The radargram obtained show very detailed information. [C80]

"Detection of granite landmarks in soil with GPR"

In Germany plots of land were often marked with landmarks. They are typically made from granite stones in a defined shape and have been buried closely below the surface. The suitability of GPR for the detection of landmarks has been tested. GPR laboratory experiments in a sandbox under ideal conditions as well as field trials have been carried out. The influence of the water content of soil on the GPR measurements was investigated in laboratory. In these experiments suitable characteristic parameters have been identified to distinguish granite landmarks from other reflectors. [C81]

"Evaluating the practical performance of absorbing boundary conditions (ABC) in higher-order, finite-difference, time-domain (FDTD) GPR modelling"

Finite-difference, time-domain (FDTD) methods are now commonly used for the integrated forward modelling of practical GPR in a wide range of processing, inversion and analysis applications. The wide availability of high-performance computing resources has led to the development of sophisticated, higher-order, 3D models that are able to tackle real-world problems in practical time scales. However, these models are often truncated by computationally inefficient and/or poorly optimised outer absorbing boundary conditions (ABC). In this paper, we evaluate the practical performance of two of the most common techniques; (a) Perfectly Matched Layers (PML) and (b) wave matching boundaries (e.g., Higdon). We show that under certain 3D conditions, the computationally faster, wave matching boundaries can perform as well as the PML techniques and reduce the likelihood of unexpected internal reflections/errors occurring. [C82]

"Multiscale analysis of 3D GPR data using the continuous wavelet transform"

The main goal of this paper is to extract land topographical information by analyzing the 3D GPR data by the Wavelet Transform Modulus Maxima Lines (WTMM) method. The first objective is to delimitate boundaries of each obstacle, the second is to characterize each one with a special roughness coefficient. Application on real data shows that the proposed tool can enhance the GPR data interpretation. [C83]

"GPR, ERT and CPT data integration for high resolution aquifer modeling"

It is widely accepted that an integrated characterization approach is necessary to define the geometry, internal structure, material distribution and water composition of aquifers. Multiple geophysical and hydrogeological data

were measured in the sub-watershed surrounding a former unlined landfill: hydrogeological data in 25 direct push full-screen wells (slug tests, water conductivity, water levels), 21 km of GPR, 5 km of 2D electrical tomography and 30 cone penetration tests (CPT) with soil moisture resistivity (SMR). The 3D data integration in gOcad facilitates data interpretation and provides the basis for a detailed numerical groundwater flow and transport models. [C84]

"Determination of wall thickness and condition of asbestos cement pipes in sewer rising mains using Surface Penetrating Radar"

Asbestos pipes are commonly used for water and sewage pressure mains. There are very few non-destructive ways of assessing the wall thickness and condition of these Asbestos Cement (AC) pipes. Traditionally, their examination was undertaken by tapping to remove a physical specimen (a 'coupon') of the pipe. This procedure is time consuming, costly and risky. Alternatively, the mains have to be shut down to allow access by CCTV cameras. Advances in Surface Penetrating Radar (SPR) technology in recent years now means that defects in thin walled pipes can now be detected non-destructively from the outside. Selected sewage pipes of different ages, diameters and thicknesses are examined in situ using SPR. In addition, some samples of damaged pipes were examined separately. The main mechanisms for pipe deterioration are from chemical attack at the pipe obvert, and scouring at the pipe invert. The results demonstrate that SPR is an effective method for detecting areas of pipe deterioration and delamination and can detect scour depths as small as 4 mm. The SPR images clearly show a change in the shape and amplitude of the reflected signal from the inner face of the pipe walls and also an apparent increase in material thickness due to retention of water within the pipe wall material in areas affected by chemical attack. Variations are also evident in the signal reflection from the interior of the pipe wall between that at the pipe obvert and that of the side walls. These variations may be attributable to chemical attack and material changes occurring in the AC material. Variations were also observed in the shape and amplitude of reflected signal from the inner face of the pipe invert that are attributed to material loss or scouring at the invert. The SPR image also clearly recorded fluctuating levels of fluid within the pipes during the data collection. Although this makes analysis more of a challenge due to the effect on the reflected signal, this information is very impor--tant in locating areas in which pipe failures are more likely to occur through chemical attack and pipe pressure surges. Information on the size of the air pocket present within the pipe and size of the fluctuations can be determined. The signal velocities variations can be detected if the wall thickness is known. Such variations may relate to the moisture content which has been absorbed by the pipe material from the surrounding moist soil and from the pipe contents. The signal velocities determined are less accurate for very thin pipes because of the uncertainty in measuring the thickness interface in the signal. It is evident from the results of cut pipe sections that the SPR provides much better resolution of the inside surface of the pipe when the pipes are empty. It may be possible to drain the pipes for a short duration to allow the pipes to be scanned in the empty state. This will also eliminate the problem of fluctuating water levels obscuring defects in the pipe obverts. SPR imaging is a quick and effective method which is now available for non-destructively evaluating AC pipes. [C85]

"GPR characterization of rocks buried in the Martian subsoil"

This work presents theoretical and experimental analyses of GPR investigations for the detection of rocks buried in media simulating the Martian soil, in the framework of the "WISDOM" project of ExoMars mission. An experimental set-up has been built consisting in a box filled with a host material and scatterers, scannable with a GPR bistatic antenna. This set-up has also been implemented and studied through an electromagnetic CAD tool. Excellent agreement has been found between the measured and the simulated results on the scattering features, thus providing reliable information on the detectability of rocks in Martian complex subsurface scenarios. [C86]

"Simulation of porosity field using wavelet bayesian inversion of crosswell GPR and log data"

In this paper, we present a novel approach to simulate porosity fields constrained by borehole radar tomography images. The cornerstone of the method is the bayesian analysis of the approximation wavelet coefficients of a petro-physical analogue. The method is tested with a two-dimensional porosity field generated from a digital picture of a real sand deposit. The porosity field is translated into electrical properties and a cross-hole tomography synthetic survey is modeled using a finite-difference modeling algorithm. In parallel, an analogue deposit is created based on the geological knowledge of the area under study. The analogue porosity field is converted into electrical property fields using the same equations as previously. A synthetic GPR tomography is also computed from the latter. Wavelet decomposition of both measured and analogue tomograms and porosity analogue fields is then calculated. Based on the assumption that geophysical data carry only the large-scale information about the geological model, statistical analysis of the approximation coefficients of each variable is carried out. From the measured tomogram approximation coefficients and the cross statistics evaluated on the analogues, the approximation of the real porosity field is inferred using bayesian inference. Finally, based on the

geostatistical relationships between wavelet coefficients across the different scales, all the porosity wavelet detail coefficients are simulated using a standard geostatistical simulation algorithm. The wavelet coefficients are then back transformed in the porosity space. The final simulated porosity fields contain the large wavelengths of the measured radar tomogram and the texture of the analogue porosity field. [C87]

"Singlehole borehole rader measurement using dipole array antenna fed by coaxial cable"

In this paper, we demonstrate 3-D estimation of reflectors with singlehole borehole radar. We use the dipole array antennas fed by coaxial cables as a directional antenna. Finding the phase shift among the array elements and different depths, we estimate the 3-D positions of the reflector. In the field test site, there is an interface, and we have the preliminary information on the reflector with boring core sampling. The 3-D estimation results with the directional borehole radar were reasonable. [C88]

"ORFEUS GPR: a very large bandwidth and high dynamic range CWSF radar"

A very large bandwidth and high dynamic range Continuous Wave Step Frequency (CWSF) Ground Penetrating Radar (GPR) has been developed with the aim to increase the detection capabilities with respect to current systems . In order to achieve this goal, an innovative electronic equipment have been designed and developed. This radar operates with ultra wide bandwidth, ultra fast scan and very high dynamic range capabilities. [C89]

"Mapping oil leak flow path using Step Frequency Radar: A case study"

Leakage of oil from pipelines in an oil refinery often goes unnoticed until its contamination effect is seen in the polluted ground water. In one such case study in an Indian oil refinery, the oil leak from refinery was traced only when neighbouring villagers complained of contaminated ground water. Since the source of leak was not known nor testing of leaked oil could reveal the source, this oil leak could not be arrested. In order to trace the source of oil leak, the GPR survey was done from the exit point outside the refinery and by following the flow path the survey was progressed inside the refinery campus on different benches. Finally after tracing around 700m long flow path, the particular plant was located from where leakage had originated and it was plugged. This paper describes the intricacies of GPR survey involved in this comprehensive exercise. [C90]

"Influence of HE11 mode on direct wave in singlehole borehole radar"

In this paper, we investigate influence of radar sonde eccentricity on a direct wave between a transmitting and a receiving antenna in singlehole borehole radar measurement. According to our calculation, at high frequencies above 200 MHz, guided waves play a vital role in the direct wave. We found that the most important guided wave is HE11mode, which is excited only when the antenna is eccentered in a borehole. We show that this causes artificial noise in the moving average subtraction, which is a common signal processing method used to remove the direct wave. In field experiments in granite, we conducted a special experiment, in which location and rotation of the radar sonde was controlled mechanically. We found the excitation of the HE11mode in high frequencies, when the sonde is eccentered by 1.7 cm in a borehole. These are also predicted in the theoretical analysis. [C91]

"Influence of acquisition related uncertainties on ground penetrating radar inversion results"

Ground penetrating radar non-destructive testing requirements become more demanding. In that respect, it is essential to understand how antenna transfer functions and real system dynamic range affect the amount of retrievable information from measurements. This paper examines the confidence level of linear system transfer functions, and practical aspects of noise floor influence on stepped frequency ground penetrating radar. Small inaccuracies in antenna equations directly reflect in Green's function errors. Degradation of the numerical signal resolution was imposed by limiting the data resolution to two-bytes. The capability of the field system to detect thin layering in building materials using numerical modeling studies has been investigated. This would lead to the assumption that the radar model is correct and the only errors are due to inaccuracies in the data and the finite precision determination of the system's linear transfer functions. Systematic errors characterization is partially possible, limiting uncertainty in the data. A link seems to exist between the data precision and the possibility of information extrapolation for different settings. [C92]

"Experimental evaluation of the antenna sub-system of the ORFEUS surface GPR"

Within ORFEUS (Optimized Radar for Finding Every Utility in the Street) project a novel antenna system for a SFCW GPR has been developed for detection and location of buried utilities. The antenna system consists of two cavity-backed resistively loaded bow ties and has been designed to cover the frequency range from 100 MHz to 1 GHz with a reasonably high radiation efficiency. The characteristics of the whole system in terms of the

impedance matching to the feeding line, radiation level from the individual antenna, parasitic coupling between the transmit and receive antennas and scattering from buried objects have been experimentally investigated in realistic scenarios for different soils. [C93]

"Influence of feed line on DOA estimation with dipole array antenna for directional borehole radar"

In this paper, we investigate the influence of the feed lines on the radar signals in the dipole array antenna fed by coaxial cables for directional borehole radar. In this investigation, we utilize a model of dipole antenna elements in circle near a conducting cylinder in a borehole. The criterion proposed in this paper is calculated, and quantifies the influence of the conducting cylinder. This criterion is tested with the data obtained in experiments in air, and we verified that the criterion represents the influence of the cylinder on the direction estimation. We made the directional borehole radar system with the dipole array antenna, which was fed by semi-rigid cables. With this system, we conducted field experiments in granite. We confirmed that we can estimate direction of arrival after processing the array signals with the band-pass filter, which was designed optimally with the criterion. [C94]

"Experimenting with different polarization arrays in a test site"

Four GPR antenna configurations were used to illuminate the subsurface using different polarizations. We conducted field experiments in a test site where different objects were buried at a known depth. Measurements with two co-pole antenna configurations were conducted along crosswise sections. In addition, measurements in a 3D grid were carried out at the top of one of the buried objects using four different antenna configurations. We show preliminary results showing some advantages and limitations of each antenna configuration. [C95]

"Imaging for foundation defects using GPR"

During construction of an RCC structure over the reclaimed ground following collapse of old structure, severe difficulties to piling were encountered due to obstruction by debris of previously collapsed RCC structure buried in the foundation regime. Hence GPR profiling along series of lines were carried along several lines at the twin constructions sites. GPR survey revealed presence of RCC debris scattered at a depth of 7-8m along the line of pile foundations. By identifying these scatters, the most likely trouble free locations for piling were demarcated. This facilitated quick solution to foundation obstructions and the erection of new structure was completed without further complications. [C96]

"Determination of space behind pre-cast concrete elements in tunnels using GPR"

Many tunnels in Nordic countries are lined with prefabricated concrete elements to protect against frost and leakages. This protective lining is fixed to the rock face in a few points, but when installed renders the rock surface inaccessible, owing to the lack of predesigned inspection hatches. Safety inspections have hitherto consisted of random drilling into the concrete lining. However, such random inspection is both unreliable and expensive. Therefore Ground Penetrating Radar has been introduced in the vault walls to map the contours of the gap more systematically. Such scanning technology provides satisfactory data, given optimal location of apertures. The scanning technique is therefore extended to the vault roof to pinpoint potential rockfalls. [C97]

"2D ground-penetrating radar AVO response to a 3D dielectric permittivity anomaly"

To evaluate the amplitude vs offset response of GPR to small distributions of hydrocarbon contamination, I acquired multi-offset 450 MHz GPR data in TE and TM modes over a buried rectangular tank filled with gasoline saturated sand. All dimensions of the tank were less than one wavelength at the characteristic antenna frequency. The permittivity ratio at the moist sand/gasoline sand boundary, estimated by fitting the Fresnel equations to the observed amplitudes and by Brewster's Angle analysis, differed from that obtained through migration velocity analysis by no more than 12%. 2D FDTD modeling reproduced amplitude characteristics for 3 o f 4 target/polarization combinations and explained some deviations from the Fresnel curves. Additional deviations may be caused by out-of-plane polarization effects or heterogeneity not included in the 2D model. [C98]

"Impact of spatial sampling and antenna polarization on 3D GPR fracture detection"

Three-dimensional Ground Penetrating Radar (3D GPR) surveys are needed to reconstruct subsurface fracture networks in terms of strike, dip and interconnectivity. This particular GPR study conducted in the Madonna della Mazza quarry (Italy) compares the impact of a dense acquisition grid versus antenna polarization on the characterization of subvertical fractures. 3D GPR data were acquired using a 250 MHz antenna over a 20 Ч 20 m area with a grid bin size of 5 Ч 5 cm. According to the quarter-wavelength criterion, profile spacing of 5 cm

allows to properly sample also the high-frequency content of the signal spectrum. The results demonstrate that, rather than repeated surveys with different antenna orientation but larger profile spacing, a single survey with a regular and highly sampled grid is a preferred approach for high-resolution characterization of three-dimensional fracture networks. [C99]

"Masonry arch bridges evaluation by means of GPR"

Some masonry arch bridges in Galicia (NW Spain) were surveyed with GPR using 250 and 500 MHz antennas. The main goal of this work was to perform an analysis of historical bridges, obtaining information about filling material homogeneity, detecting inclusions of different materials, defining structural faults -such as internal voids or cracks- and detecting ancient features -as hidden arches or previous profiles of the bridge-. Geometric 3D models of the surveyed bridges obtained with Laser Scanning methods, were used as inputs to create synthetic radargrams through FDTD simulations in order to help GPR data interpretation. [C100]

"GPR resolution in cultural heritage applications"

The non-destructive study of historical buildings, archaeological sites and other Cultural Heritage structures requires high resolution methodologies and a good knowledge of the potential of the different methods. Laboratory measurements provide valuable information about the ability to detect different targets and to determine structural problems, but these data must be compared to the results obtained in real and complex structures. In this work, we present experimental GPR measurements made in order to determine the spatial resolution under laboratory conditions. These results were compared to the data obtained in different GPR surveys applied to Cultural Heritage. The information obtained in drillings, in visual inspections and in old documentation about the historical buildings and archaeological sites is used to determine the resolution in each case. [C101]

"Can be GPR technique useful for strength characterization of concrete?"

The possibility of material characterization through the GPR measurements, taking into account the integration with the ultrasonic technique, has been studied and possible relationships between the permittivity of materials and their bulk density are discussed. We present here two different approaches. The first one describes an attempt to correlate the mechanical strength of concrete (as well the ultrasonic velocity) with the permittivity of the material. A series of samples of concrete, characterized by different material properties, were used for georadar and ultrasonic measures, seeking correlations among experimental data. The second approach illustrates the comparison between GPR and ultrasonic techniques to detect anomalies within the concrete. A 3D tomography was performed with ultrasonic and GPR measures on a laboratory model and the data obtained are here compared. [C102]

"Scattering by a circular cylinder buried beneath a rough surface"

A two-dimensional scattering problem of a circular cylinder buried beneath a rough surface is analyzed through the Cylindrical Wave Approach. The fields scattered by the cylinders are sums of cylindrical waves and the concept of plane-wave spectrum is employed, to take into account reflection and transmission through the interface. The analytical expressions of the fields are derived from the small perturbation method, with a first order approximation for the reflection and transmission coefficients. Results can be obtained both in near-and far-field region, for TE and TM polarization. [C103]

"A review of geometric issues in GPR prospecting of cylindrical structures in Cultural Heritage applications"

Cultural Heritage diagnostics often involves the application of geophysical methods like ground penetrating radar along non-planar surfaces. Sometimes, as in the investigation of columns with a small radius, the basic assumption underlying the application of conventional processing algorithms (half-space geometry) is strongly violated. Although frequently overlooked, this implies that appropriate algorithms should be developed to take into account the additional data complexity arising from the unusual acquisition setting and exceptional care should be used in interpreting the radargrams. Through numerical and real data examples an in-depth analysis of reflection/diffraction features from buried and above-surface objects is performed in this paper. [C104]

"Investigation of the frequency dependent antenna transfer functions and phase center position for modeling off-ground GPR"

We compared different methods to estimate the phase center of an ultra wideband ground penetrating radar (GPR) horn antenna operating off-ground, namely, (1) extrapolation of peak-to-peak reflection values in the time

domain and assuming a fixed phase center, and (2), frequency-domain full-waveform inversion assuming a frequency dependent phase center. For that purpose, we performed radar measurements at different heights above a perfect electrical conductor (PEC). A double ridged horn antenna operating in the frequency range 0.8-5.2 GHz was used. In the limits of the antenna geometry, we observed that antenna modeling results were not significantly affected by the position of the phase center, even when considering frequency dependence. This implies that the transfer function model used to model the antenna inherently accounts for the phase center position. This analysis showed that the proposed antenna model avoids the need for the frequency dependent phase center determination and is valid for any applications where the field measured by the antenna can be considered as coming from a distance larger than the antenna aperture itself, such as for off-ground GPR or telecommunications. [C105]

"Uncertainty in ground penetrating radar models"

Uncertainty seems an ignored aspect of everyday life of a geophysicist who uses ground penetrating radar and analyses the data beyond direct interpretation methods. Several causes of uncertainty are discussed that can be classified as belonging to uncertainties in the connection of electromagnetic parameters to desired physical parameters of different application domains, or belonging to uncertainties in the input. The input is either the system transmitter, receiver combination and the antennas, or an incident field. Given the state of the community's ability to model three-dimensional data in complicated subsurface configurations and to estimate electromagnetic parameters or other desired parameters using these models in inverse modeling of measured data, it is advocated that these uncertainties are being considered in the modeling efforts to understand how they propagate through the model into the measured data, and in turn how they affect the parameter estimation results. [C106]

"Ultra wide band radar reflectometer for density profile measurement of high temperature plasmas"

Reflectometry is considered to be one of the key diagnostics to measure density profiles or density fluctuations of fusion oriented plasmas. The electromagnetic wave launched into the plasma is reflected at the cutoff density layer of the ordinary (O) mode or the extraordinary (X) mode. The plasma density profile can be obtained by taking the phase difference between the incident wave and the reflected wave. The high resolution analysis method called signal record analysis (SRA) is utilized to calculate the phase difference. Since wide frequency band is needed for the reflectometry to measure wide density profiles, an ultrashort pulse which includes wide frequency component is utilized as a resource. Also, it is noted that the remote control system using super science information network (super-SINET) has been introduced to the present reflectometry system. [C107]

"Taper-walled linearly tapered slot antenna: A low direct-coupling antenna for subsurface imaging"

Ground penetrating radars attract attention of many researchers as a new technique to visualize antipersonnel plastic landmines. Previously we proposed a high-density and wideband array that realizes high-resolution and quick imaging. However, the high-density array sometimes suffers from direct coupling among antenna elements, which decreases the performance of the landmine detection. In this paper, we propose a new antenna element employing open slits and tapered aperture to decrease the direct coupling. [C108]

"Results of an experimental radar survey on the Gornergletscher glacier system (Zwillingsgletscher), Valais, Switzerland"

A 775-m 200-MHz GPR traverse was surveyed in July 2009 over a portion of the Zwillingsgletscher branch of the Gornergletscher System, Valais, Switzerland. The survey line was approximately parallel to the glacial flow direction and situated in an area of prominent wave ogive formation. The traverse shows a well-developed pattern of scattering that is strongly folded into apparent troughs and ridges with the ridges commencing at 10-20 m depth. This pattern mimics the expected ogive structure. The origin of the scattering has not yet been confirmed, but is possibly related to an onset of warmer ice or to variations in rock or sediment content. [C109]

"Dynamic monitoring of fracture extension in unconsolidated sand specimen by GPR"

We conducted a GPR monitoring to observe the extension of fractures created by hydraulic fracturing. To achieve this monitoring, a measurement system with higher time accuracy and faster data acquisition rate are needed. We designed a VNA (Vector Network Analyzer) measurement system using a Vivaldi array antenna. The VNA measurement system has the time resolution of 1 ps/sample and the data acquisition rate of 0.78 sec/acquisition, where the system dynamic range is about 100 dB. The Vivaldi array antenna has a wide frequency bandwidth of 0.3 MHz~6 GHz. Comparing the actual formation of the fracture and the infiltrated region with the measurement result, we can verify the extension of the fracture indirectly. Also it may be possible to understand the relation between the pressure of the fracturing fluid and the formation of the fracture in real time.

[C110]

"Symmetry based 3D GPR feature enhancement and extraction"

The efficient analysis of high-resolution 3D GPR data sets is of increasing importance given todays possibilities to acquire large and dense data volumes. In order to reduce data complexity and enhance the features of interest, attribute based analysis, a well-established field in reflection seismology, has received growing interest also in the GPR community. Here, we present a novel GPR attribute called phase symmetry, which is adapted from image processing. We believe that this attribute is well-suited for analyzing 3D GPR data sets. In this study, we introduce the basic concepts of phase symmetry. Using two synthetic examples and comparing phase symmetry to the well- known Canny edge detector, we illustrate that phase symmetry also provides high quality results in the presence of significant noise and smoothly varying anomalies. Using two 3D GPR field examples collected to detect buried utilities and archaeologically relevant features, respectively, demonstrates the applicability of phase symmetry to real GPR data and illustrates that this attribute is an effective tool in order to extract symmetric features embedded within a heterogeneous background. Additionally, we show that phase symmetry can be combined with the similarity attribute to jointly emphasize event symmetry and waveform similarity. [C111]

"Ground-Penetrating Radar reflection data sensitivity to van Genuchten parameter variations GPR reflection data sensitivity to van Genuchten parameters"

We are interested in Ground Penetrating Radar (GPR) as a geophysical tool useful for determining the depth of the ground water table (GWT) and for monitoring shallow water infiltration in sandy soils. At hydrostatic equilibrium, the water content distribution in an homogeneous ground from the vadose zone down to the water saturated zone depends on the medium water retention function. A classical way to model retention curve data is to use a van Genuchten continuous model. Using Finite Difference Time Domain simulations, we study the sensitivity of the GPR signal reflected by a van Genuchten type transition to the hydrostatic parameters. We show a power type relationship between the reflected signal amplitude and the slope of the retention curve. Furthermore, for simulating GPR reflection data acquired above a transition from unsaturated to saturated soil, geophysicists often approximate the soil water retention curve by a piece-wise linear model. We test the validity of such an approximation depending on the frequency of the radar signal and the abruptness of the retention curve. We illustrate our results with high resolution GPR data (1600 MHz) acquired above a fluctuating water table in a sand column at the laboratory scale. [C112]

"Influence of soil inhomogeneity on GPR for landmine detection"

Landmine detection by ground-penetrating radar (GPR) becomes challenging when soil is inhomogeneous. Soil inhomogeneity causes unwanted reflections (clutter) which disturb reflections from landmines. Thorough investigations on the influence of soil inhomogeneity and clutter on GPR are important for the use in demining to assess the performance and ensure the safety of the operation. In order to observe the influence of soil inhomogeneity an irrigation test was carried out and GPR data were collected after the irrigation while soil water content distribution was changing. Correlation length and variability of soil electric properties are determined by geostatistical analysis from GPR data. The theoretical calculation of Mie scattering using the determined parameters is in good agreement with power of clutter extracted from GPR data. Therefore it is demonstrated that scattering by soil inhomogeneity is governed by Mie scattering. [C113]

"Imaging the subsurface structure of Planum Boreum with the Mars Reconnaissance Orbiter Shallow Radar"

We review prior mapping of the subsurface structure of Planum Boreum that was conducted with 2-D sounding data from the Shallow Radar (SHARAD) instrument onboard the Mars Reconnaissance Orbiter (MRO). Widespread reflections from basal and internal interfaces of the north polar layered deposits (NPLD) occur throughout the 1,000,000-km2area. A dome-shaped zone of diffuse reflectivity up to ~1 km thick underlies two-thirds of the NPLD. This zone is associated with a basal unit identified in image data as Amazonian sand-rich layered deposits. In other areas, the NPLD base is remarkably flat-lying and co-planar with the exposed surface of the surrounding Vastitas Borealis materials. Within the NPLD, radar-layer packets that extend throughout the deposits have been mapped as five units with a total volume of 821,000 km3, exclusive of the basal unit. Application of a 3-D imaging technique commonly used in processing seismic data to the polar grid of 2-D SHARAD observations is expected to yield an improved representation of the subsurface layering geometry and greatly reduce the effects of surface clutter. [C114]

"High-resolution imaging of a vineyard in south of France using ground penetrating radar and

electromagnetic induction"

GPR and EMI surveys were carried out in a vineyard in southern France in order to produce high-resolution maps of soil stratigraphy and to retrieve soil hydrogeophysical properties of the different soil layers. The preliminary results presented in this paper show large spatial variations of the vineyard soil properties, which are in accordance with the distribution of the different soil types within the study area. This is particularly observable from soil electrical conductivity data, which show strong spatial correlation with large areas of comparable values delimited by well-defined discontinuities, revealing sharp variations of soil characteristics over short distances. These discontinuities almost systematically correspond to the limits of the vineyard plots, though areas of contrasted soil electrical conductivity values are also found within some plots. Furthermore, the patterns of soil electrical conductivity are in good agreement with soil stratigraphy observed from GPR measurements. Finally, these results also highlighted compaction as a likely explanation to vine vigour problems observed locally in the vineyard. Future work will focus on the full-waveform inversion of GPR and EMI data to retrieve the properties of the different soil layers and to investigate the spatial variation of soil water availability in the study area, and provide on this basis recommendations for the vineyard management. [C115]

"Rail radar-a fast maturing tool for monitoring trackbed"

Ground Penetrating Radar (`rail radar') technology has long been a focus for railway trackbed maintenance and renewals planning due to its non-destructive nature and its potential to offer significant efficiency savings in trackbed condition monitoring. This paper provides a brief introduction to the two main interpretation techniques (interface reflection and EM scattering) currently used to monitor railway trackbed and identify the causes of anomalous trackbed conditions. A number of survey examples and scenarios are provided and explained in detail. [C116]

"Radar subsurface sounding over the putative frozen sea in Cerberus Palus, Mars"

The area of Mars known as Cerberus Palus, suspected of harboring a frozen body of water, has been observed by the two subsurface sounding radar MARSIS and SHARAD. SHARAD data reveal subsurface interfaces at depths ranging from ~50 m to ~150 m which could be interpreted as either the bottom of an ice sheet lying over bedrock, or an interface between two lava flows. Echoes have been analyzed to estimate the dielectric properties of the surface layer, and results favor the interpretation that no ice is present in the area. [C117]

"Sedimentary structure of the Nazarй coastal dunes (Portugal)"

The internal structure of costal dunes located south of Nazare was analyzed using Ground Penetrating Radar. These coastal dunes comprise stabilized dunes, located in the inner part of the dune field, and foredunes, both separated by a dry dune slack. The radargram analysis allowed the identification of five bounding surfaces that define six main aeolian sand units. The Units I, II, III and IV correspond to the progradation of foredunes seaward (NW), while Units V and VI represent the migration of a parabolic dune and a blowout, respectively, to southeast. A strong reflector separating Units I, II and III from Unit V is interpreted as a paleosoil, suggesting a break in aeolian sedimentation of unknown duration, but with sufficient time for soil development. The absent of the paleosoil over the Unit IV leave some doubts in relation to its relative age, although is indicative of the occurrence of an erosive event. Radar stratigraphic analysis provided a relative chronology of units that will be used as a framework for selecting sampling points for future absolute dating and sedimentological studies. [C118]

"Preliminary performance of Sub-Surface Radar for the EJSM/Laplace mission"

The Sub-Surface Radar (SSR) instrument is a core payload for the Jupiter Ganymede Orbiter (JGO) of the EJSM, which is complementary to the Ice Penetrating Radar on board the Jupiter Europa Orbiter (JEO). These instruments work at low frequency (HF/VHF band) and are designed to penetrate the surfaces of icy moons of Jupiter. The paper will present a preliminary performance model aimed to assess the penetration capability of the instrument in different operative conditions and planet's surface characteristics. [C119]

"Full-waveform modeling of ground-coupled GPR antennas for wave propagation in multilayered media: The problem solved?"

We propose a full-waveform approach for modeling time and frequency domain, off-ground and on-ground radars for wave propagation in multilayered media. The radar antennas are modeled using an equivalent set of infinitesimal electric dipoles placed over the antenna aperture. The linear relations between the fields in the transmission line, the sources, and the backscattered fields over the antenna aperture are expressed in terms of frequency dependent, global reflection and transmission coefficients, which are characteristic to the antenna. The

interactions between the antenna and the layered medium are thereby accounted for. Far-field and near-field measurements are used to determine these antenna coefficients. The fields over the antenna aperture are calculated using three-dimensional Green's functions. We validated the approach using measurements with a 900 MHz centre frequency transmitting and receiving antenna situated at different heights above a copper plane. For heights larger than the antenna, a single point source and receiver was sufficient for accurately modeling the radar data. For smaller distances, using six sources and receivers provided remarkably good results. Although some simplifications were made in this paper, the proposed method shows great promise for characterizing multilayered media using full-waveform inversion, with very limited computation time compared to numerical methods. [C120]

"Inversion and sensitivity analysis of GPR data with waveguide dispersion using Markov Chain Monte Carlo simulation"

GPR data with waveguide dispersion are known to be very difficult to interpret using traditional inversion methods. Recently, an algorithm was developed that inverts dispersive GPR data using dispersion curves. Here we analyze the sensitivity of this algorithm, and determine posterior probability density functions of the inverted parameters using Markov Chain Monte Carlo simulation. This method is especially designed to work well in the presence of measurement and model error, and is applied to measured CMP data assuming a two layered subsurface. Lower frequencies determine the inverted permittivity of the lower halfspace, whereas higher frequencies contain information about the waveguide height and its permittivity. Removing the beginning or end of the dispersion curve significantly increases parameter uncertainty. [C121]

"GPR investigation in different archaeological sites in Tuscany. Analysis and comparison of the obtained results"

In the last five years the collaboration between the Laboratory of Landscape Archaeology and Remote Sensing at the University of Siena and the Ground Remote Sensing Lab of the Institute of Technologies Applied to the Cultural Heritage (ITABC-CNR, Rome) produced several site prospection case histories. We focused our attention on a quite limited chronological range between late roman and the early medieval period. Chronology has a direct relationship with material culture and therefore with physical and chemical property of the archaeological stratification and of the context. We should emphasise that most of the site that has been surveyed has been also excavated or at lest explored through archaeological sample excavation. The best results has been sistematically achieved through the integration with other methods as magnetic and resistivity systems. The paper will resume our experience, analyzing and comparing the different results, obtained in the sites characterised by late roman and early middle age features. [C122]

"Mariana (Corsica). Integrating GPR in Roman urban survey"

In 2000 a new phase of archaeological field activities started on the abandoned city site of Mariana, located south of Bastia (NE-Corsica). Within the on-going international research project "Projet Collectif de Recherche: Mariana et la vallйe du Golo" a joint team of the Universities of Cassino (I) and Gent (B) studies the topography of the ancient city in a diachronic framework. In this paper we will investigate the crucial role of GPR prospections integrated in a whole set of more traditional methods of non-invasive city survey and stratigraphic excavations. [C123]

"Different time gain and amplitude-color arranging for ground penetrating radar data: Applied samples"

We introduced a simple time gain approximation with a functioned amplitude-color range to image all amplitudes or only selected amplitudes. First, we reduced ground wave amplitudes near to the maximum reflected / diffracted wave amplitudes of the data. Thus amplitude range of the two dimensional (2D) GPR profile section (radargram) was rescaled by maximum reflected/ diffracted wave amplitude values only for displaying the radargram. Second, we rearranged amplitude-color range with a functional approximation which was very important as well as time gain application to pick events according to the aim of the research. Third, we functioned an opaque range to obtain transparent three dimensional (3D) image of the aligned 2D radargrams. We presented 2D and 3D applications to show our approximations. [C124]

"Mitigation of RF interference in air-launched 2 GHz GPR antennas"

Air-launched ground penetrating radar (GPR) antennas are useful for analyzing roadway, bridge, and rail-bed construction at very high speeds. The disadvantage of these antennas versus ground-coupled antennas is an increased susceptibility to radio and broadcast interference, predominantly from FM and TV broadcasting as well

as cellular telephone base stations. A novel hardware/software interference removal technique has been developed that allows 2 GHz air-launched antennas to operate in the presence of most broadcast interference sources while maintaining data integrity and measurement capability of the interference-free scenario. The performance of the conventional 2 GHz air-launched antenna is compared to the new interference-rejecting system along a 182 km (113 mile) route traversing through the harshest interference-prone highways in the Greater Boston Metropolitan area. It was found that for this data collection route, the amount of unacceptable data was reduced from 18% to 7% with the new technology. It was further found that when only unpredictable interference sources are considered, namely cellular telephones, only 2% of the measurement data is impacted. Finally, a comparison of measurement results during different times of day and antenna polarizations is made, where no improvement was observed in either case. [C125]

"Autonomous FMCW radar survey of Antarctic shear zone"

Radar survey of the Antarctic shear zone was conducted using an ultra-wideband (2-10 GHz) frequency modulated continuous wave (FMCW) radar. The radar was mounted on a sled and pulled by a robot that was specifically designed to operate in a harsh polar environment. Our FMCW radar had good penetration through Antarctic snow and we observed snow stratigraphy to a depth of 20 m. The radar images also revealed multiple crevasses in the shear zone. Our results demonstrate that autonomous survey using high frequency radar is feasible and safe approach for detecting hidden crevasses. [C126]

"Diagnostic by imaging: 3D GPR investigation of brick masonry and post-tensioned concrete"

In this laboratory study, the comparison of 4 different antenna frequencies (from 1.0 to 2.6 GHz) and radar systems on the same masonry and post-tensioned concrete specimens has served to investigate the precision achievable in imaging cross sections of masonry walls with different brick layouts and of concrete slabs with metal post-tensioning ducts at varying depths. Through high-density 3D data collection and multi-phase post-processing, the work aimed at 2D and 3D data imaging for eased and enhanced diagnosis of structural elements. [C127]

"Integrated geophysical methods for the knowledge of the urban layout of Hierapolis in Phrygia (Turkey)"

The paper concerns the various methods of geophysical prospecting (Ground Penetrating Radar, Magnetometry, Electrical Tomography) applied in Hierapolis of Phrygia, by the Italian Archaeological Mission, during the campaigns of 2007 and 2008. The integration between the different methods (in turn integrated with other exploration methods to the surface, as archaeological surveys and remote sensing from aerial platform and satellite), applied in areas of the city with different geological characteristics, allowed to retrieve important data on the urban layout in areas characterized by thick colluvial and alluvial deposits and in areas where there are extensive limestone formations that have formed recently and have incorporated the ancient remains. [C128]

"TWI in-situ experimental results"

A through-wall imaging problem is tackled by means the linear inverse scattering approach described in. In particular, here, such an approach is validated against experimental data. To this end, a CW-SF ultra-wideband radar system is used to take the measurements and an in situ scattering scenario is considered. [C129]

"Georadar Investigation of Graves and Wall Remains in Alacahцуьk, Central Anatolia"

Archaeological excavations have been conducted in two distinct areas of Alacahцуьk, located in the northwest of Alaca in the 3orum province and one of the most important Hittite settlements. The subsurface structure of the site was investigated using Ground Penetrating Radar (GPR), which has become widespread in similar studies over the last few years. On the basis of archaeological considerations that graves of princes are thought to be situated in a defined zone (Zone A) and that the possible existence of wall remains are believed to be in another zone (Zone B), we obtained GPR data using the Ramac CU II GPR system with 100 MHz antennae in 2007. In all profiles of the study area, time slices were obtained from the data collected according to the different positions of the transmitter-receiver antennae, some of which were parallel to one another and to the profiles while others were parallel to one another and perpendicular to the profiles. This was performed after the data went through basic processing steps and were mapped to observe what types of structure extensions were involved and to what depths they occurred. The results revealed the presence of strong reflections in GPR sections, which indicated the location of wall remains and some probable princes' graves. Consequently, excavations were recommended where the presence of anomalies was observed. Archaeological finds during the following excavations corroborated the existence of remains where strong reflections were observed in the maps or radargrams. [C130]

"Using englacial radar attenuation to better diagnose the subglacial environment: A review"

The magnitude of the radar echo returned from beds underneath ice sheets has been used to identify subglacial lakes based on the prediction that wetter and flatter beds have larger reflectivities than dryer and/or rougher beds. Further quantitative diagnosis of the subglacial environment requires accurate correction for englacial dielectric attenuation, which is primarily a function of ice temperature and secondarily a function of ice chemistry. Models show that the attenuation contribution from chemistry (soluble ions) accounts for about one quarter of the attenuation averaged over the full ice thickness at Siple Dome and Vostok in Antarctica. These predictions suggest that a useful initial attenuation estimate across an ice sheet can be obtained simply with ice-temperature modeling. Methods for estimating attenuation from radar data are also reviewed, with an emphasis on the potential pitfalls of individual methods. Some discrepancies exist between attenuation estimated with ice-core data, temperature models, and radar data. We discuss strategies to improve these attenuation estimates. [C131]

"Admittance inversion of crosshole radar data"

In this paper, a new inversion approach has been proposed using the ratio of two mutually orthogonal components of recorded electric and magnetic fields: apparent admittance. This study aims at the development of a full waveform inversion algorithm in two-dimension (2D) without the precise knowledge of source functions and without any compensations of 3D nature of radar wave propagation. To alleviate local minima problems, we developed a data weighting method based on the data misfits. The developed inversion approach was firstly demonstrated through inverting 2D FDTD simulation data of crosshole radar survey with false source signatures. Further demonstrated was that the numerical data simulated in the 3D space could be inverted by the proposed 2D algorithm with the 2D FDTD forward modeling. All numerical experiments showed that the material property distribution with remarkably high accuracy can be calculated in spite of the lack of the accurate source information and no compensations of the characteristics of radar wave propagation in 3D space. [C132]

"Results of an experimental radar survey on the gornergletscher glacier system (Zwillingsgletscher), Valais, Switzerland"

A 775-m 200-MHz GPR traverse was surveyed in July 2009 over a portion of the Zwillingsgletscher branch of the Gornergletscher System, Valais, Switzerland. The survey line was approximately parallel to the glacial flow direction and situated in an area of prominent wave ogive formation. The traverse shows a well-developed pattern of scattering that is strongly folded into apparent troughs and ridges with the ridges commencing at 10-20 m depth. This pattern mimics the expected ogive structure. The origin of the scattering has not yet been confirmed, but is possibly related to an onset of warmer ice or to variations in rock or sediment content. [C133]

"Aiding of the GPR method by other measurement techniques for liquid contamination detection"

In the paper the selected results of measurements carried out for detection of two types of liquid contamination are presented. The authors made detection of contamination, which very often leaks to the ground, i.e. the low-conductivity hydrocarbon contamination and the high-conductivity chemical solution. Depending of the site and the type of contamination different measurement techniques were used: the GPR, the atmogeochemical measurement, the laboratory analysis, the resistivity imaging survey and the conductometry. A brief discussion about possibilities of liquid contamination detection using electrical and electromagnetic techniques is presented in the paper. [C134]

"GPR research at the tomb of Zeynel Bey in Hasankeyf ancient city- Southeastern Turkey"

Hasankeyf is a town located along the Tigris River in the Batman Province in Southeastern Turkey. The tomb of Zeynel Bey ruled shortly over Hasankeyf- a rare example of its kind in Anatolia. We measured GPR data inside and around of the tomb of the Zeynel Bey to research buried archaeological remains. We imaged the results with interactive transparent 3D visualization and located archaeological remains with depth range. We determined the base structure and diffraction anomaly groups coming from a cemetery. Excavation in the tomb and around of it encouraged the new 3D image results and found a cemetery in the tomb. [C135]

"Localization of buried objects"

The problem of localizing both conductive and dielectric cylinders of arbitrary known radius is dealt with in a two dimensional geometry. A reflection mode multi-frequency multi-monostatic configuration is considered. A linear inversion algorithm for objects embedded into a homogeneous medium is presented, where mutual interaction between the objects is neglected and the problem is formulated in near zone. Here, we examine, by simulated data, the application of the algorithm to subsurface prospection, involving half space geometry, lossy background

medium and the presence of multiple scatterers. [C136]

"A novel detection warning signal creation method for hand-held GPR applications"

In this paper a novel detection warning signal creation method is proposed for pulse Ground Penetrating Radar (GPR) data, especially for small non-metallic targets, in time domain. Background removal is applied to the data through a sliding window scheme and Target Energy Function (TEF) is obtained as correlation summation of consecutive A-scan signals. Then Auxiliary Detection Function (ADF) is defined and a novel automatic Detection Warning Signal (DWS) creation is applied. The proposed method has been tested specifically for a set of small sized dielectric targets which are not easily detectable. The results are promising as full detection performance and zero false alarm rate in original dataset. Moreover, it is obtained that the immunity of the proposed method against noise is very satisfactory. [C137]

"Textile antenna for the multi-sensor (impulse GPR&EMI) subsurface detection system"

The performance of a planar elliptical dipole textile antenna for the multi-sensor (impulse GPR&EMI) subsurface detection system is investigated. This is a new application of textile antenna. The textile material of antenna does not create an EMI clutter comparing solid Cu material. The antenna characteristics of the proposed antenna in the multi-sensor head are measured and compared with the simulated ones. A buried target into soil, is successfully detected by the multi-sensor system with the usage of the textile antenna in the GPR sensor. [C138]

"The effects of seasonal weather differences on the bio-heat loss transferred from the human body in Antalya city"

In this study, the effects of seasonal weather differences in Antalya city on the bio-heat losses from the human body have been investigated. For application, the monthly atmospheric temperature, relative humidity, wind speed and atmospheric pressure data, which are observed in 2006, have been used. The sensible and latent heat losses from the human body in terms of skin surface and respiration have been calculated and compared to each other. According to the obtained results, the latent and sensible heat losses from the human body have been varied considerably from season to season. Approximately ninety percent of bio-heat transferred from the human body to the surrounding is caused by the skin and the rest of 10% by respiration. [C139]

"Magnetic resonance imaging shows that muscle myofascial force transmission causes substantial sarcomere length heterogeneity in human muscles, in vivo"

In this study, it is aimed to show, using magnetic resonance imaging (MRI), effects of epimuscular myofascial force transmission (EMFT) on sarcomere length distribution in human muscles in lower leg in vivo. The ankle angle of the subjects was fixed and 3D MR image sets were acquired for two different knee angles. Intensity based non-rigid demon algorithm was used to calculate displacement fields and Green-Lagrange strain for each voxel. To calculate the strain in local fiber direction diffusion tensor images (DTI) were acquired. It was showed that m. gastrocnemius crossing the knee has major strain distribution (0.125 ± 0.010 in proximal and 0.073 ± 0.014 distal) in local fiber direction. Despite remaining isometric during the experiment, synergistic m. soleus (e.g. 0.088 ± 0.017 in proximal, 0.078 ± 0.019 in distal) and even antagonistic muscles (0.157 ± 0.070, 0.108 ± 0.037) also show major strain distribution in the local fiber direction. [C140]

"Evaluation of the electric and magnetic field levels of around the medium voltage power lines in related to public health"

In this study, the electric and magnetic fields which are occurred around the medium voltage power distribution lines in the residential areas close to housing are calculated analytically. Study, different MV-LV power transmission lines (PTL) which are settlements in Antalya city center have been selected. The electric and magnetic field values which are occurred around the lines have been examined and the results were evaluated in terms of safety standards and public health. [C141]

"Classification of fibromyalgia syndrome by using fuzzy logic method"

Fibromyalgia syndrome (FMS), which appears frequently in females, exhibits itself the form of common pain and decreases life quality of a person significantly, is a musculoskeletal disease. Nowadays FMS diagnosis can be made according to the strict rules set by American College of Rheumatology (ACR). However, using strict rules in making diagnosis of FMS disease is not suitable, because FMS is affected from a good many systems and caused to complicated complaints. On the other hand the fuzzy logic method provides a flexible classification, because it has a rule base set by experts' personal experience alongside the ACR criteria. In this study a

classification that is based on fuzzy logic is done for FMS. The measurements are taken from 30 healthy and 60 patient subjects who are also under cure at Suleyman Demirel University, Faculty of Medicine, Physiotherapy and Rehabilitation Center. Consistent results are obtained from comparing the fuzzy logic and experts' comments and experiences for the classification both classification disease and disease's degree. [C142]

"Design of Wireless Gateway Based on Hybrid Net Control System"

A hybrid network system is introduced aiming at improved requirements of production management and control in modern enterprise. The data gathering is realized through CAN Bus node, and the remote data transferring is accomplished by GPRS wireless network in the system. In this paper, the design process of hardware and software of wireless gateway is introduced in detail and the applying case is given. It is indicated from the result that the system put forward in this paper has safety, economy, high precision, and real-time. [C143]

"An Algorithm for Multi Service Continuity in Multi Radio Access Cellular Networks"

Handover is the process of maintaining session Quality of Service (QoS) while the customer is changing radio access network point of attachment. Handover due to mobility, while seamlessly maintaining service continuity and QoS is one of the 3GPP standard requirements. Handover with in 2G/3G cellular networks has been successfully and widely deployed. However, deployment of new radio technologies in the mobile world has been gaining momentum. Driven by customers and applications need for more data throughput, operators are struggling to deliver the promised services and high data rates to customers. With little or no experience in the new technologies, operators are using existing traffic information from Global System for Mobile communications/ General Radio Packet System (GSM/GPRS) technologies and 3G Universal Mobile Telecommunication Services (UMTS) to deploy 3.5G High Speed Downlink Packet Access (HSDPA) systems. While initial experiences with HSDPA installations have shown improved data rate offering and the opening of new era of video communications and streaming over cellular networks. The diversity of the services and the availability at the moment of two radio access networks to choose from to deliver these services makes the management of available resources rather complex. In this paper, we propose a multi service handover algorithm to optimize the available network resources in multi radio environment based on service requests. The proposed algorithm efficiently optimizes the radio resources available based on the services supported in 3GPP standards. It has two goals: provide highest available resource to the request and maintaining minimum quality of service when networks availability changes due to handover. [C144]

"Charged particle/cell manipulation in spiral microchannels with concentric electrodes"

In this study, a solution has been proposed by investigating the manipulation and separation of charged particles in spiral microchannels and concentric electrodes. Proposed structure has been fabricated by using MEMS technology and characteristics of electrophoretic force has been demonstrated successfully. Negative charged particles could be manipulated at different speeds and in opposite directions depending on the amplitude and the polarity of the applied electric field. It has been planned that results of this study will be used in the differentiation of charged cells. [C145]

"Determination of Water Content in Automobile Lubricant Using Near-Infrared Spectroscopy Improved by Machine Learning Analysis"

The main objective of this paper is to determine the water content of automobile lubricant based on the near-infrared (NIR) spectra collected and to observe whether NIR spectroscopy could be used for predicting water content. Least square support vector machine (LS-SVM), back-propagation neural networks (BPNN) and Gaussian processes regression (GPR) were employed to develop prediction models. There were 150 samples for training set and test set, 6 inputs for one sample obtained by principle component analysis (PCA). LS-SVM models were developed with a grid search technique and RBF kernel function. The Levenberg-Marquardt algorithm was employed to optimize back-propagation neural network (BPNN) and models with 5 and 6 neurons in hidden layer were developed, respectively. The BPNN model with 5 neurons in hidden layer outperformed the one with 6 neurons. Three GPR models were built based on full data points (full GPR), subset of regressors (SR GPR) and subset of datasets (SD GPR), respectively, with Squared exponential (SE) covariance function. The full GPR outperformed SR GPR and SD GPR.The overall results indicted that the Gaussian processes model outperformed LS-SVM and BPNN model. GPR was an effective way for the regress prediction. NIR spectroscopy combined with PCA and GPR had the capability to determine the water content of automobile lubricant with high accuracy. [C146]

"A method of automatic assessment of feature compatibility in mobile networks"

Deployment and upgrade of a mobile network have always been challenging tasks. Very often they require human intervention because telecom networks are complex systems composed of different nodes that need to be compatible in order to communicate and provide network services. Therefore in current telecommunication systems a network expert must check all the requirements and compatibilities of the network prior to activation of a new service. Automation of the assessment of network compatibility is one of the key enablers for Autonomic Management of telecom networks. In this paper we describe a new method for automatic end-to-end assessment of compatibility between network features in a telecom network. The method enables fast, easy and accurate decision making regarding the planning of new feature deployment or the upgrade of already existing features. We built a prototype that demonstrates the described method. It shows that our method is not bound to any type of telecom network and could be used to automate deployment or upgrade of a multiple-domain network. [C147]

"Research of data analysis for Gb ports in GPRS system"

For more and more data services in GPRS networks, through analysis of both the GPRS network structure and the data features of Gb port, introducing into the analysis flow of multi-level, analysis and research the network data from the bottom-up. [C148]

"Design and implementation of embedded monitoring system for grain storage"

Meeting the requirement and development of large granaries, an embedded environmental monitoring system for grain storage based on ARM technology is designed in this paper. The overall structure of the proposed monitoring device consists of two components, one is the host computer located in control room for information processing and prediction of grain situation, the other is the lower computer terminal in the granary with grain data acquisition, signal processing and communication functions. They transmit data to each other over industrial Ethernet or GPRS networks. On this basis, the implementation methods of data monitoring terminal for grain situation based on S3C2410 microprocessor are studied in detail. The human machine interface of the terminal is developed by Qt/Embedded. Finally, the feasibility and reliability of the system has been proved by the laboratory test. [C149]

"Computational electromagnetic modeling & simulation of ultra wideband sub-surface sensors for the detection and imaging of buried objects using spatial and spectral diversity"

An enhanced remote sensing technique for the detection and identification of deeply buried objects is presented in this paper. A new RF Tomographic Technique is proposed for developing RF CAT Scans of buried objects using spectral and spatial diversity. This imaging technique uses an embedded ring of subsurface radiators as the source of strong underground radiated transmissions. Distributed surface-contact sensors are used to collect the tomographic data for relay to a remote control site. Three-dimensional numerical imaging algorithms have been developed to detect, image, and characterize deeply buried objects. Distributed transmitters and receivers significantly increase unwanted mutual coupling and EM emissions that interfere with signal reception; however, by embedding the transmitters underground, reduced mutual coupling and EM emissions, and improved signal-to-noise ratios, can be achieved. Simple 2D surface SAR experiments over deep mine shafts were performed to validate and verify (V&V) the 3D processing algorithms using 2D surface SAR sensor data. The WIPL-D CEM Code was used to model and simulate (M&S) the embedded and distributed sensors and to verify the significant enhancement in the received signal-to-noise ratio obtained by burying the radiating antennas. [C150]

"A 28mW WCDMA/GSM/GPRS/EDGE transformer-based receiver in 45nm CMOS"

A transformer-based receiver designed in 45nm CMOS that meets WCDMA, GSM, GPRS, and EDGE system requirements is presented. The receiver requires no interstage SAW filters and consumes 20mA from 1.4V. The use of a transformer at the LNA output helps achieve high linearity by lowering the voltage swing while simultaneously providing current gain. The analog back end is implemented with two cascaded gain stages and a 2ndorder ΣΔ ADC. The receiver has a gain of 60dB, noise figure of 3.0dB and an IIP2 of >+50dBm on both I+Q channels. The die area is 1.35mm2for 4 bands. [C151]

"SAR and Stolt Migration processing for plastic landmine detection"

The paper describes the plastic mine detection by Ground Penetrating Radar. The received data evaluation and imaging are based on two- and three-dimensional Synthetic Aperture Radar (SAR) and Stolt Migration methods. The results of the processing that are subject to discussion were presented using the examples of measurement of antitank mine situated on the sand surface and anti-personal mine located both on and under the sand surface. [C152]

"New method for GPRS cellular network traces exploitation"

In the idea to create a realistic model of mobility and traffic for the networks of 3rd and 4th generation, we have studied many techniques of modeling and planning. Our choice was for the real network traces exploitation techniques, mainly because compared to other techniques this technique is very adapted to the real modeling. Although this technique is most convenient, it has many disadvantages. From this context, was born the aim of this work which consists in the creation of a new method which can investigate on mobile network traces based on Data Mining. These new methods permit us to investigate on data GPRS network traces and extract a very significant population for the study, modeling and planning existent and new network. [C153]

"Detection for signal in ELF atmospheric noise interference"

Extremely low frequency (ELF) atmospheric noise is non-Gaussian, consisting of the sum of a Gaussian background and narrow pulses caused by lighting strokes. Therefore, the conventional detection method for signal in Gaussian noise gets worse. In this paper, a new structure for signal detection in the ELF atmospheric noise is proposed. First, the ELF atmospheric noise is modeled as a symmetric α-stable (SαS) process. Then the performance of optimum linear detector, matched filter, and locally optimum detector are examined. The FFT-based algorithm is used for calculating the probability density function (PDF). Finally, the probability of error (Pe) of each detector is compared by extensive Monte-Carlo simulation. [C154]

"Mapping Geo-Pathogenic Zones and required instrumentation"

Geo-Pathogenic Zones, the areas on Earth's surface where drastic disturbances of natural electromagnetic field are detected, and their dire effects are no longer a mystery. Present human health issues cannot be resolved without considering the influence of the natural environment on human organisms. In light of recent advances in physics this important problem can no longer be ignored. The technological level of today's electrical engineering progress enables us to develop special instruments for scanning and mapping vast areas of landscapes to reveal potentially harmful factors. Geo-pathogenic zones (GPZ) are a major cause of natural impact on humans. Interaction of Earth's electromagnetic fields with local electro-physical heterogeneities are considered as a base of GPZ. Extremely low frequency electric fields, ELFEF, influencing the human brain, have been experimentally confirmed. The spinning electric field, another important phenomenon which can affect humans, has been revealed and established experimentally. The instruments depicting negative influence of GPZ can also be employed for water prospecting due to their capability to detect ELFEF and spinning fields. The results of this research are shown as electro-physical mechanisms of GPZ. [C155]

"Remote monitoring system for oil wells based on GPRS technology"

In order to overcome the shortcoming of traditional methods of monitoring oil wells, a design of remote monitoring system based on ARM and GPRS was presented. And then the hardware and software design methods of RTU, system networking method and the design method of background monitoring center were detailed. Using GPRS module and relying on GPRS wireless network and Internet, RTU distributed in different geographic locations can communicate with the background monitoring center. This system broke through the geographical restrictions of oil wells, provided some functions such as oil wells' data collection, remote data transmission, real-time monitor and oil wells' information release, and improved the level of automation in oil production management. The experiment showed that the system could achieve the goal of real-time monitoring of oil wells by the existing mobile communication network. [C156]

"Research on optimal wireless city network using mobile network"

By analyzing the various technologies, considering the network development and full use of network resources, the conclusion is gotten that the access side should combine network with 2/3G and Wi-Fi technology. Among them, 2/3G mobile network is mainly used to achieve wide-area coverage, and Wi-Fi network is used to the hot areas with high bandwidth demand for complementary coverage. Also, the core network is researched by several methods using SIM, Web and WAPI. [C157]

"A proposed framework for m-government development assessment"

A new branch of e-government development is occurred in last decade. In this evolution, mobile network, mobile devices and mobile services are developed which construct the M-government. In this paper, we proposed the framework of m-government development assessment; moreover, the assessment method combined fuzzy AHP and fuzzy TOPSIS is presented. [C158]

"The analysis of ground penetrating radar signal of small objects based on generalized S transform"

In order to do some preliminary analyses on characteristics of ground penetrating radar (GPR) signal of objects in time and time-frequency domain, and discuss how to roughly estimate the size of an object as well as distance between two objects, firstly the characteristics of GPR signal in time domain was studied in this paper as the size and the distance were changing respectively, secondly the characteristics in time-frequency domain was studied through generalized S transform (GST), the extraction rule of twin-peak attribute was analyzed, the determination of transformation parameter and frequency point was solved. It is pointed out that the size of an object can be estimated in combination of time domain waveform and twin-peak attribute, the definition of a small object can be given according to the size and objective, the resolution of two objects can be improved by twin-peak attribute and the distance can be roughly estimated combined with the attribute and time domain waveform. [C159]

"Research on key technologies of embedded GPS navigation"

Embedded GPS navigation, based on embedded platform technology, through GPS and GIS and combined with handheld devices, achieves target location, path calculation, route guidance and surrounding search functions of mobile users. This paper, Symbian OS mobile phones as the terminal, background Linux servers providing the mapping service, path calculation, route guidance, networking search, location query and other functions, using GPRS, WIFI and other wireless communication modes, achieves navigation services provided by professional navigation mobile phones on lightweight thin-client, and, at the same time, takes advantage of mobile phone communication to achieve a certain degree of user interaction. Thus, based on the user interface on Symbian platform, GPS, data persistence layer, audio and network programming, an overall solution is proposed and the corresponding key technologies involved are discussed. [C160]

"Research and design of traffic detection based on GPRS"

This article raised the traffic detection and analysis program based on more and more data services in GPRS networks. By bringing in the traffic acquisition module, data analysis and processing module, database module and WEB terminal blocks, this article achieves the function of traffic collection, analysis and processing of the GPRS. [C161]

"Research on long-range and metering reading for water meter based on GPRS"

A kind of long-range and centralized automatic metering reading for water meter system is designed. The function of the GPRS network meter reading and the USB centralized meter reading are accomplished by the M23 GPRS module and the C8051F340 single chip micro-controller. The system is composed of water meter, data collector, concentrator and administer computer. The data of water consumption which will be converted into pulse signals are collected by the water meter, and these pulse signals are disposed by the data collector which can use RS-485 communication with concentrator, water user's machine can be controlled when the upper instructions are received by the way of controlling the electromotion valves. The Concentrator plays an important role in data transit and bus segregation. A USB interface is set up in the concentrator in order to avoid the failure of GPRS network, and the staff can copy the datas by computer or hand-written. The administer computer can manage the user's purchase of water and control the user's machine by sending specific instructions. [C162]

"Remote video monitoring system based on embedded linux and GPS"

This paper presents a design and realization method for remote video monitoring system based on embedded Linux and GPRS (General Packet Radio Service) network. Monitor terminal hardware takes ARM9 S3C2410 processor for centralization, in virtue of SDRAM, USB, GPRS module, etc. Software system adopts embedded linux, the main function realized by C programming to achieve real-time camera data acquisition, image compression and network transmission through GPRS module. Monitoring center receives image data and displays after connects with the terminal. It is easier to be used in windows system. Image data can be transmitted to the monitoring center in 3-6 seconds after JPEG compression. The results showed that the monitoring system has the advantage of high reliability, high efficiency and low cost with ARM9 and GPRS network, and it provides a feasible method for remote video monitoring. [C163]

"GPR mapping to avoid utility conflicts prior to construction of the M-29 transmission line"

Subsurface construction for utility installation and repair in urban environments presents many unique challenges. One of the most significant is the identification and location of existing underground utilities that may

interfere with construction activities. The objective of this project was to establish that non-invasive subsurface imaging with multi-channel ground penetrating radar (GPR) is a viable method to map underground utilities, influence design and planning, and reduce the need for costly and disruptive test pits. ConEd via its consultants carried out a multi-channel GPR survey along approximately five miles of the planned route of the M-29 transmission line in Yonkers, NY as a demonstration of this capability. The GPR survey verified many of the existing utilities along the M-29 alignment as well as finding numerous unknown utilities that conflicted significantly with the planned construction, resulting in potential project cost savings that far exceed the cost of the GPR work itself. [C164]

"Fast three-dimensional GPR forward and inverse scattering based on wideband diagonal tensor approximation"

A fast three-dimensional (3D) ground penetrating radar (GPR) forward and inverse scattering method is presented based on the diagonal tensor approximation (DTA). For the forward scattering problem, the first iteration about the frequency-dependent scattering coefficients in the DTA is used. By further evaluating the scattering tensor at the GPR center frequency to remove its frequency dependence, the DTA is simplified while maintaining higher accuracy than the classical Born approximation method. For the inverse scattering problem, the DTA-based algorithm is derived for the plane-wave GPR, and can be implemented efficiently by the NUFFT combined with the stabilized bi-conjugate gradient FFT (BiCGS-FFT) method. The proposed inversion algorithm is much cheaper than the existing DTA-based methods, and has a higher accuracy and a wider range of applicability than the fast method based on the Born approximation. [C165]

"Preliminary studies of putative bioeffects of experimental ultra high voltage transmission environment on mice"

In order to evaluate the effects of electromagnetic fields (EMF) of ultra high voltage (UHV) transmission lines exposure on important life organs and tissues of BALB/c mice, an exposed environment was constructed in laboratory. Fifty male adult BALB/c mice were divided into two groups. One group has been done by daily exposures of 24 hours, and the other sham-exposed group served as the control. After six weeks of exposure, all the mice were sacrificed. The important life organs of BALB/c mice in vivo were screened with serum biochemical assay, morphological observation at histological and ultrastructural levels as well as flow cytometric analysis (FCM). There were no significant differences in important organs and tissues except testis germ cells and bone marrow between exposed groups and control groups. [C166]

"GTP Security in 3G Core Network"

Nowadays, 3G netowrk plays a very important role in mobile communication system. But the security concern of such network, especially the core network, is far from being satisfied. GPRS Tunnel Protocol(GTP), which is one of the key protocols in the core network, is quite vulnerable to attacks in the flat, full IP environment. Therefore solving such problem properly is very urgent and important for the operation of 3G network. In this paper, a security analysis of GTP is presented, a defense solution for these security threats and an event-based description language are also proposed. The experiment result shows the potential of our solution. [C167]

"Optimal impedance matching design for broadband Archimedean spiral antennas"

This paper presents an optimization problem formulation to design broadband antennas with optimal impedance matching considering that the source impedance is tunable inside a range. Usually an antenna is designed to match a given source impedance, which can be too constraining. The new optimization problem formulation is introduced to answer a less strict query: which impedance is optimal for the behavior inside a frequency range of a given antenna? The formulation is used to investigate Archimedean spiral antennas. [C168]

"Research for wireless energy transmission in a magnetic field communication system"

A magnetic field communication system utilizes magnetic induction to transmit data, providing a high quality wireless communication service in a harsh environment whereas the previous wireless communication system has many problems. In general, the magnetic field communication system is used in the environment surrounded by soil, metal, and fluid. A wireless power transfer system transfers energy by magnetic induction between coils at the transmitter side and the receiver side. In this paper, we propose a new system which consists of the magnetic field communication system and the wireless power transfer system. [C169]

"Automated detection of near surface Martian ice layers in orbital radar data"

An algorithm is presented to automatically detect near surface ice layers in images from the Shallow Subsurface

Radar (SHARAD) on NASA's Mars Reconnaissance Orbiter. Mars' ice-rich Northern Polar Layered Deposits (NPLD) represents an extensive geologic record of climate history. Identifying ice layers in cross-sectional images leads to understanding the three-dimensional structure of ice layers. Scientists have manually identified layers in large data volumes, but the automated algorithm will allow studying more images from over a thousand orbital crossings. A unique coordinate transformation, based upon the surface reflection, makes subsequent filtering and detection more effective on near surface layers. Results show promising capabilities for automatically detecting ice layers on Mars. [C170]

"Domain decomposition for computing extremely low frequency induced current in the human body"

Computation of electromagnetic fields in high resolution computational phantoms requires solving large linear systems. We present the application of Schwarz preconditioners with Krylov subspace methods for computing Extremely Low Frequency (ELF) induced fields in a phantom. [C171]

"Toward free-living walking speed estimation using Gaussian Process-based Regression with on-body accelerometers and gyroscopes"

Walking speed is an important determinant of energy expenditure. We present the use of Gaussian Process-based Regression (GPR), a non-linear, non-parametric regression framework to estimate walking speed using data obtained from a single on-body sensor worn on the right hip. We compare the performance of GPR with Bayesian Linear Regression (BLR) and Least Squares Regression (LSR) in estimating treadmill walking speeds. We also examine whether using gyroscopes to augment accelerometry data can improve prediction accuracy. GPR shows a lower average RMS prediction error when compared to BLR and LSR across all subjects. Per subject, GPR has significantly lower RMS prediction error than LSR and BLR ($p <; 0.05$) with increasing training data. The addition of tri-axial gyroscopes as inputs reduces RMS prediction error ($p <; 0.05$ per subject) when compared to using only acclerometers. We also study the effect of using treadmill walking data to predict overground walking speeds and that of combining data from more than one person to predict overground walking speed. A strong linear correlation exists ($rX,Y= .8861$) between overground walking speeds predicted from treadmill data and ground truth walking speed measured. Combining treadmill data from multiple subjects with similar height characteristics improved the prediction capability of GPR for overground walking speeds as measured by correllation between ground truth and GP-predicted values ($rX,Y= .8204$ with combined data). [C172]

"A non-parametric approach to behavioral device modeling"

This work proposes a non-parametric methodology for quick and effective behavioral macromodeling of complex digital and analog devices. Gaussian Process Regression (GPR) learning algorithms are used to generate simple, robust, and widely applicable time-domain models without specifying device equations or parameters. SPICE simulations expose device dynamics to train behavioral models while exhaustive validation ensures accurate and efficient models are generated. Average speedups of 97X are observed over SPICE simulation maintaining accurate outputs within 95% confidence intervals. [C173]

"Research of wireless monitoring system in power distribution transformer station based on GPRS"

Because there are a large number of power distribution transformer stations and they are far away from city, wireless GPRS transmission provides a good communication solution to supervise power distribution transformer stations. The scheme of remote wireless monitoring system for power distribution transformer station based on GPRS wireless network was designed in this paper. A control terminal system implement was mainly given, which adopted LPC2132 as main processor, GR47 as the date communication module. The monitor terminal software and flow chart were also designed. At last, the way of configuring the GPRS module to connect network is analyzed. [C174]

"Research on Management Information System of Rural Photovoltaic Plant Equipment"

In this paper, the rural photovoltaic plant equipment management information system was built for the new rural construction. In view of the questions that rural photovoltaic plant equipment too scattered and difficult to management Occurred during the building of new rural construction, a complete set of solutions were presented, to make up gaps in this field at home and abroad. Rural photovoltaic plant equipment management information system is an open system that can be centralized management of photovoltaic plant equipment by all manufacturers through interface technology. The system can be upgrade to a data-collection management network to provide a strong support for the new rural construction in the information construction in rural areas. [C175]

"Design and Realization of an Online Power Quality Monitoring System Based on GPRS"

In order to evaluate power quality more accurately, this paper presents a three-layer distributed online power quality monitoring system (PQMS), which uses the General Packet Radio Service (GPRS) wireless network as its communication channel. This PQMS consists of three parts: the power quality monitor (PQM), the monitoring software (MS) in upper computer and the web platform (WP). The PQM which is designed on the structure of DSP (Digital Signal Processor) + CPLD (Complex Programmable Logic Device) ensures the realtime and precise monitoring. Then the MS collects and analyzes the monitoring data. At the same time, GPRS network provides the communication channel for PQM and MS. The WP provides the monitoring data and the analysis results through internet, and supervisors can monitor and manage the power quality from a long distance. The detail design and its realization of each part are explained. Precision test of the PQM and field monitoring results with the PQMS are also discussed. [C176]

"Automated Monitoring System of Pig Behavior Based on RFID and ARM-LINUX"

An automated monitoring method for pig behavior was proposed after analyzing the disadvantages of traditional observation methods for abnormal behavior of pigs. An embedded detecting system based on RFID Technology and ARM-Linux was designed to monitor the pig behavior. The system is based on ARM-LINUX platform, using the embedded equipment which installed in pig's feeding area, monitoring pigs and collecting feeding data all the day. Through data analysis, the system can automatically detect abnormal behavior of pigs, and send the relevant information to the monitoring center and the staff's mobile through the GPRS network. The staff can get information at any time by human-machine interface to know the growth status of pigs. The experimental results show that the system has the good properties in real-time and stability. The system provides good technical support for intelligent precision feeding and has broad application prospects. [C177]

"The Application of Long-Distance Inspecting Electric Power Parameter Based on GPRS Communications"

The system of inspecting electric power parameter based on GPRS communications was designed and the inspecting data worked by CPU was transmitted to the control center by GPRS and INTERNET net. Inspecting industrial signal in real time and long distance was realized. [C178]

"The Embedded ARM user Program design of Vehicle Terminal"

Based on the functions the vehicle terminal needs to implement, this paper designs an Vehicle Terminal based on Embedded ARM user Program. It carries out multi-task division, parses the NMEA0183 protocol containing GPS positioning information to complete the current time, longitude, latitude and speed extraction, real-timely displays the current position on the vehicle terminal LCD for the vehicle positioning, and packs the parsed location information to sent out through the GPRS network or short message, to complete the vehicle phones, vehicle alarm application development. [C179]

"Application of wireless communication based on GPRS in power plant's CEMS"

The wireless data exchange system based on GPRS used in monitoring smoke emission in power plant is designed, the principle and the blue print of the system are described and the terminal hardware and Software are also described in details. A conclusion was presented at last. [C180]

"Research on Visualized Monitoring of Electricity Overhauling Hanging Grounding Wire"

In order to meet the need of remote monitoring of hanging grounding wire during electricity overhauling operation, a new monitoring device of electricity overhauling hanging grounding wire is introduced in this paper. The hardware and software design of this device were presented. The device adopt ultrasonic ranging to monitor the status of grounding wire, adopt camera to collect on-site pictures, realizing the monitoring of hanging grounding wire, which made monitoring more reliable, visualized, and select the MC55 module to implement GPRS data transmission. The results indicated that the device improve safety of electricity overhauling operation and achieve visualization. The device has promising prospects of application in electricity overhauling operation. [C181]

"A 4.5mW digital baseband receiver for level-A evolved EDGE"

A digital baseband receiver ASIC that supports GSM/GPRS/EDGE and Evolved EDGE is implemented in 0.13 Г‚Вїm CMOS technology. The design centers around two main blocks: an adaptive channel equalizer processes GMSK/8PSK/16QAM and 32 QAM modulated signals and a flexible channel decoder supports convolutional and

turbo codes, as required for Evolved EDGE. The receiver occupies 2.0 mm2and the average power consumption during burst reception and processing is less than 5 mW in each of the modes. [C182]

"A quad-band class-39 RF CMOS receiver for evolved EDGE"

A single-chip RF receiver to support EDGE Evolution with downlink dual-carrier (DLDC) receive diversity and EVM < 3% in all bands for demodulating 32-QAM signals is described. DLDC multistat class 39 and single-carrier multistat class 44 have been achieved. Both receive paths achieve a IIF < 2.5 dB, an IIP3 >-3.5 dBm in the GSM 850/900 MHz band, and each draws < 57 mA from battery. [C183]

"Data Transmission over GSM Adaptive Multi Rate Voice Channel Using Speech-Like Symbols"

This paper introduces a new method to transmit digital data through Global System for Mobile communications (GSM) voice channel. A novel algorithm is proposed to design a set of Speech-Like (SL) symbols which leads to design a GSM voice channel data modem to modulate and demodulate data on GSM Adaptive Multi Rate (AMR) voice codec which consist of different bit-rates. Designing a set of time-symbols is an off line procedure with the aim of minimizing symbol detection error. This modem is useful in real-time data communication with high priority. The introduced modem encodes data into SL symbols to be transmitted over GSM voice channel and the received SL symbols are decoded back to data. [C184]

"Content Dependent Data Hiding on GSM Full Rate Encoded Speech"

This paper introduces a steganographic approach to embed data on compressed speech bit stream in order to hide secret data. This method may be used by any kind of encoded bit stream, but this research concentrates on full rate (GSM 6.10) encoded bit stream. This method allows user to adjust embedded data bit-rate or speech quality. Speech quality is determined by Perceptual Evaluation of Speech Quality (PESQ) which is an objective testing. The effect of embedding data to each specific bit of GSM Full Rate coefficients, on speech quality has been investigated and the less important bits are selected to embed secret data. Meanwhile for approaching a higher speech quality, the data embedding positions are based on different speech frame types. In other words the proposed technique is modified to achieve a content dependent algorithm. [C185]

"Distributed prognostic health management with gaussian process regression"

Distributed prognostics architecture design is an enabling step for efficient implementation of health management systems. 12A major challenge encountered in such design is formulation of optimal distributed prognostics algorithms. In this paper, we present a distributed GPR based prognostics algorithm whose target platform is a wireless sensor network. In addition to challenges encountered in a distributed implementation, a wireless network poses constraints on communication patterns, thereby making the problem more challenging. The prognostics application that was used to demonstrate our new algorithms is battery prognostics. In order to present trade-offs within different prognostic approaches, we present comparison with the distributed implementation of a particle filter based prognostics for the same battery data. [C186]

"New Authentication Architecture for GPRS Networks"

GPRS offers the user can always on connection to Internet and Intranet. Some of the services may require high level of security. This can be financial transaction over the Internet, or exchange of confidential documents from a company's Intranet to an employee. It is important to have strong focus on the security, so companies and persons that demand high level of security can take advantage of the services GPRS offered. What normally happens is that the services win against the security. This is in most cases adequate security for what a normal subscriber requires. The possible attacks against GPRS targets the equipment of mobile users, the radio access network, the GPRS backbone network, and the interfaces that connect the latter to other GPRS networks or the public Internet. The results of these attacks might be the compromise of end-users security, the users over billing, the disclosure or alteration of critical information, the services unavailability, the network breakdown, etc. The analyzed attacks and their consequences increase the risks associated with the usage of GPRS, and, thus, influence its deployment that realizes the concept mobile Internet. In order to defeat certain attacks and enhance the level of security provided by GPRS, specific security measures need to be proposed. Hence there is a need of new authentication architecture which prevents malicious actions (attacks), which threaten the GPRS network, the GPRS mobile users, and the data that either reside at the network or are transferred through it. [C187]

"Katana: A Hot Patching Framework for ELF Executables"

Despite advances in software modularity, security, and reliability,offline patching remains the predominant form of updating or protecting commodity software. Unfortunately, the mechanics of hot patching (the process of

upgrading a program while it executes) remain understudied, even though such a capability offers practical benefits for both consumer and mission-critical systems. A reliable hot patching procedure would serve particularly well by reducing the downtime necessary for critical functionality or security upgrades. Yet, hot patching also carries the risk -- real or perceived -- of leaving the system in an inconsistent state, which leads many owners to forego its benefits as too risky. In this paper, we propose a novel method for hot patching ELF binaries that supports (a) synchronized global data and code updates and (b)reasoning about the results of applying the hot patch. We propose a format, which we call a Patch Object, for encoding patches as a special type of ELF relocatable object file. Our tool, Katana, automatically creates these patch objects as a by-product of the standard source build process. Katana also allows an end-user to apply the Patch Objects to a running process. In essence, our method can be viewed as an extension of the Application Binary Interface (ABI), and we argue for its inclusion in future ABI standards. [C188]

"Routing and Tracking System for Mobile Vehicles in Large Area"

The paper describes a practical model for routing and tracking with mobile vehicle in a large area outdoor environment based on the Global Positioning System (GPS) and Global System for Mobile Communication (GSM). The supporting devices, GPS module-eMD3620 of AT&S company and GSM modem-GM862 of Telit company, are controlled by a 32bits microcontroller LM3S2965 implemented a new version ARM Cortex M3 core. The system is equipped the Compass sensor-YAS529 of Yamaha company and Accelerator sensor-KXSC72050 of Koinix company to determine moving direction of a vehicle. The device will collect positions of the vehicle via GPS receiver and then sends the data of positions to supervised center by the SMS (Short Message Services) or GPRS (General Package Radio Service) service. The supervised center is composed of a development kit that supports GSM techniques-WMP100 of the Wavecom company. After processing data, the position of the mobile vehicle will be displayed on Google Map. [C189]

"Road Surface Temperature Monitor System Realization Based on Rich Internet Application Model and GPRS Technology"

In the ice and snow weather, road driving safety has always been a major problem. A road surface temperature monitoring system design and implementation based on GPRS technology and RIA model is introduced in this paper. In the front, SCM controls sensor to real-time collect surface temperature information and data, the ARM7-based GPRS module takes charge of data transmission; the system submits the information and data to the back-end server at the same time through the internet network. When the monitoring temperature data exceeding the warning range, the system will heat automatically to melt the ice and snow in the surface, and alert messages will be sent to the monitoring and management personnel synchronously. System software building in the basis of the Flex technology to realize the whole data reading and operation, because the Flex technology can achieve real-time data communication and asynchronous transmission between the client and service, improve the system's responsivity. System realization will provide more protection and significance to the road traffic safety of critical surface and roadbed under ice and snow condition. [C190]

"Research on Realization of Group Call Service Base on TD-SCDMA Network"

For the particularity of their work and mission, some departments need that the mobile communication system not only supports the point-to-point communication service but also can provide the group call service of the one-to-multipoint communication. In view of the fact that people need this particular communication mode, a design scheme of realizing group call service based on TD-SCDMA network is given. At the same time, the communication protocol is discussed. In order to reduce the impact to users of other business and improve the use of radio resource, the allocation mechanism of the group call service based on TD-SCDMA network is described and analyzed in detail. Finally, the result which is gotten by using MATLAB software shows the group call service based on TD-SCDMA network can be realized by adopting the rational and effective radio channel allocation mechanism. The application market of TD-SCDMA network with the group call service will be extended. [C191]

"Design of a Remote Distributed Control System Based on GRPS and Internet"

Wireless communication technology, Internet technology, and standardized transducer interfaces are serving to shape the landscape of next-generation's remote distributed control system. The paper proposes originally to build the DMCS integration use of GPRS and Internet technology. Based on the analysis of function demands of the market for the measurement and control system, the thesis makes sure the function goals of the system, builds framework structure of it and determines the application model of the system and the software architecture, which is the combination of the C/S structure and B/S structure. [C192]

"Signal Filtering Based on Wavelet Transform and its Application in Ground Penetrating Radar"

Towards wavelet transforms part characters in time domain and frequency domain, a practical GPR signal processing method is proposed. Based on continuous wavelet transform, the main component of echo signal is extracted by energy analysis. Through scaled decomposition and frequency filtering, the disturbed component is eliminated. The SNR of reconstructed echo signal is improved. The experiments of real data indicate it improves the processing performance of underground target detecting than continuous wavelet transform. [C193]

"Application of GPRS Technique for Traffic Data Collection System Communication Software Development and System Evluation"

This paper describes software architecture of using GPRS technique to provide wireless data communication for a traffic data collection system. The development of the communication software was based on two scenarios: Centralized Database Management (CDM) and Distributed Data Management (DDM) systems. They were used effectively to improve the current "download on demand" and post event analysis working mode. A "close to the real time" data transmission was achieved. As the essential requirement of an Intelligent Traffic System (ITS), the application of the GPRS technique enabled the user to access the real time traffic data uploaded from multiple road side traffic data collection units. In this study, the authors have successfully developed and tested the communication software of a proposed CDM system and the software architecture of the DDM system was also discussed. For the DDM system, the interface and communication software were designed using Unified Modeling Language and developed as an Object-oriented system based on the .NET platform. The database part was developed using Microsoft SQL. The reliability and the performance of the DDM system were evaluated against proposed hardware configurations. [C194]

"On the modelling of transient scattering under ultra wideband short-pulse electromagnetic excitation"

Accurate modelling of electromagnetic radiation, scattering and propagation using ultra wideband (UWB) sources has been of significant interest with ongoing application in areas such as short-range communications, through-the-wall imaging, ground-penetrating radar and medical imaging etc. Numerical modelling of these applications is vital to the evaluation and enhancement of their performance In this paper, a review of different methods for numerical modelling of the transient electromagnetic response under UWB short-pulse excitation is undertaken. The advantages, limitations and challenges of both direct and indirect time domain methods are described in detail and numerical examples of transient scattering demonstrate the use of an indirect time domain method. [C195]

"The Transformer Station Remote Monitoring System Based on ARM/GPRS Network"

Aim at meeting the requirements of electric power system management automation and cyberlization, this thesis describes a system which builds up a wireless, real-time, multi-object remote monitoring system of electric equipment depending on GPRS network of China Mobile Telecommunication Company. It has high transfer rate with low costs and can interconnect directly with the Internet.The wireless remote monitoring system of electric equipment is to utilize GPRS technology to control the operation parameters of electric equipment real-timely and remotely. [C196]

"Design and Implementation of Dam Construction Multi-Level Verification System on PDA Platform"

Multi-level verification is important means in dam construction monitoring. But there are some flaws in traditional multi-level verification such as omission and delay, which strongly impact real-time feedback control. We develop a multi-level verification system on PDA platform after investigation into its demanding characteristics. It is based on Server/Client mode; contains dispatch workflow; and the client is developed using Windows Mobile SDK, which uses GPRS for communication. In this system, both multi-level verification and data collection are customizable, and the efficiency of data collection and feedback control is markedly improved. [C197]

"Reconfiguration-aware spectrum sharing for FPGA based software defined radio"

This paper focuses on reconfigurable systems for software defined radio applications in which the underlying hardware is dynamically reconfigured for packet processing of multiple protocols. However, due to non-negligible reconfiguration delay overhead, the physical layer may not be able to respond to all the packets scheduled by MAC layer. In this paper, we present a reconfiguration-aware spectrum sharing and spectrum access scheduling at MAC layer. We considered four protocols similar to WiFi, WiMax, GPRS, and WCDMA on a FPGA-based

system. Our results show that the optimal solution outperforms the adopted existing heuristic for time slot scheduling by 13.29%. [C198]

"An Intelligent System on Water Quality Remote Monitor and Water Bloom Prediction"

An intelligent system on water quality GPRS remote monitor and water bloom prediction based on neural network are proposed in this paper, which can realize the automatic real-time monitor for the change of water quality and via the prediction by neural network for water bloom, thereby solve the lagging state of water quality monitor and the problem of water bloom prediction at present. [C199]

"Design of Wireless Dam Security Information System"

This paper proposed design proposal of wireless dam security information system through the GPRS technical superiority, introduced hardware system set up based on the GPRS dam security information system in detail, proposed the functional requirements of software modules, has the actual application value. Using the GPRS technology to carry on the network data transfer, easy to use, no region limit, in the field of remote monitoring and control, especially in hydraulic engineering security information system, it has a very good application prospect. [C200]

"Design of Solar Photovoltaic Remote Data Transmission System Based on GPRS"

Taking the Solar Sail System combined by building construction and photovoltaic generation for example, this paper designs Solar Photovoltaic Remote Data Transmission System based on GPRS which completes data receiving, processing and evaluation indicators' calculation. The framework, composition and communication protocol of the active energy transmission were discussed in detail. The design of Data Centre including data receiving and processing based on .NET platform as well as the mathematical models of the system evaluation indicators is the focus of this paper. According to field test, the test results show that the system perfectly realized remote transmission of solar photovoltaic power and it can not only lay data foundation for calculation of system evaluation indicators, but also provide an effective and reliable basis to the model of renewable energy demonstration. [C201]

"Nanosecond Pulser Based on Serial Connection of Avalanche Transistors"

Generation and measure of nanosecond pulse with large amplitude are difficult problems in the field of exploration. The principle of avalanche transistor is analyised and four-stage serial connection of avalanche transistors is designed. Experimental results show that across the 50Г‚Вї load the amplitude of the output pulse can reach 666V and half-width is 3.4 nanosecond. Repeat frequency of the pulse can reach 10KHz. Time-domain waveforms of the pulse and the measure data are shown in the paper. The pulser and the RL-loaded bowtie antenna get matched. The pulser can be fabricated easily and works well. It can be used in UWB Ground Penetrating Radar to improve its validity. [C202]

"Low electromagnetic coupling bistatic subsurface radar using EBG structures"

EBG structures have been developed widely for reducing electromagnetic coupling. On the other hand, Bistatic radar is a system which comprises a transmitter antenna and receiver antenna. In recent years, the bistatic subsurface radar is applied to detect relatively shallow structure such as tumor detection, steel reinforced detection in concrete and etc... On the other hand, the electromagnetic coupling between transmitter antenna and receiver antenna becomes problem, because, the bistatic radar detects a reflection wave from the target by the receiver antenna, therefore artifact caused by the coupling. To reduce this coupling a cavity is used, however, the cavity is not enough to reduce the electromagnetic coupling between transmitter antenna and receiver antenna. We have proposed bistatic radar system using EBG structure. In this paper, the bistatic radar system using EBG structures will be introduced briefly. And, the target detection result by using proposed bistatic radar system will be indicated. [C203]

"Gate-oxide early-life failure identification using delay shifts"

This paper presents experimental data from digital circuits on 90nm test chips, together with circuit simulations, to establish the following results: 1. The presence of a gate-oxide early-life failure (ELF) candidate transistor (also called infant mortality) in a logic gate results in delay shifts over time; 2. Delay shifts can be effective indicators of gate-oxide ELF suspects that may be detected using inexpensive digital techniques. These results can be utilized to overcome scaled-CMOS reliability challenges through effective ELF screening during production test or on-line during system operation for systems with built-in self-healing. [C204]

"Development of Remote Monitoring Cardiac Patients System Based on GPRS"

Nowadays, the electrocardiograph (ECG) is certainly the most effective tool to identity anomalies in the cardiac activity. In this paper, we propose a remote medical monitoring system for ECG data. The system is composed of two parts, which are portable remote medical monitoring unit and the monitoring center. The portable remote medical monitoring unit consists of Advanced RISC Machines (ARM) with the embedded operating system, a custom ECG board, and a GPRS module capable of transmitting information to processing centers. The monitoring center is composed of the monitoring station and the information processing system which realizes information management, real-time analysis, wireless transmission, a warning mechanism for emergency and ECG diagnosis. The aim of this project is to provide an ECG medical monitoring for the user (patient or potential patient) at any time and any place, if there is any abnormal change of ECG data. [C205]

"Research on Physiological Parameters Monitor Based on Multi-Functional Device"

In accordance with the special requirements of medical devices, this paper describes the software design process of a physiological parameters monitor based on multi-functional device. The physiological parameters monitoring software achieved serial communication with physiological parameter acquisition module by adding MSComm widget. The monitoring software is designed into multi-view structure for the 5-lead ECG and 7-lead ECG drawing and it displays various parameters of patient and monitor on its dialog bar and status bar. When the monitor gets dangerous physiological signal form patient, the software drives speaker to sound in corresponding way, at the same time, it drives GSM/GPRS module to call for help by sending corresponding message to preset phone number. Test results showed that the monitoring and operational performance of the monitor reached expected requirements and both the two alarm modes could work correctly. [C206]

"Fast two-dimensional imaging of scattering centers using the nonuniform FFT"

Radar imaging of target scattering centers can be of great diagnostic utility. Conventionally, the radar image has been produced by a technique widely used in computer-aided tomography (CAT), e.g. the filtered backprojetion (FBP) algorithm. FBP reconstruction produces high quality images by handling the measured data directly in polar format. However, the FBP algorithm is more computationally complex than the direct Fourier methods. This paper develops fast two-dimensional (2-D) imaging of scattering centers using a nonuniform fast Fourier transform (NUFFT) algorithm. The proposed method is first compared to the conventional FBP approach on simulated data and then applied to real data sets measured on the RCS test range. Results suggest that the NUFFT method can produce more precise images and requires much less computational time than the FBP algorithm. [C207]

"Grid-cell combination in 3D-FDTD modeling of ELF propagation of the earth"

In this paper, we have developed a model of extremely low frequency (ELF) wave propagation based on an advanced three-dimensional finite difference time-domain (3D-FDTD) method. We have studied the Schumann Resonances (SR) of the earth and three different altitude profiles of conductivity in the lossy Earth-Ionosphere Cavity. The eigen-frequencies of the model have been obtained, and the global averages of the vertical Erand tangential Eθcomponents for these three different conductivity models have been investigated. [C208]

"Analysis of ELF attenuation rate using the geodesic FDTD algorithm"

This paper is analyzed the attenuation rate of extremely low frequency (ELF) electromagnetic waves propagating in the Earth-ionosphere system, using the geodesic FDTD model. In the simulation both the classical two-exponential model and the "Knee" model of ionosphere are used. The resulting difference among using different algorithm are also explained. [C209]

"A new hybrid-frequency radar system based on compressed sensing theory"

Inspired by compressed sensing theory, a novel radar system, called hybrid-frequency radar is proposed. It transmits multiple carrier-frequency modulated by random amplitude in each pulse, and can use much fewer pulses than that of stepped-frequency radar to achieve the same non-ambiguous range interval while the target is sparse spatially. [C210]

"Maintenance budget planning: A case study for rigid pavement maintenance system in Thailand"

The expansion of rigid pavement network under the responsibility of the Department of Rural Roads (DORR) has driven DORR to initiate the development of Rigid Pavement Maintenance System (RPMS). The developed system is aimed to analyze concrete or rigid pavement conditions, select the most appropriate treatment

technique, and prioritize importance of the maintenance to be performed on different road sections in order to optimize the DORR's limited maintenance budgets. The system consists of two modules: Pavement Condition Index (PCI) Module and Optimization Module. Deterioration data, obtained from the visual roads survey of pavement conditions, are collected and analyzed using the PCI Module. The Optimization Module allows the DORR to effectively arrange the maintenance for all concrete pavement sections. In addition, the rigid pavement performance criteria and the maintenance budget planning are discussed in this paper. [C211]

"Practical QoS Testing of Open Source and Commercial IMS Solution for Various Wireless Access Networks"

IP multimedia subsystem (IMS) is the base for convergence of mobile and fixed networks as it offers possibilities to create open infrastructure of services based on IP protocol, which will enable simpler development of a variety of multimedia services. In this paper, we present testing of a voice call performance over various wireless networks, especially UMTS, using Open IMS Core system, and analyze the functionality of selected scenarios for voice calls, comparing the so obtained results with the performance of the commercial IMS system that provides built-in enhanced QoS and other functionalities, as well. We also analyze how coding rate affects the quality of voice calls in our test systems, presenting the measurements' results for relevant QoS parameters and stationary scenario of the observed system. The results show that the open source solution for the IMS system, while having the QoS functionalities and the server with lower performance than those of the commercial solution, still achieves excellent performance, especially for the narrowband codec, while for the wideband speech codec, the performance remains somewhat lower than the one obtained for the commercial solution. All observed solutions exhibited good results when used for speech transmission, except the GPRS and the EDGE network when used with the wideband codec. [C212]

"Calculation of the characteristic impedance of TEM horn antenna using support vector machine"

A method based on support vector machine (SVM) is presented to calculate the characteristic impedance of transverse electromagnetic (TEM) horn antennas. The method can be used for computer aided design (CAD) of TEM horn antennas. The results obtained from the SVM model are in very good agreement with the analytical and numerical result. [C213]

"High-repetition and -stability all-solid state pulsers based on avalanche transistor Marx circuit"

Ultra-wide spectrum (UWS) pulser, in which avalanche transistor is used as its switch, can generate high-repetition and -stability short-pulse, but its power is sharply lower than that of SOS and Tesla generators. Marx circuit is used to increase the power of this type of pulser. Different charged-capacitance and class of Marx circuit determines different waveform and peak-power of output pulse. 20-class and 30-class avalanche transistor Marx circuit pulsers are designed, and the charged-capacitance is 100 pF and 470 pF, then 4 types of waveform are get. The highest output peak-voltage is 2.9 kV, the highest repetition can reach 70 kHz, and keep a better pulse stability, jitter is less than 40 ps. [C214]

"Intelligent Vehicle Control Terminal of Forestry Monorail Car Based on ARM"

Unifying the General Packet Radio Service(GPRS) networking technology, this article designs and realizes one kind of a embedded wireless forestry monorail car control system which using the ARM9 microprocessor from the hardware and the software. In terms of the hardware, completed the design and connection of ARM embedded system, GPRS module, electro mechanical interface of the rudder servo control, and obstacle testing module; in terms of software, completed the GPRS communication program, PWM output subprogram to drive the rudder servo, and the obstacle testing IRQ program. The system can achieve the purpose of long-distance's real-time monitoring and control the monorail car. The executive results of the laboratory tests show that remote control system fulfills real-time control and functional requirement of the monorail car. It provides a new idea to the forestry transportation control and so on. [C215]

"Design and implementation of the low-power tracking system based on GPS-GPRS module"

The purpose of the research proposed in this paper is to develop a Low-Power Tracking System, which can meet the special needs of the security of a mobile device. The system contains two parts: the GPS terminal in the module receives the locating information of the tracked device, and the control center. This paper discusses both hardware and software design of the tracking system. In the end, the future research of the positioning and tracking system is discussed. [C216]

"System of locating and recognizing characters in complex background"

In this paper we propose a locating and recognizing character method in complex background, a system based on this method is built. First, through color reduction to reduce the color to some main colors, then decompose the image into a series of binary images according to the representative colors. After the image decomposition, connected component analysis and combination of character area are used to locate the character area. Finally, the characters are recognized on the basis of feature extraction. The experimental results show that the method can quickly locate character area and has a high positioning accuracy; therefore, the final recognition rate is high. [C217]

"A forest fire monitoring system based on GPRS and ZigBee wireless sensor network"

The significance of forest fire monitoring was determined by the importance of forest resource and the destructive of forest fire. In the paper, according to the limitation of traditional forest fire monitoring schemes, a new wireless network implementation scheme oriented to forest fire monitoring was presented based on GPRS communication technology and ZigBee technology. The related hardware schemes and software program flows were given. The forest environmental information was collected by ZigBee network and transmitted to FTP server with public network IP on the internet through GPRS network by GPRS module which was controlled by coordinator node. The monitoring center got the data, which was provided for relative experts and decision maker, from FTP server to implement the achievement of remote data from monitoring region. Through the analysis of historical data and real-time data, correct judges and decisions were made. It had strategic significance to improve the level of modernization of forest fire monitoring. [C218]

"Environmental Monitoring System Based on GIS and Wireless Communications"

To solve the problems in environmental monitoring arising from remote data acquisition, real-time transmission and analysis, this paper researched the principle of wireless communications SMS / GPRS and the technology of seamless integration with GIS. The system architecture was designed and key technical solutions were implemented. Based on the SMS / GPRS technology, the wireless real-time transmission of the remote monitoring data was achieved, and GIS visualization technology was carried out to visualize the monitoring data. Geographic affected areas were analyzed by GIS spatial analysis. The system is applicable to the environmental protection departments to realize applications such as monitor data acquisition, communication transmission, GIS management and analysis and decision-making. [C219]

"An External Storage Support for Mobile Applications with Scare Resources"

Nowadays, users of mobile phones generate too many files that have to be frequently downloaded to an external storage repository, restricting the user mobility. This paper presents a File Transfer Service (FTS) for mobile phones with scare storage resources. It is a support that can be used through a set of functions (API) that facilitates file transfer between mobile applications and external storage servers, taking advantage of different wireless networks. The FTS selects the best wireless connection (WiFi, GPRS or UMTS) considering accessibility and cost of the service. FTS is able to use the Multimedia Messaging Service (MMS) as an alternative option for transferring files, which is especially useful when the mobile phone connectivity is limited. It is based on the J2ME platform. As a use case, a mobile application named Swapper was built on top of the FTS. When the mobile phone memory runs out, Swapper automatically sends selected files to a web storage server using the best connection available, increasing the storage space in the mobile phone. Swapper includes an efficient replacement policy that minimizes the latency perceived by users. [C220]

"Intelligent Controlling System of Pig Growth Environment"

The pig growth environment is one key factor which affects breeding economic efficiency, this paper has developed distributed automatic control system of pig house environment based on fieldbus, the system includes the networks of CAN bus and Intranet and GPRS, remote users access the system server through browser to monitor the on-site controlling units, in the growth environment, the controlling strategy is the greatest goal of the ratio of output and input, the system can present environmental regulation scheme according to growth environment information and growth information of live pigs and the status information of controlling equipments, the system uses genetic algorithms to search the optimal values of the goal setting, the experiments have shown the system is good. [C221]

"Performance footprints of heavy-users in 3G networks via empirical measurement"

Cellular technology is widely used for Internet access, also because most operators are now offering Mbit/s data rates at affordable prices. Many studies analyzed the performance of these networks using analytical or simulation approaches. However, due to lack of data from operational environments, very little is known about the performance of real cellular networks. In this paper, we assess the performance of the 3G network of one of

the major European telecom operators, using several recent traffic traces of TCP connections to port 80 and 8080. After presenting performance statistics related to all the network users, we focus on heavy users. To assess their performance and to uncover the related causes, we introduce an investigation approach easily repeatable in the very common situation where only data traces are available, with no other information such as mapping of users to cells, network capacity, or packet payload. Analyzing both "single long-lived connections" and "multiple long-lived connections", we assess the performance of those users, providing insights on how and why performance can vary significantly over time and among different users. [C222]

"Improving estimation algorithms based on field data for a hybrid energy system"

The production of green energy is a topic of great importance nowadays and of wide interest throughout the world. The system described in this paper allows an in-depth evaluation of the energetic efficiency of the green power solution proposed to power a remote location. Our goal is to study the difference between the values proposed with the aid of theoretical algorithms for energy production estimation and the field data. By studying this differences new solutions can be proposed to optimize the algorithms. [C223]

"Wavelet packet based de-noising algorithm for UWB GPR data"

For subsurface detection by UWB GPR, one of the big challenge is to eliminate background clutters. In this paper, a wavelet packet based de-noising algorithm driven by best-tree for UWB GPR data is developed. We introduce the procedure of the de-noising algorithm, and present the experiment result of iron pipe B-scan de-noising. Later, provide the suggestion for future work. [C224]

"Design of remote data acquisition system of passenger flow based on GPRS"

According to acquisition data of passenger flow relay on artificial and transporting of unreal-time, this paper introduces system of acquisition data of passenger flow base on GPRS by infrared transducer and pressure transducer. Elaborate hardware scheme design of embedded microprocessor in ARM7 core, implement transporting data of passenger flow to data terminal base on GPRS in time and exact, it is provided a reliable basis for real-time scheduling in public transportation. [C225]

"A compact double-ridged horn antenna for ground penetrating radar applications"

A compact double-ridged horn antenna for ground penetrating radar applications in the frequency range of 1-7 GHz will be presented in this work. Within this contribution the design, simulation and fabrication of such an antenna will be considered. Among the varying design parameters are linear and exponentially tapered walls as well as variations of the curvature of the dielectric waveguide between the two ridges. In addition an absorber structure and a complex shaped metallic back plate have been introduced to further improve the return loss. The primary design goal is a broad bandwidth while maintaining compact dimensions. Two modifications have been introduced in this antenna design in contrast to the standard TEM horn. By protruding the ridges from the aperture plane and filling the space between the ridges with dielectric material it is possible to lower the operating frequency without increasing the size of the original setup. The proposed design has been applied to subsurface radar application in both, field simulations by means of CST Microwave Studio and measurement in a GPR test scenario. The fabricated antenna has been verified by anechoic chamber measurements. The performance of the antenna with respect to the detection of subsurface objects will be verified by various experiments. [C226]

"Study of effect of corrugated edges on the radiation characteristics of GPR antenna"

This paper presents some results of studying the effect of the size of the corrugated edges of the tapered slot antenna (TSA) with elliptical taper on its radiating characteristics. Planar antennas with dimensions of 235 to 120 mm have been simulated in the free space and in the presence of dielectric medium in the near field. The modeling and near field monitoring has been performed using numerical method implemented in CST Microwave Studio software. The effect of the width of the corrugated area on the antennas edges in the range of 5 to 50 mm has been studied by computer simulations and experiments. [C227]

"Facial expression invariant head pose normalization using Gaussian Process Regression"

We present a regression-based scheme for facial-expression-invariant head pose normalization. We address the problem by mapping the locations of 2D facial points (e.g. mouth corners) from non-frontal poses to the frontal pose. This is done in two steps. First, we propose a head pose estimator that maps the input 2D facial point locations into a head-pose space defined by a low dimensional manifold attained by means of multi-class LDA. Then, to learn the mappings between a discrete set of non-frontal head poses and the frontal pose, we propose

using a Gaussian Process Regression (GPR) model for each pair of target poses (i.e. a non-frontal and the frontal pose). During testing, the head pose estimator is used to activate the most relevant GPR model which is later applied to project the locations of 2D facial landmarks from an arbitrary pose (that does not have to be one of the training poses) to the frontal pose. In our experiments we show that the proposed scheme (i) performs accurately for continuous head pose in the range from 0° to 45° pan rotation and from 0° to 30° tilt rotation despite the fact that the training was conducted only on a set of discrete poses, (ii) handles successfully both expressive and expressionless faces (even in cases when some of the expression categories were missing in certain poses during the training), and (iii) outperforms both 3D Point Distribution Model (3D-PDM) and Linear Regression (LR) model that are used as baseline methods for pose normalization. The proposed method is experimentally evaluated on data from the BU-3DFE facial expression database. [C228]

"A HPMM method for increasing mobile downloading speed"

Because of the lower bandwidth of mobile network and constrained resource of mobile terminals, the downloading file speed on mobile terminals is slow. Even in 3G networks, the downloading speed still needs to be improved. This paper proposed a HPMM (Hybrid Protocol with Multi-Thread over Multi-Gateway) solution to increase the downloading speed on mobile terminals. [C229]

"A novel design of water environment monitoring system based on WSN"

The importance of maintaining good water environment highlights the increasing need for advanced technologies. This paper proposes a novel design of water environment monitoring system based on wireless sensor networks (WSN). The system consists of three parts: sensor nodes; sink nodes and data monitoring center. The sensor nodes can be constructed with arbitrary parameter or multi-parameter sensor modules such as PH, dissolved oxygen (DO), conductivity and temperature. The measurement capacity ranges from 0 to 14 on PH value; from 0~20 mg/L on DO; from 0~2 S/cm on conductivity. The sink nodes communicate with the local or remote data monitoring center by RS232 or 3 G/GPRS. The performance shows the system can be effectively applied to some water area such as aquiculture, lake and river for distributed water environment automatic monitoring. [C230]

"A cross-layer flow control algorithm over HSDPA networks"

High Speed Downlink Packet Access (HSDPA) employed in 3G networks considerably augments wireless bandwidth, which enables a variety of mobile services based on TCP. However, the fundamental assumptions of TCP are disrupted by the properties hold by wireless network, such as high bit error rate, large delay and drastic bandwidth oscillation, which lead to the consequences of spurious time outs, spurious retransmission, and sending rate lagging behind the variation of bandwidth, degrading the wireless utilization greatly. To solve the problem, we design a cross-layer flow control algorithm which based on the bandwidth information of the current network environment and calculate a reference value to adjust the sending rate of the multiple senders. The experimental results show that the wireless bandwidth resource is sufficiently utilized, the queue length is stable and the sending rate is insensitive to the round trip time when using this algorithm. [C231]

"The implement of the stored-grain grossness remote monitoring system based on GPRS and ZigBee"

According to the actual demand of the system, the paper proposed scheme and implement for the stored-grain grossness remote monitoring system based on GPRS and Zigbee. The test result is shown that the max error is 0.02mA between inversion value of the server-side data and the measure value. The design should be served as the useful reference to the study of acquisition technology in similar system. [C232]

"Multi-network video streaming in a campus visit scenario"

Mobile computing devices are increasingly making use of multiple network technologies to provide seamless connectivity across changing operational contexts. Reliable delivery of video to mobile devices is particularly challenging in these dynamic and multi-network environments. This paper provides a report on our experience in applying Partially Reliable Stream Control Transmission Protocol (PR-SCTP) in a multi-network campus visit scenario. We provide a large scale evaluation of PR-SCTP along with specific site data. Our results show that PR-SCTP is a promising platform for supporting multi-network video delivery. [C233]

"A case study on the impact of rock fall on highway bridge"

Based on the engineering properties of rock fall in mountain area, analyzed the rock fall hazards in bridge construction, rock fall formation process and the motion state of falling, bouncing, sliding, rolling. Analyzed rock

fall kinematics calculation method and how it affects on bridge construction. At the end, the method was applied in a case of bridge in Shuifu-Maliuwan highway in Yunnan Province, China. [C234]

"Government Innovation Based on Electronic Government: Government Process Reengineering as the Case"

This paper studies the government innovation based on electronic government through the case of government process reengineering. The tendency from business process reengineering to government process reengineering provided a new way to government innovation under the stimulation of electronic government. We can draw the conclusion that the key point of the government innovation is the government reformation itself, however, government innovation needs new governance model to sustain electronic government have it's strongly reason. [C235]

"The role of MSC Server in LTE based network architecture"

LTE is new technology for mobile telecommunications that take in consideration all architecture elements from current mobile networks. Every new technology is much better accepted if it offers interoperation with network elements that are currently used. Goal of this paper is to examine position of MSC Server in core networks after introducing of LTE system in already complex mobile networks. Starting point is that current mobile networks with MSC Server are using CS access and ISUP protocol for voice services, while LTE networks are pure PS networks and main protocol is SIP protocol. This paper will analyze requirements for MSC Server for interoperation with LTE and IMS systems. Also possibility of using voice services and SMS in LTE networks and continuity of voice session while changing access network will be analyzed. [C236]

"Intelligent public transportation system based on AT91SAM9G20"

This article according to the current tendency of Chinese municipal transportation development, proposes the more reasonable solution about embedded platform. Connecting the MCU and the GPRS module through the serial ports, then transmits the AT instruction to the serial port. It causes the platform to be able to relation to the office terminal through the 3G network. Achieved that various sensors collected information in the vehicle can transmit mutually effect with the tube control center. [C237]

"Design of integrated positioning LBS mobile terminal based on C8051f340"

This paper analyzed various components of integrated positioning LBS mobile terminal based on C8051F340, studied pseudo-range integrated positioning of GPS and GLONASS, deduced the combined observation equations and its solution, then used GPRS technology for transmission. Combining with those methods, we finally realized the integrated positioning LBS mobile terminal and tested it later. Experimental analysis shows that the accuracy of integrated positioning is superior to a single positioning system in bad observing conditions. Receiving and sending data of the service information are efficient carried out using GPRS. That such new technique apply to LBS system will enhance the service quality of LBS and promote the development of LBS. [C238]

"Design and Application of data real-time transmission system of GPS land survey device"

In order to ensure the high positioning precision of GPS land survey device and uploading the investigating data to data central real time, the paper analyses the advantages and disadvantages of several wireless communication technique in common use. And a data transmission system used in GPS land survey device is designed and developed based on GPRS. The results of lots of tests and applications show the feasibility and reliability of the data transmission system. [C239]

"Auditory speech processing for scale-shift covariance and its evaluation in automatic speech recognition"

The syllables of speech contain information about the vocal tract length (VTL) of the speaker as well as the phonetic message. Ideally, the pre-processor used for automatic speech recognition (ASR) should segregate the phonetic message from the VTL information. This paper describes a method to calculate VTL-invariant auditory feature vectors from speech, using a method in which the message and the VTL are segregated. Spectra produced by an auditory filterbank are summarized by a Gaussian mixture model (GMM) to produce a low-dimensional feature vector. These features are evaluated for robustness in comparison with conventional mel-frequency cepstral coefficients (MFCCs) using a hidden-Markov-model (HMM) recognizer. A dynamic, compressive gammachirp (dcGC) auditory filterbank is also introduced. The dcGC provides a level-dependent spectral analysis, with near instantaneous compression, and two-tone suppression. [C240]

"Step-frequency radar with compressive sampling (SFR-CS)"

This paper proposes a novel radar system, namely step-frequency with compressive sampling (SFR-CS), that achieves high target range and speed resolution using significantly smaller bandwidth than traditional step-frequency radar. This bandwidth reduction is accomplished by employing compressive sampling ideas and exploiting the sparseness of targets in the range-speed space. [C241]

"Cramйr-Rao bound for time reversal active array direction of arrival estimators in multipath environments"

In this paper, we study the Cramer-Rao bound (CRB) for time reversal (TR) based direction of arrival (DOA) estimators operating in a rich multipath environment. Our setup is based on an array of active antennas capable of estimating the range and DOA of a passive target. We derive an analytical expression for the CRB of the TR/DOA estimator and compare it with that of the conventional DOA estimator by expressing the two CRBs in terms of the multipath parameters (multipath's attenuations and delays). Our analytical results are verified by running Ground Penetrating Radar (GPR) simulations using the electromagnetic Finite Difference Time Domain (FDTD) models. Our simulations illustrate the potential of superior performance with gains of up to 15 dB possible with the TR/DOA estimator over the conventional approach. [C242]

"Empirical model of vegetation clutter in forward scatter radar micro-sensors"

Spectral and statistical properties of measured vegetation clutter are analyzed for ground-based forward scatter radar (FSR) sensors operating in VHF/UHF bands employing omni-directional antennas. The empirical computer simulation model of vegetation clutter is proposed. [C243]

"An Empirical Analysis of the Factors Determining Multiple Subscriptions in the Swedish Mobile Phone Market"

This study aims to explain the factors determining multiple subscriptions in the Swedish mobile phone market. A generalized Poisson model of count data from a national survey in Sweden finds that business subscriptions and house-hold size are the main predictors of the multiple mobile phone subscriptions, along with individual demographic characteristics such as, age, gender and type of occupation. Other factors such as education level, area of living, prepaid as the main subscription, as well as mobile Internet and fixed phone subscription are not significant. These facts indicate that business subscriptions and subscriptions for family are the main factors that determine the incidence of multiple subscriptions in the Swedish mobile phone market. The operator can gain from this situation by tightening the network effect to the existing sub-scribers. This can be done by encouraging them to have additional subscriptions from the same operator or intra-operator multiple subscriptions. For the regulator, this situation has to be taken into consideration when determining the Significant Market Power (SMP) since a larger market share does not always indicate actual market domination. [C244]

"ARM9-based real-time acquisition of orchard soil information and GPRS wireless transmission control system"

This paper presents a new ARM+GPRS structure which can apply in the orchard soil information collection and transmission. It is a design of data acquisition and wireless transmission control system based on ARM9 with a microprocessor chip S3C2410, it is used for orchard soil realtime acquisition, data transmission and control between upper and lower computers through GPRS module. It describes that how the hardware platform works and how to accomplish the design by software. The hardware platform consists of core processor, orchard soil data acquisition module and GPRS communication module. It has been proved by experiments that the system has features of small size, high performance, real-time and low-cost. [C245]

"Research on fault monitoring for railway automatic blocking and continuous transmission lines"

The characteristics of railway automatic blocking and continuous transmission lines are studied. On this basis, a fault monitoring system is designed. Monitoring units installed on lines can detect the short fault directly (when earth fault happens, "S-injection method" is applied), and send out this information to adjacent GPRS units via Radio Frequency (RF). Then adjacent GPRS units send the data to the server. Through analyzing the gathered data, the server can locate the fault section. The test and field operation indicates that this system can identify fault section accurately and rapidly, increasing both of economic and social benefits. [C246]

"An embedded wireless transmission system based on the extended user datagram protocol

(EUDP)"

As the application of embedded wireless communication system spreads fast in many fields, it is becoming a significant problem to obtain both high speed and reliability during the transmission of large amounts of data. This paper extends the traditional UDP protocol by adding the mechanism of package sequencing and accumulative retransmission, so as to combine the speed of UDP protocol and the reliability of the extended upper protocol and build an embedded system for transmitting large amounts of data quickly and reliably. The system is designed based on STM32 microcontroller and wireless module. Through the General Packet Radio Service (GPRS), the system can communicate both data and instructions with the remote control center via Internet. Experimental results reveal that the extended UDP protocol (EUDP) reduces the transmission delay significantly compared with the usual TCP protocol, while ensuring a considerable degree of reliability. Thus the system is ideal for transmitting large amounts of data in real time. [C247]

"Design of intelligent node based on distributed hybrid net control system"

TMS320F2182 DSP chip is applied in the design of intelligent node hardware, and the embed system design method, Microsoft Massage Bus and modularization technique are adopted in the realization of intelligent node. The paper gives the software design method of intelligent node based on CAN Bus. The data collected by intelligent node can be transmitted to computer in real time, and the distributed control system based on CAN Bus and GPRS presents the characters such as safety, real-time and economic, which is worth applying in process control field. [C248]

"Optimized Handover Scheme Using IEEE 802.21 MIH Service in Multi-Service Environment"

The scenario that different RATs are used to satisfy mobile user's two or more application requirements simultaneously in heterogeneous network is called multi-service environment. Recently, powerful multi-mode wireless terminal, which is suitable for multi-service situation, has become the test product. The mobility management (MM) issues, especially handover, of different interfaces in the test product are resolved independently with a network layer solution FMIPv6. The packet loss of FMIPv6 could become an MM bottleneck. A potential approach of improving packet loss performance jointly between interfaces in multi-service scenario exists in our research. Therefore, this paper proposes a novel scheme using IEEE 802.21 MIH services to improve packet loss performance by utilizing the active links to maintain the data flow. The MIH services, Link_Action and MIH_Link_Action, are extended and an MIH event named Link_PDU_Receive_Status is added. A complete message exchange in handover procedure is provided. Numerical analysis shows that the proposed scheme performs better in terms of packet loss comparing with the traditional independent FMIPv6 scheme. [C249]

"Ecodesign of low-voltage systems and exposure to ELF magnetic fields"

The Ecodesign of modern residential and commercial low-voltage systems implements energy and equipment cost savings, optimizing the size of the distribution system without compromising their functionality or causing environmental contamination, including electromagnetic pollution. Protection of persons against shock hazards should result increased, and the electrical interferences among power systems reduced. To achieve the aforementioned improvements, a possible Ecodesign calls for an earthing system utilizing single-phase separation transformers installed in the unit, grounded at the mid-point of their secondary side. The introduction of a source of magnetic fields into the premises at the power frequency of 60/50 Hz (i.e. extremely low frequency, ELF) might expose persons to their potential adverse health effects, as well as, sensitive electronic equipment to disturbances. This paper seeks to clarify this matter by evaluating the ELF magnetic fields as produced by the user's own transformer and by other units eventually present in the vicinity. [C250]

"AADL modeling of M2M terminal"

This paper presents the application of Architecture Analysis and Design Language (AADL) for the modeling of Machine to Machine talk (M2M) terminal. Examined terminal is used in telemetry, utilizing GSM network and GPRS/EDGE services for the data transmission. The AADL model is used to apply mapping of the embedded software to the hardware of the terminal. Embedded software is designed as a multi-threaded application. Threads are described using AADL at the system level and through their implementations. Interaction between the threads is also discussed in terms of AADL behavior analysis. [C251]

"Intrinsic Membrane Noise in Living Cells and Its Coupling to External Fields"

The phosopholipid bilayer membranes surrounding the living cells, play a crucial part in cell signaling and fundamental physiological processes responsible for sustaining life. The study reports physical rationale and

some interesting experimental findings on the existence of intrinsic membrane noise (distinct from well-known 1/f and Johnson noise) and coupling of living cell membranes with ambient electromagnetic fields in the Extremely Low Frequency (ELF) regime. The manifestation of these interactions is reported to be seen in the form of amplification of ambient electromagnetic fields by cell membranes and resulting currents, as detected with the help of sensitive pico-ampere and femto-ampere amplifier instrumentation. An experimental technique is introduced to measure such minuscule biological signals existent in living cells. [C252]

"Privacy-Aware Location-Aided Routing in Mobile Ad Hoc Networks"

Mobile Ad-hoc Networks (MANETs) enable users in physical proximity to each other to exchange data without the need for expensive communication infrastructures. Each user represents a node in the network, and executes a neighbor discovery Typically, nodes broadcast beacon messages that are received by other participants within the sender’s communication range. Routing strategies are computed on-line based on the locations of nearby nodes, and geocasting is employed to deliver data packets to their destinations. However, mobile users may be reluctant to share their exact locations with other participants, since location can disclose private details about a person’s lifestyle, religious or political affiliations, etc. A common approach to protect location privacy is to replace exact coordinates with coarser-grained regions, based on the privacy profile of each user. In this paper, we investigate protocols that support MANET routing without disclosing exact positions of nodes. Each node defines its own privacy profile, and reports a cloaked location information to its neighbors. We adopt a novel strategy to advertise beacons, to prevent inference of node locations. We also propose packet forwarding heuristics that rely on cloaking regions, rather than point locations. Our extensive experimental evaluation shows that the proposed routing scheme achieves low delays and high packet delivery ratios, without incurring significant overhead compared to conventional MANET routing protocols. [C253]

"Design of Command and Dispatch System of Airport Support Vehicle"

Based on the technology of GPS/GIS/GPRS, the airport support vehicle command and dispatch system is designed in this paper. The information transmission between the vehicle mobile termination and the monitoring control center is established. The function of graphic display and phonetic warning of the airport support vehicle's working process is realized. [C254]

"Exploiting Tracking Area List for Improving Signaling Overhead in LTE"

Reducing the overhead required for tracing mobile devices is one of the major aspects in the study of mobility management of a cellular network. The Long Term Evolution (LTE) systems give a more flexible configuration of Tracking Area (TA) design by means of Tracking Area List (TAL). Being a novel concept, TAL goes beyond the capability of the conventional TA approach. Although TAL is expected to be able to reduce the overall signaling overhead by overcoming a couple of major limitations of the conventional TA concept, how to apply TAL in large scale networks, remains unexplored. In this paper, we present a novel approach for allocating and assigning TA lists. The approach does not require any data other than what is needed for conventional TA design. We present numerical results to illustrate the approach for a realistic network of Lisbon city. The experiments demonstrate the ability of TAL in reducing the signaling overhead compared to the conventional TA concept. [C255]

"The vertical handoff between GSM and Zigbee networks for vehicular communication"

Wireless communication becomes important part of everyday life, and in the future, there will be new wireless technologies. Vertical handoff between networks with different wireless network interface becomes so important especially in mobile devices that move at high speed such as vehicles. The vertical handoff is required for a vehicle to connect to different wireless networks for different purpose. For example, vehicles may connect to cellular network to send short messages such as news or email, and may connect to short range networks to acquire some localized information. In this paper, we investigate the possibility and the performance of using GSM/GPRS module as an interface to cellular networks and Zigbee module as an interface to short range networks. In our experiments, we set up both soft and hard handoff scenario to measure the packet round trip time and delay. From the results, it shows that the packet round trip time (RTT) in GPRS networks on the average is around 1-2.5 seconds and in Zigbee network is less than 100 msec. In case of a hard handoff, mobile device needs to prepare for a connection to attach to networks before transferring data. From the results, the network attach time in GPRS network on the average is around 4.5-5 seconds while in Zigbee network is less than 10 msec. [C256]

"Design and Development of Embedded Intelligent Public Transport Vehicular Terminal"

Intelligent public transport vehicular terminal is an important part of intelligent public transportation system. In view of the fact that the municipal transportation structure in our country and status of the public transportation-

vehicular equipment, the paper presents a new type of system-design of the intelligent transportation vehicular equipment. System that is based the embedded intelligent transportation vehicular terminal and take the S3C2410A processor as the core is designed. The paper mainly makes the detailed introduction to this terminal's hardware platform design and software design based on the WINCE embedded operating system. [C257]

"Lightweight efficient and feasible IP multimedia subsystem authentication"

In IP Multimedia Subsystem(IMS) of UMTS, IMS information is delivered through the general packet radio service(GPRS) transport network, before a user equipment (UE) can access the IMS service, it must performance both packet-switch domain and IMS authentication. It is inefficient that almost all involved steps in IMS authentication are duplicated. Hence, some one-pass IMS authentications were proposed to increase the efficiency of the IMS authentication. Unfortunately, these protocols have some problems which make them unfeasible. Therefore, we proposed a lightweight one-pass IMS authentication protocol to reduce signaling traffic. Through analysis, we found that it has minimal impact on the network functionality and will not influent the succeeding IMS re-authentication, which makes it more feasible. [C258]

"Self-Organizing Networks: State-of-the-art, challenges and perspectives"

In this paper, a general overview of Self-Organizing Networks (SON), and the rationale and state-of-the-art of wireless SON are first presented. The technical and business requirements are then briefly treated, and the research challenges within the field of SON are highlighted. Thereafter, the relation between SON and Cognitive Networks (CN) is covered. At last, the application of Algorithmic Information Theory (AIT) as a possible theoretical tool to support SON in addressing the growing complexity of networks is discussed. [C259]

"Improving Service Availability in 3GPP Generic Access Network (GAN) by Adaptive Keep-Alive Interval (AKI)"

The Generic Access Network (GAN) developed by 3GPP extends services to unlicensed spectrum. A mobile station with multiple air interfaces can access 3GPP services through GAN and roam seamlessly between different radio access networks. However, resource management is a critical issue in GAN. To allocate GAN resources efficiently, we propose Adaptive Keep-alive Interval (AKI). By using AKI, an MS can send less signaling messages. In addition, AKI can increase system utilization by releasing unused resources. The proposed AKI is evaluated by extensive simulations. The results show that the proposed AKI can reduce signaling overhead and increase GAN utilization significantly. [C260]

"Combine draft detector with GPS receiver to monitor barge's loadage"

In order to maintain channels and harbors at safe depths, periodic dredging is required. With increasing environmental awareness and tightening legislative control, licenses and approvals are required to dispose of dredged material. For the sake of supervision of loaded barges, this article introduces a Barge's Loadage Monitoring System (BLMS). The applications utilized in Xiamen waterway authority can display various information needed for supervising barges on electronic chart platform visually and comprehensively. The main feature of its innovation is combining draft detector with GPS and on-board transponder technologies. [C261]

"Research of Portable Community-Oriented Health Monitoring"

A new kind of wrist-worn health monitoring terminal is developed to realize multi-parameter measurement, wearing facilitates and reliable data transmission. The physiological parameters includes body temperature, pulse rate, breath rate and waveform, blood pressure, electrocardiograph(ECG), electroencephalogram(EEG) and the level of blood glucose real-timely. This terminal is designed by modules, which includes intelligent processing module based on MSP430, electrodes for collecting the physiological signals and electric circuit module for signal preprocessing, wireless data transmission module based on GPRS. The terminal is able to analyze the above signal. The terminals can be formed as a network based on wireless transmission. Credible and portable terminal for life indication is realized by developing micro-sensor and integrated modules for signal detecting and processing. Amounts of clinic tests have been done and the results have been approved by the doctors in hospitals and patients. [C262]

"Extremely Low Frequency Electric Field Induced Mutations in Escherichia Coli K12 Strains"

Escherichia coliK12 W3110 was treated by extremely low frequency electric field (ELF EFs) 10min with the field intensity of 100, 200, 300, 400kV/m. The mutant frequency reached 31.2Ч10-6at field intensity of 100kV/m, which was about 26-fold over the background (1.2Ч10-6) and 12-fold over the controls (2.5Ч10-6). This result

indicated that the ELF EFs could act as an mutagen. The results also show that base pair (bp) substitutions were the main type of ELF EFs induced mutations. Although all types of base pair substitutions were observed, 30% of the bp substitutions were G:C → A:T transitions, 70% of the bp substitutions were A:T→T:A, G:C→T:A, A:T→C:G, G:C→C:G transversions. When the spontaneous and the ELF EFs exposure group were compared, base-pair substitutions, deletions and additions of the ELF EFs exposure group were significantly increased, and the deletion or the addition of a 5'-TGGC-3' sequence at hot spot was decreased from 82 to 26%. But the remarkable increase in absolute Mutation Frequency (MF) of the deletion or the addition of a 5'-TGGC-3' sequence at hot spot in the ELF EFs exposure group suggested that ELF EFs did induce the mutations of this type. The spectra of our ELF EFs exposure group with increasing G:C to A:T transitions and A:T to T:A transversions indicate that ELF EFs exposure may induce SOS response. [C263]

"All-weather perception for man-portable robots using ultra-wideband radar"

Autonomous man-portable robots have the potential to provide a wide range of new capabilities for both military and civilian applications. Previous research in autonomy for small robots has focused on vision, LIDAR, and sonar sensors. While vision and LIDAR work well in clear weather, they are seriously impaired by rain, snow, fog, and smoke. Sonar can penetrate adverse weather, but has limited range outdoors, and suffers from specular reflections indoors. For the Daredevil Project, we have investigated the use of ultra-wideband (UWB) radar to provide obstacle detection capabilities for man-portable robots. Our research shows that UWB radar can effectively penetrate adverse weather, including dense fog, and detect obstacles that would be undetectable by vision or LIDAR under the same conditions. We have developed filtering algorithms that process the raw radar returns to eliminate reflections from ground clutter and make obstacles easier to detect. We have tested this system on an iRobot PackBot equipped with both UWB radar and LIDAR, and we have demonstrated how UWB radar can be used for obstacle detection in obscured environments. [C264]

"3G Mobile multimedia services (MMS) utilization in Indonesia: An exploratory research"

The number of subscribers to 3G mobile networks in Indonesia is around 8.2% of total mobile phone subscribers, which shows a very low number compared with other countries. There exists a huge potential market which is yet to be exploited. To capitalize on this market, however, it is important to know the potential use of the 3G mobile networks in Indonesia as a developing country. One of the potential uses of the 3G mobile networks is 3G mobile multimedia services. To understand the current status and potential of 3G mobile multimedia services use among Indonesians, it is important to explore the reason why some Indonesians have, and others haven't yet, embraced 3G mobile multimedia services, and perceiving these services. In this article, we present key findings of our research that addresses these objectives. Our study reveals that although many respondents aware of the 3G technology, only 47% of respondents use 3G mobile multimedia services. Even those who use 3G mobile multimedia services have perceived only a limited use of 3G mobile multimedia services. The service that they mostly use is the internet access followed by video call and mobile TV. The services such as video email, mobile video, movie preview, and video surveillance are not much used. 53% of respondents do not use 3G mobile multimedia services though some of them have 3G services support mobile phone. The main reasons they cited for non using 3G services are high cost of the services, no compatible hand devices, family and friends do not use 3G mobile multimedia services, and 3G applications and services are not easy to use. [C265]

"Antenna optimization using multi-objective algorithms"

This paper presents several applications of multiobjective optimization to antenna design, emphasizing the main general steps in this process. Specifications of antennas usually involve many conflicting objectives, related to directivity, impedance matching, cross-polarization and frequency range. These requirements induces multiobjective problems, which are formulated, solved and analyzed here for three distinct antenna designs: a bowtie antenna for ground-penetrating radars, a reflector antenna for satellite broadcast systems, and a meanderline antenna for radio-frequency identification tags. Both stochastic and deterministic methods are considered in the analysis. [C266]

"The application and design of embedded wireless sensor networks"

Wireless sensor networks (WSNs) are composed of sensor nodes that have the ability of real-time perceiving and self-organization. Based on the consideration of performance, power-consumption and cost, this paper gives the hardware design of embedded wireless sensor networks node, which is centering on the popular ARM core microprocessor chip AT91SAM7S256, and the system hardware and software design of embedded wireless sensor networks car security system. [C267]

"A Novel Homogeneous Mesh Grouping Scheme for Broadcast Cognitive Pilot Channel in Cognitive Wireless Networks"

With the irreversible trend of the convergence and cooperation among heterogeneous wireless networks, the need for network information awareness of user equipments (UEs) becomes increasingly imperative in the Cognitive Wireless Networks (CWN). As one of the candidate solutions for network information delivery for UEs, the Cognitive Pilot Channel (CPC) concept has been brought forward recently, providing UEs with the necessary network information for network selection by using the public signaling channel. Besides, both broadcast and on-demand CPC modes have been proposed for the network information delivery under the assumption that the geographical region is divided into meshes. In this paper, a novel homogeneous mesh grouping (HoMGP) scheme based broadcast CPC mode is designed to improve the efficiency of broadcast CPC mode in the CWN. The homogeneous meshes are selected and grouped based on the frequency occupancy graph, which is obtained by using the image processing techniques. By grouping the homogeneous meshes together, both the frame format and flow of the HoMGP broadcast CPC mode are designed to deliver heterogeneous network information to the UEs efficiently, which is verified by numerous simulation results. [C268]

"Implementation of handheld remote sense image calibration system software"

This paper based on 4S(GPS, GPRS, GIS and RS technology in a integrated system) and designed a remote sense image calibration system by using a high precise GPS module which is integrated in the handheld client device. This article designed and realized a software architecture and a data storage and transfer model though the GPRS real-time network. The handheld devices based on 4S changed the poor efficiency way of the original remote sense image of the manual data acquisition, post-mapping and other operations. The efficiency of oringinal system is also greatly enhanced by implement the digitization of external work system which is constituted on a collaborative platform within the inner work system. [C269]

"Design of elevator audio player controlled by wireless communication"

The objective of elevator audio playing system mainly concerns the device installed in elevator to provide music, advertisement and notifications. In this paper, GPRS is utilized for mode control and wireless instruction sequence update. As the core of the whole system, STM32 Microcontroller unit can browse and manage the catalog of files in SD card. Additionally, through building-up FAT 16 File System (FS), MCU will manage sound files in player flexibly and conveniently. Thus, the device supports enables three playing modes, namely, by category, by designated order or by random order. Laboratory Experimental result proves that the designed audio playing system is of flexible and stable maneuverability. This system will bring comfortable up-and-down experience to passengers, increase efficiency of elevator management and bring gains to advertiser and elevator service provider. [C270]

"GPR investigation on buried rocks in Martian subsoil for "WISDOM" project: Numerical and measurement set-up results"

In this work, the detection of buried rocks using a GPR system on a rover for Martian missions is investigated with both an experimental set-up and numerical simulations. The experimental set-up is made of a box filled with a host medium and buried basalts of different shapes and sizes. The numerical simulations, performed with a commercial software, are compared and validated with the measurement results, allowing for a greater flexibility of the analyzed environment and of the measurements devices. [C271]

"UWB antennas for communications and ground penetrating radar"

The design of an ultra wideband antenna (UWB) for communications and ground penetrating radar system presents challenges. There is often a desire for the antenna to be small while maintaining their UWB characteristics. This is especially the case in ground penetrating radar systems that need to fit into buried pipes. In this paper several antenna configurations are examined to meet these requirements. The coaxial gap antenna can be configured into a variety of combinations of radiating architectures, shielding sections and loading elements. The results presented in this paper demonstrate their attraction for Ground penetrating and communications applications. [C272]

"External calibration of GPR antenna accommodated on a rover"

This paper describes an external calibration of an antenna system that is used for rover based GPR-Systems. The used antenna system consists of two identical crossed double Vivaldi structures. After the description of the radar system, the electrical properties of the antenna system are characterized. The influence of the rover chassis is shown with the help of some simulated footprints. After explanation of the calibration in detail, it is

applied to outdoor measurements. [C273]

"A solution to a 2D electromagnetic imaging problem based on closed-form radiating and non-radiating sources"

This paper deals with the possible use of a closed-form solution to an equivalent inverse source problem, in order to solve the original inverse scattering problem and provide a method for electromagnetic imaging. Preliminary investigation are about the enhancement that the insertion on the solution of non-radiating terms could provide. Simulations show that the limitations related to the radiating part of the solution could be partially overcome by using also non-radiating components. [C274]

"GPR applications in dense cities: Detection of paleochannels and infilled torrents in Barcelona GPR applications in dense cities"

Barcelona is placed in a basin delimited by the Mediterranean Sea (E), the Collcerola Mountains (W) and the rivers Besos (N) and Llobregat (S). The city was built on Quaternary alluvial deposits and on the Tertiary and Palaeozoic materials of the surrounding mountains. The Quaternary materials are preponderant in the plane of the city, presenting a high lateral variability due to the paleochannels and infilled torrents existing between the Sea and the Mountains. The city was built on these heterogeneous materials. In order to prepare a detailed vulnerability map of the Barcelona city, a GPR survey provides information about the position of these geological structures. Results were compared to H/V spectral ratio measurements and soundings. [C275]

"Multi-channel ground penetrating radar: Hardware and software"

Current state of our multi-channel GPR elaboration is presented. GPR is designed for diagnostics of roads' coating, detection and recovery of subsurface infrastructure in soil down to 1.2 meters depth. Multi-channel architecture allows inspecting 1-m width strip of ground surface simultaneously. Designed GPR parameters, its hardware and software are discussed. 3D images of subsurface objects formed by GPR as well as results of objects geometry restoration are presented. Dedicated software enables estimating the geometry and electro-physical parameters of subsurface volume and objects inside of it. For this, so-called Computational diagnostics method, which is based on reverse problem solution, is implemented. [C276]

"Solar Wireless Intelligent Online Hydrological Monitoring System"

Water environment monitor is an important component of environmental monitoring system. In this paper, the authors discuss that the solar energy technology, the wireless GPRS network transmission technology, VPN agent technology, sensor technology and information security technology could be employed in the field of hydrology intelligent on-line monitoring to solve the on-site monitoring of power supply, and expanded the scope of monitoring and capacity. Through the VPN Proxy Server to provide guidance for on-site data collection and achieve "the collection, processing, and application" integrated treatment, and then to meet the needs of the systematic monitoring of ecological environment, geology, soils and climate. This system uses an embedded Linux system deployment, and security certification technology. [C277]

"Efficiency upgrading of data transfer in mobile networks"

Traffic intensity of data transmission in modern mobile networks produces a huge load. Unloading procedures of networks, in particularly WiFi offload, are considered. [C278]

"Recovery of road coats and related objects parameters based on method of computation diagnostics-Dipole approximation ofground penetrating radar antennas"

Several approaches, which allow increasing the reliability of diagnostics of plane layered medium in Ground Penetrating Radar (GPR) applications, are considered. This increase is reached due to accurate account of parameters of transmit-receive antenna (via electrodynamic modeling) and radio frequency channel of GPR. [C279]

"Safety issues and damage to equipment with both Smart Grid and home network connections"

Equipment getting power from the Smart Grid often has connections to the home network, a configuration which during a lightning storm is prone to safety issues and damage. Lightning can occur as direct strikes to a service, or as nearby strikes which induce currents in a service. Protection against these events is important, and existing standards deal with these. But there is a situation that existing standards have not considered, and it can result in a shock hazard and equipment failure. This potential failure is caused by Ground Potential Rise (GPR), in a

site which has two or more ground references; for example AC power grounded at the service entrance at one side of a house, and a phone line grounded via a surge protector at the opposite side. The GPR produces a voltage gradient between the two ground references. This high voltage is a potential shock hazard. It can also cause a breach of basic or enhanced insulation, with damage and potential exposure to hazardous voltages resulting. This paper discusses GPRs; how to test an equipment to see if a GPR will cause a problem; and what to do if it does. [C280]

"FDTD analysis of a planar spiral antennas for the ground penetrating radar"

In this paper, the planar spiral antennas for the ground penetrating radar (GPR) were calculated by using FDTD method. The frequency characteristics of the impedance ware discussed by changing the expansion angle of the planar element and the winding angle of the spiral. It was observed that a wide-band characteristics can be realized by a careful design of the antenna shape. Because the transient response of a GPR antenna is very important, the transient radiated electromagnetic wave was also investigated. [C281]

"Based on Internet/2G/3G Converged Network Intelligent Image Monitoring System"

In this paper, aimed at the wired network bottlenecks, for example: the unattended field sites such as the mining areas, lakes, pipeline and oil production which are not fit to set up the wired networks, it makes the most of the motion detection alarms of photoelectric, microwave and infrared fields in video as the composite alarm detection sources and on-line monitors the outdoor involving prohibited areas. Using mature 2G wireless network technology, the system transmits on-line controlling data, controls the opening and closing of 3G image channel and maximizes the efficient use of 3G broadband network by transmitting the effective image data and reducing the transmission of invalid data. Thereby, it reduces the expensive expenses of 3G transmission. [C282]

"Propagation Analysis of ELF Electromagnetic Emission below the Cut-Off Frequency in Ionosphere"

The aim of this paper is to show the propagation and polarization characteristic of some types of ELF electromagnetic emission below the cutoff frequency observed by DEMETER satellite. All the analysis is based on multi-component measurement method of electric and magnetic field in ELF band. According to the wave vector and planarity and ellipticity of polarization, we can judge the property of electromagnetic emission below the cutoff frequency. Then it will help us analysis the origin of emission further. In is this paper, only three types of emission are analyzed, and their emission origins are guessed. [C283]

"Implementation of real-time video streaming with fuzzy logic controller"

The increasing demand of video streaming recently causes a trouble on network congestion due to a huge data rate transmission. One concept to reduce such a problem is to dynamically adjust the rate of video streaming according to an available bandwidth. This paper introduces a fuzzy logic controller to control a real-time video streaming by adjusting either a frame rate or a video quality. In this paper, two experimental environments, LAN or GPRS connections, are investigated. The results show that a fuzzy logic controller is able to control a frame rate and a quality of video streaming according to an available bandwidth automatically. [C284]

"Development and Application of Mobile Water Level Monitoring Based on Multi-sensor Integration"

According to the current status of water level monitoring of inland river, this paper presents and designs a multi-sensor integrated dynamic system for mobile water level measurement, which is based on CORS(continuous operational reference system) GPS(global positioning system), GPRS(general packet radio service), PDA(personal digital assistant) technology as well as a post processing platform. The system design, signal quality control and data processing are researched in detail. This system has been used for an actual experiment. The results show that this system has high stability, reliability and flexibility. It is a very-well supplement for the present water level monitoring based on water-level stations. [C285]

"The Design of Multi-Parameter Online Monitoring System of Water Quality Based on GPRS"

The major method of water quality monitoring was sampling in the scene at present in China. In response to the problems such as weak sampling capability of water quality, untimely data processing and so on, based on GPRS technology, the design scheme of an automatic water quality monitoring system is proposed. The system utilizes the water quality monitor to process the sample and send the relevant data to the monitoring center through the GPRS data transmission. Ultimately, the system realized the function of remote collection, transmission and procession of the water quality parameters. [C286]

"Design and Implementation of Wireless FAEM System Based on the ZigBee and GPRS"

A wireless FAEM (facility agriculture environmental monitoring) system is presented by using ZigBee and GPRS technology, and the hardware realization and software flow are given too. By means of ZigBee wireless sensor module, the method can get together much information on soil humidity, Carbon dioxide, temperature, humidity and so on. Then such information is delivered to the remote control center through GPRS. Two kinds of internet technology can complement each other. During the latter part of the test, the wireless system can achieve the required operational performance: reliable data transmission as well as higher real-time system, and also reduce power consumption and overall system cost. [C287]

"Development of Wireless Monitoring System Based on Digital Filter in Oil Well"

A wireless remote monitoring system based on GPRS that is used in oil well is developed in this article. The architecture of the system and the method of data acquisition are introduced. To reduce the noise, the arithmetic mean filtering method is used to process the data. The result of operation indicates that the system is stable, and offers high regulating accuracy and easy operation. The design meets the requirements of long-term stable operation of remote monitoring. [C288]

"Surface Acoustic Wave Resonators as Passive Buried Sensors"

Acoustic wave devices are well known passive transducers for probing through a wireless link a physical quantity. Amongst the two main classes of designs-resonators and delay lines-the former have the advantage of providing informations in a narrow band signal and are hence compatible with an interrogation strategy compliant with radiofrequency (RF) emission regulations, while the latter are probed by a short RF pulse with larger instantaneous energy and shorter response time. We here demonstrate the measurement of temperature using the two configurations, and more specifically for sensors buried in soil. While we demonstrate long term stability and ruggedness of packaged resonators, and signal to noise ratio compatible with the envisioned application, the interrogation range in insufficient for most purposes and we focus towards the use of delay lines. Indeed, the interrogation method of the latter is similar to that used by Ground Penetrating RADAR (GPR) which displays interrogation ranges in the meter to tens of meters in the lower RF range, depending on soil water content, permittivity and conductivity. Thus, we demonstrate here both the temperature measurement capability of a delay buried delay line and the limit of detection of its signal. [C289]

"Broad beam high-frequency bistatic cross sections of the ocean surface"

For a bistatic high-frequency radar with a broad beamwidth receiving antenna, over the range-limited clutter cell, the deviations of bistatic angle and wind direction would bring about broadened bistiatic cross sections of the ocean surface in contrast to a narrow beam bistatic hf radar. Based on Eric Gill's narrow beam HF cross sections of the ocean surface, broad beam HF bistatic cross sections of the ocean surface were presented and the results were obtained by numerical simulation. The results showed that the broad beam bistatic cross sections of the ocean surface were the superposition of narrow beam and were broadened at the same time. [C290]

"An Embedded System of Bridge Stress Monitoring Based on ARM9 and Zigbee"

With the growing number of large-scale bridge construction as well as the increasing complexity of form and function in recent years, the bridge's structural health monitoring technology has become increasingly important. This work presents an ARM9-based embedded bridge stress monitoring system. The system uses the measuring principle of vibrating wire sensors to collect bridge stress change, and the wireless transmission of data will be completed by the Zigbee. The stress acquisition module driver was analyzed and designed under Linux. Depend upon the embedded GUI solutions-QtEmbedded, a highly effective, stable GUI application has been designed. The new design is suitable for the real-time bridge stress monitoring, thus making an important towards low-cost and portable systems. [C291]

"Remote Monitoring System of Lead-Acid Battery Group Based on GPRS"

This paper presents a remote online monitoring system for the operation of lead-acid battery group in telecommunication base stations. Combining the General Packet Radio Service (GPRS) communications and Internet connections, the system realizes data transmission between remote acquisition modules and data services center. The collected data of battery parameters in the center are analyzed and processed, and then it can be monitored by using any standard browser distributed worldwide if access permission is given. Both battery users and battery manufactures can use the system for the battery power management, maintenance and troubleshooting. [C292]

"The target detection for GPR images based on curve fitting"

Due to the complexity of the medium composition, physical characteristics and the spreading of electromagnetic waves, the extraction and automatic target detection of the Ground-penetrating Radar (GPR) is extremely complicated and has become an important issue in the practical application of GPR. In this paper, a method based on curve fitting is proposed by using the hyperbolic echo characteristics. The edge lines of GPR images firstly obtained by using image preprocessing methods and hyperbolas are fitted to approximate the edges. Finally, hyperbolic echo apex positions in the GPR images are extracted and marked on their apexes. The experimental results show that all targets are detected correctly. [C293]

"CCD camera and IGPS tracking of geophysical sensors for visualization of buried explosive devices"

High-resolution Ground Penetrating Radar (GPR) images of the ground surface and shallow subsurface are needed in order to detect and identify small buried explosive materials such as Anti-Personnel (AP) landmines. A key requirement to produce sharp visualizations is centimetre-precise sensor positioning with real-time imaging results. We are pursuing two complementary approaches to accomplish this task: 1) Sensor tracking with a CCD camera, 2) and large work volume Indoor GPS. In outdoor field tests both methods have successfully imaged small landmine targets, which has a plastic body of less than 10cm diameter. [C294]

"Design and implementation of MMS system based on GPRS modem"

Currently MMS systems, most of them existed a lot of problems, such as code confusion, large limitations on Secondary Development, bundled editing and sending. Through studying on GPRS MODEM and mechanism of MMS receiving and sending, a design project for multimedia communication system based on GPRS modem is proposed in this paper. SMIL and NowSMS platform was adopted in the design, to ensure unified coding and receiving and sending interfaces. Also, the separation of editing and receiving and sending improves the efficiency of using the system. By using this method, the MMS system can be easily embedded into other systems. [C295]

"Wireless communications technologies for energy networks in a non-industrialized society"

It is of great importance to the organisational strategy of the energy utility as well as to the society at large the activities involving the utility and the energy consumer's communication activities. However, we discovered that such communication activities in the poor third world countries with poor infrastructures are wholly undeveloped. This article will propose a framework to define the strategy which can leverage on the wireless technologies usage in order for the usefulness, efficiency and effective utilization of energy resources which are supplied by a particular electric utility could be further enhanced. [C296]

"Ground penetrating radar for tunnel detection"

Ground penetrating radar (GPR) systems have important civil and military applications and can be used for surveying subsurface structures such as bunkers, tunnels and buried pipes. However, GPR systems for detecting deep tunnels still face many challenges, and their performance often depends on soil types, specific targets and subsurface geological features. This paper discusses challenges in tunnel detection and provides a useful and efficient procedure to develop system requirements and predict detection performance. [C297]

"GPR evaluation test for humanitarian demining in Cambodia"

ALIS is a dual sensor for humanitarian demining, which is a combination of electromagnetic Induction sensor (EMI) and Ground Penetrating Radar (GPR), developed by Tohoku University, Japan. ALIS is equipped with a sensor tracking system using a CCD camera with image processing, which enables signal processing for subsurface imaging. Two sets of ALSI have been deployed in mine fields in Cambodia since 2009 and more than 50 buried landmines have been detected. We found that the Synthetic Aperture Radar processing (SAR processing) is effective not only imaging the buried objects, but also for reduction of clutter of soil. [C298]

"Extremely low frequency magnetic field survey in indoor distribution substation in Egypt"

The use of electricity become an integral part of everyday life. Besides that, exposure to extremely low frequency (ELF) magnetic fields from electric power transmission and distribution has been an emerging occupational and public concern due to their potential health effects. Utilities concern over the possible health effects from electromagnetic fields (EMF) has led to the preparation of this research. The research aims to compare between

the measured magnetic field values and the simulated models for the indoor medium to low voltage (MV/LV) distribution substations. To calculate the magnetic flux density in the substations, interactive software SUBCALC is used which is based on closed form solution of the Biot-Savart law with 3D conductor model. The comparison between the measured values and the simulated models was acceptable. However there were some discrepancies, as expected, due to the current variation during measurements. [C299]

"In-situ broadband soil measurements: Dielectric and magnetic properties"

This paper presents an in-situ method for measuring both electric and magnetic properties of Hawaiian volcanic soil for GPR applications in a broad frequency range from 50 MHz to 1GHz. For the in-situ probe, we combined two monopole antennas with parasitic elements into one piece to achieve reflection (S11) and transmission (S21) measurements simultaneously. Finally, the in-situ probe has a shape of a multi-conductor TEM transmission line, which consists of five conducting rods, two ground plates and two coaxial feed connectors. In a typical measurement the in-situ probe is connected to a two ports vector network analyzer and system calibration is then performed to characterize the sample free device. The calibration is based on measurements of the S-parameters for sample free and sample loaded devices. A unique post processing algorithm has been developed to extract accurate constitutive parameters (ε^* μ^*) from the scattering parameters (S11, S21) of the soil probe, which will be discussed in this paper. The prototype in-situ soil probe and post processing algorithm were also tested by both numerical simulation and actual soils in volcanic red soil. The simulation results showed around 1 % of error over the operational frequencies between 100 MHz and 800 MHz. Actual measurement results conducted by the in-situ probe and developed algorithms were in very good agreement with those obtained by a laboratory method. Simulation and actual measurement data will be presented in this paper. [C300]

"Design of sewage flow remote monitoring system over GPRS network"

In this paper, a new sewage flow remote monitoring system over General Packet Radio Service (GPRS) is presented, which monitors the sewage flow parameter remotely in real time. In the proposed system, GPRS network is adopted as the wireless sensor network, and the data between the slave computer and the remote terminal are transmitted via the GPRS and Internet networks. Finally in the remote terminal, the Winsock control of Visual Basic 6.0 is responsible for displaying, storing and analyzing the data of the sewage flow. The system is easy to implement and has a high degree of automation, by which the acquisition, transmission and processing of the sewage flow data can be achieved in wireless, networked and intelligent manners. [C301]

"Recent issues relevant to GPR prospecting"

In this paper some methodological aspects relevant to GPR prospecting under a linear model are proposed. In particular, it will be presented how the exploitation of the Diffraction Tomography (DT), joined to the tool of the Singular Value Decomposition (SVD) allows to give an answer to several theoretical and above all strategic problems in GPR prospecting. [C302]

"Large scale underwater FDTD ELF simulations using Acceleware and MPI parallel processing"

Very large FDTD simulations are being developed to determine the underwater propagation of EM signals at ELF frequencies. Two different approaches are being use to handle the large computation spaces, the use of hardware and software by Acceleware, and the use of the Message Passing Interface (MPI) for parallelization. [C303]

"On the imaging applications of ground penetrating radar"

This paper presents a brief overview on the imaging aspects of ground penetrating radar (GPR). Different experiments in three fields of investigation are conducted to demonstrate the feasibility of GPR for the imaging of subsurface materials. First, the GPR signatures of electrically and dimensionally different objects located inside the sand pool are obtained and processed into a focused image. The resulted image reveals that even the targets which have inherently low-level returns can be located by GPR. The second experiment is aimed to detect the water leaks from the plastic pipes via GPR technique. It is shown that additional water around the leak manifest itself as reflecting regions in the image, thereby giving information about the leak location. Furthermore, the GPR measurement of concrete column is performed to locate and image the stirrups within the columns. The results dictate the usability of GPR for concrete column analysis in measuring the position and size of stirrups. [C304]

"GPR modeling for landmine detection"

Ground penetrating radar (GPR), which can detect shallow buried low dielectric contrast objects in a variety of

soils by non-invasive subsurface sensing, is a promising technology for imaging low-metal or non-metallic landmines. In this paper we present a complete model of a complex GPR scenario which is solved via finite element method, and includes the actual impulse GPR system, interface, soil and targets. We obtain time domain signatures for different testmines and small objects under different soil conditions which are satisfactorily correlated with measurements. The simulated responses give us a broad understanding about the factors which control the electromagnetic scattering by small objects and are used to interpret the characteristics of the signatures according to the target and background parameters. These obtained waveforms may be applied to reduce the false alarm. [C305]

"Automatic monitoring and speed violation ticket system"

An automatic speed violation control system is proposed to worn the driver and using SMS communication for transmitting the speed and the unique information of the vehicle to the police station when a speed violation ticket to be issued. The system notifies a driver of certain control details in real time and prevents vehicle violation in advance via warning messages when the vehicle exceeds a safe speed zone, thus eliminating the manpower needed to use radars to check the speed of the cars or examine photographs of speeding vehicles taken by fixed cameras. [C306]

"Hybrid SVM-GPs learning for modeling of mitogen-activated protein kinases systems with noise"

In this paper, the hybrid support vector machines (SVM) and Gaussian process (GPs) are proposed to modeling of mitogen-activated protein kinases systems with noise. In the proposed approach, there are two-stage strategies. In stage 1, the support vector machine regression (SVMR) approach is used to filter out the some larger data set in the mitogen-activated protein kinases systems data set with noise. Because of the larger noise data in the training data set are almost removed, the large noise data's effects are reduce, so the concepts of robust statistic theory are not used to reduce the large noise data's effects. The rest of the training data set after stage 1 is directly used to training the Gaussian process for regression (GPR) in stage 2. According to the simulation results, the performance of the proposed approach is superior to the least squares support vector machines for regression, and GPR when the noise is existed in the mitogen-activated protein kinases systems. [C307]

"E.M. Inverse Scattering and Multi-Layer Perceptrons: Towards the automatic reconstruction of buried layers' properties"

The goal of this paper is a preliminary robustness assessment of a recently published ANN-based algorithm for the evaluation of subsurface layers' properties. In particular, the analysis will focus on the dependency of overall performances on the training set dimensions and the neural networks capabilities of managing numerical errors. [C308]

"Characterization of layered media using full-waveform inversion of proximal GPR data"

Full-waveform inversion of proximal ground penetrating radar (GPR) data is used to determine the electromagnetic properties of layered media. The radar system consists of a vector network analyzer combined with an off-ground horn antenna operating at ultra wideband. The GPR wave propagation is modeled for a multilayered medium using a recursive Green's function computed in the frequency domain. The antenna and its interactions with the layered medium are modeled using a linear system of complex transfer functions. GPR signals were acquired in laboratory above a two-layered sand medium and two concrete slabs separated by a thin air layer (simulating a fracture). Subsequent inversions permit to retrieve the electromagnetic properties and the dimensions of these thin-layered media. For humid sand, GPR-derived dielectric permittivities showed a good agreement (RMSE = 1.65) with measured volumetric water contents. Dimensions of the three-layered concrete medium could be retrieved with a millimetric accuracy. The method is promising for the non-destructive characterization of multilayered media, including thin layers, owing to the full-waveform inversion of the radar data in a large frequency bandwidth. [C309]

"Development of wideband crosshole and surface GPR for soil characterization: FDTD modeling and experiments"

Original wide band antennas dedicated to the imaging of the subsurface by crosshole or surface radar for civil engineering application have been developed. The challenge in the developments is twofold: in the case of crosshole radar, the design of a narrow antenna less than 61 cm wide working in the frequency band [0.5;1.5] GHz, and in the case of a surface radar the design of a compact antenna less than 55 cm long working in the frequency range [0.3;1] GHz. FDTD simulations have allowed to propose optimized antenna geometries and to

model both types of transmission links in the presence of a layered soil representing a moisture gradient. A first measurement campaign performed in the frequency domain in a clay sand embankment has allowed to validate the theoretical developments associated with the crosshole radar and to extract the dielectric parameters (permittivity and attenuation coefficient) as a function of the depth. The experimental validation of the surface radar will further be made and the performances of both types of radars will be compared. [C310]

"A bus management system based on ZigBee and GSM/GPRS"

This paper introduces a system design about bus management system based on ZigBee and GSM/GPRS, which implemented the basic functions of the intelligent public transport management system, such as monitoring the time of bus arrival, departing from the bus station and reporting stations name automatically. This system can ensure punctuality of vehicles to run, improve the automation level of reporting stations and quality of public transport service. The management system has low cost and thus it is more feasible. [C311]

"A low-cost handheld integrated UWB radar for shallow underground detection"

In order to fit the demands of low cost and miniaturization for ground penetrating radar (GPR), a handheld integrated high resolution UWB GPR system was developed. The design methods of the low-cost RF module with the impulse transmitter, the sequential receiver and the UWB antenna were described, and the structure of the embedded control module with the radar control unit, the data acquisition and the image process unit were also introduced. The integration improves the convenience and the stability of the system. Several experiments were carried out with the prototype. The experimental results show that the system could detect shallow underground objects effectively with high resolution. [C312]

"Session D4: Sensing and medical imaging; collision, ground-penetrating and through-wall radars"

{no data available} [C313]

"Design of Tap Water Pipe's Monitoring System Based on GSM/GPRS"

This paper analyzes the whole network architecture of Tap Water Pipe's Monitoring System Based on GSM/GPRS, and then analysis the hardware design and software design of the system, through the effective design of the system reached the real-time monitoring and Leakage-Detecting of underground water-pipe system, and improve the maintenance efficiency of the system. [C314]

"A low-power wireless remote sensor node design based on GPRS"

For the limitation of transmission distance and power volume of sensor node, a low-power remote data acquisition node which implements long-distance data transmission by combining General Packet Radio Service network with wireless sensor network is designed to acquire data periodically and upload data to remote server through General Packet Radio Service network. This paper expatiate hardware design principles of the node, power management model and software protocol design of the test system. Test results show that nodes can reliably acquire and upload data, the average work current of sensor node is 34mA, the peak current of cluster-head is 260mA when cluster-head uploads data to server, and sleep mode current are both less than 35uA. Performance indicators of node can fulfill the needs of remote monitoring applications in industrial field. [C315]

"A design of alarm system for substation perimeter based on laser fence and wireless communication"

In recent years, with the transformer substations basically unattended, a new topic for the security of power equipments and electric power lines is presented. Many alarm systems based on ac high-voltage grid, electronic pulse fence or infrared electronic fence have been installed in substations. In this paper, we propose an intelligent anti-theft alarm system based on laser fence and wireless communication network technology. Once occlusion of the laser beams occurs, it will transmit alarm information with accurate location to the control center through ZigBee network, and then send short messages to the defender's phone by GPRS. Moreover, the on-site searchlights could be remotely controlled by SMS with GPRS network. The architecture and implementation of the system is described in detail. Practical results show that our system is high-security, low-power and low false-negative compared with the conventional anti-theft systems. [C316]

"RF Mesh Systems for Smart Metering: System Architecture and Performance"

This paper describes the system architecture and the performance evaluation of a Radio Frequency (RF) mesh based system for smart energy management applications in the Neighborhood Area Network (NAN). The RF

mesh system presented in this paper leverages the Industrial, Scientific and Medical (ISM) band at 902-928 MHz and is based on frequency hopping spread spectrum (FHSS). The performance evaluation is based on a geographical model of the deployment scenario and implements geographical routing combined with appropriate radio propagation models. The results show that the system is able to handle Smart Metering communication traffic with a high reliability provided potential coverage gaps are properly filled with repeater nodes. The proposed methodology allows the identification of coverage gaps, which may cause bottlenecks in the network, prior to deployment and therefore supports efficient and reliable deployment and operation of the system. [C317]

"Comparison of the time-reversal and SEABED imaging algorithms applied on ultra-wideband experimental SPR data"

This paper presents a comparison study between a simple time-reversal algorithm (designed at LEAT) and the SEABED algorithm (designed at Kyoto University) with their application to multiple-target experiments. Data are collected with an eight element ultra-wideband antenna linear array connected to an eight port vector network analyzer, working in a frequency bandwidth starting from 1.5 GHz up to 8 GHz. Several target configurations demonstrate the advantages and disadvantages of both algorithms. [C318]

"Research on GPRS vehicle location network service system"

We can achieve vehicle location tracking on Internet by using GPRS vehicle location terminal and combining with Internet technology and GIS technology. The article gives the design structure of GPRS vehicle location network service system. The system is divided into three parts: GIS network workstations, network communications server and GPRS vehicle location terminal. Then, the article makes the brief introduction to the function of three parts of the system: GIS network workstations are responsible for sending command "Setting GPS Location Data Return Interval" to network communications server, and receiving GPS location data packet uploaded from GPRS vehicle location terminal from network communications server, making analysis of received GPS location data packet; The vehicles will be appeared as title in the specified position on the map by combining with GIS. Network communications server is responsible for receiving the command "Setting GPS Location Data Return Interval" from GIS network workstations and transmitting to the specified GPRS vehicle location terminal and receiving GPS location data packet pass backed from GPRS vehicle location terminal and distributing to the appropriate GIS network workstations simultaneously. GPRS vehicle location terminal is responsible for receiving the command "Setting GPS Location Data Return Interval" sent from network communications server and sending GPS location data collected by GPS module to network communications server. Finally, the article tests the feasibility of system design through experiment. By using the system, it will be easy and fast to make vehicle location tracking on Internet and timely access vehicle location information. [C319]

"Comparative study using an UWB measurement system and a RAMAC GPR system for subsurface imaging of the vaucluse karst aquifer"

The use of Ground Penetrating Radar is ubiquitous in near surface geophysics for subsurface object detection with a growing interest for hydrogeology monitoring and rock fracturing purposes. Conventional GPR surveys are done using narrow-band omnidirectional antennas. In this paper, we present a comparative study using an ultra-wide band measurement system and a RAMAC Ground Penetrating radar for subsurface imaging devoted to the survey of the karst aquifer located in the Vaucluse in Provence (French ANR MAXWELL Research Project). [C320]

"The control system for smart home based on GSM and the radio"

In order to guarantee the effective control to the appliances and ensure the safety of living environment, a control system for smart home has been designed. Based on the GSM network service and wireless communication, the system is developed with the MCU AVR mega 16 as the core. It can be divided into two working patterns: the long-distance pattern and the short- range pattern. Experiments have proved the two outstanding functions: under the long-distance pattern, the user can obtain long-distance monitoring of the living environment and get remote control to appliances through the GSM network service; under the short- range pattern, the user can observe the room environment condition through LCD and realize the short- range control to appliances using radio. [C321]

"Wireless home emergency system"

The wireless control technology, power line carrier technology, GPRS and other embedded technology are used to designs a home emergency system which receives start signal from users by wireless and uses GPRS to send help messages to specific persons, moreover starts the alarm and controls the lights to twinkle by PLC

technology, so if the users are in trouble they can get help as soon as possible. The experiment result shows that this scheme can achieve the expected effect. [C322]

"Real-time buried object detection using LMMSE estimation"

We present the application of linear minimum mean square error (LMMSE) estimation to GPR data for achieving buried object detection. Without employing any empirical assumptions, nonstationary form of Wiener-Hopf equations is applied to GPR signals to estimate the next sample in normal conditions. A large deviation from this estimation indicates the presence of a buried object. The technique is causal, which allows it to be used in real-time applications. Our approach is theoretically optimal in linear minimum mean square error sense, and it is also validated with the tests that are carried out on a comprehensive data set of GPR signals. [C323]

"Characterization of underground objects in UWB GPR by range profiling of phase"

In this work, a new phase-based data processing method for UWB subsurface radar is presented. The method utilizes extraction of the phase information related to the signal reflected from the particular depth inside the medium under test. This phase depends on dielectric properties of reflecting targets and thus can be used for their discrimination. Both amplitude and phase data is combined further in common GPR image where brightness is related to the amplitude of reflection and the phase profile is represented by color. The phase-extraction algorithm does not employ heavy computations and therefore is well suited for practical applications. Advantages of the method as compared to other data processing methods are shown using simulated data. The method performance is demonstrated also in several experimental examples. [C324]

"ALARIC Forward-Looking Ground Penetrating Radar system with standoff capability"

The use of low-frequency, ultra-wideband (UWB) radar technology to help detect concealed or buried targets has been demonstrated in the past, and could provide an important capability for combat systems on the battlefield. As part of Army's mission and technical objective, the Night Vision and Electronic Sensors Directorate, Countermine Division has designed and developed a Forward-Looking Ground-Penetrating Radar (FLGPR) with standoff capability. The forward-looking GPR is an impulse-based radar system with a bandwidth that spans between 300-3000 MHz. The innovative design uses commercially available, off-the shelf (COTS) components to create an effective sampling scheme of approximately 8 GHz. The design is modular, and can be scaled to provide a means for future improvement of electronic components to eventually meet the requirements of various combat systems. Early results from recent tests suggest that metallic targets buried near the surface can be detected with this radar system. [C325]

"Estimation of soil permittivity through autoregressive modeling of time-domain ground-penetrating radar data"

Recent advances in context-dependent processing for vehicle-based route clearance suggest that information regarding the environmental context associated with ground-penetrating radar (GPR) data can potentially be exploited to improve target detection performance. In this work, a statistical approach to estimating soil permittivity (dielectric constant) from raw time-domain data is presented as an alternative to electromagnetic model inversion. First, a large set of GPR data was simulated using finite-difference time-domain (FDTD) modeling over a heterogeneous subsurface with a rough air/ground interface. Physics-based features were then extracted from the simulated data through autoregressive (AR) modeling of B-scan time slices. A linear least-squares regression model was applied to the features, and experimental results indicate that the dielectric constant of the base soil can be accurately predicted by the regression model. This approach has several advantages over model inversion techniques for estimating soil permittivity, since it is causal, computationally efficient, and does not require an analytical electromagnetic model a priori. [C326]

"Application of Low-Frequency Communication System in Smart Plug Based on AVR MCU"

The supervisory information in pipeline such as the temperature and the pressure difference should be transferred by the smart plug, meanwhile the actions such as the plugging, plugging releasing, and safe preparedness starting should be realized according to the outside control instructions. Therefore the special low-frequency modem should be designed to solve the communication problems. According to the working principle of the low-frequency communication system and the low-frequency induction communication theory, the low frequency communication system which suitable for the working environment of the smart plug is designed, and the communication protocol is determined; the stable communication carrier of 20Hz is produced by the AVR MCU, and the method for Manchester coding and decoding based on the AVR MCU is put forward. The low-frequency communication system has good applicability which can be verified by the experiment. [C327]

"Study of Surrounding Rock's Stability Based on Monitoring Measurement of Highway Tunnel"

In allusion to some highway tunnels, which have many characters such as complex geologic environment, developed crack and joint of terrane, high degree of weathering, water-rich, large deformation of surrounding rock, and short self-stability time etc.. During construction stage of highway tunnels, based on varied monitoring measures which include perimeteral convergence, crown displacement, stress along bolt, ground subsidence, internal and eternal force of parapet grille, inner displacement of surrounding rock, internal and eternal force of secondary lining etc, and the ground penetrating radar advance forecasting, work out its deformation orderliness, acquire exact criterion of stability of surrounding rock, as well as alter design, adjust supporting parameters and construction technique in time, so insure the tunnel construction's safety and economy. Aiming at the sandstone and flowing carbonaceous mudstone, gives the surrounding rock's deformation and internal force of parapet grille characters, stable condition and critical criterion on condition that the preliminary supporting was done. The monitoring measurement results have referenced value to the similar tunnels. [C328]

"A Survey of System Platforms for Mobile Payment"

With the evolution and significant growth in wireless technology and the development of mobile commerce, businesses can achieve superior performance through the implementation of platforms for mobile payment. However, there are several platforms for mobile payment to choose from which makes the selection of an appropriate platform for specific applications a challenging task. In response to this challenge, the most common mobile payment platforms recorded in the literature have been reviewed. This paper presents the result of this review describing the advantages and disadvantages of each system and offers ranking of the technologies considered. MCDM method is used for assessing and comparing different platforms from technical and business points of view. The results indicate that SIM-based application with binary SMS offers the best solution compared to other alternatives. [C329]

"Field Deployment of Low Power High Performance Nodes"

When deploying a sensor network into a harsh environment the need for high levels of fault tolerance and maximising the usage of available resources become extremely important. This has been achieved by implementing a highly fault tolerant system based on our Gumsense boards. These combine an ARM-based Linux system with an MSP430 for sensing and power-control. It also allows for dynamic schedule modifications based on the available power and can be synchronised with other systems without relying on direct communication, autonomous behaviour in case of total communications failure is also supported. A deployment on Vatnajojkull, the largest ice-cap in Europe, has provided a long-term test for the systems and revealed strengths and weaknesses in the design decisions. [C330]

"Mobile and Wireless GIS Based Upon Independent Development"

Mobile Geographic Information Systems (GIS) is an outcome of integrating GIS, wireless communication, embeds and mobile computing technologies. Based on .NET Compact Framework and GPRS a Mobile GIS with own patent is developed. Services in the system include: downloading map by General Packet Radio Service (GPRS), defining geographical coordinate system of maps, Global Position System (GPS) connection and information dynamically showing on map, sharing users' GPS information through SMS (Short Message Service) to establishes communication between system users, vector feature map and related property data editing and shortest route planning. The system is now used in field data collection and simple navigation. This paper introduces the implementation of some basic GIS services in mobile environment. And some implemented services are presented and studied in detail. [C331]

"Development of Distribution Automation System Based on the Customized Integrated Services Distribution Terminal"

For the shortcomings of the existing single-function management systems of electric power marketing management at present, the energy acquisition and operation management system based on the customized integrated services distribution automation terminal is proposed, using wireless ad-hoc networks and wireless mesh networking technology to solve the `last mile' problem in the distribution automation system. As an instance of a wireless sensor network (WSN), it provides a highly reliable, real-time on-site intelligent network with strong adaptability to environment. This paper describes the structure of the energy acquisition and operation management system, and it's the uplink downlink communication channels and interfaces. The main function module design and system characteristics are detailed. The system seamlessly integrates power on-site management system, distribution transformer management system and automatic meter reading system, with a new intensive, diversified, practical system to replace the previous single-function systems. [C332]

"Design of Wearable Health Monitoring System Based on ZigBee Technology"

For home care issues in the remote medical service system, a wearable health care system model based on wireless sensor networks is proposed after composition of home-care system analyzed, and a family wearable health monitoring system is implemented based on ZigBee protocol, which has a wearable, comfortable and low power consumption characteristic. [C333]

"Design of Distributed Monitoring and Diagnosis System for Locomotive Diesel Based on GPRS-Internet"

This paper has designed a distributed monitoring and diagnosis system of engine locomotive. Diagnosis Unit which collecting the real-time parameter data such as GPS information and on-line diagnosis messages for locomotive diesel engine, is installed in each locomotive. It transmits data to the Data Transfer Station via GPRS module. Meanwhile, the Data Transfer Station is used as FTP server on Internet for the Diagnostic Center mining. Authorized clients can get the comprehensive diagnosis conclusion of each locomotive though the website visit of the Diagnostic Center. This system has been finished in the laboratory, and a model system has been established in the Wunan Locomotive Depot, Wuhan Railway Bureau. The application and promotion of the system will greatly advance the maintenance and management level of the engine locomotive. [C334]

"A Cost Effective Real-Time Tracking System Prototype Using Integrated GPS/GPRS Module"

This paper presents a real time tracking system that provides accurate localizations of the tracked vehicle with low cost. The system is implemented using GM862 cellular quad band module. A monitoring server and a graphical user interface on a website have also been implemented using Microsoft SQL Server 2003 and ASP.net to view the current location of a vehicle on a specific map. The system provides information regarding the vehicle status such as speed, mileage. The prototype has been tested experimentally and the results are analyzed and discussed. The experiments are conducted in different areas on Kingdom Of Bahrain using Google maps. [C335]

"Layered Media Q Estimation for GPR signal processing using the frequency shift method"

Layered media attenuation algorithm using constant Q model for ground penetrating radar (GPR) signals processing is introduced in the paper. We can use different Q value to describe different layered media. Over the bandwidth of a GPR wavelet, the attenuation of electromagnetic waves in many geological materials is approximately linear with frequency. As a result, the change in shape of a radar pulse as it propagates through these materials can be well described using one parameter, Q, related to the slope of the linear region. Under the assumption of a frequency-independent Q model, we present a method for the estimation of layered media Q from GPR data based on a technique developed for seismic attenuation tomography using the frequency shift method, Q is computed from the downshift in the dominant frequency of the GPR signal with time. And the downshift is obtained by using the generalized S-transform. Tests on synthetic vertical radar profiling (VRP) data indicate that this method can be very effective at estimating layered media Q value of GPR signals. [C336]

"An inverting method of moisture constent for huge grain pile based on distribution of dielectric constant"

Aimming at the detection of moisture content of grain pile, we proposed a scheme in which Ground Penetrating Radar is applied in this paper. The method proposed is that we used a permittivity-moisture model to calculate moisture content indirectly by measuring the distribution of dielectric constant in grain pile. The precise detection is discussed in this paper under the condition of extensiveness and the calculation algorithm of dielectric constant is provided by using layer inverting method based on reflection law and refraction law. In addition, we used well logging method to obtain precise detection results to infer the accurate calibration coefficient required in layer inverting method. By this way, a higher precision can be obtained by the mothed. At the same time, we proposed a model named permittivity-moisture from nonlinear model of dielectric constant of mixed media. The experiment results indicate that, compared to sampling method, the calculating results of moisture content from the method has less error by combining the layer inverting algorithm and permittivity-moisture model and can meet the requires of application well. Thus can provide a convenient and practical method to the detection of huge grain pile. [C337]

"The design of a GPRS-Based Intelligent Access Control System for Base Station"

This article describes the method for the design of a GPRS-Based Intelligent Access Control System for Base Station. The structure theory of the GPRS access control system is described in details in this paper. It gives

topology structure between the devices in the base station, which are through up by RS485 fieldbus. In this paper, the SMS and caller identification methods and the IC card identification methods are analyzed, and it points out the advantages of the SMS and caller identification methods. Meanwhile, it gives a brief description of the function of the intelligent access control system management software. [C338]

"Research on intelligent monitoring and protection system of distributive multi-tower cranes"

During construction phase of large buildings, it is of great significance to maintain safety protection on multi-tower cranes operating. Based on distributive and multi-intelligent agents design concept, and adopting ARM embedded technology, wireless network transmission, an intelligent monitor and protection system for the multi-tower cranes has been established. A multi-tower crane communication network has been set up to realize status information transmission of tower crane by adopting wireless token-ring communication. "Implication Confirm" feedback is used to speed up data transmission of communication network. Remote monitoring on working status of multi-tower cranes can be realized by using GPRS network. Field tests show the tower crane intelligent monitoring and protection system meets the requirements of monitoring construction safety of multi-tower cranes operating. [C339]

"AngelCare mobile system: Homecare patient monitoring using Bluetooth and GPRS."

The quick progress in technology has brought new paradigms to the computing area, bringing with them many benefits to society. The paradigm of ubiquitous computing brings innovations applying computing in people's daily life without being noticed. For this, it has used the combination of several existing technologies like wireless communications and sensors. Several of the benefits have reached the medical area, bringing new methods of surgery, appointments and examinations. This work presents telemedicine software that adds the idea of ubiquity to the medical area, innovating the relation between doctor and patient. It also brings security and confidence to a patient being monitored in homecare. [C340]

"A new paradigm for telehealth implementation"

Recently, efforts have been made to treat patients at home as much as possible. In many cases, the reason for the patient staying in hospital is not that he/she actually needs active medical care. Often, the principal reason for a lengthy stay in hospital is simply continual observation. This paper explains our experience and strategy to support the treatment of patients in their own home through the remote monitoring of physiological signals. The benefits of such remote monitoring are wide-ranging; the patient can continue to live their normal life, their risk of infection is reduced, costs are significantly decreased for the hospital, and clinician time is utilised more effectively. [C341]

"A research of stored grain moisture content detection based on ground penetrating radar detection technology"

The amount of moisture in stored grain is an important factor which affects food safety. Therefore, a timely and accurate detection of the moisture content in stored grain is of great importance. Electromagnetic wave has a strong trait of penetrating, which is able to detect the moisture content of grain inside the heap in the case of non-destructive. This paper mainly takes the research of grain moisture permittivity and its mathematical model which is based on the ground penetrating radar electromagnetic wave technology. It introduces the radar electromagnetic wave theory, construction of granary system's forward model, and the mathematical models of grain moisture permittivity. Through analyzing the results of the continuous section-scan measurement, we get the speed of electromagnetic waves. Then combining grain moisture-dielectric model, we calculate the dielectric constant of grain moisture. Further, we can get grain moisture content through the calculated dielectric constant. Under the guidance of the theory, we carry a field test, collect and analyze the results. It shows that the radar electromagnetic wave measurement of grain moisture is feasible and effective. [C342]

"Telecommunication systems enabling real time navigation"

Traffic is one of the most important problems in industrialized countries: roads are getting more and more crowded, especially during rush hours, with heavy consequences on people's quality of life, accidents, pollution, and fuel consumption. The transmission of up-to-date traffic information to on-board navigators would allow the redistribution of traffic flows over alternative routes, thus reducing road congestions and slowdowns. In this paper we investigate the possibility to send the information on the average-speed in any road of interest to on-board navigators by means of current broadcast and unicast communication technologies. A discussion on the most convenient transmission strategy will also be given with reference to real scenarios. [C343]

"One Vehicular Information Service System"

This article deals with several kernel technologies applied in vehicle information service. The technology referring to GPS (Global Positioning System), GPRS (General Packet Radio Service), GIS (Geographical Information System), and Computer Network etc, as we have studied, is believed to be able to construct a Vehicle Information Service System which faces the public. Synthesizing the technologies including GPS,GPRS, GIS, image capture and compress based on ARM9 processor and embedded system to establish a intelligent vehicle service model, which emphasizes U-V-S (User-Vehicle-Server) interaction. It is a integrated application in embedded system and its application software runs on relatively real-time and multi-mission operating systems. [C344]

"The Case Study of a Diffusion Theory Model of Adoption and Substitution for Successive Generations of Mobile Internet"

Norton model is a diffusion model to use for a substitution for successive generations of a product. There are many hypothesizes on this model, one of them is that only the next generation product can substitute this generation of product, and the first several generations cannot affect the diffusion of this generation product. In fact, successive generations of a product influence each other when they diffuse in the same market, so this paper takes the factors of the influence of successive generations of a product into account Norton model, and defines the substitution influence coefficients, then constructs the extended Norton model. This paper takes the adoption and substitution for successive generations of the mobile Internet in Taiwan as an example for the application of the extended Norton model. The results is satisfied after comparing with Norton model. In the end, the paper draws a conclusion that the extended Norton model is reliable, and the fitness and the forecasting is better than that of Norton model. [C345]

"Self-optimization of capacity and coverage in LTE networks using a fuzzy reinforcement learning approach"

This paper introduces a solution to enable self-optimization of coverage and capacity in LTE networks through base stations' downtilt angle adjustment. The proposed method is based on fuzzy reinforcement learning techniques and operates in a fully distributed and autonomous fashion without any need for a priori information or human interventions. The solution is shown to be capable of handling extremely noisy feedback information from mobile users as well as being responsive to the changes in the environment including self-healing properties. The simulation results confirm the convergence of the solution to the global optimal settings and that the proposed scheme provides up to 20% performance improvement when compared with an existing fuzzy logic based reinforcement learning approach. [C346]

"Enabling roaming management in GPRS and WLAN networks based on SIP"

In the wireless networks technologies, the concept of Next Generation Networks (NGN) focuses on environments in which IP technology provides transparent connectivity. It includes the roaming and mobility management between mobile users in heterogeneous networks. We compare two roaming models in order to integrate communication and session control from GPRS to WLAN 802.11 using SIP signaling protocol. The approaches follow the classification for service composition of the SAHARA project: Cooperative Model and Brokered Model. The solutions are based on loose coupled integration and IP mobility, which provide mobile applications and mobile services. Contributions include the selection of the better model, the design of SIP broker agent and the implementation of roaming management following the IETF specifications. [C347]

"Innovative ad-hoc wireless sensor networks to significantly reduce leakages in underground water infrastructures"

This paper presents an ICT solution to overcome the problem of water dispersion in water distribution networks. Leakage prevention and breaks identification in water distribution networks are fundamental for an adequate use of natural resources. Nowadays, all over the world, water wasting along the distribution path reaches untenable percentages (up to 80 % in some regions). Since the pipes are buried within the terrain, typically only relevant breaks are considered for restorations: excavations are very expensive and consequently the costs to identify the position of the leakage or just the position of the pipe itself are too high. To address this problem, and simplify the leakage identification process, the authors have designed a wireless network system making use of mobile wireless sensors able to detect breaks and reveal unknown tracks and monitor the pressure spectrum of the fluid flowing in the pipe. The sensors transmit the acquired data from the terrain to the surface by use of a wireless connection. On the surface ground there are stations that receive the signal, process it, and communicate with a central unit where necessary intelligent signal processing techniques are used to detect leakage sources. Compared to other leakage detection solutions already available in the market (such as: Ground penetrating

radar (GPR), pure acoustic techniques and tracer gases), the proposed technique appears very efficient and much more inexpensive. [C348]

"Evaluation of Handover Implementations in Commercial GPRS/UMTS/HSDPA Networks"

In this paper we present a study of the performance of handovers for live GPRS, UMTS and HSDPA networks from the point of view of data traffic. Specifically, our analysis focuses on an evaluation of the impact of handover at IP level during data connections (packet losses, jitter and outage duration). The results provided in this paper have been obtained from extensive field tests carried out on European commercial mobile networks. [C349]

"A software demonstrator for IEEE 802.21 Media Independent Handover in heterogenous networks"

In this paper we present a software demonstrator, for a system built following the directions described in the IEEE 802.21 (Media Independent Handover) standard, capable of completing an independent vertical handover. We first bring in front the field's related work, and also propose methods of implementing the components described in the standard. The architecture and the functionalities of the demonstrator application are detailed, and we also mention aspects about surpassing the difficulties that rise during the implementation process. [C350]

"Design of mine detection robot for Korean mine field"

This paper presents the critical design constraints of mine detection robots for Korean minefield. As a part of a demining robot development project, the environment of Korean minefield was investigated, and the requirements for suitable robot design were determined. Most of landmines in Korean minefield were buried close to the demilitarized zone (DMZ) more than half of a century ago. The areas have not been urbanized at all since the Korea War, and the potential locations of the explosives by military tactics have been covered by vegetation. Therefore, at the initial stage of the demining robot system development, the target areas were investigated and the suitable design for Korean minefield terrain was determined. The design includes a track type main platform with a simple moving arm and a mine detection sensor (consists of a metal detector and a GPR at this stage). In addition, in order to maintain the effective distance between the landmine sensors and ground surface, a distance sensing technique for terrain adaptability was developed and briefly introduced in this paper. The overall design of this robot was determined by considering the speed of the whole mine detection process and a point of economic view to replace human in minefield. Thus, the detail of the conceptual design and the mine detection scenario is presented in this paper. [C351]

"A new approach for classification of data transmission media in power systems"

Smart Grid denotes the integration of all elements connected to a power grid with a communication infrastructure. Recent communication systems are developed by multi layer architecture. The lowest layer in such systems is transmission media. The characteristics of the communication systems will be seriously influenced by the characteristics of its media. This paper classifies communication media of power systems as dependent or independent ones. A dependent media is part of power system which is normally owned by Independent System Operator (ISO) or distribution companies. In contrast, as an independent media, it is not normally part of power system and can be public or provided by data service providers. In this paper, first, a brief summary of popular media used in power systems is presented. Then, the two main classes of media are compared with each other. [C352]

"Development of farming PDA based on the zigbee wireless sensors network and GIS"

It is the basic needs for carrying out precision agriculture to acquire the farmland information in real-time. Farming PDA is developed based on wireless sensors network and GIS technology. Farming PDA integrates the Zigbee coordinator module, GPSOEM module, GPRS module, and embedded GIS module as a whole mobile intelligent farming solution. Zigbee module is used for coordinating and managing the field wireless sensors network and for collecting the farmland information through the network. GPS module is used for collecting and managing the geographic location information of each sampling point and for collecting the boundary geographic information of the target sampling field. GPRS module is used for the remote communicating and transferring the farmland information between the farming PDA and the host PC. The farming PDA can exchange information with the host PC in real-time so that it can be used to collect the farmland information in real-time. [C353]

"Automatic detection of reflexion hyperbolas in gpr data with neural networks"

In order to locate cylindrical objects like pipes and cables buried underground using ground penetrating radar it is necessary to detect reflexion hyperbolas in the measured radargrams. In practice, this task is in many cases complicated due to different geological environments, incomplete or disturbed hyperbolas, and first of all the fact that nearby objects lead to hyperbolas interfering with each other. In this paper we present an automatic detection system based on a specially connected neural network using receptive fields. We show that with an adequate definition of training data the system is capable of reliably detecting reflexion hyperbolas even in those challenging situations. [C354]

"Low resource demanding FOTA method for remote AtoN site equipment"

This paper presents a method for firmware update in memory constrained low-power controllers used in marine aids to navigation (AtoN) and telematics systems. The developed method allows carrying out firmware updates regardless of the communication channel used. This approach differs from other similar methods mainly by its low requirements to hardware and high flexibility; hence it is applicable to relatively small microcontrollers. The paper is concluded with experimental results performed on operational marine buoys. [C355]

"Worldwide internet based data acquisition from remote platforms"

A novel concept for using a low power web server integrated in a data acquisition platform for transferring data using "http" (hypertext transport protocol) has been developed by SAIV. The data is directly transferred from a field station to the end user without any intermediate links via the Global System for Mobile Communications (GSM). [C356]

"Key technology research of CHINA Advanced Metering Infrastructure"

This paper defines content of Advanced Metering Infrastructure (referred to as AMI), make comparative analysis of the similarities and differences between domestic and foreign AMI. This paper describes the status of China AMI related technology system and China power using information collection system architecture; proposes typical structure of China AMI; analyzes AMI related communication technologies and their applications which includes power composite optical fiber communication, power line broadband communication technology and wireless communication technology. This paper also analyzes the metering sensor networks, interoperability, digital metering, distributed generation bi-directional metering, local and remote smart control technology, demand response and other key technologies; proposes the technical requirements of smart energy meter and smart interactive terminals, data management system. [C357]

"Compact microstrip antenna design for microwave imaging"

An ultra-wideband microstrip antenna design is considered with respect to applications in breast cancer detection. The underlying design concept is based on ground penetrating radar (GPR). Simulated and measured prototype performance show excellent performance in the input impedance and radiation pattern over the target range from 4 GHz to 8 GHz. The 4 GHz to 8GHz frequency band for microwave imaging perform better in comparison with other microwave frequencies. The antenna also shows a reasonable uniform radiation performance in the broadside direction which contributes to the reduction of clutter levels, thus aiding the reconstruction quality of the final image. [C358]

"An environment monitoring system for valuable chinese herbal medicine growing based on wireless sensor networks"

The wireless sensor network, which refers to the combination of sensors, embedded system, MEMS, distributed information processing and wireless communication network has become a hot topic in the research field because of its wide application prospect. This paper propose the design of an environmental monitoring system for valuable medicinal herb growing based on wireless sensor network, which gives a real-time monitoring of the environment information on the target area, such as soil temperature, humidity, light intensity, soil components. This paper describes architecture of the monitoring system and gives a design of hardware platform for sensor nodes and workflow as well as the terminals of monitoring management system. [C359]

"Application of GPRS technology in water quality monitoring system"

The method of water quality monitoring applied by XueYe reservoir is sampling in the scene and analyzing at the laboratory at present. Based on analyzing key problem of water quality monitoring, automatic water quality monitoring system based on GPRS is provided in this paper. Considering features of water quality monitoring, the general structure and network framework of the system, and the way of access to GPRS of data monitoring center are designed based on GPRS technology. Water quality parameters collected by multi-parameter water

quality probe are transmitted to data processing and monitoring center through GPRS wireless communication network of mobile. The system collects, transmits and processes water quality parameters automatically, so production efficiency and economy benefit are improved greatly. Practice has proven GPRS technology can achieve well within the complex environment of poor water quality unmonitored, and more specifically applicable to the collection point, data transmission automatically generate the field of water analysis equipment data transmission and monitoring. [C360]

"The design of granary environmental monitoring system based on ARM9 and ZigBee"

Grain is an important strategic resource. Due to seasonal production, there are many problems in the stored procedure. This article designs an environment monitoring system of the granary combining Embedded and ZigBee wireless sensor network technology. In the actual situation of the design, using ZigBee wireless sensor network to complete Multi-point acquisition and transmission of environment parameters, using ARM9 to achieve precise control of the barn environment as system data controller; and using GPRS to achieve the system's remote control, it greatly improves the flexibility and scalability of the warehouse management. [C361]

"Research on remote wireless monitoring system based on GPRS and MCU"

In the remote, hazardous, distributed and external environment, such as radiation source, pollutant source and pipeline of petrol, water and gas, it is difficult to collect and send the necessary message in real-time by traditional monitoring ways. In response to this demand, this paper presents the design of wireless remote monitoring system solution that is based on the GPRS(General Packet Radio Service)and the MCU(Micro-programmed Control Unit). The reliability and real-time performance of the system have been proved through practical application in the engineering project. [C362]

"Texture-Based Estimation of Physical Characteristics of Sand Grains"

The common occurrence and transportability of quartz sand grains make them useful for forensic analysis, providing that grains can be accurately and consistently designated into prespecified types. Recent advances in the analysis of surface texture features found in scanning electron microscopy images of such grains have advanced this process. However, this requires expert knowledge that is not only time intensive, but also rare, meaning that automation is a highly attractive prospect if it were possible to achieve good levels of performance. Basic Image Feature Columns (BIF Columns), which use local symmetry type to produce a highly invariant yet distinctive encoding, have shown leading performance in standard texture recognition tasks used in computer vision. However, the system has not previously been tested on a real world problem. Here we demonstrate that the BIF Column system offers a simple yet effective solution to grain classification using surface texture. In a two class problem, where human level performance is expected to be perfect, the system classifies all but one grain from a sample of 88 correctly. In a harder task, where expert human performance is expected to be significantly less than perfect, our system achieves a correct classification rate of over 80%, with clear indications that performance can be improved if a larger dataset were available. Furthermore, very little tuning or adaptation has been necessary to achieve these results giving cause for optimism in the general applicability of this system to other texture classification problems in forensic analysis. [C363]

"Mining Heterogeneous ADS-B Data Sets for Probabilistic Models of Pilot Behavior"

The University of North Dakota is developing airspace within the state where Unmanned Aircraft Systems (UASs) can be flown without an onboard sense and avoid system or Temporary Flight Restrictions (TFRs). With funding from the U.S. Air Force, a mobile ground-based radar system capable of detecting aircraft operating in Class E airspace and the software to display such information to UAS operators is being developed. The current system uses an Automatic Dependent Surveillance-Broadcast (ADS-B) transceiver to detect any ADS-B-equipped aircraft within the vicinity, and a Ground Control Station (GCS) to detect and control the UAS. Once one or more ground-based radars are integrated into the system, it will also be capable of detecting non-cooperative aircraft (i.e. aircraft that aren't equipped with ADS-B transceivers) operating within the vicinity. The current system uses a portable, high-availability architecture. Since the system is intended to detect potential airspace conflicts from the ground, greater computational power is available to it than to onboard sense and avoid systems. The probability of a midair collision is dependent on the proximity of aircraft to each other, the performance characteristics of the aircraft, and the probabilities of pilots performing basic maneuvers with the aircraft. In this paper the authors present the results of data mining an ADS-B data set from 11 days in early 2010. Probabilistic models of pilot behavior were automatically extracted from the data using a genetic algorithm for cluster analysis. [C364]

"Simulation of frequency modulated continuous wave ground penetrating radar using Advanced

Design System (ADS)"

This paper explains about how a frequency modulated continuous wave (FMCW) standard system in Advanced Design System (ADS) software is implemented for ground penetrating radar (GPR) experiments using the built-in Design Guide as reference. At the moment, there is no model created especially for GPR investigation in ADS. Therefore, the purpose of this paper is to give an idea on how GPR experiment results can be simulated and analyzed without having to perform the actual experiment. Simulations have been done in ADS to see how the components change affects the baseband spectrum. The final circuit system was designed based on the spectrum line stability. [C365]

"Antenna compensation for UWB GPR systems applied in Non-Destructive testing"

Non-Destructive testing is an enhanced technique based on applying the inverse scattering algorithms upon the received scattered Electromagnetic EM waves for computing some important parameters of the material characteristics as permittivity and reflection coefficients. Unfortunately, the Ultra Wideband (UWB) antennas can dramatically affect the received signal and result in considerable degradation of the overall performance of the UWB GPR system. The isotropic, fully matched, unity gain and frequency independent antenna assumption could never be accepted for the typical UWB antennas, where the radiation characteristics and matching properties vary considerably with the frequency, introducing directionally asymmetric bandwidth reduction and waveform dispersion. Therefore an efficient antenna compensation technique would be introduced in this paper with the corresponding successive EM simulation results. [C366]

"Numerical simulation of GPR based on 3-D high-order FDTD"

The high-order finite-difference time-domain (HO-FDTD) technique is used in the simulation of ground-penetrating radar modeling in three dimensions (3-D), which can improve accuracy and reduce the error caused by numerical dispersion effectively. To absorb waves reflected from edges we implement convolutional perfectly matched layer (CPML) absorbing boundaries. It can efficiently absorb the reflections and greatly increase the computation efficiency. The surface-based reflection and cross-hole GPR modeling are simulated, and numerical results show the efficiency of the method. [C367]

"Design of SAR tomography experimental system"

In this paper, a ground-based experimental system of SAR tomography is proposed in detail. Based on the analysis for the properties of signal in the height direction of SAR tomography 3-D imaging system, the effect and relationship of parameters related to resolution in the height direction are discussed, and proper experimental system parameters are proposed. By using the general SAR tomography imaging algorithm in the experiment, the experimental system is proved feasible. [C368]

"Performance Characterization Parameters on Voice and Data Transmission in Mobile Terminals to Cellular Networks"

This work presents the experimental results related to performance measurements in GSM and GPRS cellular data networks. Two Mobile Terminals were used, in order to take place the scenario. Power Level, Power vs. Time, Modulation Analysis, Modulation Spectrum, (BER) Bit Error Rate and Throughput were considered in this analysis. [C369]

"Research on a self-powered wireless ultrasonic flow sensor system"

A self-powered wireless ultrasonic flow sensor system has been designed and developed from a system level approach in this paper. By using small-sized hydroelectric generator as the source of power for commercial low power microcontrollers, energy harvesting circuitry, and GPRS transmitters, the sensor is capable of detecting water flow in water pipelines network. A major feature of this sensor system is its power-management unit, able to recharge batteries with energy harvested from the small-sized hydroelectric generator installed in water pipelines. It allows the sensor to sustain operation as a general-purpose wireless acquisition device for remote sensing in large coverage areas, where the power to run the devices is always a concern. In addition to describing the overall architecture, hardware and software of the sensor, the paper also reports on the performance of the module in the water pipelines network, emphasizing the energy issues, crucial to obtain self-sustained operation. The testing was done in two stages: the first in the laboratory, to validate the management and solutions under particularly severe conditions, the second stage in a water pipelines network. The measurements about the behaviors of the sensor confirm that the hardware and software solutions proposed do indeed lead to good performance. [C370]

"Ground penetating radar imaging algorithm of targets located in unknown subsurface environment based on compressive sensing"

A new GPR(ground penetrating radar) imaging algorithm based on CS(compressive sensing) technique is presented in this paper. It aims at imaging of targets located in unknown subsurface environment. Firstly, a compound objective vector is constructed, including both unknown targets vector and unknown dielectric parameter of background environment. Secondly, the scattering and imaging model is formed based on GPR electromagnetic scattering principle and CS framework. Thirdly, the compound objective vector is obtained by solving a convex optimization problem. Experimental results of GPR simulation data show the effectiveness of this algorithm. [C371]

"Design of World Expo tour sites guide system based on RFID technology"

Facing growing groups of tourists, it's obviously that the traditional manual guides can't meet the needs of each visitor. Through scientific and technological means, an electronic smart guide system based on RFID technology is establishment, Expo visitors can get more information include audio and video about comprehensive equipment, exhibits, galleries by the system. It is an important means to improve the quality of services and the degree of satisfaction for tourist. In this paper, we propose a RFID application in smart guide system that voice explanation is played automatically with no need for manual operation; describe the components of guide system, software process and a feasible plan for its upgrade. An electronic smart guide system based on RFID is designed for Shanghai World Expo. [C372]

"Inverse filtering operation for reconstruction of distorted GPR response"

This study proposes inverse filtering operation for reconstruction of ground penetrating radar (GPR) responses in order to remove waveform distortion caused by transmitting and receiving antenna characteristics. As an example, we apply it to measured pulse response from a metallic sphere and show the effectiveness of the method. [C373]

"The application of the monitoring system of water environment based on overlay network technology in the cold and arid region"

With the development of computer network technology, overlay network technology is increasingly widely concerned. Aiming at many problems encountered in water environment monitoring, this paper mainly discusses the methods how to efficiently achieve the water environment monitoring and warning in the area of the special geographical environment and climate by online real-time monitoring system of water environment based on overlay network technology. Especially, we integrate the ETL process with the spatial database to analyze and process the complex heterogeneous data. Furthermore, we design a new network topology of the sensor node according to the characteristics and area of the water in Wuliangsuhai for the efficient application of real-time monitoring system of water environment based on overlay network technology in cold and arid region. Subsequently, this framework and network topology has been put into use in Wuliangsuhai for the on-line real-time water monitoring tests. The results show that the overlapping network architecture is feasible, network topology of the sensor node plays a key role for data acquisition and on-line analysis and early warning of heterogeneous data is efficient. Henceforth, we will further research on how to construct the more practical data analysis model of multidimensional cloud calculation and extended the applications. [C374]

"System of medical emergency ambulance for community based on Zigbee"

The design method is proposed for the community health emergency ambulance system based on Zigbee. The front-end sensors monitor vital physiological data and diagnosis. When the patient needs help, rescue request is send to rescue centers through the wireless sensor network. And localization algorithm estimates the location information in order to rescue the patient at the first time. Experiment shows that the system is safe and effective, and communication network is reliable. [C375]

"The design of GPS/GPRS navigation and monitoring system based on GIS"

Vehicle Monitoring and Navigation System (VMNS) is the result of the rapid development of science and technology, which developed into a certain stage. This system, which integrated with Geographical Information System (GIS), Global Position System (GPS) and Wireless Communication Technology, has been widely used in many fields, like public security, fire-fighting, finance, transportation, tourism and etc. This paper successfully worked out the design scheme of VMNS through integrated with GIS, GPS and General Packet Radio Service (GPRS). Systematically and in-depth researched the technology of VNMS and related areas, which after

surveyed and analyzed the current domestic and abroad situation in term of the development and use of this system. Particularly take Commercial Bank of China, which in Huhehot, Inner-Mongolia as an example, further interpreted the design scheme of this system, including the selection of hardware, the selection of communication way, the design of monitoring interface, finally, successfully proved the general frame of VNMS. [C376]

"Study on collaborative biohazard risk assessment system integrated with mobile GIS"

This article summarizes related factors about biohazard events, and extracts the main factors to determine the main parameters of agent spread model and hazard assessment model. Mobile terminal (PDA) is used for data acquisition and model calculation, in the mean time a variety of methods are adopted for collaborative communications with server station, ensuring the consistency of models and datas. The map of national administrative divisions, rivers and other relevant factors are incorporated to realize the dynamic visualization of models, and establish the whole system of biohazard risk assessment models. This system improves emergency response capacity of biological hazards, and runs steadily and powerfully during working. [C377]

"3D velocity model and ray tracing of antenna array GPR"

Migration is an important signal processing method that can improve signal-clutter ratio and reconstruct subsurface image. Diffraction stacking migration and Kirchhoff migration sum amplitudes along the migration trajectory, which generally is hyperbolic. But when the ground surface varies acutely, the migration trajectory is not hyperbolic. To computer the migration trajectory need the technique of ray tracing. We introduce a method of ray tracing based on 3D velocity model. Firstly, we build the 3D velocity model depending on the estimation of both ground surface topography and velocities. Then we compute the travel time between transmitter, receiver and each subsurface scattering point, and search the propagation ray depending on the Fermat's principle. The method is tested by an experiment data acquired by the stepped-frequency (SF) CMP antenna GPR system. The target is a metal ball that is buried under a sand mound. A nice result of ray tracing is shown in the case. [C378]

"Sparsity enhanced fast subsurface imaging for stepped frequency GPRs"

A sparsity enhanced and fast data acquisition and imaging method is presented for stepped-frequency continuous-wave ground penetrating radars (SFCW GPRs). In previous work it is shown that if the target space is sparse like the point like targets, an image of the target space can be constructed with making measurements at only a small number of random frequencies by solving an l1minimization problem. This greatly reduces the data acquisition time but the computational complexity for the imaging method is high. In this work, subsurface imaging is done with a suboptimal but fast method, orthogonal matching pursuit. Similar results to l1minimization images are obtained within much shorter times. Also the results are sparse and less cluttered compared to standard backprojection images. [C379]

"Electromagnetic infrastructure monitoring: The exploitation of GPR data and neural networks for multi-layered geometries"

In this paper, an inversion ANN-based algorithm for the estimation of geophysical properties (i.e. thickness and permittivity) of subsurface layers in stratified geometries is presented. The basic procedure for the analysis of GPR scans of single subsurface layers placed over a uniform background recently proposed by the authors has been here extended and inserted into a general framework where each stratum is recursively processed. [C380]

"Rotation and scale invariant template matching applied to buried object discrimination in GPR data"

In this study, a template matching approach to buried object discrimination problem is proposed over ground penetrating radar (GPR) B-scan images. The technique is scale invariant, which compensates for the change in the swinging speed of the detector. It is also rotation invariant to some extent, which reduces the number of templates to be used by compensating for the change in the scanning direction. The algorithm is tested on real GPR data and results are observed to be promising. [C381]

"Context-dependent landmine detection with ground-penetrating radar using a Hidden Markov Context Model"

Context-dependent approaches to landmine detection have been developed in recent years to exploit the sensitivity of ground-penetrating radar (GPR) to changes in environmental conditions. Previous approaches to context-dependent fusion have only considered the special case of statistically independent observations. This

work proposes the use of Hidden Markov Models, trained on the GPR background, for modeling the context of observation sequences. The performances of context-dependent fusion using two statistical context models were compared in an experiment with field data. One approach utilized a Hidden Markov Context Model (HMCM), and the other utilized a Gaussian mixture. Experimental results illustrated that the HMCM improved performance of context-dependent fusion. These results suggest that spatial dependencies are an important source of contextual information for landmine detection that warrants further investigation. [C382]

"A ground-based Arc-scanning synthetic aperture radar (ArcSAR) system and focusing algorithms"

KIGAM and KNU are developing a ground-based Arc-scanning SAR system (ArcSAR) mounted on a truck. The system achieves the coherent integration of radar returns from ground targets by the circular motion of the antennae attached to the end of an extendable arm. Precise control of antenna position and the extended coherent-integration-length enable the formation of high-resolution, high-precision and phase-preserving SAR images. Based on the Polar Format Algorithm, two SAR-focusing algorithms were developed for the data acquired from two different scanning modes of this unique system: the scan mode and the spot mode. [C383]

"Direct-path mitigation for underground imaging in RF Tomography"

Belowground imaging using RF Tomography is challenged by strong direct-path coupling between sensors. In this work, a direct-path mitigation procedure is introduced, consisting of two steps. First, the Tx and Rx dipoles are rotated in along particular directions that maximizes the signal with respect to the direct-path contribution. Then, the remaining contribution is removed by using a hybrid analog/digital feedback loop at the receiver side. [C384]

"3D subsurface visualization by suppressing ground reflection and direct wave with bistatic GPR"

A ground reflection and a direct wave which propagates directory from a transmitting antenna to a receiving antenna are often arisen as issues especially for a ground penetrating radar (GPR) to monitor a near-surface region. In this paper, a 3D subsurface radar image by suppressing those components with a bistatic GPR system is presented. A relative permittivity of a ground surface is measured at the beginning, and a Brewster angle is estimated from that value. Then, the transmitting antenna is located to match an incident angle with the Brewster angle. In this case, the ground reflection does not occur, and all the energy penetrates into the ground. The direct wave is suppressed with an f-k filter which works automatically from position information of the antennas. An experimental result gives the 3D subsurface image without the ground reflection and the direct wave under a condition that a landmine model is buried at a depth of 10cm in a dry sand. [C385]

"Use of 2D FDTD simulation and the determination of the GPR travel path angle for oblique B-scans of 2D geometries"

Scattering from a subsurface point object, such as a reinforcing steel bar embedded concrete or a tunnel buried in sand, results in a B-scan contour that is essentially hyperbolic as the Ground Penetrating Radar (GPR) passes over the object. The shape of the hyperbola can be used to determine the angle at which the GPR traveled over the point object. This information is very useful in determining the orientation and size of an object such as reinforcing steel, buried utilities, and subsurface tunnels. A 2D Finite Difference Time-Domain (FDTD) method can be used to simulate the GPR B-scan when the geometry is invariant in the third dimension and the sensors are appropriately located. The shape of the hyperbola extracted from 3D simulation, analogous to field-collected data, can be compared to a library of hyperbolas extracted from 2D simulations and used to determine the angle of the GPR travel path from the cross-sectional plane. [C386]

"Model level fusion of edge histogram descriptors and gabor wavelets for landmine detection with ground penetrating radar"

We propose a discriminative method for combining heterogeneous sets of features for the continuous hidden Markov model classifier. We use a model level fusion approach and apply it to the problem of landmine detection using ground penetrating radar (GPR). We hypothesize that each signature (mine or non-mine) can be characterized better by multiple synchronous sequences that can capture different and complementary features. Our work is motivated by the fact that mines and clutter objects can have different characteristics depending on the mine type, soil and weather conditions, and burial depth. Thus, different sets of specialized feature extraction mechanisms, may be needed to achieve high detection and low false alarm rates. In order to fuse the different modalities, a multi-stream continuous HMM that includes a stream relevance weighting component is developed. In particular, we modify the probability density function that characterizes the standard continuous HMM to include state and component dependent stream relevance weights. We generalize the Minimum Classification

Error (MCE) objective function to include stream relevance weights and derive the necessary conditions to update all model parameters simultaneously. Results on a large collection of GPR alarms show that the proposed model level fusion outperforms the baseline HMM when each feature is used independently and when both features are combined with equal weights. [C387]

"An improved content-adaptive mesh-generation method for image representation"

A new content-adaptive mesh-generation method for image representation, based on the greedy point-removal scheme of Demaret and Iske, is proposed. The proposed method is shown to be capable of producing meshes of higher quality than those generated by the scheme of Demaret and Iske, while requiring substantially less computation and memory. Furthermore, with the proposed method, one can easily tradeoff between mesh quality and computational/memory complexity as needed. Since a mesh-generation scheme proposed by Yang et al. is a key component of the proposed method, some factors affecting the performance of this scheme are also explored. [C388]

"Microphysical retrievals of dual polarization and dual frequency ground radar for GPM ground validation"

A dual-frequency precipitation radar (DPR) will be deployed aboard GPM (Global Precipitation Measurement) core satellite in order to enhance our knowledge of precipitation microphysics. A ground based dual-frequency (Ku and Ka band) and dual-polarization radar D3R is being built to perform cross validation with GPM-DPR which helps provide insight into the physical basis of the retrieval algorithm. This paper is the follow up study of the author's previous paper where a new drop size distribution (DSD) retrieval algorithm was proposed. In this paper, the algorithm evaluation is extended to the complete region including rain, melting ice and ice based on simulation data. A possible method to classify the hydrometeor identification for dual-frequency and dual-polarization ground radar is also proposed which might be applied to D3R. [C389]

"Advanced classification of UXO using fully polarimetric GPR and frequency-polarization features"

The classification of buried UXO has been a difficult task due to the large amount of false alarms resulted from troublesome clutter objects. This paper closely examined scattering characteristics of such clutter objects by using numerical simulations. From the numerical study, we found that some clutter objects, which mainly causes the false alarms, produce multiple resonances at different frequencies and different polarizations. Based on these observations, we developed new classification algorithms which utilize the frequency-polarization dependent responses of complex targets in order to discriminate UXO-like objects form such trouble some clutters. The developed algorithms were tested by experiments in a test plot. In the test, the new classification algorithms clearly discriminated such clutters from UXO-like targets. In this paper, we present the simulation results for scattering characteristics of complex clutters and the new classification algorithm based on frequency-polarization dependent responses will be discussed. Finally, results from experimental verification will be presented. [C390]

"A multimodal Matching Pursuits Dissimilarity Measure applied to landmine/clutter discrimination"

The Matching Pursuits Dissimilarity Measure (MPDM) is an effective way to to compare signals that are sparsely approximated using a Matching Pursuits method. The CAMP algorithm uses an MPDM distance measure in Competitive Agglomeration clustering to model and classify signals. The MPDM approach can only compare signals originating from a single source. Many landmine detection systems use multiple sensors to make simultaneous measurements of the same region of interest. In this paper we propose a Multimodal MPDM that can be used with CAMP to fuse signals from multiple sensors. We demonstrate the effectiveness of the Multimodal MPDM over the single sensor MPDM in improving discrimination of landmines from clutter objects. [C391]

"AN SVM classifier with HMM-based kernel for landmine detection using ground penetrating radar"

We propose a landmine detection algorithm using ground penetrating radar data that is based on an SVM classifier. The kernel function for the SVM is constructed using discrete hidden Markov modeling (HMM). Typically, the kernel matrix could be obtained by defining an adequate similarity measure in the feature space. However, this approach is inappropriate as it is not trivial to define a meaningful distance metric for sequence comparison. Our proposed approach is based on HMM modeling and has two main steps. First, one HMM is fit to each of the N individual sequences. For each fitted model, we evaluate the log-likelihood of each sequence. This will result in an N Ч N log-likelihood similarity matrix that will be adapted to serve as the kernel of the SVM classifier. In the second step, we train an SVM classifier to learn a decision boundary between the positive and negative samples. [C392]

"Spatial latency reduction in GPR processing using stochastic sampling"

Ground penetrating radar (GPR) is a promising technique for buried threat detection which provides a complimentary phenomenology to electro-magnetic induction (EMI) based sensing. However, many successful GPR-based buried threat detection algorithms require data collected both before and after an object of interest is encountered to make a declaration (typically this data is used to perform background normalization, or to adequately characterize the object's shape). Samples taken past an object of interest, but before a decision is made, constitute an algorithm's "spatial latency". For vehicular mounted antennae arrays, where vehicle stopping distance is a function of vehicle dynamics, driver responsiveness, and algorithmic spatial latency, reducing an algorithm's spatial latency can increase overall system safety and help keep operators out of harm's way. In this work we propose a stochastic sampling algorithm that can help reduce spatial latency for a wide range of GPR-based buried threat detection algorithms. [C393]

"Ground penetrating radar measurements: Applications to synthetic data generation and target characterization"

Ground penetrating radar (GPR) is widely studied for detection of landmines and mine-like targets; GPR is particularly useful for detecting minimum metal mines which are harder to detect using traditional metal detection devices alone. In order to expand the phenomenology for GPR, careful measurements of homogeneous and heterogeneous soils with and without targets (landmine simulants and metal objects) are performed in a controlled environment. These measurements will aid in the development of models for soil response beyond the initial air-ground interface. Such explicit models for soil will increase the effectiveness of algorithms designed to discriminate between returns from targets and from naturally occurring geologic materials and interfaces. Furthermore, careful measurement of soil characteristics will enable comparison and refinement of models of soil with embedded targets developed in electromagnetic simulations (using finite-difference time-domain codes (FDTD), e.g.). [C394]

"Remote monitoring application based on Modbus and China unicom 3G"

In China traditional methods of building Modbus remote monitoring system have some drawbacks. They are tightly dependent on telephone lines if wired communication was used; transferring speed is limited when using wireless technology like GPRS; Proprietary interfaces make it hard to reuse software design and new information island may be formed. So a new architecture for Modbus remote monitoring application was presented by this paper to solve the problems. 3G Gateway provides Modbus network with Internet accessing capability. Process data can be sent to LAN Gateway through 3G Gateway. LAN Gateway gets the process data and forward to OPC server. Then remote monitoring applications can read/write data from/to OPC server easily using standard OPC interfaces. A prototype system was implemented in laboratory. The system is in initial phase now, but it proved the technique feasibility of the architecture. [C395]

"The Applications of GPRS in the Mine Monitoring and Control System"

Remote monitoring system based on GPRS is a modern monitoring system which is compose of radio communication technology, signal collection and computer network technology. This article introduces a wireless coal mine monitoring system based on GPRS communications technology. This system proposed in this paper has achieved a good result in the test. [C396]

"Multilayered diffraction tomography algorithm for ground penetrating radar"

A multilayered diffraction tomography algorithm for ground penetrating radar is derived in this paper. The algorithm considers the planar air-soil interface and uses the thought of the equivalent speed to solve the problem of multilayered medium. The first Born approximation and the dyadic Green's function are adopted to construct a linear forward model that inverted by fast Fourier transform to meet the requirement of small calculation, so we can real-time reconstruct the buried objects. Simulation results are provided to illustrate performance of this algorithm. [C397]

"Design and Implementation of the Web-based monitoring system for geomagnetically-induced current"

The geomagnetically-induced currents (GIC) on the power grid results from changes of geomagnetic field caused by solar activity, which is the significant problem and needs to be monitored to provide data for disaster analysis. In this paper, we combine with computer networks and communication technologies; develop the Web-based monitoring system for geomagnetically-induced current. The system's background uses the .NET and Web

technology, and uses GPRS technology to remote data transmission. It also combined with local monitoring device to monitor GIC from a neutral point of transformer. The test and application of monitoring system shows that the system can in effect monitor the grid GIC data, and has advantages of interactive and operational. [C398]

"Design and Accomplishment of the Real-Time Tracking System of Agricultural Products Logistics Process"

This paper is based on NDRC project "National Large and medium-sized agricultural products market informatization construction projects," developing the logistics process of real-time tracking management system for real-time Management of agricultural products in China. The real-time monitoring system of the logistics is designed with four subsystems: testing the temperature and humidity of agricultural products, collecting the speed and line of vehicles, wireless data transmission, and data processing in the control center. The system use GPS, ZigBee technology, GPRS network and Internet to monitor and management the fresh agricultural products and the logistics process. In this paper, the data transmission and process in the real-time monitoring of the logistics are discribed in detail. [C399]

"Tunnel Construction Safety Inspection and Polymer Grouting Technology for Tunnel Quick Maintenance"

In this article, the monitoring and measuring of the Xuejiazhuang tunnel of Lingnan freeway is introduced. The fitting regression analysis for the data of curve was done. And the surrounding rock stability is studied with the regression analysis of the convergence displacement data. In order to maintain the existing void between initial lining and surrounding rock, the ground-penetrating radar nondestructive testing technology and polymer grouting technology is presented. The field test results show that the use of polymer grouting technology can repair the tunnel distress and provide an ideal manner for tunnel quick maintenance. [C400]

"Design and Implementation of a Wireless Multimedia Advertising Vehicle Terminal System"

A new extensible multi-function vehicle terminal system for multimedia advertising is designed, and the software and hardware design and realization method are also introduced. The terminal support remote release of text advertisement and audio advertisement and which was combined with the master server, vehicle LED screen, microphone, empty-car indicator light, taximeter to make up a multimedia advertising remote release system. It was verified by experiments that the terminal and the whole system meet the needs of the advertisement release of a media city(about 2000 terminals). [C401]

"Pipe Leakage Detection and Remote Transmission System Is Collected"

In order to reduce oil leakage accidents in transmission process, this system with the advanced algorithm and precise GPRS remote transmission technology, can be in one of the circumstances, automatic completion of leak detection and alarm and troubleshooting. [C402]

"Research and design of a high performance GPS vehicle monitoring system"

According to the defects of the GPS vehicle monitor system in the present market,a high concurrent and real-time GPS vehicle monitoring system is proposed. The entre system is based on a three-layer framework:the terminals,the interim database server,and the monitoring workstation. The monitor workstation is based on the MAPX platform,and the database server communicates with terminals through GPRS network. In order to reduce the communication payload,a reliable UDP protocol is used. By optimizing the database design, the high concurrence is obtained. The high efficiency of the system is proved in the implementation. [C403]

"Insar time-series analysis for management and mitigation of geological risk in urban area"

This work shows the capabilities of InSAR time series analyses to support civil protection activities in the framework of geological risk management and mitigation. We discuss the outcomes from an integrated analysis of conventional in situ investigations and observations with advanced InSAR analyses carried out for the test sites of Agrigento and Naro (Italy), affected by ground instability respectively due to landsliding and tectonic forces. The study of past ground deformations provided valuable insights into the spatial and temporal patterns and behaviors of these phenomena, helping local civil protection authorities to focus resources on the areas of maximum need and to identify the most appropriate mitigation measures to reduce the impacts on elements at risk. [C404]

"An application of reciprocity to the numerical modeling of a GPR system"

In this paper, a technique is developed to model ground penetrating radar interactions. It combines reciprocity with the results from a full numerical model and allows one to compute a large number of scattering responses simultaneously, provided the scatterers are small. The results of an example calculation are shown and compared with a full numerical model and a possible application is demonstrated. [C405]

"A study on anomalous signal detection using HMM for ELF electromagnetic wave"

A seismic radiation emitted from the earth's crust is useful for predicting earthquakes. The electromagnetic (EM) wave in the Extremely Low Frequency (ELF) band have been observed at many places in Japan. In this paper, we propose the anomalous signal detection method based on HMM whose input vector is the amplitude density distribution of an EM wave. The amplitude density distribution is calculated from the image of an EM wave data. The optimal scale of an image to calculate an amplitude density distribution and the optimal number of states of HMM are investigated to achieve an accurate detection. [C406]

"Real-time road traffic monitoring using a fast a priori knowledge based SAR-GMTI algorithm"

Radar systems operating on high altitude platforms can provide traffic information over wide areas, independent of sunlight illumination and weather conditions. In the paper, a novel a priori knowledge based ground moving target indication (GMTI) and parameter estimation algorithm applicable on single- as well as on multi-channel synthetic aperture radar (SAR) data is presented. Only the intersection points of the moving vehicle signals with the a priori known road axes, which are mapped into the range-compressed data domain, are evaluated. The algorithm needs low computational load and is hence well suited for real-time traffic monitoring applications. [C407]

"Feasibility of tunnel detection under rough ground surfaces using Underground Focusing Spotlight Synthetic Aperture Radar"

Detecting and imaging the presence of illicit tunnels in any given volume of soil is occasionally possible because the air that fills them is materially quite different from anything else underground. The Underground Focusing Spotlight Synthetic Aperture Radar (UF-SL-SAR) concept has been suggested for sub-surface tunnel detection due to its ability to scan large areas of terrain in a short amount of time. This paper explores the feasibility of tunnel detection under rough ground surfaces using an algorithmic implementation of the UF-SL-SAR concept. In particular, detectability is investigated as a function of tunnel depth, ground surface roughness and soil type. [C408]

"Research of wireless distributed monitoring system for petrochemical equipment"

To solve the problem of monitoring system for petrochemical equipment, proposing a three-level wireless distributed network monitoring application scheme. The terminal node and middle layer cluster head node of monitoring system were made up of short-distance wireless communication module nRF9E5 and GPRS network MC55 module. The wireless point to multi-point transceiver program based on dynamic multi-access frequency-hopping technology and the GPRS network transmission program based on the embedded TCP/IP protocol were designed. The results of the monitoring system experiments show that information transmission has lower energy consumption, quicker response, lower bit error rate, implementing wireless, efficient monitoring to petrochemical equipment. [C409]

"Soil dielectric and senisitivity analysis for subsurface imaging applications based on distributed Sensor Networks"

The concept of a subsurface imaging technique based on Unattended Ground Sensor Networks operating in the VHF range using ultra-wideband waveforms was recently proposed in. In this approach a forward model for realistic subsurface environment based on the Dyadic Green's function for a stratified medium and an inversion technique using an ultra-wideband near-field focusing were presented. Simulation results showed that very good lateral and depth resolution could be achieved. Before carrying out an experiment to test the proposed technique, three vital aspects of the work which are imposed by practical limitations are investigated and presented in this paper. First, the sensitivity analysis to assess the signal penetration depth in realistic subsurface environments for various frequencies is performed. Analysis of the frequency requirements of the inversion as they relate to depth resolution is also analyzed. A semi-analytic soil dielectric model originally devised for microwave frequencies is extended to VHF and validated using measurement results available in literature. [C410]

"The Semi-Analytic Mode Matching algorithm for GPR wave scattering from multiple complex objects buried in a dielectric half space"

The Semi-Analytic Mode Matching (SAMM) algorithm is a quick and efficient computational method that can model wave scattering from multiple objects in half spaces. This algorithm relies heavily on the appropriate choice of coordinate scattering centers (CSCs) for its modal expansions. Here, the radius of curvature method of finding CSCs is extended to "tune" the CSC loci. Because the CSC locations are essentially frequency independent and independent of the dielectric contrast between scatterer and background, it is worthwhile to analyze carefully particular scattering object shapes and store the optimal CSC locations for future use. Scattering from multiple targets buried within half spaces can be constructed from simpler simulations of the individual targets taken independently in uniform media-combining these initial simulations correctly can greatly reduce overall computational time and increase robustness in full simulations. Excellent results are found comparing SAMM and Finite Difference Frequency Domain (FDFD) for multiple 2D scattering objects 0.1-15 wavelengths in size located beneath half spaces. [C411]

"GPR applied to map Jabuticabeira-II coastal sambaqui archaeological site (Brazil)"

In this work, some GPR results obtained in Jabuticabeira-II coastal sambaqui archaeological site, located in Jaguaruna region, Santa Catarina state, southern Brazil, are presented. Sambaqui is a word in Guarani (Native South American language) that means: Tamba-shells, and Qui-conic mound, or shell mound. GPR profiles present interesting anomalous reflectors most likely related to archaeological interest targets. GPR depth slices exhibit anomalies with high amplitude probably related to point reflectors. In order to give greater reliability for real result interpretations, 2D FDTD numerical modelling was accomplished, and it shows good agreement with real data obtained in the field. Then, real and synthetic results results as reference guide to archaeological excavation activities. Archaeologist from Universidade de Sao Paulo excavated Jabuticabeira-II site after GPR results analysis. Horizontal reflectors were related to sambaqui structure, and its bottom, characterized by rich archaeological layers as well as water table level. Anomaly typified by hyperbolic reflection pattern was associated with a concentration of carbonatic shells, from 3160 to 2850 cal yBP. GPR results were very important for archaeological research in development allowing adjusting excavation, and guarantee this research success. [C412]

"Instability analysis of Villa Arianna site in Castellammare di Stabia (Naples)"

The paper is on the use of GPR to detect features of instability affecting the structures of Villa Arianna archaeological complex. GPR data were acquired with a 250 MHz antenna on a cave excavated from an in situ deposit and inside the Villa, which lies on the top of a tuffaceous terrace. The study shows a direct correlation between the time shifts and amplitude spectra variations of the ground direct wave with the detachment surface location. [C413]

"Detection of accelerated reinforcement corrosion in concrete by ground penetrating radar"

This paper presents a new approach to evaluate corrosion of reinforcement in concrete by ground penetrating radar (GPR). Pulse GPRs were used to monitor the continuous corrosion process in concrete, in which the changes of amplitudes, travel times and short time fourier transform (STFT) spectrograms associated with the bar reflections were continuously measured. The yearly long corrosion process of reinforcement bar was rapidly accelerated within 10 days by impressing 2A direct current across two embedded reinforcement bars serving as anode and cathode. When corrosion started, it was found that the travel times, amplitudes and the frequency spectra from the bar reflection reached a maximum or minimum, but the trends of these parameters were then reversed when the crack became wide open. The results presented in this paper will pave the way for future corrosion characterization using GPR, both in laboratory and in field. [C414]

"Use of Ground Penetrating Radar to map subsurface features at Lapa do Santo archaeological site (Brazil)"

In this article we present some results of Ground Penetrating Radar (GPR) studies carried out at Lapa do Santo archaeological site. This cave is within Lagoa Santa karstic region, Minas Gerais State, Brazil. In the first field work, 44 GPR profiles were acquired with 100 MHz, 200 MHz, and 400 MHz shielded antennas focusing on three mains objectives: (i) to characterize stratigraphic layer; (ii) to identify geological and archaeological anomalies, and (iii) to identify potential areas aiming at assisting archaeologists in an excavation program. GPR results indicated anomalous hyperbolic reflections, and areas with high sub-horizontal reflection amplitude suggesting archaeological and geological potential targets, respectively. These results were encouraging, and then they were used to guide excavations at this site. Excavation of test units (meter by meter) allowed

identifying an anthropogenic feature, e.g., a fire hearth structure, and natural features, such as speleothems and top of bedrock. Results also indicated the importance of GPR survey as a tool for orienting archaeological researches, increasing the probability of finding archaeological interest targets in an excavation program an area of environmental protection. [C415]

"Half-space estimation by time gating based strategy"

In this work we deal with an estimation procedure of the Fresnel reflection coefficients for an half-space starting from GPR measurements collected under a reflection mode single view/multistatic configuration. After, the estimation of the Fresnel coefficient, the related electromagnetic parameters of the soil can be evaluated via simple algebraic relations. The problem is faced by exploiting the plane waves spectrum representation. Unfortunately when an antenna is close to the air/soil interface, interactions arise so that the actual antenna plane-wave spectrum is dependent on the searched for soil properties and consequently not known. To overcome such drawbacks, a preliminary step is introduced in the overall estimation procedure, which allows us to erase the antenna/soil interface interactions thanks to a time gating method. Numerical simulations with synthetic data are presented with the aim of assessing the effectiveness of the procedure. [C416]

"Experimental approach for determining the received pattern of a Rascan holographic radar antenna"

Because of the nature of image formation for holographic radar, the role and relevance of antenna radiation pattern are different than for impulse radar, and thus have not been studied. We determine theoretical Rascan radiation patterns for different dielectric media, and compare simulations to experimental data from an antenna scanned across a spherical metal target at various ranges/depths. Positions at which the received signal (phase difference between object and reference beams) are the same within a single scan, and across scans at different depths provide a 3-D approximation of the effective radiation pattern that closely agrees with the simulations. [C417]

"Object dimension Vs antenna frequency"

The study deals with the performance of antenna frequency in detecting objects as a function of their dimensions. The results refer to actual data acquired with an IDS instrument, equipped with antenna frequency of 200, 600 and 2000 MHz, on an ancient wall reinforced with micro-piles, and on a concrete beam reinforced with iron bars. The micro-piles and iron bars are 0.13 m and 0.02 m in diameter respectively. The study shows that the dimensions of the objects in relation to the wavelength and the heterogeneity of the host environment, play an important role in making the interpretation of the GPR data easy in a civil engineering context. The results were validated with theoretical data. [C418]

"An ultra-wideband high-dynamic range GPR for detecting buried people after collapse of buildings"

An ultra wide band high dynamic range GPR radar-has been tested for buried victims detection. After a building collapse, for example due to an earthquake, the priority of search and rescue teams is to localize people trapped under debris. Several tools are available to help the detection of buried humans, such as micro-cameras, high sensitivity microphones, and so on. Many of these tools present some limitations such as low penetration depth and high susceptibility to external noises. In this paper the authors test the use of an Enhanced Ultra Wide Band (UWB), Continuous Wave Stepped Frequency (CW-SF) Ground penetrating radar as rescue equipment. The radar has been experimented both in controlled environment, and in a real test site, at the Fire-fighters Station of Pisa, Italy. [C419]

"Design and numerical analysis of a new reconfigurable antenna for georadar applications"

We propose a new completely variable reconfigurable antenna for Ground Penetrating Radar (GPR) applications. In particular, here we present the design and the numerical analysis of the structure in total geometry morphing approach, with the aim of simulating the specific behavior of a reference bow-tie dipole. The development environment of the new device was the numerical tool HFSS (High Frequency Structure Simulator) by Ansoft which exploits the Finite Element Method (FEM). Finally, we extend the analysis of a single antenna by investigating the effect of a receiving one on the radiation properties of the transmitting antenna in dependence on the distance between them. [C420]

"Integrated GPR and archaeological investigations to study the site of Aquinum (Frosinone Italy)"

To enhance the knowledge finalised to the location and conservation of the unknown buried structures below the

actual studied levels, in the territory of the Ancient Aquinum (Frosinone, Italy), an integrated archaeological and ground remote sensing study has been developed during 2008-2009 and it is still in progress. Analysis of the historical and oblique aerial photographs, combined with topographical and archaeological field-walking surveys, allowed the preliminary interpretation of the main town-planning of Aquinum. To verify this preliminary interpretation an extensive geophysical surveys, employing Ground Penetrating Radar (GPR) method, has been made during 2008-2009. The obtained results indicate the good matching between the interpretation of aerial photographs and GPR images at different depths. The location, depth and size of the individuated archaeological structures were effectively estimated. Archaeological excavations made during the summer 2009, in a southern portion of the investigated area, have confirmed the results obtained with GPR method. [C421]

"Monitoring of sequential gasoline-ethanol releases using high frequency ground penetrating radar"

Our hydrogeophysical field experiment evaluated the ability of high frequency (450 & 900 MHz) ground penetrating radar (GPR) to monitor sequential releases of gasoline followed by ethanol. The initial GPR images of the gasoline release zone reveal the development of shallow (i.e., above 10 ns) high reflectivity events and a significant velocity pull-up of an underlying stratigraphic reflection. Temporal evolution of the impacted zone reflectivity and the velocity pull-up indicate a progressive redistribution of gasoline in the impacted zone. GPR profiles obtained during frozen soil conditions clearly show that the presence of gasoline affects the freezing process. Preliminary analysis of the sequential ethanol release GPR data indicates an significant expansion of the impacted zone following this release. [C422]

"Miniature multimode deep ground penetrating radar"

Deep ground penetrating radar, as its name says, is able to image the deep buried objects with high resolution. It becomes an important tool for human to know the underground world. In this paper a stepped frequency deep penetrating radar system has been developed. This miniature system is designed for three operation modes: Mode 1 is fast measurement, real-time data storage, off-line data analysis and imaging. Mode 2 is wireless real-time detection and imaging. Mode 3 is on-line real-time detection and imaging. Three modes can be switched flexibly for different working platform, such as low altitude aerocraft, planetary rover or lander, UAV (unmanned aerial vehicle), remote control vehicle and robot, vehicles or just hand holding. The miniature radar host is designed based on the embedded frame to satisfy the multi-modes operation condition including light-weight, small volume and low power consumption. [C423]

"Nine steps to concrete wisdom"

This paper presents the results of a detailed 3D investigation of 9 structural tests pits (called cells) at our offices in Australia. The data were recorded using a GSSI SIR-3000 svstem coupled with a 2.6 GHz antenna, with 1024 samples per trace and 500 scans per metre. A range of 5-6 ns and 16 bit data were used throughout. [C424]

"Experimental investigation of different soil types for buried object imaging using impulse GPR"

Performance of electromagnetic sensors which are used to detect buried objects, is varied according to properties of soil. Most common sensor pair is EMI (Electromagnetic Induction) and GPR (Ground Penetrating Radar) for buried object detection systems. Besides the surface roughness and overlying vegetation, electrical conductivity (σ, (S/m)), electric permittivity (ε, (F/m)), and magnetic susceptibility affects the detection performance of sensors. The electromagnetic properties of soil cause wave attenuation and change reflection coefficient of electromagnetic wave reflected from soil surface. For this reason, different soil types create various effects on sensor data, therefore performance of GPR and EMI sensors may decrease. Moreover, burial depth estimation can be performed if the soil properties are known exactly. This paper contains the effects of different soil types on impulse ground penetrating radar data, experimentally. [C425]

"Simulation and application of GPR in Artificial Freezing Engineering"

In Artificial Freezing Engineering(AFE), the distribution of freezing soil and its defects are important to engineering safety. Based on relative permittivity measured by vector network analyzer, electromagnetic models of artificial freezing walls were made. Then Ground Penetrating Radar (GPR) exploration of AFE was simulated by Time Domain Finite Element Method (TD-FEM) coupled with freezing temperature calculation. GPR were also used in AFE exploration. The research results show that GPR exploration and numerical simulation are in good accordance with each other. [C426]

"Application of Ground penetrating Radar (GPR) exploration in Karst mountain areas"

When highway is built in Karst mountain areas of China, it is important for us to detect Karst distribution which would trigger embankment sliding, subsidence and other geological disasters. So, karst caves under different conditions, such as stochastic ground surface, random covering layer thickness, different filling styles and depth were simulated by Finite Element Method(FEM), which got the reflecting features in GPR profiles. Then, exploration of GuiZhou highway and borehole verification were introduced. [C427]

"Nondestructive detection of delaminations in concrete bridge decks"

To detect delaminations in concrete bridge decks, nondestructive techniques (NDT) permit a frequent and large inspection of the slabs without damaging structures. This research was devoted to detect simulated defects in twelve repaired concrete slabs. These were scanned with high frequency ground penetrating radar (GPR) with the common offset (CO) and common midpoint (CMP) methods. The electromagnetic waves speed was determined from CMPs. A 3D visualization program was also created to display the CO measurements. The visibility of the inserted defects revealed to be dependent on their lateral extension, their thickness and their constitutive material. [C428]

"3D high resolution GPR survey to help the reconstruction of the archaeological stratigraphy of Lecce (Italy)"

3D high resolution Ground Penetrating Radar (GPR) survey was performed in the Crypt of the Duomo of Lecce (South Italy), built in 1114. The GPR data revealed us a stratified subsoil in which there is a distribution, with the depth, of several "remains" referable to different epochs. Here we present and discuss the experimental evidences, comparing them with the historical-archaeological documentation. We think that they constitute a valid contribution to the knowledge of the ancient stratigraphy, as well as of the Roman history of Lecce, especially because of many suppositions have not yet found a confirmation. [C429]

"Dielectric and magnetic anomaly imaging from GPR data"

This paper deals with the reconstruction of buried targets exhibiting both dielectric and magnetic characteristics, starting from GPR data collected at the interface air/soil. The problem is tackled under a two-dimensional geometry by means of linear scalar inverse scattering and the performances of the approach will be outlined against experimental data. [C430]

"Effects of surface topography and wind on reflection horizons in ice sheets"

Radar horizons within the great ice sheets of Antarctica are distorted by greater snow deposition on windward than on leeward slopes. In West Antarctica, this effect can change horizon depth by tens of meters but still leave the horizons surface-conformable and continuous for hundreds of kilometers. When viewed on a scale of tens of kilometers, the additional effect of ice speed makes horizons appear falsely recumbent and suggests false historical changes in ice speed. In large regions of the high East Antarctica plateau, deposition occurs only on windward slopes to form prograding bedding sequences up to tens of kilometers long and hundreds of meters thick. Beneath the leeward slopes, long-term metamorphism transforms the bedded strata into unconformable and unstratified pseudolayers that grow with burial, merge with others, form concatenated layers more than 70 km long and over 100 m thick, and generally account for all major englacial horizons. For the largest sequences, the bed topography controls the surface topography and in large part, the way accumulation is distributed on the high plateaus. [C431]

"The restoration of road coats and related objects parameters based on method of computation diagnostics-Ground Penetrating Radar antennas dipole approximation"

Several approaches are considered which allow to increase the reliability of diagnostics of plane layered medium in Ground Penetrating Radar (GPR) applications. This increase is reached due to accurate account of parameters of transmit-receive antenna (via electrodynamic modeling) and radio frequency channel of GPR. [C432]

"The research of distributed power quality on-line monitoring system based on GRPS"

In order to satisfy the requirement of power quality on-line monitoring system which is always online, cheap price and a wide coverage, the thesis puts forward to methods that GPRS(General Packet Radio Service)communications technology is applied in power quality on-line monitoring system. The main content of the system is that:the combination of DSP and MCU is used in power quality on-line monitoring system to store, display, count and analyze the collected data of voltage and current from each terminal, and communicates with supervisory computer through GPRS communication module to realize power quality monitoring in the grid.

According to the need of user, it can control field device to realize the research of distributed power quality on-line monitoring System. [C433]

"Airport unexploded ordnances identification based on artificial neural network and fuzzy support vector machines"

Considering the instability of airport unexploded ordnances(UXO) and the complexity of environment, the theory of artificial neural network(ANN)-fuzzy support vector machines (FSVMs) is presented to penetrate UXO. Different from the traditional target identification methods, the proposed approach uses the characteristics of ground penetrating radar target data analyzed by using the principal component analysis (PCA) technique. Considered many coterminous characteristics data of the targets, they are classified with a combination of support vector classifiers (SVCs) and feed forward neural networks (FFNNs). The risk membership to each input points is confirmed on the base of processing input data, and then is leaded into the reasoning process of the decision function. The results of UXO show that the proposed approach gives accurate results in terms of the estimated UXO identification. [C434]

"Context system using pervasive Controller Area Network bus system to improve driving safety"

With more than one million people dying worldwide on the roads every year and lots of money in property loses, traffic safety remains an unsolved matter. The potentials of in-vehicle safety systems are currently investigated to improve this situation. Hence, embedded system which can collect some important context information and warn the driver in order to improve the safety of driving is needed. A Controller Area Network (CAN) bus with nodes of sensors or the node which is connected directly to the vehicle's CAN bus is very practical and powerful to collect driver's context information. This context information should not be just kept in the vehicles; it should be shared with vehicles in the same neighborhood or be sent to the information processing center. In order to have a wireless communication, communication technologies like ZigBee, GPRS are needed to be used. In this paper, we propose a context aware system for improving road safety and efficiency as well as driving comfort. The studied system is composed of the CAN bus and wireless communication system, a prototype of this system on the vehicle was also designed and tested in Citroen C4 car. A CAN bus was designed and realized by authors. Then, some context information from the vehicle existent CAN is collected and an experimental test is made. [C435]

"GPRS-based fault monitoring for distribution grid"

The GPRS is a useful mean to solve the communication problem in the automatic system of power distribution network system. This paper designs a GPRS-based real-time system to monitor the on-off states of the switching station in the power distribution system. The system is consisting of a low-power controller of MSP430F149, the module of GR64 from WAVECOM company and detection circuits of on-off states. The IEC60870-5-101 protocol is used in the system. Therefore, it can conveniently communicate with other SCADA systems. It is reliable and stable running on site. [C436]

"Application of ground penetrating radar in the urban environment"

Several nondestructive testing methods have been studied to detect subsurface voids. However, few focus on deploying nondestructive methods in the congested and complex subsurface environment found in typical urban locations. This research identifies the challenges with applying Ground Penetrating Radar (GPR) techniques to locating subsurface voids and buried infrastructure in a complex urban environment. The study cataloged GPR signals representing reinforcements, concrete pipes, trolley tracks, and a large range of subsurface voids from surveys collected in downtown Louisville, Kentucky. Building upon this research, the team recreated a typical subsurface urban environment on the University of Louisville campus to develop a library of GPR images taken from known targets with defined parameters for training purposes. [C437]

"How many points per scan?"

Increasingly manufacturers are promoting equipment which claims to increase the no of sample points per scan to over 1000 points. For inexperienced GPR users, this appears to be an advantage. In reality this is misleading and giving a false promise of "improved" data. This paper demonstrates, on the basis of the Nyquist theorem that 256 sample points per radar scan is more than enough. [C438]

"Tapered slot antennas for ground penetrating radar"

The paper presents current results of our ground penetrating radar system design proposed for military application. It is focused especially on antennas, but includes the properties of ultrawideband generator. Several

tapered slot antenna structures are presented and some of them have been fabricated. Some modifications of double ridge horn antenna are presented and their parameters are compared and discussed. [C439]

"Using ground penetrating radar to estimate active layer moisture conditions in the Arctic"

Polar regions, especially the Arctic, are expected to experience the largest changes in climate parameters during the coming decades, as well as increased variability. Large amounts of carbon currently stored in the arctic permafrost are expected to be released when a larger portion of the upper permafrost thaws. This will result in a deepening of the active layer, the region above the permafrost that freezes and thaws annually. Changes in this layer is thus important not only as an indicator of climate change, but also because they will alter the conditions for the vegetation and hence the ecosystem. A climate effects monitoring programme in the Zackenberg valley in the continuous permafrost zone of Northeast Greenland, has since 1995 monitored the thawing of the active layer using manual probes. Ground Penetrating Radar (GPR), a noninvasive technique that provides continuous data on the subsurface, has been widely utilized in geosciences applications and implementation of this technique in Zackenberg can greatly enhance the spatial and temporal resolution of active layer monitoring. Hence, supplying additional knowledge of the changes in the active layer and the processes involved. This paper reports a preliminary analysis of data from a pilot project that focused on the interactions between the snow, soil and vegetation. In 2009, a GPR signal at 500 MHz was used to identify the active layer depth and to assess moisture conditions (θ) along a gradient of five different soil and vegetation types. The results suggest that differences in returning radar velocity can be used to estimate variations in moisture content in the active layer. [C440]

"The shrine of edward the confessor: A study in multi-frequency gpr investigation"

Following an earlier investigation into the 13thCentury Cosmati mosaic in Westminster Abbey, Ground Penetrating Radar (GPR) investigations were commissioned in order to locate the site of a large royal tomb. Antennas of 400MHz and 4GHz frequency were used in the area of the High Altar steps and on the floor of the current Shrine Chapel. The investigation uncovered evidence of the target tomb, a number of other graves, some previously unknown, and at least one buried object. The paper briefly discusses the frequencies selected and illustrates how these have resulted in better understanding of the archaeological and historical evidence. [C441]

"GPR as an effective tool for safety and glacier characterization: experiences and future development"

In recent times, the GPR technique has assumed an important role in glacial environment exploration. Ice thickness, bedrock description, internal water floods or underground channel, glacial structures (as snow layering and crevasses detection) form part of our experience in Antarctica and in high alpine glacier ski areas. In this paper, we present some results of these investigations exploring the possibility of combining our technical expertise on Radio Echo Sounding (RES) instrumentation to develop a system for subglacial environment exploration. [C442]

"Multi-channel Ground Penetrating Radar based on ultra-wideband short-pulse signal: Hardware and software"

In [1, 2] recent state of our multi-channel Ground Penetrating Radar (GPR) design is reflected. In this paper we compare that former design with the new one which is free of some drawbacks. Both GPRs are suitable for diagnostics of road coatings, detection and recovery of subsurface infrastructure (pipes, cabling). GPRs include TX/RX module, antenna switch, multi-element antenna, carrier vehicle and control/processing computer with dedicated software. This software allows GUI, controls TX/RX module, accepts the data from TX/RX module, builds 3D radio image of subsurface volume. As well, dedicated software enables to estimate the geometry and electrophysical parameters of subsurface volume and objects inside of it. For this, so-called Computational diagnostics method is implemented which is based on reverse problem solution. Experimental results are presented. [C443]

"Accurate tools for convergence prediction of series solutions of Contrast Source Integral Equations"

Source Type Integral Equations (STIEs) provide interesting alternative formulations for the scattering from dielectric objects. In particular, the underlying operators factor into the composition product of two other linear operators, whose norms can be separately evaluated with the aid of suitable universal diagrams. Then, a specific inequality suggests that the convergence of the formal Neumann series inverting the original integral equation can be established by means of the aforementioned tools. Anyway, such an inequality sometimes

provides pessimistic (i.e. stronger than actually needed) conditions in many cases of practical interest. The previous observation motivated the authors to further investigations, so leading to sharper bounds on the relevant norm of the STIEs operators. Numerical examples are reported, confirming the usefulness of the new tools. [C444]

"Imaging of 3D magnetic targets from multiview multistatic GPR data"

Ground Penetrating Radar surveys aimed at imaging magnetic anomalies are gaining an increasing attention in several applications. In this respect, we introduce in this communication an inverse scattering strategy based on a suitable reformulation of the Linear Sampling Method (LSM). The LSM is a reliable and computationally effective imaging approach, which is exactly cast as a linear inverse problem (i.e., no approximation is required). This is made possible by restricting the processing task to the reconstruction of the shape of the anomaly and neglecting the retrieval of the electromagnetic features. Since the LSM has been never applied to the imaging of magnetic targets from electric field data, a preliminary assessment of its reconstruction capabilities towards purely magnetic anomalies is given by means of numerical examples. [C445]

"A kind of MIMO ground penetrating radar plane antenna array and corresponding imaging method"

Antenna array is widely used in real time imaging of ground penetrating radar (GPR). With circumstance restricting, the number and interval of antenna elements are difficult to fit the need of high imaging resolution. In this paper, a kind of 4-transmitter and N-receiver MIMO GPR plane antenna array is proposed. Based on phase center approximation (PCA) theory, its equivalent antenna array is a uniform square antenna array with 4N T/R antenna elements, and the interval of equivalent elements is half of that of the real receiving elements. The equivalent uniform square antenna array has two synthetic apertures and can obtain the 2D information of target. So, the 2D image of the target can be derived by using narrowband transmitting signals and the 3D image can be derived by using wideband transmitting signals. Corresponding imaging method and procedure are also given in this paper. [C446]

"Crosshole GPR traveltime tomography in elliptically anisotropic media"

Owing to relatively rapid water content variations with respect to electromagnetic wavelength at GPR frequencies, the vadose zone usually exhibits significant velocity anisotropy. Neglecting anisotropy in traveltime tomographic reconstruction leads to artifacts that can obscure important subsurface features, the vadose zone being subject to this problem. In this paper, an algorithm for crosshole GPR geostatistical traveltime tomography in elliptically anisotropic media is presented. The advantages of the geostatistical tomography algorithm are that the solution is regularized by the covariance of the model parameters and that stochastic simulations can be performed to appraise the variability of the solution space. The implementation relies on a fast curved raytracing scheme specifically crafted for the problem at hand. The benefits of the algorithm to image the vadose zone are illustrated through a synthetic case that is representative of typical studies in quaternary geological settings. The results show that considering anisotropy yields better fit to the data at high ray angles and reduces reconstruction artifacts. [C447]

"Velocity analysis in the GPR method for loose-zones detection in the river embankments"

Determination of continuous distribution of the loose zones in the river embankment between points of geotechnical investigations is a very important matter for the embankment stability during the flooding. Presently, only non-invasive, geophysical methods can deliver such information. On the basis of numerous tests carried out by the Department of Geophysics at AGH University of Science and Technology in Cracow, the following conclusion may be drawn: zero-offset, reflection GPR profiling very seldom gives positive results at the detection of the loose-zones in the levee. Therefore, another concept of the loose-zones detection, using the GPR method, is presented in this paper. This technique is based on the modified CMP profiling, which allows to prepare a velocity map. Such a map may be used for evaluating of degree of the embankment disintegration. [C448]

"Petroleum industry techniques yield new insights into 3D GPR data"

We have adapted petroleum industry technologies to 3D GPR datasets from a variety of geological and archaeological settings. Seismic attribute analysis designed for 3D seismic volumes of oil fields has been used to map a 19thcentury cemetery and to prepare a Roman archaeological site for detailed study by mapping the prior disturbances of the site. Specific seismic attributes that we have successfully applied include connectedness ("geoanomalies"), semblance (or dissimilarity), volume rendering (transparency visualization), and waveform classification. An especially powerful strategy is to use two or more attributes simultaneously via volume

rendering that allows multiple visualizations. [C449]

"EISS: An HF mono and bistatic GPR for terrestrial and planetary deep soundings"

EISS (Electromagnetic Investigation of the SubSurface) is an HF (~2MHz) impulse Ground Penetrating Radar dedicated to deep soundings (kilometric depths) of planetary sub-surfaces. This radar has the particularity to be operated from the surface in both monostatic (transmitter and receiver at the same location) and bistatic configurations (with a small receiver separated from the transmitter that can easily be displaced on the area to be investigated). A prototype has been developed in the frame of ExoMars mission B-phase. This article mainly focuses on the bi-static mode and details the selected design, its various subsystems and its operations. Preliminary tests involving antenna impedance measurements on Earth are shown. [C450]

"Automatic classification of metallic targets using pattern recognition of GPR reflection: a study in the IAG-USP Test Site, Sao Paulo (Brazil)"

In this work, a methodology to automatically classify of metal targets using pattern recognition techniques on GPR reflection data is presented. The methodology consists of designing a multilayer perceptron (MLP) classifier based on features extracted from the targets in the subsoil, and then using it to classify hyperbolas diffraction indicating their position and depth. The classification of reflections allows a high resolution reconstruction of the subsurface with reduced computing time. The system was developed in MATLAB and applied to GPR data obtained at IAG-USP test site, located in the city of Sao Paulo, Brazil, where metallic drums were studied under controlled field conditions. This site contains different targets of variable sizes buried under different depths and it served as a model for the computational experiment. The results indicate that the automatic classification of the metallic targets in the subsoil is efficient, contributing for the reduction of the ambiguities in the geophysical data interpretation, besides having application on the subsoil mapping of utilities. [C451]

"A study of GPR vertical crack responses in pavement using field data and numerical modelling"

The application of ground penetrating radar (GPR) as a non-destructive technique for characterization of pavement structure on road networks has gained considerable attention during recent years. High resolution ground coupled GPR has the potential to provide important additional information on pavement deterioration, defects and cracks, the last being the focus of this study. Crack geometry and the electrical properties of the pavement surrounding the crack can be quite variable, resulting in often complex and hard to interpret data. Therefore, FDTD numerical modelling has been employed to help understand a range of GPR vertical crack responses observed in a variety of pavements. [C452]

"Recent advances in RF tomography for underground imaging"

Underground imaging for tunnel detection is proposed using the principles of radio frequency (RF) tomography. In RF tomography, a set of distributed transmitters and receivers are deployed arbitrarily above the ground, or slightly buried. These transmitters radiate suitable narrowband, low-frequency waveforms into the ground. The resulting wavefront impinges upon underground objects, scattering electromagnetic energy in all directions. Receivers sample the scattered signal, mitigate direct-path leakage, retrieve the phasor of the scattered signals, and relay this information to a base station. After adaptive processing of measured data, an image of the underground facilities is achieved. [C453]

"Monitoring of seasonal influence on spatial distribution of moisture content at a natural Kanto loam site using ground wave of GPR"

Ground penetrating radar (GPR) ground wave was used at a natural Kanto loam (i.e. Andisol) site to examine the influence of seasonal variations on surface soil-moisture content. Kanto loam is a type of volcanic ash soil found widely distributed in Japan. In order to investigate the influence of surface soil conditions on GPR based estimates, the study site was divided in two zones: with and without vegetation. Measurements were conducted at regular intervals during a three month monitoring period. Results indicated that GW was sensitive to the surface soil conditions as well as to seasonal variations. A significant increase in moisture content was observed in the vegetated zone over that of the bare zone during a period of a day after precipitation (i.e. September 1st). It shows that in the vegetated zone moisture in plants themselves, including roots, stems, and leaves, affects GPR measurements, leading to higher moisture content than in the bare zone. However, the influence of vegetation was not found to have a large impact during periods of good weather. The effectiveness of surface soil conditions with seasonal variations on GPR-based moisture content provided a clear insight to agricultural management prospectivies. This research confirmed that Kanto loam can be a good GPR site for noninvasive mapping of moisture content regardless of the presence of organic matter, silt, and clay content. [C454]

"GPR measurements and FDTD simulations for landmine detection"

Among the technologies used to improve landmine detection, Ground Penetrating Radar (GPR) techniques are being developed and tested jointly by "Sapienza" and "Roma Tre" Universities. Using three-dimensional Finite Difference Time Domain (FDTD) simulations, the electromagnetic field scattered by five different buried objects has been calculated and the solutions have been compared to the measurements obtained by a GPR system on a (1.3 Ч 3.5 Ч 0.5) m3sandbox, located in the Humanitarian Demining Laboratory at Cisterna di Latina, to assess the reliability of the simulations. A combination of pre-calculated FDTD solutions and GPR scans, may make the detection process more accurate. [C455]

"A GPR imaging algorithm with artifacts suppression"

Based upon an image reconstruction algorithm which has been proposed in medical imaging field, an algorithm termed as Multiply Back Projection (MBP) is firstly used in GPR imaging. This algorithm is similar to the conventional Back Projection (BP) imaging algorithm except for the additional pairing multiplication procedure. In the MBP algorithm, time delays from each synthetic aperture position to a given point in the imaging area are calculated firstly. Then the backscattered signals corresponding to a certain imaging point are searched out through the time delay in each synthetic aperture position. Afterwards, the backscattered signals are multiplied in pair and the products are summed subsequently to form a result point. Experimental results present the superiority of the MBP algorithm over its original counterpart in artifacts suppression, as well as a slightly improvement in image resolution. In the end, theoretic analysis is performed to justify the validity of the MBP algorithm. [C456]

"EM characterization of resistively loaded printed dipole antennas for GPR applications"

A resistively-loaded printed dipole antenna is modeled and the relevant circuital and radiation properties analyzed thoroughly. The optimal resistive loading is determined in order to achieve a wideband input impedance matching. Then, the electromagnetic characteristics of the individual antenna in terms of radiation efficiency and surface footprint are investigated thoroughly for different types of soil. Emphasis is put on the full-wave analysis of the antenna performance in pair configuration for different Tx-Rx separations and elevations over the ground, as well as on the analysis of the electromagnetic scattering from dielectric and metallic pipes buried at different depths and with different diameters. [C457]

"Design and full-wave analysis of cavity-backed bow-tie antennas for low-frequency GPR applications"

In this paper, a comprehensive analysis of a novel GPR antenna featuring almost 30: 1 relative bandwidth (55 MHz->1.5GHz), with a maximum antenna size of 40 cm is performed. The antenna transient behavior, near-field radiation properties, and the impact of the ground are analyzed in details. It has been shown that the antenna exhibits reduced and short ringing, low spurious energy emission in the air region, as well as stable circuital and radiation properties over different types of soil. [C458]

"Water table detection by GPR in Sardon, Salamanca, Spain"

GPR was applied in the semi-arid Sardon catchment (Salamanca, Spain) in order to analyze the distribution of the water table depth with a high spatial resolution to serve as input in the parameterization of a hydrological model. We used a pulse radar with a single 200 MHz bowtie antenna combined with a differential GPS and a survey wheel for accurate positioning. Measurements were performed following a series of transects crossing perpendicularly the bed of the Sardon streams, which were dry during that period (September 2009). We measured the depth of the water table in several observation wells to interpret and validate the GPR data. A time domain reflectometry probe was used to estimate the shallow soil dielectric permittivity and corresponding wave propagation velocity along the transects. In general, the water table was visible in the GPR data, with depths ranging from about 2 to 3 meters. [C459]

"Ground penetrating radar (GPR) studies in the Agios Voukolos church, Izmir, Turkey"

The Agios Voukolos church is one of the unique Orthodox constructions in Izmir. Ground penetrating radar (GPR) study was carried out to define the crypts, ossuaries and other subsurface structures under the church. Regular GPR investigations were performed by using a Ramac CU II instrument with 500 MHz center frequency shielded antennae. In addition, two small parts of the Katholikon were measured with 1000 MHz shielded antennas. Data acquired in continuous mode was processed by standard GPR processing steps. The results were given important information about deformation variations (floor cracking and the distortion of architectural elements) and subsurface relics (crypts, ossuaries etc.) inside the church. [C460]

"Synthetic GPR modelling studies on shallow geological properties and its comparison with the real data"

The synthetic GPR modelling studies are quite important to evaluate the interpretation of shallow geological properties such as faulting, bedding, weathering etc. This study aims to simulate some shallow geological structures by GPR technique. To obtain a successful interpretation, we performed the synthetic modelling studies for paleoseismology, sedimentary and geotechnical problems using different values of electrical properties that affect the radar signals. During the modelling studies, we produced a lot of models for various subsurface conditions. Also, real GPR data was collected on some geological problems. As a result, the combined usage of the real GPR data and synthetic modelling could be contributed the joint interpretation on shallow geological structures. [C461]

"Analysis of dispersion of pulse signals in underground tunnels using finite-difference time domain and short-time Fourier transform"

The dispersion of pulse signals of a cross borehole radar simulator for tunnel detection was analyzed using FDTD and STFT. Two simulation cases with extremely different dispersion properties were simulated by the FDTD method. In the two cases, the trace path between the transmitter and receiver penetrated an air-filled tunnel perpendicularly and obliquely, respectively. The recorded fields in the cross sectional plane during FDTD computation were decomposed into several frequency components by STFT. By analyzing the propagation behaviors of frequency components, the different dispersion characteristics according to the tunnel's oblique angle variation are visually rendered in detail. [C462]

"Exact solution of idealized subsurface sensing problem"

Identification of subsurface objects detected by GPR requires an accurate estimate of their size and shape. In this paper, as a generalization of the migration methods based on the "exploding reflector" approximation, we consider a model of synchronously exploding volume sources. The excited impulse radiation is registered on the earth surface. We write down a closed-form solution of the inverse problem: reconstruction of the current spatial density from the transient electric field distribution along the surface. This model solution can be used to refine practical migration algorithms. It is also interesting as a model to estimate the basic factors limiting GPR spatial resolution. [C463]

"A GPR survey on a morainic lake northerly Turin (Italy)"

A waterborne GPR survey consisting of 50 profiles with a total length of about 37 km has been executed on the morainic lake of Candia northerly Turin (Italy). The survey tested the capability of GPR in shallow low-conductive waters to estimate bathymetry, water volume, bottom sediment type, bedding and porosity. Spotty measurements of electrical conductivity and temperature allowed for a better processing of GPR raw data. The results seem to confirm the effectiveness of GPR to give useful information providing suitable geometrical (water depth) and physical (water conductivity) conditions. [C464]

"Estimation of soil electromagnetic parameters using frequency domain techniques"

In this paper two frequency domain methods for characterization of the dielectric properties of dry sand over a broad microwave frequency range will be presented. The investigated electromagnetic parameters of the soil relevant for most GPR applications are dielectric permittivity and loss tangent. Although the majority of GPR applications concentrate on frequencies below 1 GHz, this work will investigate the constitutive parameters of soil with very low water content in three microwave bands (X, Ku and part of K) ranging from 7 to 20 GHz. In particular, this study will focus on the evaluation of the complex permittivity by means of a numerically robust evaluation rather than the well-known Nicolson-Ross-Weir (NRW) method. The proposed procedure yields the apparent real part of the permittivity and the loss tangent without the inaccuracy in the vicinity of $\lambda m/2$ resonances known from the NRW method. The second approach utilizes a free space measurement, in which the soil is confined by a polystyrene probe holder in a mono-static GPR setup. The measurement result of the backscattered excitation will be compared with a commercial time-domain solver based on Finite-Integration-Technique (FIT). The material parameters of the electromagnetic model are adapted iteratively in the way that measurement and simulation results coincide. The measurement results of both frequency domain methods demonstrate the validity of the estimated dielectric parameters. [C465]

"Full-waveform inversion of crosshole ground penetrating radar data to characterize a gravel aquifer close to the Thur River, Switzerland"

Imaging results of crosshole GPR can be significantly improved by using full-waveform inversion compared to conventional ray-based inversion schemes. A recently developed 2D finite difference time domain (FDTD) vectorial full-waveform crosshole radar inversion method was made more flexible to allow using an optimized acquisition setup that reduces the measurement speed and the computational cost. This improved algorithm was used to invert crosshole GPR data acquired within a gravel aquifer in northern Switzerland. Compared to the ray-based inversion, the results from the full-waveform inversion show significantly higher resolution images in the depth range of 6m-10m. Comparison of the inversion results with borehole logs shows that porosity estimates obtained from Neutron-Neutron data correspond well with the GPR porosities derived from the permittivity distribution in the depth range 6 m-10 m and that the trends are in good qualitative agreement. Furthermore, there is a good correspondence between the conductivity tomograms and natural Gamma logs at the boundary between the gravel layer and the underlying lacustrine clay sediments. [C466]

"3-D GPR imaging of central pillar of the Mireuk stone pagoda in Korea"

Mireuk Pagoda is a very important national treasure which is known to be constructed during late Baekje kingdom about 1,500 years ago. To investigate the inner structure of central pillar of this stone pagoda, 3-D GPR and tomography imaging was applied. During this geophysical survey, we could find and define a small room in the pillar. Since full coverage was available in the radar tomography, we could obtain very accurate image of this empty room. By the disassembly of the cover stone of central pillar after this investigation, we could find great historical remaining in this room. The findings include golden jars containing relics of Buddha and written documents explaining construction history of this pagoda. [C467]

"Practical algorithms of geometrical migration"

Practical GPR survey schemes based on a geometrical migration algorithm are implemented and experimentally tested: (1) random GPR data collection from water surface along a tangled path and interpolation to a regular grid for bottom reconstruction; (2) double-pass B-scan with different antenna offset for estimation of the upper ground layer thickness and permittivity. An analytical relation between the shape of subsurface reflecting interface with measured signal travel times is used for the reconstruction of the layer parameters. [C468]

"Advantages and restrictions of holographic subsurface radars"

Holographic subsurface radars (HSR) are not in common usage now; possibly because of the historical view amongst radar practitioners that high attenuation of electromagnetic waves in most media of interest will not allow sufficient depth of penetration. It is true that the fundamental physics of HSR prevent the possibility to change receiver amplification with time (i.e. depth) to adapt to lossy media (as is possible with impulse subsurface radar or ISR). However, use of HSR for surveying of shallow subsurface objects, defects, or inhomogeneities is an increasingly proven area of application. In this case HSR can record images with higher resolution than is possible for ISR images. This paper presents experiments with HSR imaging in media with different degrees of attenuation, and illustrates the principle of HSR through an optical analogy. [C469]

"Full-waveform inversion of multi-offset surface GPR data"

Common ray-based techniques for analysing common midpoint (CMP) ground penetrating radar (GPR) data use only part of the measured traces and return results with limited resolution and non-quantitative values for conductivity. Due to the fact that full-waveform inversion uses all information of the measured traces, a higher resolution image of the subsurface and quantitative conductivity values can be obtained. Using an experimental dispersive CMP dataset, the results of dispersion analysis, i.e. permittivity and thickness, define the start model parameters for full-waveform inversion. After estimating an effective source wavelet, the full-waveform inversion based on a simplex search algorithm returns reliable permittivity and conductivity values of the subsurface. [C470]

"Underground asset mapping with dual-frequency dual-polarized GPR massive array"

Nowadays, GPR is one of the most effective tool for enabling the safe use of the underground; in fact, amongst the various state-of-the-art methods available, it is a noninvasive technique capable of accurately locating both metallic and non-metallic buried objects. After a multi-year development, a new system has been recently introduced on the market; due to the combined use of low and high frequency antennas (dual-frequency antennas), the use of array of sensors in different polarization and dedicated data processing techniques, the equipment enables the recreation of a 3-D volume from spatially correlated data, with clear benefit in terms of achievable performance and productivity. [C471]

"Electromagnetic monitoring of concrete structures"

Non-destructive evaluation of reinforced concrete structures is an increasingly important field in the construction and civil engineering community. A large number of pathologies that affect both the concrete and the reinforced bar inside concrete are related to the presence of water and its spatial development. In this context, the quantification of both water content and bar diameter is an important phase for the diagnosis of concrete. The propagation of electromagnetic waves is controlled by its electromagnetic properties, mainly influenced by the presence of water in the case of concrete. The dielectric properties of concrete were studies as function of volumetric water content. To measure the dielectric properties of concrete as function of volumetric water content at high frequency, a HP-impedance analyser was used. More than 800 samples of concrete were analyzed and a new relationship between relative dielectric constant and volumetric water content was obtained. Furthermore the study was focused on the simulations for one centre frequency GPR applied to a range of rebar sizes common used as concrete reinforcement. This is compared with real measurements of different known rebar sizes inside concrete structures using 1GHz centre frequency antenna. Furthermore empirical relationship between rebar sizes and electromagnetic parameters was established and analytical functions were proposed. [C472]

"Tests of sommerfeld ground wave theory using ground-penetrating radar pulses"

We have used ground-penetrating radar pulse waveforms within moveout profiles that we recorded over dielectric ground, to test the geometric amplitude attenuation rates of interfacial surface air waves predicted by classic Sommerfeld theory. The pulses allow separation of interfacial wave modes. We used horizontally polarized pulses centered from 37-390 MHz, frozen ground, and an intermediate range of tens of wavelengths over which radial polarization is predicted to exhibit anomalously low rates. As predicted, azimuthal broadside polarization at 37-45 MHz attenuated in proportion to the square of range, but the radial endfire rate was closer to the 1.6 power of range. At 360-390 MHz, both rates exhibited predicted range-squared amplitude attenuation. Not readily extractable from the theory are the rates for subsurface direct waves, for which we found, from numerical experiments, that both polarizations attenuate in proportion to the square of range. This suggests that geometric rates for all types of subsurface interfacial waves attenuate in proportion to range squared and could be subtracted from actual rates to determine material loss rates. [C473]

"Development of a bore-head GPR for Horizontal Directional Drilling (HDD) equipment"

ORFEUS is a Specific Targeted Research Project (STREP), partly funded by the EC, that started in November 2006. One of the objectives of the project was to design and develop a radar mounted on the drill head of Horizontal Directional Drilling (HDD) machines to provide a real-time indication, to the operator, of obstacles in the drill path. The system consists of a GPR control unit (housed in a drilling rod) and two UWB antennas. These can detect buried infrastructure that the bore-head may strike and verify a clearance zone around the drill string to ensure that new pipes may be installed with a minimum separation from adjacent plant. During the 3 year project, several key technical problems, mainly concerning electromagnetic and mechanical compatibility issues, have been solved. The system was finally tested both in experimental and operational sites. These tests confirmed the capability of the equipment to provide useful information on the obstacles in the drilling path; detection range has been evaluated to be sufficient to generate a warning message to the operator to allow corrective action to be taken, thus enabling HDD equipment to be used in greater safety. [C474]

"A simple inversion model for the estimation of subsurface features of Mars poles"

Radar observations from Marsis have demonstrated that Martian Polar Layered Deposits (PLD's) are very transparent to radar waves. Thus, the sounder is able to detect the presence of subsurface reflections in the polar regions below the ice-rich layered deposits. The analysis of radar data makes it possible to gain information about some physical features of Mars surface. In this work an electromagnetic inversion model is used to characterize the shallower structures. This approach assumes that structure consists of layers with parallel plane interfaces and that the electromagnetic properties of the first layer are known a priori. Under these assumptions it is possible to estimate the dielectric permittivity of the subsurface structure. The inversion method has been tested in an area of South Pole and reconstruction results are shown. [C475]

"Influence of interface roughness and heterogeneities on the waveguide inversion of dispersive GPR data"

To investigate the influence of interface roughness and heterogeneous media on the inversion of dispersive GPR data, we performed 3D FDTD modeling with GPRMAX. For both the broadside and endfire source-receiver configurations the responses were calculated for models with different interface roughness and for models that include media with heterogeneities in their dielectric properties. Due to the use of multiple source-receiver offsets

to calculate the phase-velocity spectrum, the signal to noise ratio was relatively good and for low interface roughness the medium properties could be reasonably well reconstructed. Only for the largest interface roughness the data contained significant diffractions and the medium properties could not be reliably reconstructed. For variations of the relative permittivity values equal to 10% and 20%, the model parameters could still be relatively well reconstructed. [C476]

"Attenuation of large bandwidth microwave signals in water and wet sand"

Large bandwidth microwave signals propagate in dispersive media as pulses that attenuate according to a non-exponential law. Although this is a direct consequence of wellknown theory of propagation in dispersive media, this fact is rarely acknowledged. The aim of this paper is an experimental study of this effect in fresh water and wet sand, both media of interest in Ground Penetrating Radar, which performances dramatically rely on capability of microwaves to propagate through soil. [C477]

"Inversion of guided waves in georadar data"

We analyze the dispersive characteristics of the electromagnetic guided waves (at georadar frequency) to infer the electrical properties of materials that constitute a layered wave guide. WARR (Wide Angle Reflection and Refraction) georadar acquisitions could be carried out in both TE (Transverse Electric) and TM (Transverse Magnetic) configuration to collect the full wavefield at different offset from the source. The dispersive curves of TE and TM modes are obtained by transforming the space-time acquisition into phase velocity-frequency domain (f-v spectrum); the relative maxima in the fv spectrum represents the different propagation modes. We adopt both global and local inversion algorithms for minimizing the misfit function between measured and theoretical curves in order to obtain a ID model of the layered subsoil (thicknesses and electrical permittivity). [C478]

"Tackling the non-linearity problem in GPR waveform inversion"

Crosshole radar tomography is a non-invasive tool used in diverse geological, hydrogeological and engineering investigations. Conventional tomograms provided by standard ray-based techniques have limited resolution. Higher resolution radar tomograms can be derived by using full-waveform inversion schemes. However, despite the theoretical improvement in resolution, convergence problems can arise in the application of full-waveform schemes due to the ill-posed nature of the inverse problem and the high non-linearity of the relationship between the model parameters and the scattered fields (i.e. the forward problem). We present here a new inversion scheme that starts with a low-pass filtered version of the radargrams and progressively expands the frequency bandwidth as the iterations proceed, thus reducing the likelihood of the inversion getting trapped in a local minimum. The benefits over standard full-waveform time- domain inversion are demonstrated by means of three synthetic examples. [C479]

"Wireless video monitoring system based on image restoration technology"

A video monitoring system based on GPRS wireless transmission technology is introduced. The system mainly consists of video monitoring modules, MCU, GPRS communication system and monitoring computer. It can use GPRS network and the Internet instead of traditional wired video system to monitor the remote targets in the environments of not suitable for cable transmission. For video degradation during the image formation and transmission process, a method of image restoration based on Hopfield neural network is introduced. Simulation results show that this method can restore the vague image effectively. [C480]

"Portable satellite backhauling solution for emergency communications"

This paper describes the portable satellite backhauling solution for emergency communications used in the e-Triage Project. The main objective of e-Triage is the efficient electronic on-site registration of the victims in Mass Casualty Incidents (MCIs) to enable a fast distribution of the information to hospitals for a better handling of victims. To achieve this, e-Triage designs the end device used to register the victims, the database where the information of the victims is saved, and the communications infrastructure necessary to transmit the data, as after a disaster event the terrestrial networks are likely to be overloaded, damaged or not operative, if they ever existed. This paper focuses on the design aspects of a hand-luggage-size suitcase that offers GSM/GPRS and WLAN to rescue teams and victims in the disaster area and connects them over satellite to the disaster-safe area. [C481]

"Design and implementation of wireless fingerprint identity authentication based on GPRS"

Wireless fingerprint identity authentication system based on GPRS is presented. The application model is provided. The hardware circuit and software design process are given in detail. Finally, the application scenarios

of wireless fingerprint identity authentication system based on GPRS are given. [C482]

"Learning feature transforms for object detection from panoramic images"

We present a novel technique to detect objects from panoramic images using existing object detectors trained from perspective images. By leveraging existing object detectors, we save the cost of training a new detector which requires tedious and time consuming training data collection and labeling. The core of our technique is learning a feature transform which is represented by Gaussian Process Regression (GPR). Feature vectors computed directly from panoramic images are transformed into new feature vectors in such a way that the existing classifier has much better detection rate on the transformed feature vectors. Our feature transform has the interesting property that it not only corrects for the geometric distortions resulted from panoramic imaging process, but also corrects for the pose mismatches between the objects on the panoramic images and those on the training images. Our experiments show that we are able to successfully apply an existing car detector trained on perspective images to panoramic images which have both geometric distortions and larger pose variations. [C483]

"The lake water bloom intelligent prediction method and water quality remote monitoring system"

According to the lagging state of water quality monitoring and problems of difficulty to predict water bloom, one water bloom prediction method based on grey-BP neural network is proposed and a system on water environmental remote monitoring and water bloom early warning based on GPRS wireless communication technology is built, which can obtain the automatic real-time monitoring information for the change of water quality and occurrence of water bloom, then provide a kind of efficient and practical system for water environment control. [C484]

"Multiple-Sensor Indoor Surveillance System Based on Hybrid Network"

Since the aging population increasing and the acceleration of the life pace, more intelligent robots have been developed for health monitoring and home security. In this paper, we proposed a framework of indoor security information interactive system basing on Internet and GSM/GPRS hybrid network. On hardware, the system consists of several sub-systems: industrial computer, GSM/GPRS module, ultrasonic module, infrared module, photoelectric sensor module, motor driver and controller, video server module, environment detection module, CAN bus data acquisition card and CCD camera. We also achieved a network architecture on software including client, local server and robot console. A robot system is developed to verify the feasibility and efficiency of this architecture. The experiment results proved that the system can meet our expectations. [C485]

"A Kind of Design and Implementation for the Monitoring System Based on MMS"

This paper presents a new design and implementation of MMS-based monitoring system. The architecture, functions and key techniques are detailed. This system is real time and reliable with the advantage of low power consumption. It is very suitable for personal and property safety. [C486]

"The wireless extension of CAN-bus based on GPRS"

CAN-bus is applied widely in many industrial systems and vehicles. Nevertheless, in some cases, two or more distant CAN-bus segments are needed to transfer data. If the distance is too long, utilizing twisted wire pairs are impossible. In wireless method, GPRS is so far the reliable style. In this paper, a kind of CAN/GPRS gateway is designed to achieve the function of the wireless extension of CAN-bus. [C487]

"A practical ground penetrating radar signal processing method based on wavelet transform"

Wavelet transform is a new applied signal processing technique in recent years, its time-frequency multi-resolution and signal processing performance are analyzed in the paper. A practical ground penetrating radar signal processing method based on wavelet transform is proposed; it contrast with continuous wavelet transform, the experiments indicate that it improves the processing performance of underground target detecting. [C488]

"Analysis of firing patterns in Chay neuron under external sinusoidal ELF electric field stimulus"

Neuronal firing patterns are related to the information processing in neural system. In this paper, we investigate the response characteristics of Chay neuron model to the stimulation of externally-applied sinusoidal electric field. The stimulus frequency is used as the bifurcation parameter. By calculating the inter-spiking intervals (ISIs) and Lyapunov exponents, we find kinds of firing patterns such as period-n bursting, period-n spiking, mixed-periods bursting, bursting-chaos and spiking-chaos. Meanwhile, various phase-locking patterns have been

studied in this paper, such as p: 1(p ≥ 2), 1: p(p ≥ 2) and p: q(p, q ≥ 2) phase-locking, etc. Especially, it is easy to control the transition between various firing patterns of excitable cell under external sinusoidal ELF stimulus, which has significance of theoretical guidance for treatment of diseases by the external electric field. [C489]

"The Design of Remote Update System Based on GPRS Technology"

The thesis analyzes and designs a remote update system based on GPRS technology. It mainly describes the application of GPRS technology in this system, the program structure in SCM (Single Chip Microcomputer), the subdivision of Flash code space and the design of communication protocol and system security. And it also briefly presents the specific achievement of the remote update system. The program framework of SCM in this system has a strong generability, which is applicable to a variety of data sources. [C490]

"Evaluation of RFID based Tracking Systems for securing transit goods in East Africa"

In this paper, Radio Frequency Identification based Tracking Systems for securing transit goods under customs control in East Africa are discussed. Challenges experienced in the port and shortcomings of manual based tracking systems necessitated Kenya Revenue Authority to explore use of modern methods to track transit cargo. Two systems one based on Relevant Time System and the other on Real Time Location Tracking Systems were piloted. However an evaluation has never been done on the effectiveness of these systems in addressing previous challenges. This study therefore explores the salient feature of the two piloted systems, strengths, weaknesses, shortcomings, limitations and suitability of each. Results from the pilot use of both systems are discussed in which both tracking systems were observed to be more superior and effective compared to the current manual tracking systems. The suitability however of the two varied depending on the required level of security, risk profile of cargo, constraints on the cargo and means of transporting the goods. [C491]

"On remote automatic meter reading system based on GPRS technology"

In order to precisely collect realtime data of Watt-hour meters, this paper presents a wireless automatic meter reading system based on GPRS technology, which is permanently online, high-speed, low power consumption and widely used. In hardware system, it mainly introduces a GPRS module's interface concentrator, whose core component is the TMS320F2812 chipset produced by the US's TI company. Whereas in software system, it addresses the main station with a systematic analysis management software. This system has a promising market because of its simple building, low operating cost, reliable performance, high automation, and quick investment return. [C492]

"Design and implementation of web services based GPRS automatic meter reading system"

For the purpose of enhancing the management level of the meter reading of power enterprises, web services based GPRS automatic meter reading system is put forward. In this paper, the characteristics of GPRS technology and Web Services technology are analyzed, and the architecture of web services based GPRS automatic meter reading system is designed. The front-end based on the GSM/GPRS network is implemented by Java multi-threading and socket technology, Master station system implemented using Web Services technology. At the lost of this paper, we will give the model design and key codes based on the latest Java Web Services specifications JAX-WS. [C493]

"Design and implementation of marine dumping area's monitoring system based on GPS/GPRS"

In this paper, it advances the reasonable development programs of the waste dumping in the dumping areas and achieve the position, navigation and monitoring of the ship-borne navigation monitoring system which based on the GPS/ GPRS wireless remote monitoring technology on the embedded SPCE3200 platform. The software and the hardware which are consisted of a ship-borne information processing termination are introduced. Our work provides a low cost scheme for realizing the information-based management of the ship and the safety of the shipping and the effective management of the dumping areas. [C494]

"The real-time gpr signals preprocessing algorithm based on LWT in high scan rate"

In this work, we use DSP mechanism for real-time Ground Penetrating Radar (GPR)data preprocessing assess in high scan-rate scenarios. The lifting wavelet transform-based algorithm takes the advantages of efficient computation and memory reduction and is a suitable solution for DSP real-time implementation. In addition, the parallel operations technique on DSP memory is applied to enhance the system efficiency. Such that we realize a 3-level pipeline data structure which can significantly release the signal preprocessing time from the data collecting and data display time etc. The experimental results demonstrate the effectiveness of the developed scheme for real-time GPR data processing. [C495]

"The design of the integrated remote monitoring system based on Internet/GPRS"

By analyzing the problem of the current monitoring system, the design solutions of the integrated remote monitoring system based on Internet / GPRS is proposed. The system is integrated multiple monitoring ways and it can monitor multiple locations simultaneously. By phone software, short message and Web browser, users can view video, temperature and humidity, smoke, infrared intrusion and other information of monitoring spots,and also can remote control through these three ways. [C496]

"Probabilistic robust hyperbola mixture model for interpreting ground penetrating radar data"

This paper proposes a probabilistic robust hyperbola mixture model based on a classification expectation maximization algorithm and applies this algorithm to Ground Penetrating Radar (GPR) spatial data interpretation. Previous work tackling this problem using the Hough transform or neural networks for identifying GPR hyperbolae are unsuitable for on-site applications owing to their computational demands and the difficulties of getting sufficient appropriate training data for neural network based approaches. By incorporating a robust hyperbola fitting algorithm based on orthogonal distance into the probabilistic mixture model, the proposed algorithm can identify the hyperbolae in GPR data in real time and also calculate the depth and the size of the buried utility pipes. The number of the hyperbolae can be determined by conducting model selection using a Bayesian information criterion. The experimental results on both the synthetic/simulated and real GPR data show the effectiveness of this algorithm. [C497]

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The following topics are dealt with: GPR; radars; communication; medicine; UWB antennas; pulse generation; pulse radiation; electromagnetic compatibility; and electromagnetic metrology. [C498]

"Practical application of UWB georadar technique for investigations of cultural heritage objects"

The UWB GPR technique is applied for investigation of covered structure of cultural heritage objects without affect their construction integrity. The obtained information is important for restorers since the most part of it is not available for conventional diagnostic methods and technical documentation is often lost. Some examples of cultural heritage objects investigations are performed. [C499]

"An automatic feature extraction technique for GPR data processing in electromagnetic inverse scattering problems"

This work presents an automatic feature extraction technique for the analysis of GPR data. Despite the rapidly increasing demand for such technology, the interpretation of radargrams is still a specific task which only expert users can accomplish. As a radar probing system, in fact, the GPR is able to measure the backscattered EM waves from buried targets and the travel time of these signals, information which cannot be directly exploited, but that needs to be be used in inverse scattering problems for the evaluation of the dielectric properties and spatial positions of subsurface targets. Starting from a practical example of GPR employment-the reconstruction of pavement's vertical cross section-the evaluation of the two above-mentioned features is carried out through an energy-based method, which ensures high performances and robustness to signal interference. [C500]

"Design and Implementation of Remote Meter Reading System"

The paper proposes a remote power meter reading system based on Bluetooth and GPRS technology. It introduces the overall structure and work flow of the system, and elaborates on the hardware and software design of the various components in the system. This system is not only used in the electricity sector, but also provides a technical solution for the water meter reading, gas meter reading, smart home and security. [C501]

"Design and implementation on wireless power meter system based on GSM network"

This paper designs a wireless power meter system based on GSM network; the main communication way is GPRS and secondary SMS. The user can choose the different transfer modules based on different demands and can choose the Local network, dial network, ISDN, ADSL to connect into network. It accomplishes the hardware and software design in GSM network collector and the meter system software. [C502]

"Design of mobile robot system with remote control based on CAN-bus"

In order to realizing remote control and information collection quickly and reliably, the mobile robot with remote control is designed. In the paper, according to analysis of the overall structure, hardware circuit of the robot

system is designed. Because the CAN2.0 standard only makes physical layer protocol and data link layer protocol, application layer protocol is ruled according to robot control system. In the last part of this paper, the software of master/slave computer is introduced in detail. The experiment shows that running performance of robot control system is balanced, efficient and has satisfied the practical demand. [C503]

"Search algorithm for local objects in GPR image"

An automatic search algorithm for local objects in GPR profile has been considered in the work. The algorithm is based on the Hough transform. The proper software tool has been developed in order to analyze the accuracy of the permittivity of ground as well as coordinates of the local object in a GPR profile. The algorithm efficiency with simulated data has been shown. The influence of the sampling-step at sounding on the algorithm accuracy has been considered. [C504]

"Presentation of the field surface wave generated by an antenna at the interface of two homogeneous media"

In circumstances where the dispersion of the permittivity can be neglected, the tangential component of the surface wave is expressed through the Laplace function of two complex arguments algebraically. This reduces the computation time of the surface wave at a given point to a few milliseconds, and to determine the current in the radiating antenna, as well as the dielectric constant of the underlying surface, for the time of the order of several seconds. Obtain estimates of the surface wave field for the most typical parameters of soils. These calculations can be used to select regularizators inverse GPR for quantitative calculations of the parameters of the soil and for the qualitative interpretation of GPR data. [C505]

"The Application of Wireless Communication in Mountain Highway Landslide Monitoring"

In the remote monitoring system developed by the authors for highway landslide, GPRS net of China Mobile is applied to transfer data in real time, Microsoft Visual C++ network technology and SQL Server 2005 data base are used to realize the target of real-time remote receiving and visual management of monitoring data. With the advantages of economy, high accuracy, high automation and high efficiency, the remote monitoring system has been successfully applied in Changji highway and Louxin highway in Hunan Province, to provide safety security and environment protection. [C506]

"Design and Implementation of Automatic Vending Machine Based on the Short Massage Payment"

A design of vending machine based on the short massage payment with the main control module M68HC11 and GPRS module MC35 has been illustrated. This paper describes the working program of the system and especially the MDB bus and photoelectric conversing circuit and MC35 module are presented. A structure of vending machine is designed, the hardware ideas of bus conversion interface, the software protocol rules based on AT command and the way to use short message payment are given out. [C507]

"Cross Entropy Optimization of the Random Set Framework for Multiple Instance Learning"

Multiple instance learning (MIL) is a recently researched technique used for learning a target concept in the presence of noise. Previously, a random set framework for multiple instance learning (RSF-MIL) was proposed; however, the proposed optimization strategy did not permit the harmonious optimization of model parameters. A cross entropy, based optimization strategy is proposed. Experimental results on synthetic examples, benchmark and landmine data sets illustrate the benefits of the proposed optimization strategy. [C508]

"Regression-Based Multi-view Facial Expression Recognition"

We present a regression-based scheme for multi-view facial expression recognition based on 2D geometric features. We address the problem by mapping facial points (e.g. mouth corners) from non-frontal to frontal view where further recognition of the expressions can be performed using a state-of-the-art facial expression recognition method. To learn the mapping functions we investigate four regression models: Linear Regression (LR), Support Vector Regression (SVR), Relevance Vector Regression (RVR) and Gaussian Process Regression (GPR). Our extensive experiments on the CMU Multi-PIE facial expression database show that the proposed scheme outperforms view-specific classifiers by utilizing considerably less training data. [C509]

"Application of integrated geological prediction in expressway tunnel"

Because of the complicated geological conditions of tunnel surrounding rocks, it is of necessity to operate

geological prediction during tunnel construction. Geology analysis, seismic wave method (TSP was adopted) and GPR (ground penetrating radar) are used to make prediction in the construction of Gaojiabao Tunnel. The utilization of several prediction methods that can be seen as an integrated prediction system can avoid one-sided conclusion obtained by single method. Moreover, ach conclusion can be checked and made up mutually. The application result shows that the prediction conclusions are relatively accurate, which can meet the needs of safe construction. [C510]

"Regularized non-parametric multivariate density and conditional density estimation"

In this paper, a distance-based method for both multivariate non-parametric density and conditional density estimation is proposed. The contributions are the formulation of both density estimation problems as weight optimization problems for Gaussian mixtures centered about samples with identical parameters. Furthermore, the minimization is based on the modified Cramer-von Mises distance of the Localized Cumulative Distributions, removing the ambiguity of the definition of the multivariate cumulative distribution function. The minimization problem is amended with a regularization term penalizing the densities' roughness to avoid overfitting. The resulting estimation problems for both densities and conditional densities are shown to be phrasable in the form of readily implementable quadratic programs. Experimental comparison against EM, SVR, and GPR based on the log-likelihood and performance in benchmark recursive filtering applications show high quality of the densities and good performance at less computational cost, i.e., the density representations are sparser. [C511]

"Automatic Layer-Interface Detection of Pavement Based on Matched Filter"

Ground penetrating radar (GPR) is a non-destructive and non-intrusive subsurface investigation equipment which has been widely used in the field of civil engineering. As the GPR signals are easily corrupted by noise, so it's always difficult to detect the multi-layer reflection signal of the pavement. To address the problem,In this paper we present the wavelet transform modulus maximum de-noising and Matched Filter (MF) method for clutter reduction and layer-interface automatic detection respectively. The experimental results based on simulated data using FDTD show that under the Low SNR condition, the presented algorithm outperform the MF algorithm alone. [C512]

"Ultra-Thin Asphalt Pavement Layer Interface Detection and Time Delay Estimation Based on MUSIC"

Ground penetrating radar (GPR) is a non-destructive and non-intrusive subsurface investigation equipment which has been widely used in the field of civil engineering. Some challenges which GPR encountered for pavement subsurface inspection are: 1)GPR signal are easily corrupted by noise; 2) commercial GPR whose resolution is depended on system bandwidth, is not suitable for ultra-thin thickness estimation. This paper focus on using super-resolution MUSIC algorithm for ultra-thin pavement layer-interface detection and time-delay estimation compared to threshold detector and match filter.The results based on the simulation data under different conditions and measured GPR data are also presented. [C513]

"A new ground penetrating radar signal analysis method based on S transform"

The paper discussed the characteristics of GPR signals of one object and two objects respectively, and studied the rule of extracting twin-peak attribute when the size of object or the distance of two objects was changing through GST. For one object, the two reflections can't be resolved in time when the diameter of object is less than or equal to 1/3 dominant wavelength within object medium, but the twin-peak attribute can resolve the reflections when the diameter is as small as 1/7 dominant wavelength, so the size can be estimated combining the attribute with time-domain waveform and the definition of a small object can be given. For two objects that each is a small object in time-frequency domain, we considered the situations where the permittivity were same or different, and it is pointed out that the attribute can improve the resolution of two objects and can estimate the distance combined with time-domain waveform. The selection rule of parameter and frequency point of twin-peak attribute was given as well so the unsystematic problem was solved. [C514]

"Low-cost gate-oxide early-life failure detection in robust systems"

We present a new low-cost technique for detecting gate-oxide early-life failures (ELF) to overcome reliability challenges in robust systems without requiring expensive concurrent error detection. Our approach is enabled by an on-chip clock control technique, applied during periodic on-line self-test and diagnostics, to detect delay shifts over time before functional failures occur. Using 90 nm test chips, we demonstrate the following key results: 1. A gate-oxide ELF transistor inside a combinational logic circuit results in delay shifts over time before functional failures appear. 2. The delay shifts can be successfully detected during on-line self-test and diagnostics using our on-chip clock control technique. [C515]

"Time domain radiating model for GPR antenna"

In this paper, we suggested a method to substitute any antenna by a model based on the use of dipolar sources in the FDTD method. This approach allows to model antennas with their supports or environnement context. Thus, it makes possible to model complicated structures and oriented in any direction of space. The effectiveness of this approach is validated with Feko simulation of the original antenna. [C516]

"An Efficient Handover Technique for 4G Networks"

The IEEE802.21 protocol has provided a mechanism to perform a seamless handover within heterogeneous networks guaranteeing a higher level of mobility. In this paper, we discuss different characteristics and challenges facing 4G mobility. We propose an efficient user zoning handover technique based on the IEEE802.21 protocol. The proposed approach connects users to a preset network upon entering a zone. The process is guided by the MIIS server. [C517]

"Remote monitoring of open numerical control system"

This paper investigates hardware and software architecture of numerical control (NC) system for remote monitor, and realizes in open numerical control system on field bus. Using principles of digital dictionary and data acquisition, the remote monitoring system of open NC system is designed. After in-depth analysis of needs, the design of hardware and software is completed, and applied research on NC EDM machines is conducted. Besides, the development of prototype is completed and the functions of online data acquisition, remote monitoring and remote machining services are realized. [C518]

"ALIS: GPR for humanitarian demining and its evaluation in Cambodia"

The authors developed dual sensor ALIS, which is equipped with GPR and metal detector. The image reconstruction algorithm is useful for clutter reduction and buried landmine image can be obtained. The system has been evaluated by test in minefields in Cambodia and could detect more than 30 mines. We are planning to continue this evaluation tests, and plan real deployments. [C519]

"Comparison between genetic programming and Neural Network in classification of buried unexploded ordnance (UXO) targets"

In this paper, we present the results of our next step effort in comparison of classification performances between the NN and the GP techniques based on the simulated scattering patterns of UXO-like object and non-UXO objects. For this comparative study, 2 dimensional scattering images from one UXO target and four non-UXO objects were generated by numerical simulation tool (FEKO). For non-UXO objects, the most challenging targets to discriminate from UXO, since all these objects produce resonance signal as UXO-like targets do [6], were selected. Classification performances of both techniques (NN vs. GP) in different level of noise and in the case of presence of untrained data were examined and the results and observations are discussed. [C520]

"Feasibility study for IED detection using forward-looking ground penetrating radar integrated with target features classification"

In this paper, we examined the natural resonance frequency and polarization features of UXO-Like IED target in forward-looking GPR configuration. Based on the simulation results, we confirm that these feature not only exist but also measurable in the case of FLGPR. It is therefore, strongly suggested that these features be included in the target classification algorithms as they are expected to improve detection, increase stand off distance and minimize false alarm rate. [C521]

"Impulse response of Vivaldi antenna using cubic-spline and exponential taper profiles for compact ground penetrating radar applications"

The measured impulse responses of Vivaldi tapered slot antennas employing conventional exponential and cubic-spline taper profiles are presented and compared. The method used to design the tapers is based on a Chebyshev impedance transformer given in which minimizes reflection. A brief presentation is given for this design method and the profile of the tapers. Then, the experimental results and analysis of impulse response of antennas are provided. Finally, peak values of the impulse responses of the antennas are compared to the theoretical maximum achievable values and are shown to be quite close to this fundamental limit. [C522]

"An Internet File Transfer Service for Mobile Phones with Limited Connectivity"

Nowadays, users of mobile phones generate too many files that have to be frequently downloaded to an external storage repository (freeing local space), using a USB cable or a short-range wireless connection such as Bluetooth. This situation is very common in developing countries where there are not many available wireless networks, restricting the user mobility. This paper presents an Internet File Transfer Service (FTS) for mobile phones with limited connectivity. It is a service that can be used through a set of functions (API) that facilitates file transfer between mobile applications and external storage servers, taking advantage of different wireless networks. The FTS selects the best wireless connection (WiFi, GPRS or UMTS) taking into account accessibility and cost of the service. FTS is able to use the Multimedia Messaging Service (MMS) as an alternative options for transferring files, which is especially useful when the mobile phone connectivity is limited. It is based on the J2ME platform. As a use case, a mobile application named Swapper was built on top of the FTS. When the mobile phone memory runs out, Swapper automatically sends selected files to a web storage server using the best connection available, increasing the storage space in the mobile phone. Swapper includes an efficient replacement policy that minimizes the latency perceived by users. [C523]

"A segmentation-based CFAR algorithm for subsurface targets detection in FLGPSAR"

Forward-Looking Ground Penetrating Synthetic Aperture Radar (FLGPSAR) has the capability of forming two-dimensional high-resolution images of subsurface objects from a standoff distance. This paper addresses the detection of subsurface targets, i.e. landmines, in FLGPSAR images. The conventional Constant False-Alarm Rate (CFAR) algorithm has been widely used in SAR image target detection, but its performance will degrade in subsurface targets detection because of the presence of interfering targets and clutter power transition. In this paper, a segmentation-based CFAR (S-CFAR) algorithm is proposed. The S-CFAR algorithm can remove the interfering targets or clutter power transition before estimating the parameters of the clutter background to achieve a better performance than the conventional CFAR algorithm. The real data processing results are given to validate the efficiency of the proposed method. [C524]

"High-efficiency and well-integrity method for dynamic acquisition of GNSS location information"

Location-based services play an ever increasingly important role in modern society. The high efficiency and well integrity of GNSS location information is required in these services. For well integrity, a new dynamic transmission processing method named Transmission Intelligent Selecting Mechanism (TISM) is presented in this paper. Based on the detection of communication signal, different methods for information processing are selected for different signal intensity. For high efficiency, a new dynamic compression method named Time-Interval Alternated with Distance-Interval Intelligent Judging Method (TAD) is presented based on traditional compression methods Single Time-Internal method (STI) and Single Distance-Internal method (SDI). There are three different modes, high speed mode, medium speed mode and low speed mode in TAD. For different modes, different compression styles are selected. Experimental results show that TISM has made location information acquired successfully in some areas where the GPRS signal is very weak. TAD has reduced more than 75% of data and 50% of deviation comparing with STI. Thus, more than 75% of communication cost has been reserved. [C525]

"A design of efficient transport layer protocol for wireless sensor network gateway"

It is necessary that in the small-or-medium-size wireless sensor networks, the networking information of network and monitoring data of sensors should be sent to the remote computers through the gateway to achieve remote monitoring for the target area. Wireless sensor network data characterize strong bursts, instability of traffic and small amount of data in a single packet. Considering these features as well as the bandwidth of wireless network, the paper proposes a Transport Control Protocol (TCP) with an improved Nagle algorithm. The experiments prove that the improved algorithm obviously enhances the utilization of wireless channel and reduces system energy consumption, while it ensures transmission reliability. [C526]

"A temperature remote monitoring system of cable joint"

In order to monitor the temperature of cable joint, this paper designed a cable joint real-time temperature monitoring system based on GPRS which is integrated of computer technology, microcomputer control technology and digital sensor technology. It described the whole structure diagram of the system, and presented the hardware circuit and software design in detail. The system takes SCM as main control chip, adopts DS18B20 to build up the temperature measurement terminals, and uses the GPRS network as a wireless transmission network to realize wireless data transmission through the TCP/IP protocol management. Experimental results show that: the system have high accuracy, it is able to identify a variety of cable faults caused from overheating effectively and can meet the needs of cable temperature monitoring. [C527]

"Implementation and analysis of integration GSM/GPRS modem in a TMS320VC6713 digital signal processor for vehicle location"

The rapidly evolving wireless communications environment and 3G, where the standard are constantly created and modified, has given rise to the integration of GPS (Global Positioning System) and GSM (Global System for Mobile Communication). This integration has been widely applied in many disciplines including Intelligent Transportation System (ITS) and Logistic Management to aid the users to locate their vehicles remotely. Further on, the fast growth of city transportation also has stimulated the development of VMS where it is recognized as one of the major components of ITS. However, this system is rarely being implemented on embedded system using DSP processor. Thus, this paper discusses design and implementation of GSM/GPRS integration in a TMS320VC6713 for Vehicle Location that permits users to communicate with their vehicles via a Short Message Service (SMS). This system provides an alternative solution to solve vehicle theft and hijacking problems where the system is able track the real-time moving car location by using cellular phone. The system performance analysis has been carried out where the executions of three functions have been measured in clock cycles. [C528]

"The identification test of soil texture with ground penetrating radar"

The detection of soil texture needs nondestructive methods. Ground penetrating radar (GPR) develops fast in the fields of geological and agricultural survey in the recent years. To get a quantitative recognition of soil texture, experiments were designed with GPR of 500 MHz and 250 MHz frequency. Fine sand, sieved soil and natural soil were selected and tested indoors to acquire basic soil properties, amplitude attenuation characteristics and speed of electromagnetic wave. Compared to the experimental results outdoors, soil texture in the spots can be identified and classified. The strong signal changes only happened at the surface of the medium. The study results also showed GPR could recognize silt loam and sand loam, which help us analyze the effects of soil texture on soil dielectric characteristics in the further research. [C529]

"Two-dimensional diffraction tomography algorithm of underground objects located in planar multilayer medium1"

An efficient inverse scattering algorithm is developed to reconstruct the permittivity profile of two-dimensional(2-D) dielectric objects buried in planar multilayer environment. The forward model of this inversion scheme is based upon first order Born approximation and 2-D planar multilayer scalar Green function. A planar multilayer diffraction tomography algorithm is established subsequently. Numerical results are provided to illustrate the performance of the inversion scheme. [C530]

"Car monitoring, alerting and tracking model: Enhancement with mobility and database facilities"

Statistics show that the number of cars is increasing rapidly and so is the number of car theft attempts, locally and internationally. Although there are a lot of car security systems that had been produced lately, but the result is still disappointing as the number of car theft cases still increases. The thieves are inventing cleverer and stronger stealing techniques that need more powerful security systems. This project "Car Monitoring and Tracking System" is being proposed to solve the issue. It introduces the integration between monitoring and tracking system. Both elements are very crucial in order to have a powerful security system. The system can send SMS and MMS to the owner to have fast response especially if the car is nearby. This paper focuses on using MMS and database technology, the picture of the intruder will be sent via local GSM/GPRS service provider to user (and/or) police. The Database offers the required information about car and owner, which will help the police or security authorities in their job. Moreover, in the event of theft local police and user can easily track the car using GPS system that can be link to Google Earth and other mapping software. The implementation and testing results show the success of prototype in sending MMS to owner within 40 seconds and receiving acknowledgment to the database (police or security unit) within 4 minutes. The timing and results are suitable to owner and police to take suitable action against intruder. [C531]

"Overview on remote meter reading system based on GPRS"

Through introducing the development and current situation of remote meter reading system at home and abroad, the application of the GPRS wireless communication technology in remote meter reading system was illustrated. Aiming at the key section-network architecture, the network structure of data transmission based on GPRS, several access modes the data center server connecting to Internet, communication protocol are especially discussed. At last, the prospects for the remote meter reading technology were given. [C532]

"The estimation of the ground penetrating radar wave velocity based on template matching"

Ground penetrating radar (GPR) has been used as a nondestructive testing tool in many fields. Accurate determination of the GPR wave velocity is essential for calculating depth of examined buried object, and is the base of the synthetic aperture imaging. In this paper a new GPR wave velocity estimation method is proposed based on template matching. The proposed GPR wave velocity estimation method can determinate the velocity accurately. The experiment shows that we can calculate the depth, of the object accurately and can focus the radar image well with the estimated velocity. [C533]

"Tracing systems for user&Control-Plan traffic of Packet Core of GPRS-UMTS networks"

The resources of actual tracing tools for Control-Plane and User-Plan traffic are limited and most of them are crashing under the task of tracing 100% User-Plan traffic. This paper proposes a new tracing system for UP&CP traffic of Packet Core networks, like GPRS-UMTS networks, in order to verify their functionality. [C534]

"Feature extraction and selection for landmine detection using textures of Time-Frequency Representation"

Ground Penetrating Radar (GPR) is widely used in the probe of subsurface targets, in which the Time-Frequency Representation (TFR) approaches have been proved effective for GPR signatures. Since we can treat TFR results as 2-D images, texture analysis is an applicable way for image discrimination. In this study, we propose a target detection method based on TFR textures of GPR A-scans and then select 20 descriptors to interpret TFR image into texture features for decision. The mutual correlation and discrimination ability of the descriptors are studied based on the comparative experiment. According to the results, it is clear that the twenty descriptors are redundant and can be grouped into three weak-correlated classes: 11 descriptors of the first class and 2 of the second one are helpful and recommended to use in texture discrimination while the rest can be discarded. [C535]

"The research of interaction management based on the IPv6 wireless mobile terminals"

The packer switching service of the third-generation mobile communication network (3G) has provide a broader range of services, while wireless local area network (WLAN) has a faster speed in information transmission, thus making these two complementary functionally. However, with the improvement of technology and increasing of mobile users, it has a significant impact on network communication when switching the networks which result in handover latency, although the different networks allow mobile users roaming between different IP networks; furthermore, it will lead to care-of-address of mobile users error caused by the failure of agent information return if the users move too fast. This thesis basically studies on mobile terminals in the WLAN and 3GPP, two different networks using a wireless IPv6, aiming at proposing a to reduce switching delay and position error. [C536]

"Remote Monitoring System of the Motor in GPRS Based on LabVIEW and Embedded TCP/IP"

According to the demand of actual application for motors, the software and hardware structure of remote wireless monitoring and control system for the motor based on LabVIEW and GPRS were designed. The paper presented the design principles of the motor's speed measurement system based on the singlechip, studied the communication protocol of the serial interface between singelchip and GPRS module. The remote computer monitoring platform was established with network communication technology of LabVIEW and database technology. The system was not affected by geographic location restrictions and it was suitable for the remote monitoring and control system of the motor in different districts. [C537]

"Study on Digital Management of Industrial Water System in Steel Industry"

At present, the shortage of water resources has restricted the development of steel industry. Industrial water minimization is the inevitable choice that break through the bottleneck and reduce energy consumption in enterprises. To solve problems of more extensive operating mode, lower water recycle rate and higher wastewater discharge, life cycle and digital management is very important to joint enterprises. Firstly, the accurate base data was accessed by water balance testing. Then, online monitoring, diagnosis, early warning and the use of dynamic cascade control system was established. This system can realize dosing process control and the reasonable dynamic cascade of wastewater. The model of intensive and digital management would tap maximum energy saving, water-saving potential. [C538]

"A solution for the data collection in the field survey based on Mobile and Wireless GIS"

Traditional data collection methods for geological investigation, profile measurement, and other field survey in the research community of geosciences are generally based on the manual measuring and recording by the

investigators. The most popular "instruments" used in the traditional survey are pencils as well as printed hard copy charts. The methods are obviously complicated and inefficient, at the same time the collected data are always inaccurate and not compatible with the digital process in computer. For these reasons, a solution for the data collection in the field survey based on Mobile and Wireless GIS is proposed in this study. Key technologies involved in the solution are reviewed at first. Then, a prototype of mobile GIS with basic GIS functions is designed and implemented based on independent development. Important technologies of implementation some basic GIS services for data collection in mobile environment introduced and many key challenges related, which are overcome in the process of the system development, are studied in detail. [C539]

"The Research in New Architecture of Petroleum Drilling Instrument System"

Drilling technology in petroleum exploration and development has developed, which follows the development of sensor technologies, electronic measurement and computer network technology, more and more assistant methods are used in the course of drilling, and more information about drilling project and underground to be detected. They direct the driller to operate. At the same time they also allow the decision-makers at the base of oil field and technicians in first time to understand the progress of drilling with the schedule. And we can also receive the regional geological parameters to do other applications and decision-making. This article presents a drilling instrumentation system. It is able well site connect to the base of oil field as a whole by wireless network. They can collect and storage the state of drilling on-site and the geological data and transfer to the base quickly. This system could get the new detecting signal in drilling process, and incorporate in to our instrumentation system signal. Just because the high cost of oil professionals and the volatile political situation of oil-production region, it is the most urgent desire of many oil companies to reduce the number of technical staff in site. This paper discusses the system which could enable multiple drilling well field to share professionals and technical experts in the base, so we could achieve remote operation, remote control in this way. [C540]

"The Internet of Things Based on Embedded Mode Design"

This article describes a composition by the sensor and the embedded system host, and it is the internet of thing technology which collect data on the material and sent to the Internet .The system uses the ARM7 microprocessor as a core processing unit, and it will receive the temperature and humidity sensors which send real-time temperature and humidity data by TCP / IP protocol sent by the GPRS module to the GPRS public networks. Socket programming technology used to establish TCP/IP server, the host sends the data to receive the embedded information, and the data uploaded to the Internet with a rich client (Rich internet application, RIA) model for dynamic call. [C541]

"Design and Practice of GPS Inspection Data Acquisition System to Telecom Pipeline Network"

Pipeline network is an important component of the telecommunications system, effective management of pipeline networks, pipeline networks and equipment to ensure safety and efficient utilization of a basic work. The network GPS inspection data collection system was designed based on unistrong expansion product in this paper. the advantages of the system was analyzed based on briefly described the overall design of the system, and principles of data acquisition and data processing methods were described, and finally system application practice was detailedly explicated, and made a detailed analysis. The actual application shows that the program can effectively meet the telecommunication resource management pipeline fast, efficient, timely, and with the original data and GIS platform for seamless docking of the job requirements. [C542]

"Directional coupled sectorial loops antenna for Ground Penetrating Radars applications"

In this paper, a directional UWB antenna based on the concept of coupled sectorial loops antenna (CSLA) is presented [2] [3]. The proposed antenna uses CSLA backed by a short cylindrical cavity with a modal suppressing septum to accomplish unidirectional radiation pattern. Bandwidth enhancement is accomplished by a pair of peripheral slots and a stacked CSLA configuration. sensitivity study is carried out to optimize the geometrical parameters of the antenna in order to achieve the maximum bandwidth and uniform radiation pattern. Through this optimization, this antenna has a VSWR lower than 2.5 across a 2.7:1 frequency range without the use of absorbing foams or lossy elements. The dimension of this antenna is approximately 0.5 λo at the lowest frequency of operation. [C543]

"Underwater FDTD ELF simulation using dedicated hardware"

The 1-core CPU, 32-core CPU and Acceleware calculations were performed for the comparison. The results show that Acceleware approach is faster than the 1-core CPU calculation and twice as fast as the 32-core CPU calculation. [C544]

"Detecting flaws in buried pipes under rough surface using the natural frequency technique"

The matrix pencil method is a MatLab friendly algorithm that generates results in real time. The technique was able to detect cracks in pipes whether they were on top of the pipe or on the bottom up to a SNR = 10dB. Also cracks in hidden and buried pipes were detected using the same technique. [C545]

"Design and analysis of wideband antennas for borehole and surface ground penetrating radars: Application to soil moisture content measurements"

In this paper, we have presented original wide band antenna design associated with a crosshole and a surface GPR configuration dedicated to the dielectric characterization of the subsurface. The antenna geometries defined, usually used for UWB applications at frequencies higher than 3 GHz, have been adapted to work at lower frequencies around 500 MHz to obtain a sufficient penetration depth. Moreover, size constraints have led us to design compact geometries. The overall links in both configurations have been modeled using FDTD simulations and detailed parametric studies have been made to optimize the antenna geometries for our application. First measurements associated with the crosshole radar have allowed to validate the two types of antenna designs proposed. Concerning the surface radar the experimental validation of the antennas developed on a test site is under way. [C546]

"Simulation of UWB echoes from ground based on CPML-FDTD"

In designing some UWB-IR (ultra-wideband impulse radio) devices, the effects of ground echoes must be taken into consideration. The dispersion of soil and roughness of ground surface are significant factors in ground echoes calculation. FDTD (finite difference of time domain) algorithms applied in ground echo simulation at present have the problems of slow speed or large errors. By using multi-pole Debye model as soil dielectric coefficients, and CPML (convolutional perfectly matched layer) as absorption boundary condition, a CPML-FDTD algorithm is derived in multi-pole Debye media. Simulations are carried out under different conditions, and comparison with non-PML FDTD algorithm proves the validity and efficiency of the proposed algorithm. [C547]

"Linguistic Challenges in Global Software Development: Lessons Learned in an International SW Development Division"

In multinational companies, English is used more and more as a "lingua franca" for international collaboration. This is for example true for a unit like Siemenspsila Program and System Engineering Division SIS PSE, with headquarters in Austria and subsidiary units in many European countries and China. This article will initially present the concept of ELF (English as a lingua franca), which is steadily gaining importance in applied linguistics research. The main part of this article will outline the practical challenges of using English as a non-native language in international collaboration, including examples of oral and written communication (such as meetings, meeting minutes, training, and requirements specifications). It will be argued that these linguistic challenges are closely connected with intercultural ones. Dealing professionally with these topics is a key asset for project success, especially in project management and requirements engineering. [C548]

"Remote Electric Power Network Monitoring System Based on GPRS"

In the past, the managers of the electric power department know the situation whether electric power network works well, by recording all kinds of monitoring data artificially, or setting some observations for video surveillance with the aid of ISDN. While video surveillance has a lot of advantages, there are still many inadequacies, such as, requiring complex digital terminal, responding slowly, building the network on a small scale and costing highly. These constrain the development of it. Through a large number of experimental studies, using the China Mobile's GPRS wireless communication technology to transmit data, we can simply use the cell phone to complete the data reception. It is fast and cheap, making a good solution to the shortcomings of the video surveillance. In addition, in the aspect of data acquisition, we usually choose expensive A/D converter chip to ensure data's high accuracy. The author has used V/F chip to meet the required precision through massive successful experiments. [C549]

"A Design of Multi-threaded Shader Processor with Dual-Phase Pipeline Architecture"

In this paper, dual-phase pipeline architecture and variable length instructions of a shader processor are proposed. The dual-phase pipeline architecture achieves a performance of dual core using a single core, and a parallelism of GP-GPU to accelerate graphic operations. For simplifying hardware, the register optimization is proposed. The variable length instructions are designed for efficient executions with less memory. Various pipeline hazards are resolved by a multi-threaded method. The proposed processor supports OpenGL ES 2.0. It

has a size of 0.13Mlogic and shows the performance of 16.6MVertices/s, and 33.3MPixels/s. [C550]

"NQR-based explosives detection-an overview"

Nuclear quadrupole resonance (NQR) is a radio frequency spectroscopic technique that can be used to detect solid-state compounds containing quadrupolar nuclei, a requirement fulfilled by most high explosives (and narcotics). In this paper, we present an overview of recent research in the detection of explosives using this technique. We also present mathematical models for the data for different acquisition techniques and discuss different state of the art detection algorithms. Finally, we evaluate various algorithms on measured and simulated NQR data. [C551]

"Design of Detection Terminal for Active Object Based on GPRS"

This paper proposes a design of detection terminal that adopts the embedded operating system and the high performance processor for active object based on GPRS network. It transmits the captured image processed by detection algorithm to userspsila mobile telephone by means of MMS, SMS or email. In this paper, the design of the terminal is discussed in detail including hardware design, software design and an object detection algorithm based on the judgment by zone statistic of DC coefficients. The outcome of experiment verifies the designpsilas reliability, stability and correctness. [C552]

"MMS Protocol Analysis and Implementation Base on Embedding GSM/GPRS Wireless Communication Module"

The Multimedia Messaging Service(MMS) system mainly focus on supporting multimedia function, by the GPRS channel, transfer video file, photo, audio file, text file, and so on. Based on this function, the implementation of the image communication between wireless modules, between wireless module and mobile phone, between wireless module and computer became true. This paper describe the MMS system framework based on the embedded GSM/GPRS wireless modules, MMS system protocol and the software implementation of the MMS protocol. [C553]

"Pricing Strategies in the Mobile Phone Market-An Algorithm for Simulating the Success of Mobile Tariff"

The mobile market is characterized by a large number of mobile phone providers. Therefore the market entrance is very difficult for newcomer. This article presents an algorithm for simulating the behavior of changing the mobile phone provider regarding to several given competing mobile tariffs and ones own. [C554]

"A Lightweight Distributed Implementation of IMS LD on Google's Android Platform"

Learning activity based standards like the IMS Learning Design (IMS-LD) have recently emerged. Typical implementations of this standard rely on client-server architectures. This is problematic for resource limited mobile devices that may not have reliable Internet access. This paper presents the design and implementation of a system that takes a sub-set of the IMS LD design specification involving multiple roles and creates native code for mobile devices that collectively run the learning design using SMS messages for synchronization. An implementation targeting the Googlepsilas Android mobile platform is shown. [C555]

"Design and implementation of vehicle monitor system based on GIS and GPRS"

Most of vehicle monitoring systems based on GPS and GIS technologies use SMS as their communicating means. SMS didn't have private channel and is difficult to extend to suit other data business, could not afford stable communicating in those systems in some special situations. Contrasting with SMS, GPRS is cheap, real time and is more stable, and more suitable for those systems. A vehicle monitoring system that using GPRS and GIS is introduced, including the architecture, design, and the implementing of software is emphasized, also. [C556]

"A RF receiver front-end with adaptive discrete-time charge-transfer filter and passive gain-boosting in 90nm CMOS"

Discrete-time signal processing receivers combine gain, down-conversion, anti-aliasing, down-sampling, filtering and dc-offset compensation in one analog block to reduce the size of the solution. This paper presents an analog front-end (AFE) of a single-chip GSM/GPRS/EDGE (GGE) radio in 90nm digital CMOS which based on discrete-time analog signal processing. At the heart of the AFE is the passive switched-capacitor stages providing gain-boosting by impedance transformation while providing a 3rdorder RC filter response. The AFE

achieves 1.8dB NF with −19dBm IIP3. The filter occupies 0.2mm^2 and consumes only 7mA. [C557]

"Data Organization Methods for Travel Time Acquisition System Based on 3GS"

The reasonable organization of system data is the requisite and powerful technological means used to promote the efficiency of the system. Aimed at the data organization for the travel time acquisition system based on 3GS (GPS/GIS/GPRS), the article has designed a conceptual model of the system database according to the data requirement analysis, proposed a new hierarchical organization method of data based on the object-oriented theory, and designed a layered logical model of the dynamic information database of the system. The hierarchical data organization method can be used to provide technical support for improving the system efficiency and the timeliness of the acquired travel time data. [C558]

"Design and Implementation of Wireless Sensor Network Gateway Based on Environmental Monitoring"

In this paper, we propose a gateway system for wireless sensor network based on environmental monitoring. Resource sharing and long-distance accessing are important issues for application of wireless sensor network and environmental monitoring. Itpsilas necessary to connect wireless sensor network to external network which makes the administrator could access data duly and expediently from long-distance. Especially users can avoid the awful situation when the environment is terrible. A gateway which is high performance, high reliability, low-power and expandable is designed to connect WSN with external network. Gateway accepts data collected by wireless sensor network and then stores the data in an embedded database SQLite3. And users can manage the data via a website from long-distance or applications in console terminal. [C559]

"Study on Signal Processing of FMCW Ground Penetrating Radar"

In this paper, a frequency-modulated-continuous-wave (FMCW) ground penetrating radar (GPR) is developed and used to measure the thickness of concrete/asphalt layers of highways/airports. If the thickness of the layer is thin, measurement may be impossible using traditional DFT method since the frequencies of reflected waves are very close and the week waves reflected from underground layers will be ldquosubmergedrdquo by the strong one reflected from the pavement surface. An adaptive filtering method is presented to eliminate the strong wave reflected from the pavement surface and thus the week waves reflected from the underground layer surfaces can be detected. Then the modified frequency estimation method is proposed to enhance the frequency estimation precision of FMCW GPR signal. Simulation experiment results have demonstrated the effectiveness of the proposed method. [C560]

"Design of CAN/GPRS Gateway for Vehicle Remote Communications"

The solution of inter-vehicle networks platform based on CAN bus and GPRS is provided. Implementation of system software and hardware for the platform is also reported. Bridging the in-vehicle CAN bus network and mobile communication network to remote hosts, design of CAN-GPRS gateway is described and some details are presented. The system can be used for vehicle monitoring system and remote supervising management. [C561]

"Seamless vertical handoff algorithm for heterogeneous wireless networks-an advanced filtering approach"

Next generation wireless networks are foreseen to be heterogeneous in nature.Wireless networks consisting of different access technologies with different bandwidth and coverage area will coexist to provide roaming users with their requirements. Handoff among heterogeneous networks, i.e. vertical handoff (VHO), has attracted enormous attention from researchers over the last couple of years. Absence of symmetry is the core distinction between homogeneous and heterogeneous networks, as one network has preference over the other network. Therefore a proficient handoff mechanism is crucial for making the experience seamless to the user, trim down the number of unnecessary handoffs, as well as to capitalize on the underlay network utilization. In this article, we propose an advanced filtering based VHO algorithm in 3G/WLAN and discuss its performance. Performance criteria are based on the number of handoffs. [C562]

"A Mathematical Optimization Approach for Radio Network Planning of GSM/UMTS Co-Siting"

3G UMTS networks are being widely deployed by several cellular operators worldwide that already have existing GSM networks. In this paper, we model the problem of GSM/UMTS co-siting as a nested mixed integer optimization problem which takes as input an area of interest with existing GSM sites and obtains as output the optimal number and locations of UMTS sites to be deployed (new and co-sited with GSM sites) in order to

optimize target objectives. The goal is to minimize the cost of UMTS network deployment by reusing as many existing GSM sites as possible while guaranteeing that every cell is covering a target capacity load which is a percentage of the downlink pole capacity. We propose an algorithm taking into account both integer and continuous variables to solve the formulated optimization problem as a function of the user distribution and the existing fixed GSM site locations. Results for different scenarios show that it is optimal to reuse a subset of the existing GSM sites in addition to deploying new UMTS sites. [C563]

"A direct digital frequency modulation PLL with all digital on-line self-calibration for quad-band GSM/GPRS transmitter"

The quad-band GSM/GPRS transmitter is implemented by using a PLL with an all-digital on-line self-calibration. Based on the all-digital self-calibration algorithm, all RF impairments including VCO gain and loop filter variations can totally be calibrated and repaired all digitally within 1% error. The calibration time is only 50usec by using digital adaptive gain algorithm so that the RF impairments are calibrated for every burst to track temperature, voltage, and process (PVT) variations. The measurement results show that the typical RMS phase error < 0.7° and 0.8°, 400kHz ORFS are < −69 and −66dBc, and the receive-band phase noise is 165 dBc/Hz and 158 dBc/Hz for the low and high bands, respectively. It demonstrates that exceeds 4° margin to phase error and 6dBc margin to ORFS requirements for GSM/GPRS SAWless application. [C564]

"The Importance of Being Really Random: Methodological Aspects of IP-Layer 2G and 3G Network Delay Assessment"

The accurateness of round-trip- and one way delay measurements for 2G and 3G networks rely to a much larger extent on employing a sound methodological framework than this is the case for other types of networks. Typical mobile access networks differ significantly from core networks, most prominently with respect to delay. In this paper we present payload-dependent delay measurement results for public 2G and 3G networks which illustrate that accurate IP-layer delay measurements in mobile networks must use high sample counts and randomness in start times for uplink and for downlink. Most notably this concerns ICMP round-trip delay measurements which, due to the synchronization of ICMP requests with the network clock when leaving the mobile network's uplink, fail to meet the random start time criterion for ICMP replies in the downlink (or vice-versa). This synchronization effect leads to significant clustering of one-way delay values for the reply leg and causes minor delay differences in the core network to have potential significant impact on ICMP round-trip delays. Therefore, highly accurate simulations and emulations must model uplink and downlink of time-slotted networks as two interrelated links based on a common timebase. [C565]

"Serial Concatenation of LDPC and Turbo Code for GPRS System under Different Fading Channels"

In wireless communication systems, error control coding is necessary to provide reliable communications over fading channels. Turbo code is used practically in third generation due to good error correcting capability. However, it has error floor at high signal-to-noise ratio (SNR). Concatenation of another code as an outer code is an alternative to reduce turbo codepsilas error floor. In this paper, we study the behavior of a general packet radio service (GPRS) system, under different scenarios. We propose a method for reducing transmitter energy versus bit error rate and eliminating the error floor via a serial concatenation of low density parity check (LDPC) and turbo codes instead of the convolutional coded system. Moreover, computer simulations were conducted to compare the overall system performances obtained with turbo coding to the serial concatenation coded and channel non coded systems. The performance of the coding scheme is discussed in a Rayleigh fading channel with correlated and non correlated fading amplitudes and an additive white Gaussian noise (AWGN). Evaluation of the proposed encoder has shown a performance improvement over fading channels. [C566]

"A Detailed Implementation and Analysis of Data Center of GPRS DTU"

This paper gives an overview of the architecture of the telecontrol system based on GPRS. The objectives of this paper are two fold. One is to present the design and implement of the data center of GPRS DTU. The other is to investigate its performance. According to the features of GPRS DTU, data center provides reliable communication between members of a group by implementing the telecontrol system in the client/server model. With the use of the data center, it is of practical significance to implement multiple master stations to receive data from all slave stations simultaneously and to control all slave stations in parallel. The data center design parameters include real-time control, deployment simplification and the ability to provide high availability, scalability and reliability. [C567]

"The charging problems in mobile service deployment"

This paper presents the solution which is open and flexible, empowering service providers to customize and create new and innovative value-added services (VAS). The problems and lacks of rating process current model are analyzed and the problem-solving ways are discussed. [C568]

"System for analyses of end-to-end quality of data services in cellular networks"

End-to-end quality of service in today's mobile networks is essential to end users since most of the services are non-real-time data services (primarily based on IP) which have time-varying quality over time, end-user position and other-end location. It is possible to have different quality for the same service under same mobile network conditions in the core and wireless part. Therefore, mobile operators need systems for testing and measurements of end-to-end quality of service. In this paper we present our developed system for service quality testing, which is created for testing the user perceived quality of services in mobile cellular networks. The system is consisted of distributed testing stations over the mobile network coverage area and centralized management and processing nodes, which provide collection, storage and statistical processing of data regarding the quality of service parameters for mobile data services. The system provides objective end-to-end quality of service information in real-time, which is essential to provide services with desired quality to the end users. [C569]

"Surface acoustic wave resonators as passive buried sensors"

Acoustic wave devices are well known passive transducers for probing through a wireless link a physical quantity. Amongst the two main classes of designs-resonators and delay lines-the former have the advantage of providing informations in a narrow band signal and are hence compatible with an interrogation strategy compliant with radiofrequency (RF) emission regulations, while the latter are probed by a short RF pulse with larger instantaneous energy and shorter response time. We here demonstrate the measurement of temperature using the two configurations, and more specifically for sensors buried in soil. While we demonstrate long term stability and ruggedness of packaged resonators, and signal to noise ratio compatible with the envisioned application, the interrogation range in insufficient for most purposes and we focus towards the use of delay lines. Indeed, the interrogation method of the latter is similar to that used by ground penetrating RADAR (GPR) which displays interrogation ranges in the meter to tens of meters in the lower RF range, depending on soil water content, permittivity and conductivity. [C570]

"The Design and Implementation of TAP3 Encoding Engine Based on ASN.1"

A brief introduction is given to describe the TAP3 Standard PRD TD.57 based on ASN.1. TAP3 has been applied in the roaming system in telecommunication industry. Based on the data definitions in TD.57, it is provided to analyze the TAP3 file structure. The depiction of the data types of ASN.1 and their encoding methods have been specified as well. According to the analysis of TAP3, the design of the TAP3 encoding-engine based on ASN.1 is carried out. Not only has this design solved the problems that the list elements of TD.57 cannot be directly handled during encoding by using ASN.1 compiler system, but also overcome the difficulties to achieve and apply the ASN.1 compiler itself. This algorithm is totally independent of the TD57 structure and easy to maintain. [C571]

"Design and Realization of Wireless Sensor Network Gateway Based on ZigBee and GPRS"

This paper discusses an embedded access platform, which takes S3C2410 as the center core and is built upon the Linux operating system. Based on the character and advantage of ZigBee and GPRS, this article advances the solution scheme of the wireless sensor network gateway. Mainly analyzes the software design of the gateway, including the way to realize the connection of ZigBee protocol and GPRS network, along with the design of data conversion task between ZigBee network and GPRS network. And it proposed a solution of data loss, which is caused by the different transmitting rates of ZigBee module and GPRS module. This paper also describes the structure of hardware platform and running process, and analyzes the structure of the three layers software system, as well as PPP protocolpsilas characteristics and transplanting key point. As a result, the wireless data communication link between the embedded gateway and GPRS network is set up, and the solution of keeping the gateway on line is proposed. [C572]

"Design and Realization of Distributed Wireless Telemedicine Monitor Center Based on Virtual Instruments"

This paper presents a new model of distributed wireless telemedicine physiological monitor center, which is developed by the Laboratory Virtual Instrument Engineering Workbench (LabVIEW) and integrates general packet radio service (GPRS) technology and signal processing with DSP processor. At the patient's location, a

wireless PDA-based monitor is used to continuously acquire the patient's vital signs, including heart rate, ECG, SpO2 and so on. Through the internet and LAN, the patient's physiological signals can be transmitted in real-time to telemedicine monitor central unit, and the unit can access the data and the case history of the patient to medicine database. This paper presents our prototype implementation of signal processing based on a high-performance DSP processor on distributed nodes. The nodes analyze the patient physiology signal data which transmits from the central server through the LAN and transmits the results to telemedicine monitor central through the LAN. The results of the designing also show that the wireless telemedicine physiological monitor center model is superior to the currently used monitors both in mobility and in usability, and, therefore, is better suitable for monitor patients under the state of activities. [C573]

"A new mechanism to deal with process variability in NoC links"

Associated with the ever growing integration scale of VLSI technologies is the increase in process variability, which makes silicon devices to become less predictable. In the context of network-on-chip (NoC), this variability affects the maximum frequency that could be sustained by each wire of the link that interconnects two cores in a CMP system. Reducing the clock frequency so that all wires can properly work is a trivial solution but, as variability increases, this approach causes an unacceptable performance penalty. In this paper, we propose a new technique to deal with the effects of variability on the links of the NoC that interconnects cores in a CMP system. This technique, called Phit Reduction (PR), retrieves most of the bandwidth still available in links containing wires that are not able to operate at the designed operating frequency. More precisely, our mechanism discards these slow wires and uses all the wires that can work at the design frequency. Two implementations are presented: Local Phit Reduction (LPR), oriented to fabrication processes with very high variability, which requires more hardware but provides higher performance; and Global Phit Reduction (GPR), that requires less additional hardware but is not able to extract all the available bandwidth. The performance evaluation presented in the paper confirms that LPR obtains good results both for low and high variability scenarios. Moreover, in most of our experiments LPR practically achieves the same performance than the ideal network. On the other hand, GPR is appropriate for systems where whithin-die variations are expected to be low. [C574]

"A method for authentication of the GPS transmitter"

The activities related to IRNSS (Indian Regional Navigational Satellite System) are at the peak at this time. It includes the integration of GPS, GNSS (Global Navigational Satellite System) and Galileo navigational systems. The single chip solution looks at integrating the RF/IF block with the digital signal processing block on a single chip. Such solutions invoke the possibilities of integrating GPS with the technologies like GPRS, GSM, etc. The goal of the experiment is to implement and authenticate the GPS system on the Texas Instrument DSK TMS320C6713. As a part of that in this paper an approach to implement and authenticate the GPS transmitter on the DSK is described. MATLAB is used to implement each blocks of GPS transmitter. First part of the paper describes the software implementation of the GPS transmitter, and the later part contains the description of the hardware implementation and the authentication of the same. [C575]

"Ultra light-weight antenna system for full polarimetric GPR applications"

The motivation to develop an ultra light-weight antenna system was driven by a space borne radar application. The experiment Г‚Вїwater ice and subsurface deposit observations on MarsГ‚Вї (WISDOM) is a ground penetrating radar (GPR) selected to be part of the Pasteur payload on board the rover of the ExoMars mission. Among the Pasteur panoramic instruments on the ExoMars rover, only WISDOM can provide a view of the subsurface structure. WISDOM is the first GPR on a planetary rover. It has been designed to characterize the shallow subsurface structure of Mars. WISDOM will for the first time give access to the geological structure, electromagnetic nature, and, possibly, hydrological state of the shallow subsurface by retrieving the layering and properties of the buried reflectors. It will address important scientific questions regarding the planet's present state and past evolution. The measured data will also be used to determine the most promising locations to obtain underground samples with the drilling system mounted on board the rover. The instrument's objective is to get high-resolution measurements down to 2 m depth in the Martian crust. The radar is a gated step frequency system covering a frequency range from 500 MHz to 3 GHz. The radar is fully polarimetric and makes use of an ultra wideband antenna system based on Vivaldi antenna elements. The paper describes antenna requirements to fulfil for this very specific GPR application and it gives an overview about the light-weight design and its realization. Simulated and measured antenna performance is compared in this paper. Test measurements were performed in permafrost regions on earth. [C576]

"Effective time-domain antenna modeling based on impulse-matching method"

This paper deals with analysis and optimization of wideband and ultra wideband antenna structures in the time domain by numerical solvers. In proposed method, signals at port and field probes at far-field region are used as powerful and effective markers. The method enables true time-domain computation with no susceptibility to difficulties connected with classical approach; hence is suitable especially for large structures with time-consuming analysis. Using of proposed method is demonstrated on the design of directional ultra wideband tapered slot antenna for ground penetrating radar application. Demonstration uses CST Microwave Studio. [C577]

"Implementation issues for the deployment of a WMN with a hybrid fixed/cellular backhaul network in emergency situations"

In this paper we present a research project of the research council of St-Joseph University (USJ) at its faculty of engineering (ESIB) in Beirut, Lebanon, in collaboration with professors at INRS-EMT, Montreal Canada. This project aims at addressing the issues of deployment of a Wireless Mesh Network (WMN) on parts of the Lebanese territory, supported by an already installed dense infrastructure of WiFi hotspots (in urban areas), cellular and fixed telecommunications networks. In particular, we wish to address issues of using such networks in emergency situations, where parts of the telecommunications infrastructure have been damaged, with the need to maintain predominantly voice communications and urgent data communications over any available telecommunications infrastructure that is still operational. The architecture that we look at is a two-tier WMN supporting VoIP and data communications between mesh clients and mesh routers (tier 1), with mesh routers either communicating directly between themselves or, in case of overload or priority traffic, via a backhaul network based on the cellular (GPRS/EDGE) or fixed telecommunications network (tier 2). In this paper, we discuss the issues to be addressed in such a scenario, particularly admission control and priorities with limited backhaul resources, radio interference between closely located mesh routers and clients, and other related issues. The structure of the paper is as follows: section the autho gives an introduction to ad hoc wireless networks and WMN; section II the author discusses the migration issues from independent WiFi hotspots to a fully connected two tier WMN, where the backhaul tier may use other types of networks; in section III, we address the issues for emergency scenarios with limited connectivity between mesh routers. In section IV, we present the simulation scenarios to be considered and the planned tests on a prototype network for a WMN that will be deployed at ESIB, Lebanon. We conclude in s- ection V. [C578]

"Design of a shielded antenna system for ground penetrating radar applications"

A practical design guidance of a wide band shielded GPR antenna is discussed. The designed antenna is used in a GPR system working at 400 MHz center frequency. Measured data show that with properly designed shielding and absorbing materials, the bow-tie antenna with shield performs as desired. Besides antenna design, the key issues in a shielded GPR antenna design are the depth of the shield box and the absorbing material insertion. [C579]

"Experimental study of gate oxide early-life failures"

Large-scale experimental data from 90 nm test chips consisting of 49,152 transistors, and experiments on 90 nm test chips containing inverter chains are used to establish: 1. A gate-oxide early-life failure (ELF, also called infant mortality) candidate transistor produces gradually degraded drive currents over time; 2. A digital circuit path consisting of a gate-oxide ELF candidate transistor experiences gradual delay shifts over time before the circuit produces functional failures. These results may be utilized to effectively overcome ELF challenges in scaled CMOS technologies. [C580]

"4G as a Next Generation Wireless Network"

User requirements are growing faster than ever and the limitations of the current mobile communication systems have forced the researchers to come up with more advanced and efficient technologies. 4G mobile technology is the next step in this direction. 4G is the next generation of wireless networks that will totally replace 3G networks. It is supposed to provide its customers with better speed and all IP based multimedia services. 4G is all about an integrated, global network that will be able to provide a comprehensive IP solution where voice, data and streamed multimedia can be given to users on an "Anytime, Anywhere" basis. At present we have many technologies each capable of performing functions like supporting voice traffic using voice over IP (VoIP), broadband data access in mobile environment etc., but there is a great need of deploying such technologies that can integrate all these systems into a single unified system. 4G presents a solution of this problem as it is all about seamlessly integrating the terminals, networks and applications. The race to implement 4G is accelerating as well as quite challenging. The aim of this paper is to highlight the benefits, challenges in deployment and scope of 4G technologies. [C581]

"Study ways to assess quality parameters in the current 3G networks online"

The report discusses a method for estimating the real work of 3G technology in the context of urban megalopolis. Getting information about the parameters of the network (in this case, the speed of information transfer) is necessary to assess the level of network development and identify further steps to streamline and improve its quality of services. [C582]

"High resolution interpolation for underwater FDTD simulation at ELF frequencies"

A high resolution interpolation scheme for use with the FDTD method at ELF frequencies under water is described. Since the interpolation is applied after the FDTD Simulation, it adds very little to the computation time or resources. [C583]

"Design and Implementation of Bus Monitoring System Based on GPS for Beijing Olympics"

To guarantee the safety of public transport and effectiveness in dispatching buses, overall solution on Beijing bus monitoring system (BJ-BMS) based on GPS is put forward in this paper. The system is composed of communication control and GIS subsystems, each of which was independently developed in the beginning and integrated in the end. The key technologies of the system are described in detail. In addition to some fundamental functions such as real-time monitoring, some featured functions tightly combined with the daily operations in Beijing Bus Company are realized in the BJ-BMS. Finally, the status of system implementation and maintenance are introduced, which have proven to be very effective in practical applications during 2008 Beijing Olympics. [C584]

"Compact high-isolation directive UWB transmit/receive antenna pair for radar applications"

In this paper, we presented a compact directive UWB transmit receive antenna pair. The basic operation of the antenna was discussed and the effect of the dimensions on the bandwidth, pattern and isolation performance was investigated. The antenna was fabricated and measured. The measurement and simulation results showed good agreement. The measured isolation was better than 21 dB and the measured VSWR was better than 2.3 over the band 0.9-3 GHz. [C585]

"Sidelobe comparison of golay and PRBS codes for subsurface radar applications"

Ultrawideband (UWB) radar is an evolving area of great interest with many potential defense and civilian applications. Broadly, UWB waveforms could be classified into non-random and random waveform categories; both nonlinear and linear frequency modulated (LFM) and typical coded waveforms fall in the former category, while random noise-like and pseudorandom noise-like waveforms are the examples of the latter. Since the waveforms transmitted by the radar systems can affect the target detection, accuracy, resolution, ambiguities, and clutter rejection, etc., there is a great interest to design and implement various transmit waveforms with predetermined criteria. [C586]

"A Perfectly matched layer for lossy media at extremely low frequencies"

The perfectly matched layer (PML) is an effective means of absorbing outgoing waves for finite-difference time-domain (FDTD) simulations. This letter describes the development of a PML specifically for underwater simulations at low frequencies. [C587]

"A robust W-MUSIC algorithm for GPR target detection in the presence of noise"

When applied to ground penetrating radar (GPR), the multiple signal classification (MUSIC) algorithm is an important frequency estimation method as it can detect very closely spaced targets, particularly when one of the target responses is substantially lower than another. The MUSIC algorithm however must be seeded with the number of targets to find and will indicate that number of targets regardless of the number of targets actually present. In the presence of relatively low levels of noise the MUSIC algorithm is prone to reporting the position of false targets in preference to weaker genuine target responses. In this paper a superimposed MUSIC technique is proposed to suppress false targets. A novel windowed FFT MUSIC (W-MUSIC) algorithm is examined using a linear sweep frequency in noise. It is seen to give a clear indication of targets in the presence of modest noise that prevents MUSIC from working. [C588]

"Scheme and secure protocol of mobile payment based on RFID"

In this paper, a mobile payment scheme is proposed based on Radio Frequency Identification (RFID) for both

micro-payment and high value payment. The payment processes are designed under the structure of mobile communication and RFID systems. The potential risks are discussed. Also, a mutual authentication protocol is presented using secure certification and dynamic key techniques. The protocol can prevent the mobile payment systems from illegal reading, eavesdropping, camouflaging deception, replay-attack and position-tracking effectively. This scheme is secure for the mobile payments and can be implemented easily. [C589]

"Mobile Assisted Language Learning in a Developing Country Context"

Mobile learning has significant potential to be very influential in developing countries. Because of its ubiquitous nature and comparatively low cost, the mobile phone system appears to be the most practical way of delivering m-learning for the foreseeable future. Mobile learning with its any time/place/pace learning will conveniently accommodate different modes of language learning for different groups of learners. In this study, three different educational environments have been utilised for Iranian language learners. Government employees received continuous refreshment of their language skills in a non-formal mode using a combination of mobile Web and short messaging. Two mobile games have been designed, which served as a platform for exercises, assignments and self-study in combination with schools and higher education. These games have shown that they can motivate the learners using an informal setting. Learners develop their knowledge whilst they perform in a pleasant virtual world in order to achieve the goals proposed. The paper concludes that using m-learning within the informal framework of learning provides a ubiquitous tool that can powerfully help adult learners and students in Iran during their continuous lifelong learning. [C590]

"Approach for Name Ambiguity Problem Using a Multiple-Layer Clustering"

Name ambiguity refers to the problem of attributing a publication to a proper author. This is a common issue in digital library. It is a difficult problem as the same author's name may be written in different ways and different authors may share the same name. In this paper, we examine a multiple-layer clustering approach which is based on a limited amount of associated information with each publication. It combines the Package-Merge algorithm, pattern-matching extraction methods, as well as a fuzzy logic rule based concept. This experimental study uses the DBLP collection as a case study, and the three attributes used are email addresses, the co-authorship relationship and paper title similarity. Our experiments show that this approach can distinguish authors and classify papers on the test dataset more accurately than the previous studies. [C591]

"Cost benefit analysis for implementation of a system for remote control and automatic meter reading"

This paper presents possibilities of implementing the system for remote control and automatic meter reading in Distribution Utilities in Serbia. Conception and structure of new system is illustrated. Advantages of new meter reading system over conventional system, like reducing the costs due to unpaid electric energy, non-technical losses, improving the quality of delivered electric energy and possibility of load control are pointed out. On an example of Belgrade Distribution utility, cost-benefit analysis for wide-scale implementation of new remote control and automatic meter reading in a distribution grid has been outlined. [C592]

"Design of a remote-monitoring system of MOA based on GPRS"

By measuring resistive current of the Metal-oxide Arresters(MOA) on-line monitoring technology, we can understand the performance condition of MOA at any time without unnecessary power-cut-off overhaul. Thus we can detect the abnormal phenomena and hidden accidents of MOA in time, take measures in advance to prevent the accident from getting worse and to avoid the economic loss resulted from the accident. To conquer the defect of this transmission method, a new method of monitoring of metal-oxide arresters in long distance was presented. The monitoring system consists of on-spot collection module, GPRS transmission module, long-distance monitoring center. The design of hardware and software of TMS320F2812 microprocessor according to the data collection and processing module was introduced. Data report can be formed in this system. The state of MOA can be inspected conveniently and accurately. Electric Power system can run in the reliable state. [C593]

"Design wireless multi-sensor fire detection and alarm system based on ARM"

The system uses nRF2401 for short-range wireless communications, GPRS for long-distance wireless communications, ARM9 for center console, Wireless Multi-sensor Fire Detector for node, and BP algorithm is used for judging the probability of fire. Wireless Multi-sensor Fire Detector is formed of the low-power electrochemical carbon monoxide sensor, photoelectric smoke detector and semiconductor temperature sensor. BP algorithm program is embedded in the S3C2440A ARM. The samples of BP algorithm were derived from the fire detection standard room of the State Key Laboratory of Fire Science of China. Center console uses Em GIS(embedded GIS) to show where the fire break out and uses GPRS to transmit SMS to the fire command

center. The system is low false alarm rate, low cost, fast response and convenient to install. [C594]

"Research and development of non-magnetic heat meters based on ZigBee and GPRS"

Adopting MSP430 ultra-low power 16-bit single-chip microcomputer as the core of heat meters, Pt1000 matching platinum resistance as temperature measurement sensor, non-magnetic meter as the hot water flow measurement sensor, the micro-power testing of heat consumption in the heat exchange circuit and wireless reading meter combined with ZigBee and GPRS are realized here. ZigBee node module uses high-performance microcontroller module CC2430 wireless transmission module and transplants ZigBee2006 protocol stacks, GPRS module uses MC39i module. After more than four months' running and testing, the test results show that the system has outstanding benefits of low power consumption, low transmission error rate and high antiinterference performance and deserves better popularization. [C595]

"Architecture of wireless sensor network for monitoring aquatic environment of marine shellfish"

Aquatic environment monitoring plays an important role in the artificial breeding of marine shellfish. Wireless sensor network (WSN) is an efficient approach for monitoring large-scale coastal beach with densely distributed smart nodes. Combined with a project of aquatic environment monitoring and assessment of marine shellfish in Zhejiang province, China, a new structure of WSN combining network clustering and route enhancing is proposed with the aim at facilitating node deployment in offshore and tidal zone and regular network maintenance. The topology of wireless sensing cluster, hard- and soft- design of wireless node and routing enhancement are elaborated. The testing result shows that the proposed scheme has the capability of robust data transmission. The method proposed in the paper is also suitable for other water quality monitoring system. [C596]

"A practical approach of smart metering in remote monitoring of renewable energy applications"

Renewable Energy is our future trend to reduce the CO2 emission from the power generation. Although, it may not cheap from the construction cost at the moment but we should try every effort to reduce the impact due to climate change. Naturally, if we can use energy efficiently, we will be in a position to minimize our power generation as well. In this paper, the authors propose a Smart Metering System to remotely access the data from renewable PV energy system. The authors focus the GPRS/3G application in which the architecture can be scaled up to a large system if the fixed communication link is not available such as in some developing countries or remote area. A practical scheme is proposed and demonstrated in real-life. [C597]

"On the significance of UWB wireless technology for industrial users"

While emerging ultra-wideband wireless technology is widely expected to play an important role in consumer products, its significance to industrial users may be even greater. UWBs role as an enabling technology for high speed data links that can operate in noisy environments, low power wireless sensor and building automation networks, and ground penetrating radar and though wall imaging will almost certainly change industrial users' perceptions of how wireless technology can be used to meet important business needs. In this presentation, we consider these needs in detail and the possible role of UWB technology in satisfying them. [C598]

"Design and Application of the MIS of Patrol Police Based on the Platform of 3GS"

Based on the platform of 3GS (GPS/GPRS/GIS), a method of designing the MIS of patrol police is proposed in this paper which offers a convenient and real-time monitoring platform for the administration of patrol police. The proposed method can extent the monitoring range and promote the supervising efficiency of patrol police. Oracle9i adopted in this paper to save the spatial and attributive data can bring about the strong points of rapid accessing and the reliability of system data. The system based on 3GS has been adopted by the patrol police department in a city of Liaoning province. [C599]

"Ultra-wideband rules in Canada and worldwide"

Canada introduced its domestic UWB rules in March 2009. Issue-1 of Radio Standards Specifications RSS-220 established provisions for the introduction and use of short-range UWB devices on a licence-exempt no-interference no-protection basis. This speech presents the Canadian UWB rules, and outlines similarities and differences with those of other countries (e.g.; US, Europe) and ITU-R recommendations. [C600]

"Subsurface object detection using UWB Ground Penetrating Radar"

Ultra wideband (UWB) ground penetrating radar (GPR) has been widely used in the detection of buried

unexploded ordnance (UXO), particularly for small and/or shallow objects. Detecting subsurface objects from a weak reflection signal against strong clutter from GPR data is an important problem. A detection method which employs principal component analysis (PCA) and digital image processing techniques is proposed in this paper for clutter reduction in underground object location. The proposed method can robustly indicate not only the regular hyperbolas but also the perturbed slant lines as a result of buried objects. Experimental data collected using an UWB GPR system is used to demonstrate that the proposed methods are effective in reducing clutter and detecting subsurface targets. [C601]

"Location-aware wireless networks"

The availability of positional information is of great importance in numerous commercial, health-care, public safety, and military applications. The coming years will see the emergence of high-definition location-aware (HDLA) networks with sub-meter accuracy, minimal infrastructure, and robustness in harsh environments. We propose to realize this ambitious goal using cooperative peer-to-peer algorithms. This talk will present a brief technical overview of our recent activities with particular emphasis on cooperative localization in wideband wireless networks from three points of view: fundamental performance bounds, cooperative algorithms, and experimentation. Fundamental bounds serve as performance benchmarks and as guidelines for network design. Cooperative algorithms will be designed to approach these bounds, resulting in dramatic performance improvements over traditional techniques. Experimentation will be used to determine important attributes of physical environments; these realistic models are necessary to obtain accurate bounds, to develop robust algorithms, and to validate their performance in harsh environment. [C602]

"Accumulating a Personalised Ubiquitous Learning Platform for Enhancing the Third Level Educational Experience"

This paper describes a personalised, single-supported mobile learning environment for University College Dublin that aims to provide efficient learning content delivery and promote constructivist learning anywhere, anytime to third level students. The system will offer accessibility via desktop computer and mobile devices; interactive tool; personalised interface; reusability of learning objects; recommendation of available educational resources and similar peers. [C603]

"Application of Bloom Filter for GTP Stateful Inspection in Network Processor"

The 3rd generation network rely on a key protocol-the GPRS tunneling protocol (GTP). However, GTP itself is not designed to be secure. So it is necessary to inspect the legal GTP channels and protect the backbone. Because a great deal of GTP-U packets transferring in the channels and the 3G firewall is required to check ten thousand GTP channels which needs mass bytes, so a fast and saving space algorithm is needed. A bloom filter algorithm is used to inspect the GTP-U flows. This method takes advantages of multi-threads and hash units of network processor. The analyses prove that the method only store some bit vectors and corresponding counters which needs less space. The experiments show this method can inspect of 1Gbps flow in the GTP channel. [C604]

"Localization in 3D environments using differential, evolution"

It is necessary to determine the robot's pose to localize a mobile robot in a known environment. If there is no information about the initial location, we are talking about global localization. In our previous work we solved this problem in a two-dimensional environment with an algorithm known as Evolutive Localization Filter (ELF). Based on evolutionary computation concepts, the proposed algorithm searches stochastically along the state space for the robot's best pose estimate. In this paper we have improved our method designing an algorithm with new features, called ELF-3D, that uses three-dimensional sensorial information. The resulting global localization module has been tested in a simulated indoor environment. The most important improvement obtained is the accuracy of the method, allowing to apply it in manipulation tasks. [C605]

"Research of Water Resources Remote Monitor & Control System Based on GPRS"

In this paper, a system of water resources data remote transmission was designed. In the system GPRS wireless was adopted. The terminal of water monitoring data collection will be collected data and information, which transmitted to the water system control center, then monitoring center back through the transmission of data analysis, and to control information transmitted to the bottom machine, for the realization of automated systems of water resources in real-time data collection and processing. [C606]

"The Monitor System of the Electric Network Voltage Distribution"

To scatter location and complex structure in distribution network, a kind of power distribution intelligence monitoring and energy management system based on distributed structure was developed in this paper. By using the technology of UML(Unified Modeling Language) and the computer network programming of GPRS, RS232, it introduce the design of hardware and deluxe applied software development platform for monitor check system. Based on the theories of the software engineering, the system decomposed of monitoring, control and alarm real time model, data management model and systems maintenance model. Multi-function data acquisition system collected data from energy meter. Voltage power distribution intelligent monitoring system is designed by analyzing the above models. It has the following functions: routine measure including voltage, current, power and so on. Besides, it has a beautiful and practical human machine interaction based on menu operation. In the section of the experiment, the results prove that the prototype has a good performance and reaches the expecting design requirements successfully. [C607]

"The Implementation of Distributed Wireless Data Center System"

This article discusses the agent-based wireless data center architecture. The system is devised by 6 parts, such as the GPRS communications services, the embedded Linux database server, the GSM modem, the core monitoring system, the B/S access control and the wireless router firewall and so on. They can be distributed in different servers or the same server. The system uses a distributed work model, involves GPRS network technology, RS-232/RS-485 serial transfer protocol, Transmission Control Protocol/Internet Protocol, systematic anti-jamming circuit design technology. [C608]

"A Novel Revolutionary Surgical Device for TransOral Incisionless Surgery: EsophyX™ Used for Endoluminal Fundoplication (ELF) in Patients Suffering of Reflux Disease"

Summary form only given: A huge revolutionary step toward surgery with no incisions, through natural orifices has been done in last two years. The novel endoluminal fundoplication (ELF) technique using a Trans-Oral Incisionless and fastener-deploying device (EsophyXtrade, EndoGastric Solutions) was developed and evaluated for feasibility, safety and the treatment of gastro-esophageal reflux disease (GERD) in a series of animal and human (phase 1, phase 2) studies. The studies verified biological compatibility, durability and non-toxicity of the polypropylene fasteners as well as the feasibility of the ELF technique. The results of the preclinical testing indicated that the EsophyXtrade device was shown to be safe, and capable of deploying fasteners directly into tissue and forming an interrupted suture line at the base of the gastro-esophageal valve (GEV). The clinical studies demonstrated also that the ELF technique performed using the EsophyXtrade device resulted in the creation of new gastro esophageal valve of 3-5 cm in length and a circumference of 200deg-310deg, which maintained their anatomical aspects at 2 years. The ELF-created GEVs appeared similar to those created by laparoscopic anti- reflux surgery (LARS). The ELF procedure also resulted in reduction of all small hiatal hernias (2 cm in size) and restoration of the angle of His, providing an anatomical approach similar to that of LARS for the treatment of GERD. Our work shows that that at 24 months follow up more than 80% of the subjects no longer had heartburn, or regurgitation, needed PPIs and almost 70% had normal or clinically improved esophageal acid exposure. The paper presents the new incisionless surgical technique and approach. [C609]

"A Framework for Software Performance Simulation Using Binary to C Translation"

This paper presents the realization of a simple but efficient technique to increase the performance of the processor simulator, which can be used both for software performance evaluation or hardware performance evaluation, such as MPSoC. Due to the fast increasing of the software complexity, it brings forward more requirements on the speed of the processor simulation, which simulates a certain target processor (such as PowerPC, ARM etc.) on certain host platform (usually PC). The performance improvement of a processor simulator can enlarge the exploration space and shorten the time-to-market. The existing approaches use either interpretive simulator or complied simulator or a binary translator. This paper performs binary to C translation to generate the processor simulator. [C610]

"Design of Wireless Environmental Monitoring Data Acquisition System Based on Cortex"

Remote environmental monitoring often has the characteristics of monitoring points widely distributed, large numbers, long distance, individual collection points in remote areas, etc. In the past, the manner of remote environmental monitoring data acquisition that staff operate in person on the spot is extremely inconvenient. In order to solve the problems produced in the manner above, we design the Cortex-M3-based wireless environmental monitoring data acquisition system, which has the following excellent features: It adopts a high cost-performance chip based on Cortex-M3 core; Pre-terminal, integrated into a circuit board, has small volume, take up less space, and can work without any special requirements for the environment; System can automatically restart; Power supply designed for the system can reduce the interference on the circuit from

external AC voltage, and lower the interference from high frequency entering through power supply; It can be applied to multi-channel data acquisition information monitoring system. [C611]

"The Design of Remote Medical Monitoring System Based on Sensors and GPRS"

As a new medical method, the remote medical monitoring system is being paid more and more attention to. This article proposes a kind of remote medical monitoring system which is based on the sensor and GPRS (general packet radio service, GPRS). The article first analyzes the necessity of the remote medical monitoring system, and then explains the advantages of the GPRS which is used in the remote medical monitoring system, and finally gives the architecture design of the remote medical monitoring system. The remote medical monitoring system is composed of two parts, which are mobile remote medical monitoring unit and the monitoring center. The user can carry the mobile unit along, while this mobile unit can real-timely monitor the physiological data from the user with sensors. When something abnormal happens, the intelligent control system automatically connects to the monitoring center. The monitoring center is composed of the monitoring station and the information management system. The information management system is connected with the monitoring center by a local area network, and its main function is to manage information such as the electronic map, the user's medical record and so on. [C612]

"Shipping Monitoring System Based on GPS and GPRS Technology"

A scheme of constructing shipping monitoring and control system has been provided: consists of monitor and control center, data communications, ship-borne terminals and user terminals; Hardware Structure of ship-borne terminal has been discussed: consists of central processing unit, GPS module, GPRS module, memory modules, I/O interfaces, keyboard and display modules etc. And the overall structure of ship-borne terminals, two types of memories and their connections with the microprocessor and LCD biasing voltage circuit etc. have been given after introducing related devices and modules; Highlights the initialization statement of GPS module and positioning information acquiring statement in the software design, and the related examples are given to illustrate it. IP is determined for network layer protocol and DUP for application layer protocol for communication after analyzing IP, TCP and DUP communication protocols. [C613]

"Mobile Video Monitoring System Based on FPGA and GPRS"

In order to improve efficiency of video monitoring system and meet the needs of mobile video system, MPEG-4 video compression encoder was designed, which use the "cross" motion estimation algorithm and DCT if whose coefficients all is zero, it can prejudged, processor structure based on the Nios was created, and video transmission based on GPRS module was built. The system is real-time mobile video monitoring intelligent system with implementing the integration of monitoring, security and control. [C614]

"Dynamic home agent assignment in WLAN with cellular networks"

Wireless local area networks (WLANs) are providing the most economical means of Internet access. However, their access is very much limited. They can be deployed in a large scale by integrating them with cellular networks such as universal mobile telecommunication system (UMTS), general packet radio services (GPRS) etc. A seamless roaming between these two hetero networks can be ensured through mobile IP. But the two networks don't have support towards mobile IP which requires the deployment of home agents and a protocol between the mobile nodes, home agents and foreign agents. Hence seamless roaming can be provided by incorporating Mobile IP support in 802.11 (WLAN) networks. The cellular networks require the home agent placement to be placed and the appropriate home agents to be assigned. The home agent placement and home address assignment are the issues for supporting Mobile IP for heterogeneous roaming. If the mobiles use a home agent (HA) that is deployed in a UMTS network when roaming in a WLAN network, the UMTS network may get overloaded with WLAN traffic. The solution to this problem is to dynamically assign an HA in the WLAN domain. Different architectures can be obtained by placing HA at different positions each having its own shortcomings, in which HA is placed between border router and GGSN that requires HA performing very high speed routing as fast as GPRS gateway signaling node (GGSN) which is practically not possible occurring in the existing architecture. To overcome these difficulties different architectures are proposed in this paper. In the first architecture the HA and GGSN is connected to the border router instead of tightly coupling the HA to the GGSN, and the second architecture is HA can be collocated with one of the GGSN in UMTS network and in the third architecture, GGSN is the default router of the mobile nodes (MN) under its coverage area, the foreign agent (FA) is best collocated with the GGSN. Based on the observation of proposed arch- itectures through performance metrics on packet overhead an attempt towards dynamic home agent assignment has been proposed. [C615]

"Design and realization of the vehicle-mounted unit for a remote electronic monitoring and calibration system"

This paper introduced the GPS/GPRS-based remote electronic monitoring and calibration system, as well as its working principle and system framework. Then the hardware structure and software designing of vehicle mounted unit were introduced. Next, we emphasize testing the reliability and speed of communications while refreshing the data of ECU through GPRS. As a conclusion, it quickly implements the functions of vehicle remote supervision and ECU calibration. [C616]

"The design and realization of communication technology for street lamps control system"

To meet the demands of urban street lamps automated monitoring and intellectualized management, a street lamps control system is designed in this paper. In this system, dual-core architecture based on SPI communication is used. GPRS communication visited by domain name is adopted, which has lots of good features such as "charge-by-byte" "always-online", etc. Simultaneously a set of CRC coding check is designed, which insures the rapidity and security of real-time communication. The operational results in the street lamps control system verify the stabilization and efficiency of the wireless communication. [C617]

"Satellite-based well site data transmission system (SWDTS)"

In modern oil industry, real time data transmission and sound database technology can remarkably improve exploration and production efficiency. Satellite-based well site data transmission system (SWDTS) is a unique system combining well site information gathering with real-time data remote transmission by comprehensively applying well site mud logging unit, wireless communication technology and computer information acquisition technology. This paper gives a brief introduction to SWDTS, illustrates system configuration of SWDTS (including hardware and software), key techniques for SWDTS, function of SWDTS, practical effect as well as prospect of SWDTS. [C618]

"The Remote Wireless Monitoring System Based on GPRS for Off-Grid Wind Turbine"

The article introduced a remote wireless monitoring system for the off-grid wind turbine. Considering the characteristics of the off-grid wind turbine, the system will have primarily function-monitoring, counting and saving the operation data. And, the design adopts primarily the remote communication technique to finish communication between control terminal and monitoring center. It can master the operation conditions of the wind turbine in real time, and can also manage dozens of or hundreds of wind turbines together. The test results of the system are satisfied. [C619]

"Study of government information construction based on BPR"

The theory of business process reengineering (BPR) is the newest managerial principle. It has archived dramatically as an effective way for the reform of corporations to radically redesign the business processes. BPR is widely used in many other fields due to its remarkable achievements. From the aspect of BPR, this paper proposed e-government planning approach, applied BPR to the government information construction and discussed how to carry out BPR in the e-government. Finally, based on the deep analysis of the characteristics of government work activities, both the fundamental construction and their inter relationship of the new information system in terms of the principle of business process reengineering. In a word, this paper mainly studied the GPR and the value government, which is of some reference significance for actual practice in government information. [C620]

"Remote measurement and control system based on GPRS for multi-frequency IP instrument"

We have developed a remote measurement and control system based on GPRS for multi-frequency IP instrument to resolve the problem that the receiver cannot control the transmitter and controller remotely in electrical exploration. The system is composed of communication module, host apparatus and slave apparatus. Communication module contains three DTUs inserted with three SIM cards, respectively, which implements the function of remote data transmission via message way and realizes data communication between host apparatus and slave apparatus. As the active station of system, the host apparatus initiates connection and fulfills the monitoring as well as function control of slave apparatus. As the passive station, the slave apparatus receives connection and carries out any command from host apparatus. Three modules realize mutual coordination and various functions. Our test of the system shows that it ensures normal operation and reduces labor intensity as well as highly improves work efficiency for electrical exploration which is carried out in outdoor area. [C621]

"Building heterogeneous reconfigurable systems using threads"

Field Programmable Gate Arrays (FPGAs) have long held the promise of allowing designers to create systems with performance levels close to custom circuits but with a software-like productivity for reconfiguring the gates. Unfortunately achieving this promise has been elusive. Modern FPGAs can now support a complete Multi-processor System on Chip (MPSoC) architecture that raises the design abstraction level from gates to processors. In this paper we present a new design flow and run-time system that enables developers to create a complete heterogeneous MPSoC from high-level programming model abstractions. This approach allows designers to eliminate synthesis times by using soft core processors thus enabling the creation of custom heterogeneous MPSoC architectures at software productivity levels. [C622]

"Achieving the Real-time rectification of remote sensing data based on 4S integration in handset"

This article introduced the design and implementation of real-time correcting remote sensing data based on the handset witch integrated 4S functions. Introduced the function and status quo of the 4S integrated system, given the development environment and related technologies of the 4S integrated handset correcting remote sensing data, explored the design method of the system's hardware and software. Using appropriate optimization algorithm to load remote sensing data fast, using GIS map overlay to collect real-time high-precision GPS geo-data, it can collect real-time, accurate mass of GPS information, achieve the accurate corrective of the remote sensing map, then send the corrected real-time data to the center through GPRS module witch embedded TCP/IP protocol. Combined with the advance of the WINCE system and the integrated development environment EVC perfect supports for the GDI interface, it can facilitate the design of correcting system, easy operation for user, become an extremely important field of the handheld device in field prospect. [C623]

"M-Commerce Development and Challenges Facing"

With the advancement in mobile technology, many business activities can be conducted through wireless networks. M-commerce is experiencing rapid growth in terms of capabilities of mobile devices, services, applications, standards and network implementation. However, we are still facing some important factors that influence m-commerce adoption and development. The implications of these factors are discussed in the paper. [C624]

"Certificate chain based authentication in MANETS using 4th generation technologies"

MANET security is becoming a challenge for researchers with the lapse of time. The infrastructure-less networks gives rise to authentication and key-management problems in the MANETs. Most of the TTP (trusted third party) and non-TTP based schemes seem to be infeasible for being adopted in MANETs. A hybrid scheme of the two can server the purpose. One of the hybrid schemes addressed these issues effectively by pre-assigned logins on offline basis and issuing certificates on its basis using 4thgeneration services (4G); however, the scheme suffered overheads in different communication scenarios. Another non-TTP scheme based on certificate chain approach in MANETS tried to resolve key management by the nodes themselves but faced the security problems due to the blind trust being put on the nodes for adding other nodes in the MANET. Both schemes seem to have weaknesses regarding overheads and security concerns. We have tried to overcome these by merging both schemes and introduce an optimized solution, eliminating the flaws of each scheme. The proposed model authenticates the nodes through 4G services and enables communication after the nodes being the part of certificate chain-based groups. [C625]

"Interpretation target pattern of a buried basic object on Surface Ground Penetrating Radar system"

Surface ground penetrating radar (GPR) is the one of radar technology that is widely used on many applications. It is non-destructive remote sensing method to detect underground buried objects. However, the output target is only hyperbolic representation. This research tries to enhance GPR capability by representing the visual/pattern of the detected target. GPR data of many basic objects (with circular, triangular and rectangular cross-section) are classified and extracted to generate data training model as a unique template for each type basic object. The pattern of object under test will be known by comparing its data with the training data using a decision tree method. A simple powerful algorithm to extract feature parameters of object which based on linier extrapolation is proposed. The result shown that tested buried basic objects can be correctly interpreted. [C626]

"Design of intelligent and integrated information system for shield construction"

In order to improve the construction of shield, an intelligent and integrated information system for shield construction is designed. Ground Penetrating Radar(GPR) is installed in shield cutter disc for the first time to explore frontal geology in real time and continuously. Based on the route deviation of shield and the influence of geological conditions on shield construction, a compound intelligent control system with double structure is

designed to control shield. The information of construction is integrated and published in order to be shared by all authorized users. This scheme is important to improve intelligence and infomationization of shield construction, which is innovative and valuable for engineering application. [C627]

"The Implementation of Dynamic Linking in Dynamic Binary Translation Systems"

Dynamic binary translation (DBT) is a commonly used technology in virtual machines. Most DBT systems, like Dynamo, can only translate programs statically linked but not ones dynamically linked. Statically linked programs will lead to expansion of binary codes, which is the indirect reason of loss on performance. In this paper, we propose an approach to implement dynamic linking on DBT systems. During the research, we came across some challenges related with operating systems, compilation and architecture, which will be discussed later in detail. And we have developed a module and had it tested on our DBT system, CrossBit. The statistics show that CrossBit with dynamic linking reduces the number of translated blocks and execution time. [C628]

"Image Denoising of Ground Penetrating Radar Based on Wavelet Scale Space Correlation"

Donoho and Johnstone (1994) proposed a method for threshold shrink denoising based on wavelets coefficient estimation of each isolating scale get optimal results, but the correlation of contiguous coefficients is not considered. The detail of signal will be dismissed if its coefficient is similar to noisy coefficients. a novel algorithm for ground penetrating radar (GPR) image denoising based on scale space correlation, and wavelet coefficients energy transformation rule, is proposed to solve this problem. The results of simulation experiment and processing GPR images show that, compared with the existing denoising methods, the proposed algorithm can more effectively denoising noise in GPR image. [C629]

"Design and Implementation of Mobile Security Access System (MSAS) Based on SSL VPN"

With the rapid development of mobile networks technology and popularization of mobile device, people can access Internet by mobile device and wireless connection covering the entire mobile communication network (GSM/GPRS/CDMA/3G/802.11etc) at any moment. Business system based on mobile network has been becoming hotspot. Compare with traditional business system, the security risk of business system based on mobile network is more popular and grave. However, the traditional mobile communication technology does not provide the security services such as authentication, confidentiality, and integrity etc. To solve this security problem, in this paper, we designed and implemented a mobile security access system (MSAS) using SSL VPN, CA and smart card technology. It establishes a complete authentication mechanism based on smart card and X. 509 certificates, and uses SSL VPN tunnel to protect the security of a message transmission on the Internet and mobile communication network. It will help some commercial companies and government authorities, who need confidential information transmitted over the air, such as banks providing mobile bank service, policemen exchanging data of criminals, etc, to build secure communications channel, and some secure business system based on fixed-IP network extend to mobile network. [C630]

"IMS Vertical Handover Optimization Based on Network Resources"

Transition to convergent systems built over the IMS architecture should attempt to service availability and mobility requirements in heterogeneous technologies. Mobility solution on IMS should allow operators delivering network resources related to handoff policies beyond triggering only by power strength as done so far. This paper reviews emerging heterogeneous access networks and their integration, discussing relevant metrics to mobility which indicates resource availability in a way to support vertical handover decision in networks deployed over IMS. The selected architecture is under evaluation in a simulation environment. The results are used to build up an analysis of the solution and drown up some conclusions. [C631]

"Compressive sensing for MIMO radar"

Multiple-input multiple-output (MIMO) radar systems have been shown to achieve superior resolution as compared to traditional radar systems with the same number of transmit and receive antennas. This paper considers a distributed MIMO radar scenario, in which each transmit element is a node in a wireless network, and investigates the use of compressive sampling for direction-of-arrival (DOA) estimation. According to the theory of compressive sampling, a signal that is sparse in some domain can be recovered based on far fewer samples than required by the Nyquist sampling theorem. The DOA of targets form a sparse vector in the angle space, and therefore, compressive sampling can be applied for DOA estimation. The proposed approach achieves the superior resolution of MIMO radar with far fewer samples than other approaches. This is particularly useful in a distributed scenario, in which the results at each receive node need to be transmitted to a fusion center for further processing. [C632]

"Design and implementation of real time vehicle tracking system"

Tracking systems were first developed for the shipping industries to determine the position of ships and boats in the sea. Initially passive systems were developed to support in tracking and navigation for location-based applications. For the applications that require real time location information of the vehicle, these systems cannot be employed, because they store the location information in the internal storage that can only be accessed when vehicle is available. Recently, Automatic Vehicle Location (AVL) systems are developed and deployed in numerous environments. These systems are capable of transmitting vehicle's location information in real time. In these systems, the device installed in the vehicle can transmit the location information in real time to a remote data centre, instead of storing into local storage, using some radio network. In this paper, we present the design and implementation of a real time AVL system that incorporates a hardware device installed in the vehicle and a remote Tracking Server (TS). [C633]

"The Mobile ECG Telemonitoring System Based on GPRS and GPS"

This presentation provides a description of a new mobile ECG telemonitoring system. The portable ECG monitoring terminal in the system consists of GPRS and GPS module in order to send the ECG signal data through GPRS network with the position information of the user, and a accelerometer is embedded in the terminal to sense the sudden posture change of the user, this will enable the monitoring center in the system give a immediately response to the user who suffer a suddenly cardiac failure. [C634]

"Experience of AMR systems based on BPL in China"

With the energy reduction become more and more popular, power company need to build AMR system to improve energy efficiency. Many AMR systems around the world have used PLC as communication channel and it's the same in China. BPL technology has become more mature, and it's reliability, stability and practicality has been verified in a number of field trial which shows great potential in the future market. This paper introduces the status of AMR in China at first, and shows two typical application cases of AMR system based on BPL, and also describes the perspective of this solution. The use of BPL technology in AMR system laid the foundation of smart grid in the future. [C635]

"Power Distribution System Design for a FPGA-Based Ground-Penetrating Radar Receiver"

Power distribution system (PDS) development of compact, low-cost ground penetrating radar (GPR) receiver based on field programmable gate array (FPGA) environment is presented. Four key steps of PDS design: transient current, target impedance calculation; bypass capacitor determination; voltage regulator module (VRM) design and inter-planar capacitance calculation are discussed in detail. The design and fabrication process of PDS as well as FPGA-based GPR receiver board are introduced. The frequency spectrum of designed PDSs and data capture experiment results demonstrated that the PDS and other critical hardware components on the receiver are fully functional. [C636]

"PAWES: A Flow Distribution Algorithm Based on Priority and Weight Self-Production"

This paper focuses on the issue of flow distribution for multimode mobile terminals in heterogeneous networks, and proposes a flow distribution algorithm based on priority and weight self-production mechanism. The algorithm utilizes the notion of "priority", assigning higher priorities to more important sessions, therefore ensuring these sessions have the preferential utilization of the network resources. In addition, this paper proposes a new method to automatically determine the weights of the multiple attributes which influence the session flow distribution decision, thus avoiding the difficulty and irrationality when relying on the users to specify the weights directly. Simulation results show that our algorithm can efficiently distribute the session flows on a multimode mobile terminal to the appropriate networks for transmission based on the current conditions of different access networks, and on the QoS requirements of different types of sessions. The decisions made by our algorithm reduce the monetary cost and power consumption of the communication as well as guarantee the QoS of different types of sessions. Finally, our algorithm offers significant improvements in performance indicators such as adjacency to the optimal network and session completion rate. [C637]

"An integrated closed-loop polar transmitter with saturation prevention and low-IF receiver for quad-band GPRS/EDGE"

This paper describes a 2.5G cellular transceiver with standard DigRF interface, implemented in a low-cost 0.13mum CMOS process. This is the first CMOS single-chip, polar closed-loop transmitter, excluding the power amplifier (PA). This transmitter achieves an efficiency of 26% in EDGE mode by linearizing a saturated PA in a closed-loop feedback system. This is much higher than the typical 15-to-18% efficiency of systems using a

linear PA. Typical high-band/low-band performance of -62/-64Bc in 30 kHz for 400 kHz offset spectral mask and 1.4/1.7% EVM in EDGE mode are significantly better than those reported earlier. Using a low-noise quadrature mixer topology, the receiver, including T/R switch and SAW filters, achieves a sensitivity of -110 dBm. The RF solution, consisting of PAs in a multi-chip integrated antenna switch module, SAW filters with integrated matching components and the transceiver is the smallest form factor available in the market today. [C638]

"Full polarimetric GPR antenna system aboard the ExoMars rover"

A full polarimetric antenna system on board the ExoMars rover is part of the Experiment ldquoWater Ice and Subsurface Deposit Observations on Marsrdquo (WISDOM). The WISDOM-Experiment is a Ground Penetrating Radar (GPR) selected to be part of the Pasteur payload aboard the rover of the ExoMars mission. The Pasteur Panoramic Instruments (wide angle camera PANCAM, infrared spectrometer MIMA and WISDOM) will perform large-scale scientific investigations at the sites the Rover will visit. Among these instruments, WISDOM is the only that can provide a view of the subsurface structure prior to drilling. WISDOM has been designed to characterize the shallow subsurface structure of Mars. WISDOM will for the first time give access to the geological structure, electromagnetic nature, and, possibly, hydrological state of the shallow subsurface by retrieving the layering and properties of the buried reflectors. It will address important scientific questions regarding the planet's present state and past evolution. The measured data will also be used to determine the most promising locations to obtain underground samples with the drilling system mounted on board the rover. The instrument's objective is to get high-resolution measurements down to 2 m depth in the Martian crust. The radar is a gated step frequency system covering a frequency range from 500 MHz to 3 GHz. The radar is fully polarimetric and makes use of an ultra wideband antenna system based on Vivaldi antenna elements. The paper describes requirements, design and realization of the WISDOM antenna system accommodated on the ExoMars rover. Simulated and measured antenna performance is compared in this paper. Test measurements performed in permafrost regions on earth will be shown in the presentation. [C639]

"Probabilistic planning integrated in a multi-level dependability concept for mechatronic systems"

Self-optimizing mechatronic systems are a new class of technical systems. On the one hand, new challenges regarding dependability arise from their additional complexity and adaptivity. On the other hand, their abilities enable new concepts and methods to improve the dependability of mechatronic systems. This paper introduces a multi-level dependability concept for self-optimizing mechatronic systems and shows how planning can be used to improve the availability and reliability of systems in the operating stages. [C640]

"Natural ELF electric oscillations in human life: From subterranean waters, earthquake forecasts and fire detection to brain waves entrainment"

Extremely low frequency (ELF, up to 30 Hz) electric oscillations play an important role in human life. [C641]

"Towards connectivity improvement in VANETs using bypass links"

VANETs are ad hoc networks in which devices are vehicles moving at high speeds. This kind of network is getting more and more importance since it has many practical and important applications, like multimedia file sharing (e.g., maps, music, news, weather), or dissemination of alarm messages (e.g., accidents, traffic jams, bad road conditions). One important problem faced in ad hoc networks is network partitioning, causing the formation of isolated clusters, and preventing devices in different clusters from communicating. Usually, devices composing the ad hoc network are provided with other communication interfaces rather than Wi-Fi and/or Bluetooth that allow them to connect to remote devices, such as GPRS/HSDPA. Additionally, there exists some network infrastructure in cities or roads that could be used by VANETs (e.g. hotspots). By taking advantage of these technologies and infrastructures, devices could be able to form a hybrid network, establishing remote links between them (called bypass links) in order to improve the network connectivity by joining, for example, separate clusters. In this work, we face the problem of optimizing the number and location of these remote connections for maximizing the QoS of the network. We use an efficient genetic algorithm with structured population, called cellular genetic algorithm (cGA), to optimize this hard problem. The evaluation of the quality of the network connectivity is made using small world properties. Our goal is to find highly accurate solutions (that could be used as reference values for future works) and then analyze the influence of the quality of the solutions in the real behavior of the network. This is achieved by using the JANE simulator to disseminate a message in the network using two broadcasting protocols having different features. [C642]

"Exploring the Martian subsurface of Athabasca using MARSIS radar data: Testing the volcanic and fluvial hypotheses for the origin of the morphology"

This work aims to test the formation hypotheses of the rafted-plate morphology observed in the Martian area of Athabasca Valles (5degN, 150degE,) using the subsurface radar echo from the Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS) 5 MHz-band data over this area. The backscattered signal losses are compared to those arising from two geoelectrical subsurface models (differing in their assumed ice content) generated by finite-difference time-domain (FDTD) simulations. Within this region, the MARSIS signal experience average losses of 0.09 dB/m in the first 160 m beneath the surface. FDTD simulations suggests that, if the near-surface environment is ice-rich (80% by volume), it will result in average losses of 0.048 dB/m, whereas the losses associated with an ice-poor model (20% of ice by volume) increase to 0.10dB/m. Comparing the observed MARSIS losses with the simulated ones suggests that the propagation characteristics of Athabasca's subsurface are more consistent with a volcanic rather than a fluvial origin for the rafted-plate terrain. [C643]

"Three-dimensional human imaging for through-the-wall radar"

Three-dimensional imaging can provide more detail information of the target than two-dimensional image, which can be used to identify the target. Thus, it is very useful for detecting in enclosed structures or behind the obstacle. This paper mainly research on the three-dimensional through-the-wall human imaging and introduce an approximate method to calculate the propagation delay when electromagnetic wave passing through the wall. The refraction point can be computed directly by specific rule rather than searched the solution of complicated transcendental equation. We will design the experiment to validate the proposed method. [C644]

"A novel W-MUSIC algorithm for GPR target detection in noisy and distorted signals"

When applied to ground penetrating radar (GPR), the multiple signal classification (MUSIC) algorithm is an important frequency estimation method as it can detect very closely spaced targets, particularly when one of the target responses is substantially less than another. The MUSIC algorithm however must be seeded with the number of targets to find and will indicate that number of targets regardless of the number of targets actually present. In addition, there is no reliable indication of the magnitude of the responses of the targets. In the presence of relatively low levels of noise the MUSIC algorithm is prone to reporting the position of false target positions in preference to weaker genuine target responses. In this paper a superimposed MUSIC technique is proposed to suppress false targets. A novel windowed FFT MUSIC (W-MUSIC) algorithm is examined using a linear sweep frequency in noise, and it is seen to give a clear indication of targets. In the presence of distortion, FFT is seen to be a more robust approach than the MUSIC algorithm, the latter method becoming very prone to inaccuracy in the presence of distortion. [C645]

"A CMOS ultra-wideband impulse generator for 22-29 GHz automotive radar application"

This paper presents the design and simulation of a CMOS ultra-wideband pulse generator using IBM 90 nm CMOS technology. The operating frequency band of the pulse generator is from 22 to 29 GHz for the application of short-range automotive radar. The pulse generator has a simple architecture using digital circuits. The simulation results show that the power spectral density of the pulse generator has a center frequency of 24.4 GHz and has a -10 dB bandwidth from 22 to 29 GHz. [C646]

"Phase spectrum of signals in ground Penetrating Radar applications"

Phase structure of signals relating to the ground penetrating radar (GPR) using the stepped frequency continuous wave (SFCW) signal is being analyzed for extraction of additional information about physical properties of buried objects. It was shown that the gradient of phase frequency dependence of signals reflected from underground layers is determined by their electrical properties. The method of representation of signals phase structure at georadar movement along earth surface like the image of phase shift isolines (lines corresponding to phase shift of n2pi) is proposed. It was shown that the variability of the isolines is determined by medium physical properties change or presence of nonhomogeneous objects. [C647]

"A Collaboration Mobile System for Epidemiology Investigation in the Wenchuan Earthquake-Stricken Area"

Communication is one of the major issue for the epidemiology investigation in the area affected by Wenchuan earthquake. A collaborative mobile system has been designed for the field epidemiology event investigation and disposal for it. To get more stable communication between field and indoor groups, provide more information to field investigators and experts, we designed a star communication topology. Because of the different networks and different terminals, an asymmetric client/server network has been designed for the collaboration between field and indoor workfellows. A prototype system has been implemented and tested in the Wenchuan earthquake stricken area, the results show the system works well and is very useful for field work and collaboration. [C648]

"Real-Time Monitoring and Pre-alarm System for Dangerous Mountains in the Railway Line"

There appear frequently natural phenomena such as collapse, landslide along the railway line, which badly threaten the transport safety of the railway. This system adopts the method of auto-monitoring, and the monitoring content is the earth's surface deformation. At the front, through high-accuracy displacement sensor, the deformation signals of the dangerous mountains can be acquired, then data collection is carried out at the regular intervals, using the GPRS wireless communication technology, and the real-time monitoring and pre-alarm for dangerous mountains can be achieved. This method is simple, convenient and penetrating, with lower-cost and higher -accuracy. [C649]

"A Parallel Method in the 3G Firewall"

IMSI (International Mobile Station Identity) is a unique number associated with all GSM and UMTS network mobile phone user. IMSI filtering-a prefix filtering, is an important function in the 3G firewall. It is an indefinite filtering which affects the efficiency of the security device. This paper brings forward a parallel processing method which uses vector coding and structure of bloom filter. This method is realized in Intel network processor-IXP 2850. The features of parallel multithreads and hash unit in network processor are taken advantages. The experiments show the excellent performance of the method in 3G firewall. [C650]

"Design of a new wire bow-tie antenna for ultrawide-band GPR applications using multi-objective genetic algorithm"

In this paper, a modified resistively loaded wire-bow is designed for impulse ground-penetrating radar applications. The new bow-tie is improved in terms of VSWR and band width. The improvements are achieved by tapering the arms and applying genetic algorithm to choose the optimum parameters for the tapered configuration. Curving arms is designed to decrease the reflection at the drive point, which in turn increases energy radiated to the ground. Genetic algorithm is applied to find the optimum curved antenna parameters. The objective function is composed of broadband performance and VSWR which constitutes a multi-objective optimization problem. The genetic algorithm is used to find, the optimal parameters for the antenna, i.e., resistive loads, loads' locations, number of arms and angular distances between arms. The performance of the proposed antenna is validated in terms of bandwidth and VSWR. Simulation results are presentated to validate the effectiveness of the new antenna as compared with those antennas previously reported in the literatures. [C651]

"The use of geometric diversity for spectral dominance in underground imaging"

Underground imaging of dielectric and conductive anomalies performed using ground penetrating radars (GPRs) requires expensive wideband systems to increase the resolution. The advent of tomographic principles in multi-monostatic GPRs dramatically improved the imaging capabilities and suggested the possibility of reducing the bandwidth of the probing waveform. In this work we propose to extend the tomographic principles to the case of below-ground distributed sensing, thus taking advantage of the geometric diversity. We show that, by using geometric diversity, the frequency content required to image below-ground targets is drastically reduced to virtually a single monochromatic signal, thus achieving full spectral dominance in the waveform design. [C652]

"Voice over Data over GPRS/ EDGE Networks"

GPRS or the general packet radio service is a non-voice value added technology that allows data communication over mobile phones in an Internet Protocol (IP)-based network [11]. This paper focuses on the transmission of voice over the existing data channel in GSM/GPRS networks using a Web server. Since the data channel in any network is economically viable for transmission, a mechanism to transfer voice over the existing network can prove to be a boon. Because of the fact that general packet radio service has a data rate from 56 to 114 kbps (In case of EDGE it goes upto 177.6 kbps) and has a continuous connection to internet via the GGSN & SGSN and is based on the packet switched network, so if the voice at one end be broken into data packets and transmitted through a Web server, can be reassembled at the other end. This whole process can be termed as Voice over data over Mobile (VODOM). Obviously GPRS based voice packet service should cost extremely less than the traditional circuit switched voice service. [C653]

"Systems Modeling for IP-Based Handoff Using Timed Petri Nets"

The mechanisms and design principles needed for achieving optimized handoff for mobile Internet services are poorly understood and need better analysis. This paper contributes to the general theory of optimized handoff and addresses the need for a formal model that can characterize a mobility event and the associated mobility optimization methodologies. It provides a systematic and formal approach to analyzing a mobility event. After a

thorough analysis of the abstract operations associated with several mobility protocols, it determines that these basic handoff operations form a set of discrete events that can be modeled as discrete event dynamic system (DEDS). It then uses deterministic timed Petri nets to model the mobility event and evaluate the performance under different scheduling schemes. This model also helps to validate optimization methodologies that could lead to a set of design principles for any new mobility protocol as well as evaluate its effectiveness. [C654]

"Evaluation of Effect of Data Throughput Evolution on Mobile Station Performance"

The next generation of wireless phones promises to change consumers services habits-video streaming, video conferencing, DVB-H etc. will be used practically anytime and anywhere in the world. However, it has been observed that the CPU load and the memory usage is increasing significantly with the increasing data rate and at some point the need for higher processing power and memory is quite evident to support higher data rate. This paper investigates the costs for implementation of higher data rate in mobile station in terms of processing power and memory usage. [C655]

"Adjust ELF Format for Multi-core Architecture"

There are two problems emerged while multi-core platform become popular in daily life, no matter for high end or low end. The first is how to fully utilize computing resource of these cores without requirement of large modifications of current software design model. The second is about dividing a piece of serial program into parallel program. However, the latter is the responsibility of compiler, which involves complex analysis of logical relationship and data dependency hidden in source code. Assuming a powerful compiler, we propose a new ELF format with multiple text sections each of which corresponds to a piece of logically separated code that could be loaded into a single thread. Similar research has been done on this, but they need a compiler with multiple thread library support which may lead to an overstaffed compiler. We assign this work to program loader and thus reduce design complexity of compiler. [C656]

"Mobility Modeling for Personal Networks: Properties and its Impact"

User centered personal network (PN) interconnects various devices belonging to a user in different geographic locations, such as home, office, car, etc., to form one network to improve the quality of life of the user. In PNs, the user's devices move in different groups, where these groups merge and split. A PN mobility model (PNMM) has been proposed to model the devices' movements in PNs. In this paper, PNMM has been evaluated: stability evaluation proves that PNMM maintains a long-term steady state. The impact of PNMM on the performance of protocols designed for PNs has been discussed in this paper. Simulation results give insights of the performance of the PN clustering protocol, and provide guidelines for future design of clustering in PNs. [C657]

"Techniques for Region-Based Register Allocation"

Register allocation is an important component of every compiler and numerous studies have investigated ways to improve allocation quality or reduce allocation time. However, techniques proposed to reduce register allocation time tend to have a detrimental impact on application run-time. In this paper we propose three enhancements to region-based register allocation that not only provide scalable allocation times across multiple applications, but also improve application run-time. We have developed a register pressure based model to determine when using multiple regions is profitable, proposed the use of different regions for each register class, and designed a new region formation algorithm. Our implementation in HP-UX C/C++/Fortran production compilers led to 29% allocation time and 1.4% run-time improvements over a global allocator on the SPEC2006FP suite of benchmarks. [C658]

"Reducing electromagnetic coupling for bistatic subsurface radar using EBG structures"

Bistatic radar is system which comprises a transmitter antenna and receiver antenna which are separated by a distance that is comparable to the expected target distance. In recent years, the bistatic subsurface radar is applied to detect relatively shallow structure such as tumor detection, steel reinforced detection in concrete and etc. On the other hand, the electromagnetic coupling between transmitter antenna and receiver antenna is problem, because, the bistatic radar detects a reflection wave from the target by the receiver antenna, therefore artifact caused by the coupling. To reduce this coupling a cavity is used, however, the cavity is not enough to reduce the electromagnetic coupling between transmitter antenna and receiver antenna. On the other hand, the EBG structure is used as electromagnetic insulator. In this research, in order to reduce the electromagnetic coupling the EBG structure is applied. [C659]

"The Application of Wireless Sensor Network in the Irrigation Area Automatic System"

In the irrigation area automatic system, high- performance embedded micro-controller and low-power technology is used to design the water wireless sensor network. The sensor node gathers the hydrographic information such as water-level, gate position and rainfall. The sink node receives the real-time data; the information center stores and processes those data which are transmitted from the sink node through the GPRS network. The system replaces the wired transmission with the wireless transmission, which reduces the costs in installment and maintenance, and improves the systempsilas reliability and extension. It has better application prospect. [C660]

"A Novel Mobile IP Protocol Supporting Roaming Subnet"

It supports only one mobile terminal to roam in wireless network using mobile IP technology. We extend one terminal to a small network, and propose ldquoroaming subnetrdquo to support network roaming while keeping data connection with huge network. In a roaming subnet, home agent, foreign agent and intra-domain routing agent cooperate instead of traditional MAC level device. Mobile node in subnet can go through multi-hops instead of one-hop of mobile IP. We propose a protocol for this kind of application and a demo system is developed to verify it. The test results illustrate it is fit for keeping high data transmission with rapid movement. [C661]

"An Object Packaging Based Cache Scheme for GPRS Network"

In this paper, we proposed an object packaging based cache scheme for GPRS network. Our study demonstrated that better performance can be achieved when packaging utilized. In addition, the scheme can be used for other resource limited networks. [C662]

"Post-deployment tuning of UMTS cellular networks through dual-homing of RNCs"

In conventional UMTS cellular networks, during deployment usually a set of NodeBs is assigned to one Radio Network Controller (RNC), and a set of RNCs to one Serving GPRS Support Node (SGSN) for data services, as well as to one Mobile Switching Centre (MSC) for voice services. Operators thus far have considered single-homing of RNCs to MSCs/SGSNs (i.e., many-to-one mapping) with an objective to reduce the total cost over a fixed period of time. However, a single-homing network does not remain cost-effective any more when subscribers later on begin to show specific inter-MSC/SGSN mobility patterns (say, diurnality of office goers) over time. This necessitates post-deployment topological extension of the network in terms of dual-homing of RNCs, in which some specific RNCs are connected to two MSCs/SGSNs via direct links resulting in a more complex many-to-two mapping structure in parts of the network. The partial dual-homing attempts to increase link cost minimally and reduce handoff cost maximally, thereby significantly reducing the total cost in a post-deployment optimal extension. In this paper, we formulate the scenario as a combinatorial optimization problem and solve the NP-Complete problem using two meta-heuristic techniques, namely Simulated Annealing (SA) and Tabu search (TS). We then compare these techniques with a novel optimal heuristic search method that we propose typically to solve the problem. The comparative results reveal that, though all of them perform equaIn conventional UMTS cellular networks, during deployment usually a set of NodeBs is assigned to one Radio Network Controller (RNC), and a set of RNCs to one SeIn conventional UMTS cellular networks, during deployment usually a set of NodeBs is assigned to one radio network controller (RNC), and a set of RNCs to one serving GPRS support node (SGSN) for data services, as well as to one mobile switching centre (MSC) for voice services. Operators thus far have considered single-homing of RNCs to MSC--s/SGSNs (i.e., many-to-one mapping) with an objective to reduce the total cost over a fixed period of time. However, a single-homing network does not remain cost-effective any more when subscribers later on begin to show specific inter-MSC/SGSN mobility patterns (say, diurnality of office goers) over time. This necessitates post-deployment topological extension of the network in terms of dual-homing of RNCs, in which some specific RNCs are connected to two MSCs/SGSNs via direct links resulting in a more complex many-to-two mapping structure in parts of the network. The partial dual-homing attempts to increase link cost minimally and reduce handoff cost maximally, thereby significantly reducing the total cost in a post-deployment optimal extension. In this paper, we formulate the scenario as a combinatorial optimization problem and solve the NP-complete problem using two meta-heuristic techniques, namely simulated annealing (SA) and tabu search (TS). We then compare these techniques with a novel optimal heuristic search method that we propose typically to solve the problem. The comparative results reveal that, though all of them perform equally well for small networks, for larger networks, the search-based method is more efficient than meta-heuristic techniques in finding optimal solutions quickly. [C663]

"Fluid modeling for GPRS uplink traffic"

In this paper, a fluid-based analytical model for General Packet Radio Service (GPRS) traffic in uplink direction

is presented. This model is a generalized form of the previous proposed fluid-based models for TCP/IP traffic. It is shown that the capacity of the uplink direction in GPRS is a time varying parameter which depends on some parameters such as channel model and mobile station (MS) speed. This capacity is formulated analytically and then calculated numerically by simulation. [C664]

"Voice communication over GGSN/SGSN"

SGSN and GGSN are the two core network elements of the general packet radio service which enables Internet to become mobile. It allows mobile users to access text based data services without continuously occupying a specific radio channel (which is not the case when you access voice channel). This paper successfully discusses the possibility of exploiting the data communication features of GGSN/SGSN to transmit voice packets, using a web server. This can help GPRS grow beyond its capability. As the data channel is considered to be economically viable in any network, If a mechanism is devised to use mobile's data channel for voice communication too, it will obviously be preferred over the conventional non-mobile based VOIP service. Because of the fact that general packet radio service through the GGSN/SGSN element can transfer data at the rate of 56 to 114 kbps (For EDGE it is 177.6 kbps) and has a continuous connection to internet via the core network elements, so if the voice at one end be broken into data packets and transmitted through a web server, can be reassembled at the other end. This process wont make a big hole in the customer's pocket and can easily make the VOIP go mobile, using the same network elements. While the traditional circuit switched network makes a quite bigger hole if the call is a long distance. [C665]

"Evaluating algorithm performance metrics tailored for prognostics"

Prognostics has taken center stage in condition based maintenance (CBM) where it is desired to estimate remaining useful life (RUL) of a system so that remedial measures may be taken in advance to avoid catastrophic events or unwanted downtimes. Validation of such predictions is an important but difficult proposition and a lack of appropriate evaluation methods renders prognostics meaningless. Evaluation methods currently used in the research community are not standardized and in many cases do not sufficiently assess key performance aspects expected out of a prognostics algorithm. In this paper we introduce several new evaluation metrics tailored for prognostics and show that they can effectively evaluate various algorithms as compared to other conventional metrics. Four prognostic algorithms, relevance vector machine (RVM), Gaussian process regression (GPR), Artificial Neural Network (ANN), and Polynomial Regression (PR), are compared. These algorithms vary in complexity and their ability to manage uncertainty around predicted estimates. Results show that the new metrics rank these algorithms in a different manner; depending on the requirements and constraints suitable metrics may be chosen. Beyond these results, this paper offers ideas about how metrics suitable to prognostics may be designed so that the evaluation procedure can be standardized. [C666]

"A Real-Time Observation scheme for UMTS networks"

In this paper, we propose a real-time observation scheme for UMTS networks. There is a 3GPP specification for subscriber and equipment trace, but it only provides the basic aspects of subscriber and equipment trace. Thus, it is very hard to define and develop various parameters for effective trace. Now we define three types of real-time observation scheme-event trace, periodic trace, and call observation. We called these types of call tracing method real-time observation, and propose the data format for three schemes. Using these schemes, we can be able to keep real-time observation on a specific mobile more effectively. [C667]

"Realization of Robot Communication System Based on Linux"

Based on Linux, the focus on this paper is how to realize long-distance and short-distance duplex control mode of robot system. The communications system is made of two parts: terminal of embedded Linux system and robot system. Using the technology of GSM/GPPS expander board and Qt/embedded software, through GPRS network and serial communication separately, realizing long-distance or short-distance duplex control mode of robot system. Finally makes long-distance or short-distance control robot go head, go back and move along the four axes machine-arm. [C668]

"Location-based Services Applied to an Electric Wheelchair Based on the GPS and GSM Networks"

With the development of social affairs and human civilization, the services demand for the ageing and handicapped people will be increasing, as well as for the development of better means of service robot. This paper outlines a design which incorporates the power of concurrent GPS and GSM networks positioning technology to provide location-based services for an electric wheelchair. It offers a better monitor service for elder and the person who has a handicap in the using of a wheelchair. In contrast to methods which depend

solely on GPS positioning, the proposed method provides higher positioning accuracy and is capable to compensate the problem of the lost of GPS signals in urban areas or indoors. The design is composed by a GPS receiver, a GSM/GPRS module for location acquisition and message transmission, a 32-bit DSP microprocessor as controller and a web-based management server designed on the LabWindows/CVI for monitoring and tracking the wheelchair's positions. We have implemented several real world experiments for our design and results are promising. [C669]

"Exploiting Cellular Networks for Road Traffic Estimation: A Survey and a Research Roadmap"

In this contribution we address the problem of using cellular network signaling for inferring real-time road traffic information. We survey and categorize the approaches that have been proposed in the literature for a cellular-based road monitoring system and identify advantages and limitations. We outline a unified framework that encompasses UMTS and GPRS data collection in addition to GSM, and prospectively combines passive and active monitoring techniques. We identify the main research challenges that must be faced in designing and implementing such an intelligent road traffic estimation system via third-generation cellular networks. [C670]

"A Measurement Based Uplink Packet Latency Analysis in GPRS Network"

In this paper, we described the correlations between uplink packet latency of TCP, application traffic characteristics and uplink characteristics. Our study demonstrated that the packet latency in uplink direction mainly caused by TCP setup time instead of the packet size and the bandwidth. In addition, we also found that TCP failure number varies with the configurations of PDCH in BSS. [C671]

"Latency in Broad-Band Mobile Networks"

Whilst currently available speeds on Mobile 3G Networks are comparable with many fixed broadband carriers, RTT is still away from the values achieved in fixed NWs. There is still significant room for improvement of latency in 3 G NWs to provide the best quality of experience for broadband services, therefore, latency is a key parameter that should be taken into account in future 3G NW configurations. The goal of this paper is to demonstrate the high impact latency has on current Mobile NWs and also to present ways that should be followed to reduce RTT, based on real NW measurements. In realizing this challenge, the current state of HSPA NWs in terms of latency have been analyzed, the sensitivity to latency of that traffic carried by the 3G NW quantified and measuring the proportional contribution of RTT from all the elements of the NW. Initial analysis shows that the UTRAN is, currently, the predominant factor in E2E latency for 3G NWs and therefore this study focuses more on this aspect. The next step has been to study the reduction of latency on 3G real NWs by means of current technology optimization(s) and planned technology deployment. Finally, it was investigated how QoS differentiation can be optimised for sustaining RTT over a potentially congested NW in several of its interfaces and/or nodes. [C672]

"Modeling of Cellular Network Subscriber Mobility"

In this work, we have studied the behavior and mobility of a cellular network subscriber who belong to a determined class such as (personal employee, student, retired and others) between different areas. Our contribution in this work is a proposition of a mobility model that reproduce in deterministic case, the possible traffic of cellular network subscriber between specified areas with different velocity. Our model incorporate many parameters, such as area size, the number of subscribers, areas types, subscribers types, moving velocity and the direction of users moving. The result obtained show us that the behavior of mobile station in a cellular network can be approximated to a vehicular traffic model. [C673]

"A Web 2.0, Location-Based Architecture for a Seamless Discovery of Points of Interests"

This paper presents a system for a location-based discovery of points of interest, based on the current geographic position of mobile users. The proposed approach exploits a mixture of Web 2.0 technologies (for the localization of point of interests), positioning techniques and cross-layer networking schemes for a seamless navigation, while moving through different and heterogeneous wireless networks. [C674]

"Impact of Self-Organization in P2P Overlays on Underlay Utilization"

Peer-to-Peer (P2P) systems gained popularity and are responsible for a large share of today's Internet traffic. Nevertheless, their dynamic nature and the intended lack of control through central instances make their behavior unpredictable and, therefore, it is difficult to achieve a high level of Quality-of-Service for P2P traffic. Thus, peers are themselves responsible for dealing with these issues by applying so-called self-organization mechanisms to deal with their heterogeneity, unpredictable behavior, and asymmetric resources. This paper

discusses and classifies relevant self-organizing aspects of P2P systems, including metrics and mechanisms. Hereby, the key focus is in better understanding on how such self-organizing mechanisms-originally designed to improve the performance of P2P overlays-affect the underlying Internet infrastructure. [C675]

"Improved Design of Remote Wireless Transmission Terminal using GPRS/GSM Integrated Network"

A GPRS/GSM hybrid communication method is designed to develop a low-power RTU (remote terminal unit) for sensor signal acquisition and data transmission of distributed monitoring systems in industrial fields. The hardware architecture, key technology and transmission protocol of RTU are illustrated. Considering to GPRS network congestions, the reliability design of RTU is analyzed. When GPRS connection fails, the RTU switches to the SMS mode to resume the data transmission such that data integrity is ensured. Besides, the RTU is provided with multiple data sampling interfaces and low power mode. The data transmission experimental results show that the average GPRS transmission delay is 1.126~2.669 s, and the data loss rate decreases to 0 in hybrid communication from 6.94%, in single GPRS mode. [C676]

"Design of Electric Energy Meter for Long-distance Data Information Transfers which based upon GPRS Technology"

With the popularization of Internet in China, as GPRS service improved increasingly, electric energy meter transmits the data information and controlling command remotely and wirelessly. Based on the current electric energy meter, with the well-functioned ARM kernel microprocessor, it not only finishes the power data's measuring and processing, but also realizes the TCP/IP by cutting. By ARM kernel microprocessor controlling GPRS module, electric energy meter could be linked to the Internet by use of GPRS service. The overall system is stable and reliable because it is managed by mu C/OS-II operating system. This is especially for some outlying areas where the Cable Network hasn't been popularized. It not only raises the efficiency of electric energy meter data information's acquisition and transition, but also the national measure management of electric energy improved greatly. [C677]

"Towards a Policy and Charging Control Architecture for Online Charging"

Consistent and flexible policy and charging control is one key factor for effective access control and efficient resource management in IP-based multimedia communication networks. One approach to deal with this challenge is to put more decision logic into the so-called mediation layer which is residing between the operatorspsila core network and the charging system. This article describes our research study to extend the mediation layer with more capabilities for online charging control. The presented prototype implements and extends parts of the 3GPP Policy and Charging Control Architecture using the open source JAIN SLEE framework Mobicents. [C678]

"A highly efficient GSM/GPRS quad-band CMOS PA Module"

The highly efficient CMOS power amplifier module (PAM) is designed for quad-band cellular handsets comprising GSM850, EGSM, DCS, PCS and supports Class 12 general packet radio service (GPRS) multi-slot operation. This module integrates an input matching network, a complete power control, and a thermal, over current, and load mismatch protection in a standard RF CMOS process and also contains a high-Q integrated passive device (IPD) for an output-matching network. The modular integration of the IPD makes it easier to manufacture PA module and also guarantees higher power-added efficiency (PAE) when compared with PAM products based on other technologies. [C679]

"Application of SVM in Embedded Character Recognition System"

During the development of hand-held character recognition device, the conflict of limited resources and high demanding for real-time makes the traditional classification method fails to meet the requirements of both speed and recognition rate at the same time. Thus, Support Vector Machines (SVM) classification algorithm is applied to the Embedded Character Recognition System. The SVM theory for pattern recognition is introduced firstly. One against one method is used to solve the Multi-class classification problem, with Cross-validation to sort the optimal parameters. The algorithm is finally transplanted to the embedded platform based on ARM. Comparing with the RBF neural networks, the experiment shows that the use of SVM for character recognition brings faster speed and higher recognition rate and meets the system requirement perfectly. [C680]

"On the Implementation Problems of Mobile Peer-to-Peer Networks"

Since peer-to-peer (P2P) systems are dominating in Internet traffic, there were several attempts to implement it

in mobile wireless networks, in particular in GSM/GPRS and UMTS networks. In this work basic and hidden problems which prevent it from successful implementation are studied as well as some proposals and improvements are presented. Mainly this work is focused on specific features of mobile wireless networks which make current fixed network solutions inefficient or even inadequate using GPRS or UMTS networks as a transport channel. As a result, bandwidth-efficient and totally adapted to wireless ldquonaturerdquo of mobile networks torrent protocol (wp2p) for mobile users has been developed and proposed. [C681]

"Mine detecting GPS-based unmanned ground vehicle"

Mines which are located on the ground have been threating not only military forces but also civilians. These threating mines are classified as wooden, plastic and metal types. In this study a detector, which is able to detect all the mines placed on the ground, has been developed. Detecting and destroying the mines on a suspicious area without personel have been possible with remote control devices. In our work we aimed to produce a GPS-based mobile prototype vehicle carrying a system which can jam electromagnetic waves to blow up the mines with a remote control. This vehicle runs on solar energy and it can be steered by simulation glasses. [C682]

"Active Location Reporting for Emergency Call in UMTS IP Multimedia Subsystem"

The IP multimedia core network subsystem (IMS) provides multimedia services for Universal Mobile Telecommunications System (UMTS). In IMS, an emergency call is established by an emergency call session control function (ECSCF). The E-CSCF dispatches the call to the nearest public safety answering point (PSAP) according to the location of the caller. After emergency call setup, the caller's location is tracked by the PSAP through location polling. This paper investigates the performance of location tracking. Then we propose the active location reporting scheme to improve the performance of location tracking. Our study indicates that the active location reporting scheme may significantly outperform the location polling scheme. [C683]

"Wireless Ad Hoc Networks Remote Meter Reading System Based on GPRS"

Characteristics of GPRS and ad hoc networks are briefly introduced and a novel design of a wireless ad hoc network remote meter reading system based on GPRS is proposed. With the implementation of the system and relevant techniques being thoroughly investigated, system performance analysis and pros and cons of this system are presented at the end. [C684]

"Multi-core for mobile phones"

High-end mobile phones support multiple radio standards and a rich suite of applications, which involves advanced radio, audio, video, and graphics processing. The overall digital workload amounts to nearly 100GOPS, from 4b integer to 24b floating-point operations. With a power budget of only 1W this inevitably leads to heterogeneous multi-core architectures with aggressive power management. We review the state-of-theart as well as trends. [C685]

"A low-cost quad-band single-chip GSM/GPRS radio in 90nm digital CMOS"

In this paper we present a quad-band single-chip GSM/GPRS radio in 90 nm digital CMOS process based on the digital RF Processor (DRPtrade) technology. This chip integrates all functions from physical layer to the protocol stack and peripheral support in a single chip RF SoC. The transmitter uses a low-area small-signal digital polar architecture merging amplitude and phase information directly in an RF DAC. The receiver is based on direct RF sampling and discrete-time analog signal processing. A dedicated internal microprocessor manages the digital RF controls to provide best achievable RF performances. The transceiver exceeds all 3GPP specifications demonstrating a receive NF of 1.8 dB and a margin of 8 dB on TX spectral mask at 400 KHz offset in GSM850/900 bands. The transceiver is best-in-class in area and occupies only 3.8 mm2of silicon area. [C686]

"UWB LNAs for ground penetrating radar"

Two LNA topologies for use in UWB systems are examined and compared in this paper. Design specifications have been derived from a ground penetrating radar system which is the target application. Circuits have been designed to cover the frequency range from 3.1 GHz to 10.6 GHz. The SiGe:C technology SGB25V of IHP Microelectronics is applied to enable volume production at low prices. For measurement purposes, input and output are matched to 50 Omega. [C687]

"MobTorrent: A Framework for Mobile Internet Access from Vehicles"

In this paper, we present MobTorrent, an on- demand, user-driven framework designed for vehicles which have intermittent high speed access to roadside WiFi access points (AP). Mobile nodes in MobTorrent use the WWAN network as a control channel. When a mobile client wants to initiate a download, instead of waiting for contact with the AP, it informs one (or multiple) selected AP(s) to prefetch the content. The scheduling algorithm in MobTorrent then replicates the prefetched data on the mobile helpers so that the total amount of data transferred and the average transfer rate to the mobile clients are maximized. Therefore, instead of limiting high speed data transfer to the short contact periods between APs and mobile clients, high speed transfers among vehicles are opportunistically exploited. Evaluation based on testbed measurement and trace-driven simulation shows that MobTorrent provides substantial improvement over existing architectures. For the case of a single AP, its performance approximates that of an off-line optimal scheduler. In case of multiple APs, our evaluation shows that MobTorrent's performance is robust in a variety of settings. [C688]

"Study on roadbed disease recognition algorithm based on support vector machine"

Based on the principle of support vector machines as well as the analysis to the characteristics of roadbed diseases, a new GPR echo signal recognition algorithm is brought up. By using the proposed method to identify the ground-penetrating radar measured data, the test results show that this algorithm is better than the neural network recognition algorithm and overcomes the shortcomings of the local minimum value and over-learning. The algorithm is suitable for ground-penetrating radar signal recognition and is an efficient algorithm. [C689]

"A Statistical Analysis of Uplink Packet Latency in GPRS Network"

In this paper, we described the correlations between uplink TCP packet latency, behavior of TCP and behavior of application. Pearson product moment correlation analysis and partial correlation analysis are worked out to characterize correlations between five user perceived parameters. Our study demonstrated that the packet latency in uplink direction mainly caused by TCP setup time instead of the packet size. In addition, we also found that a larger continual successful transmit byte number lead to a smaller packet latency. These results illuminate the directions of end to end optimizations both in handset side and network side. [C690]

"Rolled-dipole array for GPR with multiple footprints"

Antenna footprint indicates the shape and size of the area illuminated by the antenna on the ground surface or subsurface. For GPR it is important as it determines the cross-range resolution of the radar. In this paper we demonstrate that an array antenna comprising a number of rolled-dipole elements can produce a variable footprint by activating certain elements and deactivating the others. In this way the size of the array's footprint can be adjusted to remain comparable with the cross section of various targets which in turn minimizes clutter and improving the GPR performance. This paper presents FDTD simulation results and preliminary experimental result of the proposed antenna. [C691]

"Analysis and synthesis of circular UWB arrays"

Pulsed arrays are collecting growing interest in many applications such as automotives, ground penetrating radar, Tera-Hertz imaging, and indoor tracking. This contribution presents the analytic derivation of the space-time and energy patterns of pulsed circular arrays in terms of geometrical and electrical parameters as well as of the distortion effect of the antennas. It is shown that the field emitted by a dense array can be represented as a summation of a practically finite set of high-order Hermite-Rodriguez waveforms, while the energy pattern is a generalized Hypergeometric Function. The angular and temporal resolution are finally related, through handy formulas, to the array size, to the input signals and to the antenna types. [C692]

"Archeological researches of the ancient fortress by GPR"

The investigation purpose is studying by ground penetrating radar (GPR) methods of the fortification features of Hakassko-Minusinsk Region at the Bronze Age. The estimation of GPR efficiency at monitoring researches, time and expenses on engineeringarcheological works were carried out. Object of researches is the ancient fortress on Stone Island of Yenisei River. In 2007 GPR researches of total amount 1500 meters of GPR tracking structures has been carried out by Radar R&D. As a result of researches, contours of fortifications battlement are restored. Contours of the stone bases under dwellings are found out and restored. In the studying, GPR sounding is practically tested with the purpose of detection and construction of contours of the fortification rests and other objects. The software for efficiency increase of archeological researches and reduction of expenses was developed. By results of experimental and practical works the GPR method is proved and practically approved for the undersurface environment monitoring with the purpose of revealing of the zones interesting from the archeology point of view. [C693]

"Bistatic two-antenna scanning in microwave imaging"

It is known that two-antenna aperture synthesis scanning doubles azimuth resolution of imaging systems. Our previously reported image reconstruction approach assumes that transmitting and receiving antennas are situated very closely to each other. In real conditions this can be violated due to antennas physical dimensions and necessity to reduce coupling. Using common approaches can cause reconstructed image distortions. This paper presents approach that takes into account antennas separation. Effectiveness of the approach is experimentally proven. [C694]

"Measurement of pressure in wood by the subsurface radar"

In this paper, the change of wood strength under pressure of fixing items is studied. Influence of the handle tool on the wood strength is experimentally investigated and modeling. Radar images are received which allow to quantitatively evaluate a change of building material strength. There are zones of cracks besides compression pressures in the nail field. It is directed along fibers and taking place on distance about four diameters of nail. [C695]

"The use of wavelet transformation for detection and recognition of the small size and small contrast subsurface targets"

In this paper, possibilities of use of the wavelet analysis for detection and recognition of small size and small contrast subsurface targets are considered. For the test image the wavelet spectrum was performed and its analysis was carried out. [C696]

"The algorithmic methods of detection improvement and increase resolution at GPR sounding"

This paper presents the GPR efficiency and resolution criterions. The compare of Wiener filtration and high frequency filtration of the test radar images is carried out. The Wiener filtration has more advantages that high frequency filtration. [C697]

"UWB antennas for radio positioning systems"

Ultra wideband (UWB) radio positioning systems are being developed for many emerging applications. This paper is aimed at addressing the aspect of the antenna by identifying the main requirements and technical challenges, and examining available antennas so as to find suitable solutions for this special application. [C698]

"GPRS network optimization based on Physical Optics approximation"

This paper presents the optimization of a General Packet Radio Service (GPRS)/Global System for Mobile communications (GSM) network. A real scenario with real base stations emplacement has been simulated with the aim of making a diagnosis of the radioelectric coverage along a train path. Afterwards, new locations for new reflex isotropic stations are proposed in order to improve the coverage where the electric field level does not exceed the sensitivity or threshold of the receiver. The antenna radiation patterns have been synthesized from the characteristic parameters, such as gain, power, directivity of the original antennas. A modified Physical Optics (PO) approximation where not only perfect electric conductors (PEC) but also dielectrics are considered is used to calculate the first reflection contribution. [C699]

"Using a Supercapacitor to Power Wireless Nodes from a Low Power Source such as a 3V Button Battery"

Portable and remote data gathering systems often need to be powered from small long life batteries and are required to transmit data sporadically. GPRS RF transmitters typically operate at a minimum voltage of 3.2 Volts and draw pulsed currents in the order of 1 to 2 Amps. Zigbee typically requires 10-100 mA transmit current from a 3 V battery. These peak load powers are too great to be supplied by small long life batteries such as a CR2032, even though the battery can supply the average system power. This paper offers a solution using a single cell supercapacitor to supply the peak loads with low cost circuitry. A single cell supercapacitor cannot operate at 3 V, but does not require a balancing circuit and is lower cost and half the size of a dual cell supercapacitor required for 3 V operation. [C700]

"Multi-slot Channel Allocation for Priority Packet Transmission in the GPRS Network"

In the General Packet Radio Service (GPRS) network, data packets from services like mobility management and ldquopush-to-talkrdquo (PTT) are sensitive to delay. During the channel allocation process, the delay-sensitive

packets should have higher priority than other packets. Previously priority queue and Uplink State Flag Channel Allocation (USFCA) have been used to reduce the transmission delay of priority packets. In this paper, we study the performance of channel allocation for priority packet in the GPRS network with multi-slot capability. The results show that the transmission delay of priority packet can be further reduced by assigning multiple channels to priority packet in addition to the use of priority queue and USFCA. [C701]

"Implementation of Header Compression in 3GPP LTE"

Header compression is the process of reducing protocol header overhead in order to improve link efficiency while maintaining the end-to-end transparency. Robust header compression (ROHC) is a scheme for IMS (IP multimedia subsystem) and MBMS (multimedia broadcast multicast service). ROHC is defined for 2.5 Gm (GPRS) and according to 3Gpp2 next generation network, in CDMA2000 1x EV-DO and 1x EV-DV (Release B and onwards) system. ROHC specifies compression of IP headers including IPv4, IPv6, RTP and ESP on a per hop basis. The compressed header size is reduced to around 1-3 bytes. This header compression can be implemented in mobile handsets and all of the wireless infrastructure equipment upstream BTS/NodeB. Header compression basically includes generation of IP context to send on wireless device and each IP context is given a sequence number which is encoded before sending the information. The audio-video streams is first encapsulated in RTP (real time transport protocol) packet, which is then included under UDP packet, and finally IP packet carries this whole UDP & RTP data. The compression takes place at the radio layer defined at PDCP link layer. ROHC is very robust against bit errors on the link and also against errors introduced due to long RTT. In addition, it results in very high compression ratios, which increase effective link bandwidth and decrease packet processing requirements in power sensitive downstream devices. [C702]

"2D imaging of shallow buried objects based on frequency domain data"

A new buried object detection algorithm using ground penetrating radar system based on the UWB frequency domain measurements is proposed. With the implementation of C-scan data acquisition and wide angle reflection and refraction schemes, the 2D imaging of metallic and plastic mine-like targets buried in dry soil is demonstrated. [C703]

"Design of tapered-slot antenna arrays for landmine detection"

Two compact ultra-wideband antenna arrays built of tapered-slot antennas and intended for landmine surveys are described. In one array, the antennas are arranged in two parallel lines differing by the antenna polarizations. Polarimetric data collected by the array are important for the detection of lengthy objects buried in the ground. The antennas in the second array form a zigzag line with reduced spacing between adjacent transmitting/receiving antenna pairs. Such a dense array is useful to detect small buried targets like landmines. Some experimental examples for the both arrays are presented. [C704]

"Accurate FDTD modelling of resistively-loaded bow-tie antennas for GPR applications"

In this paper, a cavity-backed bow-tie antenna for ground-penetrating radar is presented. Dielectric embedding and resistive loading of the radiating structure are employed to achieve a 10:1 relative bandwidth (from 100 MHz to 1 GHz), with a maximum antenna size of 52 cm, and stable performance over different types of the ground. The full-wave analysis of the developed antenna is performed by means of a dedicated locally conformal finite-difference time-domain procedure. [C705]

"Characterization of tapered-slot antenna designs for subsurface radar applications"

Some characteristics of ultra-wideband tapered-slot antennas important in subsurface radar applications such as return loss, radiation pattern and low variation of the antenna response with respect to variations of the distance between the antenna and reflecting surface have been analyzed. Three types of the antenna opening, namely exponential Vivaldi type, elliptical flare with corrugated edges and elliptical flare have been studied. All the antennas had been fed by baluns formed of microstrip and slotline radial stubs. [C706]

"Modeling of the backscatter behavior of typical antipersonnel landmines by computer simulations"

This work will focus on modeling of different types of antipersonnel land mines (APL's) without environment (i.e., in free space). The received backscattered electric fields as a function of the frequency (called fingerprints) are computed at different distances above the mines computed by using different excitations, i.e., dipole, point source, and homogenous plane wave. The work is devoted to study the Ground Penetrating Radar (GPR) sensor as a promising tool for humanitarian demining. For a reliable detection of antipersonnel land mines it is necessary to calculate the electromagnetic backscattering characteristics in order to make an accurate modeling

of the material properties which are important to identify modern plastic antipersonnel land mines in a realistic environment. These interactions can play the role in making false alarms when they are embedded in a realistic environment. To increase the spatial resolution of the operating radar, the simulations have been done in the frequency range 200-8000 MHz. To model these APL mines, the Integral Equation Method-Method of Moments (MoM) and the Finite difference in Time Domain (FDTD) have been used. [C707]

"Background noise estimation using outer product expansion for ELF electromagnetic wave signal"

This paper shows the denoising performance of the outer product expansion with non-linear filters for the background noise included in the extremely low frequency (ELF) electromagnetic (EM) waves. We have proposed novel source separation techniques based on an outer product expansion with non-linear filters. Some kinds of the algorithm for the outer product expansion and its effectiveness have been reported. However, the denoising accuracy for real data has not been shown in the conventional researches. In this paper, two algorithms for an outer product expansion are applied to conduct the suitable method for the background noise reduction problem of EM wave data. Two topics are discussed in this paper. The performance of background noise reductions for ELF EM data analysis is represented using an outer product expansion. Moreover, optimal parameters, which yields the accurate denoising for EM wave data, are introduced. [C708]

"Signal detection technology on earth diastrophism using electromagnetic wave observation"

It is well known that electromagnetic (EM) waves are radiated from the Earth surface as precursor phenomena due to Earth-crustal movements such as earthquakes. Issues on anomalous signal detection and observation systems are widely investigated by researchers. Recent several researches in our study are reviewed in this paper. [C709]

"A Practical Approach for Planning WLAN Deployment under 3G Cellular Network"

This paper deals with a practical approach for planning WLAN hotspots to be underlaid within an existing 3G network. Given the number of access points (APs) and access routers (ARs), their locations, call handling capacities of ARs as well as serving GPRS Support Nodes (SGSNs), intra-WLAN handoff costs, and 3G/WLAN inter-system handoff costs, an important consideration for a mobile telecom service provider (MTSP) is to identify: (a) the APs to be connected to the corresponding ARs, and (b) the ARs to be connected to the corresponding SGSNs in a cost effective manner. In this work, while planning a WLAN roll-out for an MTSP, we present an integrated approach based on the minimization of total system cost. Using a heuristic strategy, the planning attempts to determine simultaneously an optimal partitioning of APs with respect to the given set of ARs in each hotspot and also the assignment of ARs to SGSNs over the complete service area. Our study shows that acceptable results are achievable with a reasonable computational effort, which supports the engineered planning of a tightly coupled WLAN/3G integration. [C710]

"Web Services for Quality of Service Monitoring"

In this paper we present an analysis on Policy and Charging Control (PCC) functions in all IP-based multimedia networks and identify the required functionality for quality of service (QoS) monitoring. The support of "Application-driven Quality of Service" (ADQ) Parlay X Web Service to reporting function in PCC is evaluated and improvements of ADQ interfaces are suggested without violating the interface functionality. The gateway which provides Parlay X interfaces for third party applications supports Session Initiation Protocol (SIP) towards the network. A new SIP event package is suggested to support monitoring of QoS provided on SIP sessions. [C711]

"Research and Design on Vehicle-Mounted Wireless Transmission Terminal"

Based on the wireless data transmission technologies, the vehicle-mounted wireless transmission terminal is able to provide reliable, up-to-date and accurate transport information for the moving vehicle, which contributes towards efficient road use, better traffic flow and greater road safety. The design of this vehicle-mounted wireless transmission terminal is based on ARM embedded technology and GPRS wireless transmission technology. By adopting S3C2440 as its microprocessor, this terminal connects with GPRS at first through driving GPRS communication module GTM900B, and then access to Internet by GPRS to transmit information or date from GPS and CAN. Experimental results show that the system has a strong practicality in data transmission, and it has an important practical value for the design of the vehicle monitoring system. [C712]

"Security in Mobile Governmental Transactions"

In recent years mobile transactions have attracted a large number of clients. Being a more convenient and

secured approach to perform remote governmental transactions than Internet, mobile transaction has turned into a more appealing method than previous methods. However, implementing wireless communication technologies may result in more complicated information security issues. This paper discusses the security of mobile network protocol along with information security for governmental transactions. [C713]

"Enhancement of QoS of VOIP over Heterogeneous Networks by Improving Handoff Speed and Throughput"

The increasing demand for broadband services is causing the cellular network providers to consider for the integration of Wireless LAN with GPRS. WLAN is having higher data rate but low coverage area but GPRS is having lower data rate but with high coverage area. So integrating these two heterogeneous networks will lead to utilization of advantages of both and can increase the system throughput. The handoff latency is reduced by considering the threshold values of both the networks and anticipating the handoff well before. Especially the packet loss is completely eradicated by multicasting the packets during the handoff period and switch back to normal mode after the handoff. Hence the system throughput obviously increase by certain amount by our procedure of multicasting. [C714]

"Interactive Pervasive Wireless Services over GPRS and Bluetooth"

The large scale adoption of mobile phones brings a merging mobile commerce market. Most wireless applications are based on GPRS to provide services in wide areas, while some location based services are based on Bluetooth to enable mobile users to enjoy proximity services. However, very few systems marry the two communication technologies together to provide a more pervasive wireless system with which mobile users can enjoy PAN-WAN wireless services. In this paper, we present a new hybrid interactive wireless system over both GPRS and Bluetooth called Lykii. The system has three layers: backend servers deployed in data center, Bluetooth stations installed hotspots in city public areas and mobile software clients installed in mobile phones on user side. In the hotspots, mobile users can connect to the Bluetooth stations over Bluetooth which is fast and free by using the mobile software clients, and when they are out of hotspots, they still can access the remote server through GPRS. In this system, several interesting applications are implemented by taking advantages of the two communication technologies. The architecture and implementation of this system are presented in details as well as discussions on business potentials of this hybrid wireless system over both GPRS and Bluetooth. [C715]

"V2X-Based Traffic Congestion Recognition and Avoidance"

Vehicular traffic congestion is a global phenomenon that has increased in importance in the last decades and has caused economically and ecologically negative effects. Thus, finding a way to improve traffic efficiency is a high-frequented problem to be solved by scientists and politicians worldwide. One new promising approach is the usage of decentralized wireless vehicle to vehicle communication based on the Vehicle-2-X (V2X) technology. The idea is that vehicles share information about the current local traffic situation and use this information to optimize their routes. In this paper, we introduce a new algorithm that can be used by navigation systems to calculate routes circumnavigating congested roads. For this purpose, each vehicle transmits its average speed of a road segment to vehicles in the neighbourhood. As a result, vehicles receiving this information can recalculate their routes based on the knowledge about the current possible speeds in the road segments of their neighbourhood. To evaluate the improvements that can be achieved by our algorithm, simulations have been done. Our results show that navigation systems using the V2X technology for a more intelligent route calculation can improve the traffic efficiency of future transport systems. [C716]

"A Risk Management System of Real-Time Gas Pipelines Network Based on Wireless Data Transmission"

Based on advanced ZigBee and GPRS technology, which collects and transmits data, risk evaluation system of gas pipelines network realize the real time risk analysis and management. This paper introduces the methods of wireless data transmission, gives the architecture of software platform, discusses a processing method for real-time data, and analyzes risk assessment and evaluation model. This has extremely application prospect. [C717]

"Historical data learning based dynamic LSP routing for overlay IP over WDM networks"

In overlay IP over WDM networks, there are only limited information exchanges between the two layers through the user network interface (UNI) [1] for service requests and responses. To enhance the overlay network performance while maintaining its simplicity, we propose for the first time to learn from the historical data of lightpath setting up costs maintained by the logical layer network operator(s), to facilitate the logical layer routing

process. Using a simple cost updating strategy to alleviate the logical layer cost outdating issue, we present two dynamic LSP routing algorithms, namely existing link first (ELF) and enquiries-first (ENF), for the overlay network architecture. Simulation results show that the proposed algorithms achieve much better performance than the existing algorithms with or without constraint on the number of optical ports. [C718]

"Design of a fully programmable shader processor for low power mobile devices"

In this paper, we propose a novel architecture of a general graphics shader processor without a dedicated hardware. Recently, mobile devices require the high performance graphics processor as well as the small size and low power. The proposed shader processor is a GP-GPU (General-Purpose computing on Graphics Processing Units) to execute the whole OpenGL ES 2.0 graphics pipeline by using shader instructions. It does not require the separate dedicate H/W such as rasterization on this fully programmable capability. The fully programmable 3D graphics shader processor can reduce much of the graphics hardware. The chip size of the designed shader processor is reduced less than 60% in comparison with previous processors. [C719]

"A Remote Wireless Data Acquisition System Based on Ad Hoc Network and GPRS"

This paper introduces the characteristics and benefits of GPRS and ad hoc networks briefly. A novel design of a wireless ad hoc network remote data acquisition system based on GPRS is proposed. The paper introduces the implementation of the system and relevant techniques thoroughly. The system performance analysis and advantages and disadvantages of this system are presented. [C720]

"Improved Hough transform algorithm for radar detection"

In this paper, we describe a new algorithm for radar detection based on Hough transform which employs the slope-intercept parameter space. Unlike the conventional Hough transform, we shift the parameter space cells to perform the transform. The computation burden is reduced. Another advantage of our proposed is that those straight lines whose intercept are bigger than the radar maximum range can also be detected in our method. In addition, we also investigate the performance of the algorithm we present and show its efficiency with some simulations. [C721]

"Embedded system of oil wells monitoring base on GPRS"

In some oil fields, the consumption of electricity and energy was very high because the beam pumping unit worked sustained, expect in the height period of electricity consumption. It increases the burden on the grid and make machines wearied easily when voltage instability. In this paper, we propose a concept of intermittent pumping to beam pumping unit and build a monitoring system of oil wells based on this concept. According to the requirements of system, we design software and the circuit of hardware of this system, and build terminal of data processing in server use J2EE. Then we build a wireless monitoring system of embedded based on GPRS finally. The design extends the application areas of traditional GSM/GPRS network and achieves the intermittent pumping to beam pumping unit. It allows the monitoring of oil wells is no long subject to the place and time limit. [C722]

"Bent tapered microstrip balun transformer"

In this paper the traditional tapered microstrip balun transformer is modified by bending its whole structure to significantly reduce its length. The resulting bent tapered microstrip balun is then extended with a twin-semirigid line to simplify antenna feeding. The decoupling coefficient of the proposed balun has been found to be smaller than -30 dB. [C723]

"Fabrication of portable HSDPA USB dongle"

The construction of portable HSDPA USB dongle is studied. Of course, data service such as GPRS and EDGE are also supported. In the multi-mode operation of GPRS & EDGE exit GSM850, EGSM, GSM1800 and GSM1900. For WCDMA & HSDPA, Band I, II, and V are treated in our dongle. So, the dongle must fulfill the requirements for multi-mode and multi-band services. The power regulator with LDO is indicated to have the heat problem and leads to adjacent channel leakage ratio (ACLR) fail even drop the call. Change LDO to Bulk can overcome the temperature rising, but produce switching noise, which will cause the in-band noise and sensitivity degradation. The solutions to the wireless in-band noise are proposed. Also the transient peak current for GSM transmitter is solved. [C724]

"Integrated platform for continuous monitoring of children with suspected cardiac arrhythmias"

Children with cardiac arrhythmias constitute one of the most difficult problems in cardiology both in terms of diagnosis and management. In such cases continuous monitoring of ECG vital signs and environmental conditions can significantly improve the identification of a possible arrhythmia. In this study we present the design and development of a system which enables the continuous monitoring of children, from the hardware and software perspective. The system is able to carry out real-time acquisition and transmission of ECG signals, and facilitate an alarm scheme able to identify possible arrhythmias so as to notify the on-call doctor and the relatives of the child that an event may be happening. In-house monitoring of a child is performed using a sensor network able to record and transmit ECG and the living conditions, while outside the house, monitoring is performed through a GPRS/UMTS enabled device. The transmitted information can be accessed through a web based platform which facilitates basic an electronic patient record module and continuous display of monitoring information of the patient. The system design and development steps are finished and the initial tests performed on healthy volunteers proved to be very promising. [C725]

"Design and Implementation of a Multiplayer Bluetooth Game"

The mobile phones have undergone a tremendous advancement in terms of technology. They are no more a communicating device. They are more into computing, photography and entertainment. There are numerous single player games available on mobile phones. But we have successfully implemented a multiplayer game on mobile phone by making use of the Bluetooth functionality of the mobile phone. This paper focuses on the design and implementation of a multiplayer Bluetooth game. The game chosen was "Four Connect" and it is being successfully implemented. [C726]

"Home care phonocardiography: an Italian experience"

In this work we describe an Italian experience of foetal home monitor, based on a pilot system consisting of three phonocardiograph home monitors by Pentavox. Phonocardiography is non invasive and passive in nature and allows developing of low-cost and easy to use equipments. Its application in a telemonitoring system enhances diagnostic capabilities, allowing long-term measurements. The home monitors can have telemedicine facilities as far as they can transfer data by GPRS to a remote server. Six selected patients, without effective pregnancy risk, were supplied with a lightweight ambulatory cardiotocograph (Fetaphon-home) equipped with two probes: a microphone and a pressure transducer. Monitoring covers the measurement of foetal heartbeat, uterine contractions and foetal movements. The selected patients were instructed by trained personnel in the use of the monitoring device. Patients were asked to perform the recording two times a week once and to transmit 20-min signal to the computer sever of reference centre. The home monitoring sessions were performed in addition to the routine surveillance at the clinic; thus, the study monitoring did not replace clinic visits. Preliminary measurements on the selected pregnant women have shown that the use of this methodology significantly reduces the need of travel for patients and consequently their stress. Moreover, the obtained results, even if performed on normal foetuses, suggest that, after a short training, pregnant women are able to record and transmit long traces without troubles. Use of telemedicine system was generally well accepted by pregnant women increasing the possibility of foetal long-term home surveillance which in turn could increase the efficiency of the service offered to pregnant women. [C727]

"Design of Electric Power Monitoring System Based on ZigBee and GPRS"

According to the shortcomings and deficiencies of Electric Power Monitoring System at present, this paper designs a kind of Electric Power Monitoring System based on ZigBee and GPRS. The system utilizes CC2430 as the ZigBee module, and designs the ZigBee Coordinator and ZigBee monitoring terminal nodes. The system uses GPRS for remote transmission to realize a real wireless system. The system can substantially save cost and reduce the complexity of construction, and has broad application prospects. [C728]

"Highway Pavement Subsurface Layer Detection Using Air-Launched GPR"

Data preprocessing algorithm including clutter suppression, threshold detector, ROI (region of interest) extraction and layer interface smoothing is presented, which is a part of automatic pavement subsurface rating system. The results based on simulation and measurement GPR (ground penetrating radar) data show that the presented algorithm is feasible. [C729]

"Topology and Design of Power System for RTU of Remote Monitoring Pharos"

The article introduces hardware structure of RTU for monitoring remote pharos and its details of power topology, the power system consists of DC-DC modulators and LDOs, it solves the questions to improve power reliability and compatibility, and the control with good flexibility, it not only ensures RTU running well but also meets the demand of low-power-consumption. [C730]

"Remote Uninterruptable Power Supply Monitoring over GPRS"

The running status of Uninterruptable Power Supply (UPS) is very important factor for the safe running of devices in computer room or other application fields. In order to supervise the running status or performance of the UPS, a UPS online remote monitoring system based on general packet radio service (GPRS) network is proposed in this paper. The system could monitor the voltage, current and temperature of the UPS through the long-distance supervised terminal. The system sends the running parameter to the supervision center or mobile termination and receives the remote command from remote hand terminal or control centre by GPRS or Internet. The system could also set the alarm boundary of the voltage, current and temperature of the UPS, if the UPS appears abnormal status, the system would sent the alarm information to the mobile termination or the supervision center, as a result, the UPS could be maintained easily. The system shows the superiority in remote monitoring UPS in practice. [C731]

"Geophysical Characters for Archaeology in the Ancient City of JinYang, China"

The ancient city relics in Jinyang have a long history, and Jinyang is a very important burial region of ancient culture. It has abundant relics with unique burial forms under the ground. Due to the wide measured range of the target layers and target articles which is from centimeters to meters, and the different requests of the resolution, we take the method combining with the high density resistivity technique (HDRT) and geophysical prospecting radar (GPR) to carry through geophysical testing exploration on several ancient culture layers and target areas of relics in Jinyang. In this paper, we have collected a rich knowledge of the geophysical characters, which has laid a solid foundation of geophysical exploration for archaeological study on the ancient city relics in Jinyang. [C732]

"Bridge Management with GPR"

Ground penetrating radar (GPR) is regularly applied to examine bridge deck, roads,railways and runways. Many applications have been pioneering proof-of-concept tests to define the benefits and limitations of GPR. For the quality of bridge major include three parts: the thickness of the liner; the Defects of the liner such as the voids, non-compacting area and crack; the number diameter of the rebar concrete deterioration (delamination and debounding) and rebar corrosion. There are many situations where GPR signals do contain quantitative information useful for developing data needed for engineering decision making. [C733]

"Research of SoftMan Migration Based on Linux Checkpoint"

SoftMan is a software artificial life and migration is one of its attributes. Through analyzing the format and load process of ELF file, checkpoint mechanism of Linux is made use of in this paper and designs the algorithm which integrates static migration and active migration of SoftMan. In the environment of LAN, a method of SoftMan migration based on rebuilding the Linux kernel is designed and implemented in the paper and values it. [C734]

"The FDTD Modeling of GPR for Tunnel Inspection"

Ground-penetrating radar is an important tool non-destructive testing for buildings and transportation systems. However, ground-penetrating radar signals is extremely complex and is easily influenced by many factors, which lead the interpretation of radar data to be very complex and often with a certain error. The accurately interpretation of radar data need workers have some special experience, such experience is often get through the acquisition of a large number of data and their predecessor's scholarly papers. Based on the finite-difference timedomain method, the forward modeling of GPR signal provides the reference for the interpretation of ground penetrating radar data in tunnel lining inspection, so that the reliability of detection can be improved. [C735]

"System performance simulation of an UWB FLGPSAR based on Matlab/Simulink"

The simulation system of an ultra-wideband forward looking ground penetrating synthetic aperture radar (FLGPSAR) is analyzed and designed according to the characteristics of FLGPSAR. The ideal of modularization is used in this simulation system, so it is flexible and effective to realize the simulation system. After applying the simulation system in the Matlab/Simulink (MS), the methods of choosing system parameters including pulse width and IF bandwidth are obtained. At the same time, the effect of the movement and incline of the platform, the harmonics levels, and the environment noise and so on is analyzed. And the radar system architecture is finally determined by system analyzing and simulation. By using this system architecture and the chosen parameters the radar system performance is optimized. This simulation system would be a foundation for effectively developing the FLGPSAR system. [C736]

"A Vertical Soft Handoff Scheme Based on SIP in the Ubiquitous Wireless Network"

Ubiquitous Wireless Network will be the important infrastructure for ubiquitous information service in the future. Ubiquitous Wireless Network is objectively heterogeneous network, so vertical handoff is one of crucial topics. A vertical soft handoff scheme is proposed based on SIP using Wireless Access Gateway (RGW). RGW triggers and controls the handoff session to ensure same two-way delay of handoff and rate of zero-loss packet for real-time streaming media. Using M/M/1 queue model, delay of the scheme meets requirement of real-time streaming media. [C737]

"Research on Wireless Storage System Key Technologies"

In the environment of wireless and pervasive computing, wireless storage can provide flexible data access function, data transfer, data collection, and information services, etc. The paper proposes the architecture of wireless storage system, discusses wireless storage system key technologies, and gives performance analysis of it. Later, the paper illustrates related question and some algorithms, and makes a conclusion at last. It is expected that the wireless storage system will be developed and applied more popularly with the cloud computing and cloud storage technology. [C738]

"Fast compressive sensing radar imaging based on smoothed l0 norm"

Compressive sensing technique has been shown capable of reducing the number of data samples beyond the Nyquist theorem, and achieving perfect reconstruction of the original signal. Because of its compressed sampling ability, compressive sensing has been found many applications in imaging, remote sensing conversion and many other fields. Although several kinds of radar imaging arithmetic were proposed, but the reconstructed speed arithmetic are slow. In this paper, we propose a faster compressive sensing radar imaging arithmetic based on smoothed l0norm. Simulation experiments conformed that the algorithm has faster reconstruct speed and well reconstruct quality compared with other algorithm. [C739]

"Imaging methods for detection of airfield runway disaster"

Ground penetrating radar (GPR) is often used in detecting void and cavities under the airfield runway. Delay and Sum (DAS) imaging method based on time-domain focusing of pulse-echo radar data is commonly applied in imaging technique. Image quality depends on echo amplitude and time delay of backscattered signal that picked up from elementary cell. In this paper, in order to improve the image quality, we decompose the target echoes by calculating the echo amplitude and time delay based on EM inversion theory and then image using DAS focusing method after disposing. The simulation results show that this method improve the image quality greatly. [C740]

"Maximum likelihood method for time-delay estimation of multiple echoes"

When the ground-penetrating radar (GPR) is used as a non-destructive testing method in the field of civil engineering, the thickness of the mediums can be deduced from radar profiles by echo detection, which provides the time-delay estimation (TDE) associated with each interface. In order to improve the performance of TDE, this paper proposes a new technique based on maximum likelihood principle for estimating the time delays. The proposed method takes into account the multiple echoes phenomena of the propagation of underground wave. [C741]

"Imaging model of forward-looking ground penetrating radar with split-aperture transmitting configuration"

In this paper, a novel antenna configuration for the forward-looking ground penetrating radar is studied. In the novel configuration, the two transmitting antennas are located at two ends of the receiving array, which is referred to as the split-aperture transmitting (SAT) configuration. Firstly, a modified back-projection (MBP) image formation is proposed according to the imaging geometry of the SAT configuration. And then the analytical azimuth resolution expression of the SAT configuration is derived. Based on the analytical form of the azimuth resolution, the relationship of target scattering information between received raw echo and focused imagery is obtained. The theoretic calculation and analysis in this paper are validated by the field data of the forward-looking ground penetrating radar with the SAT configuration developed by the National University of Defense Technology (NUDT). [C742]

"Investigation on spatial resolving capability of bistatic SAR"

Bistatic synthetic aperture radar (Bistatic SAR) have became the focus of increasing research activity these

years, but the resolution of bistatic SAR is quite complex than that of monostatic SAR. In this paper, a general approach to estimate bistatic SAR ground range resolution based on spatial gradient is developed. This approach has more adaptability and can be agilely applied to different bistatic SAR configuration. The characteristic of gradient is analyzed and ground range resolution based on the spatial gradient is deduced. Detailed simulations test the validity of this approach and range resolution distribution in ground plane of airborne bistatic SAR is analyzed. [C743]

"Research on Admission Control Mechanism in Heterogeneous Network Platform"

In the future, different types of networks will be integrated. The heterogeneous networks should support a broad range of multimedia services with guaranteed quality of service. In order to support the requirements, a new call admission control is needed to support the integrated architecture. In this paper, we focus on admission control in heterogeneous network platform. Because rejecting a handoff session would lead to the result much worse than rejecting a new session, service class differentiation is adopted to define the service priority according to service type and handoff type. A new admission algorithm is proposed on consideration of service utility functions to maximize the utility function and balance load of heterogeneous networks. Analysis results show that the admission control mechanism is effective to the extent. [C744]

"Design and Implementation of Web Services Oriented GPRS Remote Meter Reading Model"

Based on the research on a power company remote meter reading system and for the purpose of enhancing the management level of the meter reading of power companies, the Web services oriented GPRS remote meter reading model is suggested. By means of the Web services technology, the model is integrated with various related heterogeneous systems and application seamlessly; simultaneity through the JNLP (Java network launch protocol) specifications, the deployment and maintenance of the system can be simplified much; The real-time and reliable front-end based on the GSM/GPRS (global system for mobile communications/general packet radio service) network is implemented by Java multi-threading and and socket technology. As an example of reading "the present three-phase voltage and current" of one remote transformer meter, this paper will give the model design and key codes based on the latest Java Web services specifications JAX-WS (Java API for XML-based Web services) and the JNLP specification. The model designed meets the actual requirements well, and accords with the standards of State Grid Corporation. The model has a favorable application in the actual remote meter reading system of the power companies. [C745]

"Research and Design of Short Message Service System Based on ARM and GPRS"

In recent years, data service has been gaining popularity in embedded system and general packet radio service (GPRS). In this paper, we first analysis the embedded system theory, short message service (SMS), and combine with the latest computer technology, network technology, communication technology and GPRS technology, then propose an method to design the short message service system based on ARM and GPRS. We put forward the system principle block diagram and the hardware circuit of GPRS. At the same time, we give the software process flow and specific algorithm, namely, GPRS initialization module, port 1 receiving interruption module, GPRS communicate with S3C2410's port 1 module and sending message module. This proposed technique is well suited for various applications and has good prospects. [C746]

"Health risk assessment in occupational EMF exposure"

In our study we tried to evaluate the health estate of physiotherapists in relationship with occupational exposure. EMF measurements were made in workplaces, we applied special questionnaires, performed micronucleus test from lymfocytes, and urinary thioethers assay. The results were compared to those of a control group by statistical analytical methods like logistic regression. We found an overexposure of this profession to diathermy procedures and magnetodiaflux. Significant relationships were found for presented syndromes(astheno-vegetative, neurological, cardiovascular), biological parameters (micronucleus, urinary thioethers) and values of exposure to RF EMF, respectively ELF EMF, and RF+ELF. We conclude that physiotherapists are exposed to electromagnetic risk, that imposing adequate health monitoring and limiting exposure. [C747]

"Vertical handover based on IEEE802.21 and Mobile IPv6 in UMTS/WLAN networks"

The internetworking among heterogeneous networks is in demand to provide "always-on" connectivity services. A widespread vision of the fourth generation (4G) mobile networks includes coexistence of current wireless technologies such as WLAN, WiMAX, General Packet Radio Service (GPRS) and Universal Mobile Telecommunications System (UMTS). The major problem that faces next generation wireless networks (NGWN) is vertical handoff management. The existing handoff management protocols are not sufficient to guarantee handoff support that is transparent to the applications in NGWS. In this paper we propose an approach based on

IEEE 802.21 MIH and Mobile IPv6 to optimize vertical handover management for multi-interface MN. [C748]

"An Automated Passive Testing Approach for the IMS PoC Service"

Although the adoption of the IP Multimedia Subsystem (IMS) keeps growing, IMS applications are often integrated to the system without being formally tested. In this work, we are interested in the IMS Push over Cellular (PoC) service, an OMA standard. We propose a conformance passive testing approach to check that its implementation respects the main standard requirements. This approach is based on a set of formal invariants representing the most relevant expected properties to be tested. Two testing phases are applied: the verification of the invariants against the service specification and their testing on the PoC collected execution traces. [C749]

"A Holistic Approach to Mobile Service Provisioning"

Mobile service provisioning is concerned with enabling handheld devices, such as phones and PDAs, to host services. This naturally raises significant challenges that stem from mobile devices' inherent mobility and limited resources. Furthermore, mobile services tend to operate in dynamic, insecure and heterogeneous operating environments. The aim of our research is to develop a novel toolkit for constructing mobile services that addresses such challenges. In getting started, we have taken a middleware-based approach that mediates interaction between clients and mobile services. This work offers a foundation upon which we intend to build using techniques that fall within the domain of automated software engineering. [C750]

"Blind deconvolution via independent component analysis for thin-pavement thickness estimation using GPR"

Blind deconvolution of sparse spikes is a well-known problem in the fields of seismic exploration and ultrasonic nondestructive testing. In measuring thin layer thickness of asphalt pavements using GPR, a similar problem arises; the sparse reflectivity series representing the layered structure of the pavement convolved with the radar wavelet results in masking closely spaced reflections. A successful deconvolution retrieves the reflectivity series and thus improves the time resolution and facilitates quantitative data interpretation. In this paper, we cast the convolutional model as a multidimensional data model which renders blind deconvolution via independent component analysis (ICA) possible. We use a nonlinearity related to the double exponential density whose heavy-tailed nature provides further insight into the sparse nature of the reflectivity series. The method is tested on synthetic and real GPR data from a thin PVC slab. The results attest to the accuracy of the time delay estimates and verify the high resolution of the proposed approach. [C751]

"Low frequency radar targets 3-dimensional imaging using ramp response signatures"

Low frequency imaging in radar domain can have applications for stealthy or buried targets. We consider a technique using transient scattering response from a ramp waveform, which is proportional to the profile function of the target, i.e. its transverse cross-sectional area along the line-of-sight, and consequently, gives information about target size, orientation and geometrical shape. Usual 3-dimensional image generation from ramp responses uses approximate limiting surfaces and is limited to single convex objects. We propose here a new algorithm to reconstruct the global shape of any perfectly conducting target from its ramp response signatures. [C752]

"Fragment size detection within homogeneous material using Ground Penetrating Radar"

Ground Penetrating Radar (GPR) offers the ability to observe the internal structure of a pile of rocks. Large fragments within the pile may not be visible on the surface. Determining these large fragment sizes before collection can improve mine productivity. This research has examined the potential to identify objects where the background media and the object exhibit the same dielectric properties. Preliminary results are presented which show identification is possible using standard GPR equipment. [C753]

"Practical tables for the design of the grounding systems in distribution networks in presence of metallic interconnection"

The present paper deals with the dependence of the ground current, due to a single-line-to-ground fault in a secondary substation, on the electrical and geometrical parameters of a Medium Voltage distribution network in which a metallic interconnection between the grounding systems is realized. Examining different situations, some easy-to-use tables are provided for a practical approach to the design of the ground electrodes of the secondary substations in these networks. The relevance of the work is due to the lack in the international standards of specific indications on how to consider the presence of the interconnection elements in distribution networks. [C754]

"Research on SCADA system for urban pipeline network based on wireless sensor network"

Summary form only given. In order to measure urban pipeline network signal and transmit the data to the data center in real time, the construction method about Supervisory Control and Data Acquisition (SCADA) system for urban pipeline network is presented based on GPRS and wireless sensor network through researching the characteristics of wireless sensor network as well as Zigbee technology. The system consists of wireless sensor network, GPRS network and monitoring center, the core of sensor node is integrated chip CC2430 called RF-SOC, which achieved the single-chip solution to field data collection and wireless transmission. The network coordinator node consisting of AVR microcontroller, RF chips and GPRS communication module plays the role of the gateway in the system. Some approaches for ensuring the reliability of data communication are discussed and system performance is validated through experiments. Experiment results show that the SCADA system based on GPRS and wireless sensor network improves the real-time property, reliability and integrity of pipeline network data with increasing the sensor node density in the monitored region. [C755]

"Ethernet frame tunneling over GPRS/EDGE for universal network monitoring"

Many equipment manufactures introduce proprietary protocols in network monitoring and equipment configuration to maintain market monopoly. This paper presenting a low cost solution to access, monitor and configure such equipments irrespective of its communication method. The solution consists of especially designed hardware modules which are collocated and connected with the equipments (need to monitor remotely) distributed over large geographical area. The system is designed such that multiple peer to peer connections can be setup with remotely held equipments to ensure the physical connectivity. Due to its' peer to peer and low level nature, system supports proprietary or standard network monitoring despite the differences of the equipment or the network monitoring software implementation. Furthermore, this paper discuss the solution facilitated the transportation of analogue and digital alarms from remote sites to a central network monitoring node which often equipment operators need separate transport system. [C756]

"Experimental finding in implementing "CommRobot"-Comparing IMS and proprietary solution"

In this paper we present the experimental findings in comparing standard IMS with proprietary non-IMS solution from the aspects of session control mechanisms and service management capabilities support in the context of providing automated converged services. The methodology used in the experimental study is via developing an automated converged communication service called CommRobot (Communication Robot) as the use case for comparison. The CommRobot use case is aimed to demonstrate the capability of enhancing user flexibility in choosing how and when services to be delivered regardless of access methods i.e. interfaces, devices or networks. Together with the comparison, we also present the experimented CommRobot test-bed, discussion of our findings and the challenges we identified in implementing the use case service using both standard IMS and non-IMS proprietary solutions. [C757]

"Downlink Traffic Modeling and Analysis for Push to Talk over Cellular"

This paper presents the downlink traffic pattern and analytical evaluation for Push-to-Talk over Cellular (PoC), which is a half duplex voice over IP (VoIP) service using IP capable Network. The behavior of user to form group and the nature of conversation within the group members are modeled and analyzed by simulation. Group session generation procedure is modeled by Binomial model while the floor control traffic is modeled as Poisson model and voice traffic has an ON-OFF traffic model. The Session Initiation Protocol (SIP) signaling is considered without using any compression algorithm and the GPRS and PoC voice traffic are considered at the packet level. Both PoC signaling and voice traffic share the GSM traffic channel with the GPRS traffic following FCFS queuing model and Fair Share Round Robin scheduling algorithm. The effect on PoC signaling traffic due to different group formation mode, user answering mode and session mode and effect of group size on PoC voice traffic are investigated and analyzed in this paper. We have developed an event driven simulator using Java programming language to simulate PoC traffic. [C758]

"WinCon-8000 Smart PAC Used in Survey the Tide Height of Coast"

Combine with the item of survey the tide height of coast in Tianjin. Detailedly introduce the structure and peculiarity of WINCON-8000 control unit and how to use the isagraf language to program it. The control unit connects various sensors to measure the wind speed, wind direction and the tide height and also sends the real time data to the control center via the GPRS. The raw data should to be analyzed and progressed at the center and then be issued on the website. [C759]

"Mobile Spatial Information Location Algorithm"

In view of the multidimensional and enormous for spatial data, this paper provided a new based on the mobile oriented spatial information location algorithm. The algorithm used quadtree theory has nothing to do with a specific space to operate object excluded, so that the spatial location of the operation be able to fast access to the operation object, improve the spatial location operational efficiency. Finally, application examples were given out to prove this design model's feasibility, and the contrast between the existing Web location algorithm and based the Quadtree theory location algorithm also validated that the latter was more efficient and faster for spatial location. [C760]

"The Research of Mobile Communication and Internet Interface Technology Based on WAP"

Mobile communication and Internet are the backbone of present information industry. With the implementation of 3G, both integrated has become the direction in the future. This paper aims at the technology between Mobile Communication Network and Internet interface technology, focuses on the analyze and design of the interface based on WAP, as well as gives an example to justify the effectiveness. [C761]

"GPRS Based Guard Robot Alarm System Design"

This paper presents a practical approach to design guard robot alarm system using GPRS technology. GPRS offers an interesting communications infrastructure for remotely accessing, controlling and interacting with robots in an integrated and highly portable manner, particularly in recent years the GPRS network provides wireless access of internet for mobile phone which becomes the most important and common terminal equipment. Therefore, in this paper the alarm information is designed to send to the user's mobile phone, and add man-made intervention to the system, thus achieves a more convenient and reliable alarm system. The system mainly consists of two parts: detection of abnormal and dangerous situation in domestic environment and sending the alarm information as MMS form to the user's phone via GPRS networks. Finally experiments show that the alarm system can accurately send alarm information to the user's mobile phone. The system is low-cost, flexible, reliable, and can be widely used. [C762]

"Adaptive Heartbeat Mechanism for Meteorology Operation Command System Based on GPRS"

An adaptive heartbeat mechanism has been designed. Hosts on both sides can detect the states of connection established on General Packet Radio Service (GPRS) by exchange heartbeat packets. This mechanism can adapt to the network latency by detect the Round Trip Time (RTT) of transmission, reduce data flow by adjust sending interval and resume the connection automatically when network is at disconnection. This mechanism was integrated into a meteorology operation command system. Testing result performed on many types of mobile-phone indicate that this mechanism is cost-saving and improves the reaction speed for disconnection detection. [C763]

"A distributed algorithm for instantaneous allocation of discrete resources in heterogeneous networks"

The objective of this paper is two fold: proposes a distributed resource optimization framework in the context of heterogeneous systems and optimizes allocation of discrete resources and bit rates to users within each system (network). In fact, most of existing wireless techniques use Adaptive Modulation and Coding technique where a finite set of Modulation and Coding schemes is available in the system. The bit rates to attribute to users are then selected among a finite set of available discrete rates. More specifically, the objective in this paper is to minimize to overall transmit power of the whole system while ensuring to each user a minimum data rate and fulfilling a maximum power constraint within each system. The use of centralized optimization frameworks to handle Radio Resource Management (RRM) problem in heterogeneous systems requires huge signaling overhead. In order to obtain distributed resource allocation, we approach the problem by using a convex optimization framework and thus split it into different subproblems each one performed by a given agent of the network(base station or user). We propose then a distributed algorithm based on successive iterations (negotiations) between the base stations and users. In each iteration, each network node (user or base station) has to handle a discrete optimization problem using an efficient (low complexity) algorithm described in the paper. By using in each iteration an appropriate update method, based on the subgradient of the dual Lagrangian objective function, our approach converges to the optimal solution with zero duality gap and after a finite number of iterations. Simulation results show good performance of the proposed algorithm and the convergence to the global optimal solution. [C764]

"Mobile IP handoff based link layer information"

Network layer indications are not readily available upon a link change; therefore, general dependence on the network layer may introduce unnecessary delays due to network layer signaling for a simple link layer handoff. If information could be gathered at link layer to determine the need for network layer signaling, then both the delay and signaling load could be really improved over current standards. In this paper we introduce the use of link layer information which will be the main function of the Mobile IP handoff decision to reduce packet loss and handoff latency during the handoff. [C765]

"Analyzing signal strength versus quality levels in cellular systems: A case study in GSM"

The authors propose a new tool to analyze the performance of a cellular base station. The analysis is based on the joint processing of the received power and quality measurements, both in the uplink (UL) and the downlink (DL). These measurements are originally designed for power control and handover purposes. The main objective of the paper is to fully describe and, therefore, to detect situations involving abnormal interference levels in UL and DL. These situations can be a consequence of a malfunctioning of the power control algorithm, a bad radio optimization and planning or the presence of an outer interference, among others. The novel tool proposed is valid for any cellular system, in this paper we focus on its application to GSM/GPRS system to illustrate its benefits. We include some experiments where real cell data recordings were analyzed. [C766]

"Wireless Channel Allocation Based on Double Auction"

In this paper, we propose a model of wireless channel allocation scheme based on double auction, this scheme has the following properties: The available and the demand of the wireless channel is balance in the auction; The wireless users' dominant strategy is to provide their true value; The wireless service providers' dominant strategy is to provide their true value. [C767]

"Customization of Natural Language Interfaces to Databases: Beyond Domain Portability"

The first Natural Language Interfaces to Databases were built and designed for specific domains, and their customization processes implied source code manipulation. Open systems and database inter-operability enabled these interfaces to be independent of the operating system and database management system, and the separation of the knowledge base from the translation process allowed for domain portability. Although commercial interfaces incorporate semi-automatic configuration wizards that help configure the interface without knowledge of its inner workings or its source code, it is still difficult to customize these interfaces for a given database, due to confusion on the information that is necessary to provide to the knowledge base of the interface in order to make it able to answer some query category. For solving this problem, we propose an ontology whose design is simple and flexible enough to assist the customizer's work. This paper describes the design of the ontology, as well as an empirical evaluation of this approach versus the customization process of a commercial interface. The evaluation was useful to detect problems with different types of queries used to retrieve information from a specific database. In spite of the difficulties found to make the evaluations and some unquestionable advantages offered by commercial interfaces. [C768]

"Distributed RF tomography for tunnel detection: Suitable inversion schemes"

Distributed Radio Frequency (RF) Tomography is a novel approach for detecting underground tunnels and caves, over relatively wide areas. This method requires a set of affordable transmitters and receivers randomly deployed above the ground. Using the principles of inverse scattering, it is possible to develop a simplified theory for imaging below ground, thus revealing and locating voids. In this paper, we introduce inversion schemes suited for ground penetrating radar tomography applied to sensors that are randomly distributed over the area of interest. [C769]

"2−1/2 Dimensional bi-static GPR propagation and scattering modeling of roadways and tunnels with projected 2D FDTD"

Subsurface sensing modalities such as Ground Penetrating Radar (GPR) are increasingly being used to assess the condition of aging civil infrastructure by evaluating deterioration within roadways and bridges, and to monitor the security of national borders by the detection of underground tunnels. The need to address these issues is intensifying and, while valuable data are collected using nondestructive evaluation there is urgency for improved understanding and analysis. Simulation of GPR investigations to search for defects in bridges and the presence of underground tunnels can help to understand and analyze real world data. Three-dimensional simulations consider the full geometry of an area. When the geometry is relatively invariant in the third dimension, 2-1/2D simulations can capture most of the 3D scattering and account for bi-static transmitters and receivers located out of the cross-sectional plane. Additionally, comparison of 3D simulation results to a library of 2D results may help to indicate the angle of GPR travel from the cross-sectional plane. [C770]

"High range resolution directional borehole radar for 3-D fracture delineation"

Directional borehole radar was developed for detection of three-dimensional (3-D) target localization in single-hole radar measurement. Phase differences among four dipole elements of receiving circular array uniquely determine an azimuth direction of a reflected wave. Receiving voltages of dipole elements are measured by optical electric field sensors whose high electrical isolation feature enables data acquisition of highly correlated signal between the channels. Besides, a switching unit to control resonant frequency of dipole elements was newly developed to reduce mutual coupling between the dipole elements. Laboratory experiments have demonstrated that approximately 30% frequency bandwidth enlargement is achieved by the switching operation without been affected by the mutual coupling in air. The directional borehole radar system was tested in a field test site in Kamaishi-Mine in Japan. All the boreholes available in this test site is filled with water and past borehole radar surveys conducted in this test site revealed presence of complex fracture system. Cross-hole and single-hole borehole radar measurement were conducted to clarify the performance of the resonant switching control and also to detect 3-D geometrical structure of fractures in this test site. 3-D analysis of data acquired by the directional borehole radar in a single-hole measurement clarified azimuth orientation fractures up to a range distance of 15 m with a range resolution less than 1 m. High reliability of the result was inferred from the fact that individual fracture pattern in a reflection profile showed a consistent color along the depth and also high repeatability of the result was obtained by repeating measurements. [C771]

"3D SAR focusing for subsurface point targets"

In this work we develop a methodology for imaging subsurface point targets using a single-pass strip-map synthetic aperture radar (SAR). The point targets are embedded in an arbitrary homogeneous half space, and are located at arbitrary depths. It is assumed that the radar frequency is low enough and system sensitivity high enough to allow the required two-way penetration depth to target. The succession of steps required to form the image of the subsurface point targets are described, including the estimation of the subsurface wave velocity, estimation of the depth of the point target, and the modified range and azimuth filters to achieve optimum resolution. The theoretical approach is described and results are presented for a range of point target depths, subsurface velocities, and radar system parameters. It is found that with the assumptions made it is possible to image the point targets in 3D with good range, azimuth, and depth accuracy. [C772]

"Modeling and validation of GPR wave scattering with the Semi-Analytic Mode Matching algorithm: Choosing optimal coordinate scattering centers"

Choosing the coordinate scattering centers (CSCs) for the Semi-Analytic Mode Matching (SAMM) algorithm is a critical and heretofore unexplored aspect of this method, necessary for the ultimate goal of simulating full 3D scattering. Establishing the locations at which modes originate is essential for accurate modeling of electromagnetic fields with SAMM. Six test scattering objects are investigated, and the CSCs are found for each by considering the radii of curvature at each Г‚ВїfittingГ‚Вї point on the objects' perimeters. Additional CSCs are needed for scattering objects which have long Г‚ВїflatГ‚Вї regions. Excellent results are found comparing SAMM and Finite Difference Frequency Domain (FDFD) for 2D scattering objects several wavelengths in size. [C773]

"A neural network electromagnetic approach for GPR pavement diagnostic: A preliminary study"

In this paper, a preliminary study, based on GPR data analysis by means of artificial neural networks, for automatic pavement diagnostic is addressed. The proposed solving solution models the pavement as a multi-layered medium composed of N parallel homogenous layers, which are separately analyzed through a recursive procedure able to reconstruct their permittivity and thickness. The basic processing module of the whole procedure, is here presented. [C774]

"Integrated full-waveform analysis of ground penetrating radar and electromagnetic induction data for non-invasive reconstruction of multilayered media"

We present a new integrated method for full-waveform modeling of zero-offset, off-ground ground penetrating radar (GPR) and electromagnetic induction (EMI) in multilayered media. For both GPR and EMI systems, a vector network analyser (VNA) is used as transmitter and receiver. The antennas and their interactions with the investigated medium are modeled in the frequency domain by means of a linear system of complex transfer functions. The air-subsurface is represented by a 3-D multilayered medium, for which Maxwell's equations are exactly solved. These approaches have been validated in laboratory conditions, demonstrating the high accuracy of the GPR and EMI models. The results show great promise for non-invasive reconstruction of multilayered media using GPR and EMI. [C775]

"A novel speech-like symbol design for data transmission through GSM voice channel"

This paper introduces a new approach to design speech-like (SL) symbols in order to transmit digital data through global system for mobile communications (GSM) voice channel. Using these symbols leads to design a GSM voice channel data modem to modulate and demodulate data on enhanced full rate voice codec. Designing a set of time-symbols is an offline procedure with the aim of minimizing symbol detection error. This modem could be useful in the situations where real-time data communication with high priority is needed. Data is encoded into SL symbols to be transmitted through GSM voice channel. At the receiver side, the received SL symbols are decoded back to data. We present a full procedure of symbols design and implement it in a real system. We achieved a bit rate of 2 kbps with 1.5 ГґВ— 10-5symbol error rate (SER) using the proposed method. [C776]

"A machine learning algorithm for GPR sub-surface prospection"

The paper presents a novel approach for the (semi-) automatic extraction of sub-surface layers' properties from GPR data. The methodology solves the inverse scattering problem by means of artificial neural networks which are able to map proper features derived from the electromagnetic signal onto the dielectric permittivity and thickness of the layer which has backscattered the radiation. The whole procedure is first described and then tested over a set of simulated scenarios and their corresponding GPR traces, showing high reconstruction accuracies and denoting the opportunity of a wide range of applicability. [C777]

"Precise optical scanning for multiuse"

Many approaches for remote measurement techniques for object surfaces and approaches for 3D object recognition have been proposed; but often they still require complex and expensive equipment. Not least due to the rapidly increasing number of efficient 3d hard- and software system components, alternative low cost solutions are in great demand. We propose such a low-cost system for 3d data acquisition and fast surface registration by digitized points Cartesian coordinates matrix keeping. There are presented experimental research and computer simulation of various natural factors which can affects the normal functioning of the passive optical scanning aperture under proposition. [C778]

"Water conditions monitoring system based on GPRS"

This paper presents a method to transmit data through public web. It is characterized by less investment, operation reliability and low operating cost. It also elaborates the automatic monitoring system of small drainage basin water conditions based on GPRS. That system has been applied to reservoir region of some hydroelectric power station in North China and achieved the real-time and automatic monitoring of water conditions. [C779]

"Business Models and Application of M-Commerce"

21st century is a digitization, networking and information-based era. In particular the arrival of 3G, mobile phones that have had the function of network access, so that people can access information anytime, anywhere, to communicate and carry out various activities. Thus, e-commerce expanses to a new business model that is mobile e-commerce. Mobile e-commerce is a trend, getting rapid development and a wide range of applications because of its flexible, simple, convenient, as well as the advantages of anytime and anywhere. This paper mainly introduces the application and market status of mobile e-commerce. [C780]

"Numerical modeling of a spiral-antenna GPR system"

To better study the ground penetrating radar (GPR) problem, an important step is to develop an accurate simulation of the fields induced by the radiating antennas. In this work, a finite-difference time-domain (FDTD) model of a spiral-antenna GPR system was developed and verified against measurements of a prototype system. The paper discusses difficulties in modeling the antenna elements and presents evidence that the model properly predicts the response of the antennas to scatterers in the presence of the ground. [C781]

"Remote pulse wave monitoring system"

In this paper we present a novel remote pulse wave monitoring system with hybrid infrastructure network which is based on ZigBee protocol and LAN (local area network) technique. The advantage of this type of network infrastructure is that it can fully make use of the low power consumption of ZigBee protocol in sensor network and the long-distance transmission of LAN technique. Hence, it is a good scheme to be realized in the remote health monitoring. We have designed and fabricated the ZigBee wireless pulse wave detection node that can require the pulse wave data with low power consumption. Several important techniques, such as the ZigBee-

LAN exchanging method, the multiresolution analysis for de-noising and removing baseline drift of pulse wave and the calculating method of oxygen saturation and heart rate will be discussed in this paper. [C782]

"Distributed or Centralized Mobility?"

Expecting a significant increase in number of mobile terminals to be managed together with a mobile data traffic boom in future heterogeneous networks, current centralized mobility management schemes may encounter scalability issues due to the creation of network bottlenecks and single point of failures. Recently, alternative approaches have been proposed to better distribute mobility management entities not only in the control plane but also in the data one like the "Dynamic Mobility Anchoring" scheme we designed. In this article we compare centralized and distributed approaches and describe our simulation environment using TCP in both schemes. The obtained results validate the adequacy and design of "Dynamic Mobility Anchoring". They confirm that we may expect interesting benefits in terms of handover latency and global scalability when moving towards such a distributed mobility management in future networks. [C783]

"Performance Modeling for Heterogeneous Wireless Networks with Multiservice Overflow Traffic"

Performance modeling is important for the purpose of developing efficient dimensioning tools for large complicated networks. But it is difficult to achieve in heterogeneous wireless networks, where different networks have different statistical characteristics in service and traffic models. Multiservice loss analysis based on multi-dimensional Markov chain becomes intractable in these networks due to intensive computations required. This paper focuses on performance modeling for heterogeneous wireless networks based on a hierarchical overlay infrastructure. A method based on decomposition of the correlated traffic is used to achieve an approximate performance modeling for multiservice in hierarchical heterogeneous wireless networks with overflow traffic. The accuracy of the approximate performance obtained by our proposed modeling is verified by simulations. [C784]

"Detection and radiation area estimation of anomalous environmental electromagnetic wave related to earthquake precursor"

Anomalous radiation of environmental electromagnetic (EM) wave is reported as a portent of earthquake. We are observing environmental electromagnetic waves in ELF band all over Japan. Our goal is to predict earthquakes by detecting anomalous EM radiation. We have proposed various detection methods of anomalous radiation. However, the earthquake prediction requires the estimate of EM radiation area in addition to the detection of anomalous radiation. If the EM radiation area can be estimated, we can obtain information about the occurrence area of possible future earthquake. In this paper, we propose the method of detection and area estimation in the anomalous EM radiation by using cross-correlation in magnetic field azimuth. We apply the proposed method to the observed signals before the large earthquake that occurred in the past, and we detect an anomalous radiation and estimated the EM radiation area. [C785]

"A pattern recognition system for extracting buried object characteristics in GPR images"

In this work, we present a pattern recognition system for the automatic analysis of ground penetrating radar (GPR) images. This system comprises pre-processing, segmentation, object detection, object material recognition, and object dimension estimation stages. Object detection is done using an unsupervised strategy based on genetic algorithms (GA) which allows to localize linear/hyperbolic patterns in GPR images. Object material recognition is approached as a classification issue, which is solved by means of a support vector machine (SVM) classifier. Dimension estimation is formulated within a Gaussian process (GP) regression approach. Results on synthetic images, representing random exploration scenarios, are reported and discussed. [C786]

"Combined metal detector and ground-penetrating radar sensor experiments in a variety of soil conditions"

Landmine detection is a hazardous operation. To reduce the human casualties during landmine detection, unmanned ground vehicles (UGV) can be used. There are many landmine detection modalities that can be used with a UGV. However, the ground-penetrating radar (GPR) and the metal detector (MD; electromagnetic induction sensor) are fast and may be the most reliable means of landmine detection. In addition, GPR and MD sensors can easily be packaged in one sensor head. It is also easy to configure the sensor heads in an array. To combine GPR and MD sensor data, a series of experiments has been performed. The GPR and MD combined sensor is scanned over a 2 m ГґВ— 2 m ГґВ— 1 m soil box at a constant height. The soil box contains stony sand and a landmine, which is buried at 200 mm depth when measured from the surface of the ground to the top of the landmine. The control parameters for the experiments are sensor height and soil

moisture. The sensor height is varied from 40 mm to 100 mm with 20 mm increment from the soil. The soil moisture conditions considered in the experiments are dry and wet. The stony sand used in the experiments contains rocks with approximately 100 mm diameter scattered in a random manner and a brick placed 200 mm apart horizontally from the landmine. The GPR and MD responses are recorded for all control parameter combinations and later analyzed. The GPR images are generated using time-domain back projection (TDBP) algorithm. The GPR images and MD responses are compared for the soil conditions and sensor heights. A combination algorithm, which enhances GPR images using MD responses, is also presented. [C787]

"Subsurface microwave remote sensing and scattering modelling on hyper-saline soil: Example of Lop Nur"

Subsurface microwave remote sensing is a direction of Synthetic Aperture Radar (SAR) research. With the penetration capability, SAR is capable of detecting the subsurface targets and materials, especially in arid environment. Lop Nur Lake is located at the east of Tarim Basin in Xinjiang province of China, which is described as Г‚Вїdry coreГ‚Вї of the world, and it can provide conditions for SAR penetration. This paper presents preliminary analysis about Lop Nur, and gives out an abstract subsurface structure about it. Then, the major scattering processes are concluded and a two-layer scattering model is developed. Based on parameters of soil samples, some rules about Lop Nur evolution will be figured out. With Genetic Algorithm (GA), an inversion procedure is constructed. All the attempts are viewed as the basis of future comprehensive interpretation about Lop Nur phenomenon. [C788]

"Rough thin pavement thickness estimation by GPR"

In civil engineering, usually the methods used to estimate the thickness of thin pavements consider flat interfaces for simplification. In this paper, the roughness of the surfaces is taken into account. First, the amplitudes of the first two echoes from the rough thin pavement are calculated from a rigorous electromagnetic method, the PILE method. A comparison is then made with the flat interface case, and their differences in the electromagnetic backscattering are highlighted. Eventually, the influence of the pavement roughness on the pavement thickness estimation is investigated by using the Maximum Likelihood Method. [C789]

"Design and Implementation of Portable Multi-Parameter Tele-Monitor Terminal Based on S3C2410a"

This paper introduces an implementation of portable multi-parameter tele-monitor terminal(PMTT). This terminal is reliable, portable, real-time and high cost-effective, which can tele-monitor many kinds of vital bio-signals and GPS signal through GPRS, such as electrocardiogram(ECG), blood pressure, oxygen saturation, blood glucose, body temperature, respiration and so on. The Samsung's S3C2410a is the core of the mutiparameter tele-monitor terminal's hardware platform. muC/OS-II is cut down, customized and ported into the embedded system, for which the monitor software based on muC/GUI is also developed. [C790]

"Design and Implementation of GPS/DR/GPRS Integrated Position and Monitoring System for Vehicle"

The paper designs and implements positioning monitoring system for vehicle based on GPS/DR (Global Positioning System/dead reckoning) technology. It solves the deficiency that vehicle can not locate and monitor when GPS signal loses, and improves positioning accuracy. The system uses S3C2410A microprocessor as the core of the entire system modules. The designation of the whole system, hardware and software is given in this paper, and gives the way to solve time synchronization, alignment of the initial azimuth, calibration of installation error angle when the GPS/DR data fuses. [C791]

"Experimental evaluation on UWB aggregation and coexistence"

A measurement campaign has been carried out in Japan to evaluate UWB technology for both aggregation characteristics and coexistence performance. Different from other previous studies, our evaluation is based on measurements with real devices. We examined both UWB low band and UWB high band, the latter has rarely been investigated by others. UWB aggregation results with real measurements are also rare. Both OFDM type and impulse type UWB were used in the measurements. Coexistence evaluations with several existing wireless systems were conducted. Main results of the measurements and evaluations are presented. [C792]

"Boundary Element Modeling of the human body when exposed to overhead power lines: Influence on conductivity variations"

The paper deals with the human exposure assessment to extremely low frequency (ELF) electric field due to overhead power lines. The formulation is based on a realistic human body representation taking into account different conductivities for various tissues inside the body. In particular, the influence on conductivity variation to the induced current densities and electric fields is investigated. The solution is carried out via the boundary element method (BEM). Some illustrative numerical results are presented. [C793]

"Application of superconductor in ELF communication"

ELF communication is linked up with superconductor technological in this paper. The advantage of receiving superconductor antenna, which is applied to replace the existing submarine communication antenna, as well as current technology difficulties are together introduced in particular. It is also pointed out in the paper that, along with the development in superconductor sector, the application area of superconductor antenna is promising. [C794]

"Performance Evaluation of IMS-Based Push-to-Talk Service over Multiple Wireless Access Networks"

This paper evaluates the performance of IMS-Based PoC service over three typical wireless access environment, such as GPRS, UMTS/WCDMA and WLAN/802.11. The contributions of this paper are: developing a NS2-based simulation platform with multiple wireless access environments which can be taken as a general platform for study; proposing a series-connected M/M/l queuing model to simulate the call processing delay of IMS entities; simulating and analyzing the call establishment delay of PoC sessions over GPRS, UMTS/WCDMA and WLAN. The simulation results can conduct the deployment of the real PoC system and evaluate the feasibility of performance optimization schemes for both network and services. [C795]

"Monitoring Architecture for UMTS Networks"

Monitoring of a suspects' personal communications can be a very effective evidence collection mechanism in criminal investigations. Existing packet sniffer and protocol analyzer applications have limitations in their usefulness with the rapid development of wireless networks. This research outlines a monitoring architecture, which is suitable for the UMTS networks. It works on Gn interface, FPGA is used for packet sniffer and generator, following with packet parser. Experiments show the effectiveness of this architecture. [C796]

"An Adaptive Resource Allocation Scheme for GPRS/EDGE Towards 3G"

An adaptive radio resource allocation strategy for GPRS/EDGE system is proposed in this paper, which is the optimal smooth transition solution from 2G towards 3G. The proposed long-term allocation mechanism and short-term channel sharing mechanism can improve resource utilization by configuring channels effectively for both voice and data traffic. In addition a statistical model is introduced to estimate voice traffic, which is one of the features of the long-term allocation mechanism. The simulation results fully indicate that the proposed schemes can efficiently increase not only the traffic throughput but also the resource utilization. [C797]

"The Design of the Remote Water Quality Monitoring System Based on WSN"

To resolve the problem of the manual analytical method adopted in water quality detection with bad real-time character, this paper introduces a novel kind of remote water quality measuring and monitoring system based on WSN. It has used wireless sensor network based on the ZigBee to realize the water quality parameter remote probing and the real-time monitoring function. Users can observe the current or historical water quality status easily, and it provide a reasonable basis for the further breeding plan. This system has a simple architecture, and isn't confined by the geographical position. According to the test results, this system can run stably. And its operation is convenient. [C798]

"Dynamic Information Management System of Mining Production in an Open Pit Based on GIS/GPS/GPRS/RFID"

Using GIS (Geographic Information System), GPS (Global Positioning System), GPRS (General Packet Radio Service) and RFID (Radio Frequency Identification), a dynamic information management system of digital mining in an open pit has been designed and developed. A linear programming model is set up in a practical application. By the model, the system can automatically draw up production plan of ore blending well every day. The system can monitor and dispatch open-pit trucks and shovels well, and can play back their historical paths. It can monitor and control the process of mining production in real time. By RFID, The system can also count the number of trucks' delivery and shovels' loading automatically. Experiments on real scenes show that the performance of this system is stable and can satisfy production standards of ore blending in open pits. [C799]

"Different effects of the extremely low frequency magnetic fields on neurons action potential and synaptic habituation"

Influence of the EMF MF on the single Action potentials parameters and neuron synaptic habituation was investigated. It is shown, that AP parameters exert reduction after applying of the ELF EMF. Neuron synaptic excitability is increased due to applying ELF EMF. [C800]

"Mobile Service Provisioning Middleware for Multihomed Devices"

Recent years have witnessed growing interest in using mobile devices to host services. The move from service consumer to service provider has been enabled by advances in mobile device hardware. Many contemporary devices also come equipped with multihoming, which allows a device to connect to heterogeneous networks, such as GPRS, WiFi and Bluetooth. To help leverage these new capabilities, we have developed middleware infrastructure that allows clients to consume services hosted on mobile devices. In this paper, we describe key functions of the middleware, namely ensuring reachability of roaming services and managing device connectivity in the presence of multihoming. Novel contributions of our work include session-preserving connectivity, proactive and reactive switching between network interfaces, and independence of network technologies and communication protocols. Proactive switching allows a device to initiate a switch from one network interface to another. Reactive switching responds to the loss of connectivity on one interface by changing to another. In both cases the logical connection, including any state, is preserved. Furthermore, logical connectivity is preserved when switching between heterogeneous networks and protocols. Our current implementation includes support for Bluetooth and HTTP/WiFi connectivity. Preliminary performance evaluation reveals that the middleware imposes little and acceptable overhead at run-time. [C801]

"Charging problems in mobile networks"

This paper presents the solution which is open and flexible, empowering service providers to customize and create new and innovative value-added services (VAS). The problems and lacks of rating process of current model are analyzed and the problem-solving ways are discussed. [C802]

"Use of RFID Technologies to Combat Cattle Rustling in the East Africa"

A solution that could contain cattle rustling activities among the cross border communities between Kenya and adjoining areas of Uganda, Sudan, Ethiopia and Somalia is proposed. The region is characterized by nomadic movements of people with their livestock on vast and hostile terrains with inadequate physical and communication infrastructure. The vice has caused havoc to many inhabitants of the region and has been the main source of conflict and instability. No adequate mechanism is in place to aid in identification and recovery of stolen animals which is necessary in addressing these challenges. This paper discusses how RFID technology can be designed and used to address these challenges. The design provides for tagging, identification and information management system supported by a centralized database system. The system allows for querying of livestock details remotely for one or more animals; using Internet, Short Messaging (SMS) or GPRS technology. The design of an appropriate supportive animal records management framework is also provided. Upon implementation, the proposed solution will aid governments in the region to stem a vice that has consumed considerable resources and has seemingly appeared insurmountable. [C803]

"Research on Reliable Transport Technology of Tubular Distribution Mobile Wireless Sensor Network"

This paper presents a reliable transport technology of tubular distribution Mobile Wireless Sensor Network (MWSN). The combination of GPRS and distance measurement location algorithm is presented to precisely locate sensor nodes. Connection handoff is put forward to support the reliable transport technology. Cluster node selection algorithm and connection handoff node selection algorithm are proposed to dynamically arrange the nodes in MWSN. The method is transparent to the sensor node so can be used to many fields. [C804]

"Integrated Application of WBAN and WSN"

With the keep growing of the ratio of people over 65, the health care system for elder people is facing challenges. WBAN, being the newest technology, will play an important role in elder people health care system. In this paper, we discussed integrated application of WBAN and WSN in nursing home's health care system, proposed a gradient routing protocol for WSN to satisfy the needs of WBAN data transfer in a limit area, and gave out its principle and implementation. The locating algorithm for moving people in the yard was also discussed in detail, and different algorithms were given out to adopt different situations. [C805]

"Effects of frequency-dependent attenuation on time delay estimation techniques applied to ground penetrating radar data"

In this paper, the effects of frequency-dependent attenuation on the performance of some time delay estimation techniques applied to ground penetrating radar (GPR) data are investigated. Being based on a complex power law of frequency for dielectric permittivity, the adopted signal model deviates from the damped exponential model and it is this mismatch that is likely to deteriorate the performance of the employed techniques. At first, we carry out a sensitivity study by determining the variations of the relative root mean square error of the time delay estimates as a function of the SNR and the quality factor Q for three algorithms, namely, root-MUSIC, ESPRIT and the matrix pencil method (MPM). These variations reveal a systematic error which is quantified by means of a first-order approximation and is found to be the ratio of the phase delay to the group delay. Then, this error is used to compensate for the bias introduced by the model mismatch with the aim of improving the estimates. [C806]

"ORFEUS project: the surface GPR system"

A surface based GPR system for locating buried pipes and cables suitable for deployment in urban areas is under development within the ORFEUS (Optimized Radar for Finding Every Utility in the Street) project. Innovative technical solutions allow significant inherent limitations of conventional radar systems to be overcome. [C807]

"Multi-channel landmine detection radar signal processing using blind deconvolution"

Landmine detection using multichannel radar poses many signal processing challenges, but the main issue lies with the variability of the propagation characteristics of the soil. These affect the spatial signature of the mine and require adaptive signal processing algorithms to optimise the performance. Investigation of various spatial deconvolution techniques has shown that blind deconvolution offers best image reconstruction compared with Wiener, Lucy and regular deconvolution. This paper describes the application of these processing techniques to multi-channel radar data. [C808]

"Design of the real-time data acquisition and transmission system for the Qinghai-Tibet Railway particular detection ground penetrating radar"

This project develops a set of ground penetrating radar system special for the Qinghai-Tibet Railway detection, in order to rapidly detect the freeze-thawing damage and so on to the Qinghai-Tibet Railway subgrade. The parallel analog-to-digital converter AD7634 with high speed and high precision is adopted in this paper, which combines the FPGA technology and the USB bus to realize the rapid and real-time transmission of the Radar echo data, and the high-performance floating point signal processor is also adopted for the Radar echo data of real-time procession. Real-time data acquisition, procession and transmission system with three channels is adopted in the ground radar, which has achieved well application result on the Qinghai-Tibet Railway, and reached the required detecting velocity of this project. [C809]

"The application of modern technology in Power Quality Management"

Little business integration of power quality management (PQM) is forthcoming amongst electrical utilities all over Southern Africa. Restricted access to proper information is the main reason. A integration of tools, procedures and people is required before an electrical utility can be operational in management of the quality of electrical energy. The South African NRS 048 document describes the minimum standards on PQ at a point of delivery and compliancy is reported through a standardised assessment report. Empowering people with appropriate tools and procedures in Power Quality Management by the creative application of modern technology is presented in this paper. A Web-based PQ Management system was developed that continuously disseminate PQ information extracted from data recorded at more than 300 sites distributed all over an electrical network in near real time. [C810]

"Experimental 3D imaging of metallic small spheres by a linear distributional approach"

The problem of determining the number and the locations of "small" metallic spheres from scattered field measurements is addressed. The problem is casted as the inversion of a linear integral operator by means of the distributional approach based on truncated singular value decomposition (TSVD). The performance of the inversion scheme are analyzed for the case of a multi-view/single-frequency configuration by exploiting experimental scattered field data collected in controlled conditions at the Electromagnetic Diagnostics Laboratory of the Second University of Naples. [C811]

"Microwave tomography for GPR diagnostics of reinforced concrete"

In recent years, innovative strategies such as inverse-scattering or data fusion have been suggested for the processing of GPR datasets in complex scenarios. In this framework, high-resolution concrete inspections are a challenge regarding the treatment of radar data because of the size of the datasets and the complex structures involved. In addition, the achievable depth of inspection is in many cases restricted to unacceptable limits because of the material properties of concrete and the "masking effect" of the upper layers of rebar. Thus, the application of innovative approaches to high-resolution concrete data seems to suggest itself. In this framework, this work deals with the processing of a high-resolution, dataset acquired on a concrete retaining wall via an inverse scattering technique. In particular, we show how the adoption of a strategy based on signal processing techniques and an inverse scattering approach is able to provide the mapping of the two layers of rebar. [C812]

"CW radar based vital signs detection"

This paper sets up to discuss further development of continuous wave (CW) radar based living bodies' vital signs detection methods. The paper summarizes experimental results obtained with proposed CW radar configurations for vital signs detection and ranging. [C813]

"2 D simulation with the FDTD method of GPR modelling applied to the detection in stratified lossy medium using the frequency effect pulse"

In this paper we are interested in the implementation of the Yee finite-difference in time domain (FDTD) of a ground penetrating radar (GPR) model using an electromagnetic differentiated Gaussian pulse (EDGP) propagation by using the MATLAB code and taking into account the: stability criterion and the perfect matched layer (PML). The source emits an (EDGP) from a free space and hits a slab which is formed by a dispersive multilayer media. Our objective is to assess the modelling and the detection of buried objects when using the (GPR) and to see the frequency effect excitation source on the medium. It is clearly shown that with the increase of the frequency, the pulse attenuation increases too. Our code, which can be used to detect metal or plastic materials in a slab like concrete or soil (with every electrical conductivity and permittivity of each layer such as used in non destructive techniques in civilian engineering) is well commented, relatively easy to understand and can be easily modified for user's specific purpose such as taking any kind of soil for detecting any kind of objects. [C814]

"Multimonostatic shape reconstruction of dielectric cylinders by a linear inversion approach"

In this paper the inverse problem of reconstructing the shape of dielectric cylinders by limited aspect multimonostatic scattering measurement is dealt with. The problem is formulated as a linear inverse one by means of the physical optics approximation distributional approach. The penetrability of the scatterers is taken into account by considering the contribution of the ldquoshadowedrdquo side to the local reflection coefficient. The adopted model allows to predict that both the illuminated and the shadowed sides of the scatterer provide contribution to the reconstructed image, but with a delocalization depending on the relative dielectric permittivity. Numerical results confirms this expectation and show the effectiveness of the approach. [C815]

"A methodology for WLAN planning under 3G network"

This paper deals with a practical approach for planning WLAN hotspots to be underlaid within an existing 3G network. Given the number of access points (APs) and access routers (ARs), their locations, call handling capacities of ARs as well as serving GPRS Support Nodes (SGSNs), intra-WLAN handoff costs, and 3G/WLAN inter-system handoff costs, an important consideration for a mobile telecom service provider (MTSP) is to identify: (a) the APs to be connected to the corresponding ARs, and (b) the ARs to be connected to the corresponding SGSNs in a cost effective manner. In this work, while planning a WLAN roll-out for an MTSP, we present an integrated approach based on the minimization of total system cost. Using a heuristic strategy, the planning attempts to determine simultaneously an optimal partitioning of APs with respect to the given set of ARs in each hotspot and also the assignment of ARs to SGSNs over the complete service area. Our study shows that acceptable results are achievable with a reasonable computational effort, which supports the engineered planning of a tightly coupled WLAN/3G integration. [C816]

"Analyze the performance of GPRS DTU and the impact on the remote monitoring street lighting system basebd on GPRS"

This paper presents a method for implementing remote monitoring street lighting system based on virtual private networks. The communication between master station and substation is realized by using the data center which

provides socket interface to communicate with GPRS DTU directly. With the use of the data center, it is of practical significance to implement multiple master stations to receive data from all slave stations simultaneously and to control all slave stations in parallel. The objectives of this paper are two fold. One is to present an overview of the architecture and protocol layers of remote wireless monitoring street lighting system. The other is to present the fundamentals of GPRS DTU and to analyze its performance and impact on the remote wireless monitoring street lighting system. At the same time, we also analyze the negotiation mechanism of point-to-point protocol in detail. A good foundation for further implementing a remote wireless monitoring system which uses point-to-point protocol to establish communication link between nodes is provided. [C817]

"A novel wireless traffic characteristics analysis based on log-infinitely divisible cascades (LIDC)"

According to the analysis of turbulence on the log-infinitely divisible cascades (LIDC) method, analysis GPRS network traffic of multi-scale, the actual GPRS traffic analysis on the basis of the discussions, that the flow of GPRS is suitable for the log-infinitely divisible cascades, flow data for the depth of analysis. With the use of analysis frame, we conclude that the scale of GPRS network has the trait of keeping power-law relations, single scale and scale invariability etc. Internet and traditional wireless network have different traits, so we need further research every protocol component and percentage in GPRS and these protocols under LIDC frame in order to judge and analyze data flow more correctly. [C818]

"Unified time- and frequency-domain approach for accurate modelling of electromagnetic radiation processes in ultra-wideband antennas"

In this paper, a singularity-expansion-method-based approach is proposed for the accurate time- and frequency-domain modelling of electromagnetic field radiation processes in ultra-wideband antennas. By the use of a dedicated two-step vector fitting procedure, a minimal pole/residue spherical harmonic expansion of time-domain equivalent electric and magnetic currents excited on a suitable spherical Huygens surface enclosing the considered radiating structure has been derived. The transient electromagnetic field distribution in Fraunhofer region is presented in closed form as the superposition of outgoing propagating non-uniform spherical waves attenuating along with the radial distance and time according to the real part of the poles accounting for complex resonant processes occurring in the structure. The proposed approach has been validated by application to an ultra-wideband resistively-loaded bow-tie antenna for ground-penetrating radar applications. [C819]

"Design of applicative quality testing system for data services in mobile networks"

Mobile operators nowadays have plenty of data services and this number is increasing towards future 3G LTE mobile networks. There are IP-based services which were migrated from wired to mobile networks, such as HTTP, FTP and E-mail. But, also mobile specific services were created such as WAP and MMS. On the other side, behavior of mobile services is influenced from the environment, the terrain, interference, from protocols on different OSI layers, from user behavior, etc. Therefore, mobile operators need to examine their network and be assured that services are performing well. In this paper we describe an applicative solution for Service Quality Testing System (SQTS), which provides efficient way for testing of all data services, including bearer as well as IP-based services in mobile networks from the user point of view, through a defined set of Key Performance Indicators. We define all SQTS functionalities as well as all needed networks nodes for its functioning. The proposed system is robust and scalable regarding definition of new services that will appear in future. [C820]

"A unified full-waveform method for modeling ground penetrating radar and electromagnetic induction data for non-destructive characterization of soil and materials"

We propose a unified full-waveform method for modeling zero-offset, off-ground ground penetrating radar (GPR) and electromagnetic induction (EMI) in multilayered media. Both GPR and EMI systems are set up using vector network analyzer technology. The antennas are modeled using frequency dependent, complex transfer functions, which include interactions with the medium layers. Wave propagation and induction effects are accounted for by means of three-dimensional (3-D) Green's functions. Laboratory results demonstrated the high accuracy of the GPR and EMI models. This shows great promise for non-destructive characterization of soil and materials. [C821]

"M-Commerce in the Period of 3G"

The application of 3G will provide an opportunity for the development of M-Commerce. In this paper, we analyzed the development tendency of M-commerce and the advantages of 3G, and finding that the launching of 3G services will greatly contribute to the development of M-Commerce in China. We also found that M-Commerce would become the development emphases of 3G, basing on the survey of the mobile communication

market in China. With the transformation of telecom operators, they will extend to higher value layer and become the leaders in M-Commerce market. The competition of the value-added services market will be more intense, so we also study the challenge that the M-Commerce operators might face in the context of 3G, and giving the suggestion accordingly. [C822]

"Research on Lifecycle Strategy of Group Data Service"

It is analyzed the characteristics of available group data service in the mobile communication market on the basis of product life cycle in this paper. Then the obstacle factors of group data service development in different life cycle phases are analyzed and also the corresponding strategies are given. At the end of the paper the key points of life cycle management about this kind of service are concluded. [C823]

"Tunnel Liner Quality Management with GPR"

Ground penetrating radar (GPR) is regularly applied to examine tunnel liners, roads,railways and runways. Many applications have been pioneering proof-of-concept tests to define the benefits and limitations of GPR. For the quality of tunnel liners major include three parts: (1) the thickness of the liner (2) the Defects of the liner such as the voids, non-compacting area and crack (3) the number, diameter of the rebar and rebar corrosion. There are many situations where GPR signals do contain quantitative information useful for developing data needed for engineering decision making. [C824]

"Design and Implementation of Mobile GeoSpatial Information System for Public Health Emergency"

As mobile devices like personal digital assistant (PDA) or handheld PC (HPC) are rapidly developing and the wireless Internet is increasingly used, interests in the mobile geospatial information system are gradually expanded. Nowadays, the outbreak of emergent public health events can be heard more often than before and make lots of people ill in a short time. How to deal with the events much more rapidly and efficiently are the main factors needed to be considered. With the development of mobile devices and wireless network, according to the characteristics of emergent public health event, the authors have designed and implemented a mobile geospatial information system based on PDA for public health emergency. The platform integrates the technologies of geographic information system (GIS), Global Positioning System (GPS), global system for mobile communication (GSM) and general packer radio service (GPRS). Based on platform, the paper conducts an experimental case study of HFRS (hemorrhagic fever with renal syndrome) fieldwork, and test the effectiveness and usefulness of field survey based on mobile collaboration. [C825]

"Feature Extraction and Recognition of Landmine"

As a new detecting landmine method, Ground Penetrating Radar (GPR) is introduced into the field of detecting buried landmine. In order to improve the detection accuracy, A approach based on the Support Vector Machine (SVMs) is presented in the paper. The Support Vector Machines (SVMs) has solved the inevitable partial minimum problem and overcome the disadvantage which the traditional neural network cannot avoid, especially, it is suitable for the high dimension data space and sample less situations, it is used to extract feature vector and recognize landmine. In order to improve the accuracy of detection landmine, WP (wave packet)-based preprocessing algorithm is used to clutter reducing and the genetic algorithms (Gas) is used in the feature selection. The experiment result shows the feasibility and advantage of the presented algorithm. [C826]

"The Road Lighting Control Technology Research Base on Ubiquitous Network"

With development of urban modernize construction, the demands of road lighting and green lighting are in urgent need, however, the conflict between supply and demand of energy is more serious, lighting control system that takes ubiquitous network can greatly improve the performance of the system and reduce the cost. In this paper, road lighting control technology, which is base on ubiquitous network, is introduced and summarized, including system architecture, ZigBee network, GPRS network and management software. [C827]

"Application and Research of Data Acquisition Technology Based on GPRS"

Data acquisition technology based on long distance wireless network is one of the hot research problems of data acquisition technology at the present time. This paper applies data acquisition technology based on GPRS to automatic collection of noise data, designs encapsulation format of data. Data collection terminal accesses to network through GPRS to upload noise data to database of remote server and display terminal gains noise data through network and real-time outputs with the form of broken line. This system has been successfully applied to environment acoustic GIS management system of Wuhan and provides a new method for environmental

planning, monitoring, decision support and scientific evaluation, and it has very important reference value for environmental monitoring. [C828]

"A Hybrid Power-Saving Algorithm Based on Linear Growth in IEEE 802.16e"

To support battery powered mobile broadband wireless access devices efficiently, IEEE 802.16e defines a sleep mode operation for conserving the power of mobile terminals. In this paper, a linear hybrid algorithm is proposed based on the adjustment of sleep window under circumstances of low service traffic, aiming for reducing the response time and energy consumption of mobile subscribe station (MSS). A performance evaluation for this algorithm is utilized by theoretical analysis, and the simulation result shows that the proposed algorithm improves the performance in power conservation. [C829]

"A Closed-Form Solution for ELF Radiated Fields of a Line-Current Antenna in Earth-Ionosphere Waveguide"

The empirical formulas for extremely low frequency (ELF) radiated fields of a line-current antenna grounding at each end in the Earth-ionosphere waveguide have been given in some literatures. But the derivation of the radiated fields in spherical waveguide is mathematically not strict. In this paper, a scalar wave function is used in mode theory of wave propagation to closely solve ELF radiated field of a vertical electric dipole (VED) located in the spherical Earth-ionosphere waveguide. The closed-form formulas for the radiated fields of a line-current antenna grounding at each end are obtained by an application of the reciprocity theorem. [C830]

"Investigations of RL-Loaded Bowtie Antenna for Low-Resolution GPR"

A resistively-inductively loaded (RL-loaded) bowtie antenna for impulse ground penetrating radar (GPR) is theoretically and experimentally investigated. The antenna has been designed for transmission of Gaussian-like pulses with duration of 6 ns (100 MHz central frequency). As ultra-wideband (UWB) antenna, it is suitable for low-resolution GPR that can be used in tunnel geology forecast. The simulating results and the Smith chart created by the network analyzer are analysed. We implement lumped resistor-inductance loading (RL-loading) to the antenna. Experimental results show that VSWR of the loaded antenna is less than 2.5 in the band 0-300 MHz while the transmission efficiency keeps unchanged basically after loading. The RL-loading raised in this paper makes the narrow pulse generator and the antenna-feed system get matched. Time-domain waveforms and radiation pattern of the antenna are shown in this paper. [C831]

"Construction of a wireless sensor networking platform with vibration sensing and GPS positioning"

In this paper, the networking architectures and information middleware of wireless sensor networks are developed to construct the heterogeneous information system platform for the real-time structural health monitoring application. The design and implementation of sensor firmware and networking middleware are the key study topics for WSN-based intelligent system platform. The networking gateway of system platform must be developed the independent and highly interoperability to integrate the heterogeneous networks. The application study combined with vibration sensing and GPS positioning is used to demonstrate the feasibility of the developed system platform. The middleware technology is implemented to filter and pre-process the received data from the Zigbee sensor node and extract the available information to transfer to and record in the system database. Moreover, the GPRS and GSM modules are used to be responsible for the long-distance and alarm message transmission on the information network, respectively. Furthermore, the integration system platform is constructed by integrating Zigbee sensor network, GPRS/GSM communication and LAN Internet to illustrate and evaluate the feasibility and performance of the proposed architecture for wireless sensor systems. In conclusion, the intelligent system platform of WSN-based monitoring system is developed and integrated to demonstrate and speed up the practical applications of wireless sensor networks in this paper. [C832]

"Wireless-based remote monitoring and control of intelligent buildings"

Wireless technologies have witnessed a surge in recent years, making them more appealing for a wide range of applications, such as intelligent buildings. The purpose of this paper is to present a domotic system which integrates such wireless technologies. In order to remotely monitor and control the intelligent building, the authors have proposed an approach based on PDA (Personal Digital Assistant) Smartphones which include the functionalities required by such applications (e.g. processing power, multi-modal communication). Through this paper, the authors try to prove that wireless technologies can be successfully integrated into domotic environments and that the capabilities of high performance PDAs can be fully exploited. [C833]

"Study of ELF electromagnetic fields from a submerged horizontal electric dipole positioned in a

sea of finite depth"

Formulas for extremely low frequency (ELF) electromagnetic fields generated in a sea of finite depth by a submerged horizontal electric dipole (HED) are derived based on an air-water-seafloor three-layer model. Field components in seawater are computed using numerical integration technique and Euler's transform. The effects of frequency, sea depth, seabed conductivity and depth of submerged transmitting HED on the electromagnetic field distribution in a sea are studied, and substantive results are obtained. [C834]

"An auto-adjustment cache algorithm in handheld learning devices"

There are many challenges of using all kinds of handheld devices as learning tools, that can connect to the Remote Learning System by cable or wireless network and then browser the downloaded course contents. First of all, network connection, especially wireless link, is usually not persistent and wireless coverage is often limited. In this case, the handheld learning devices become useless and the learning activities are interfered. Secondly, the learning resource size become more and more large, so that the time to wait for these resources downloaded from the remote learning system would be more and more long. Thirdly, computing power and storages ability of the device is too weak to save or perform plentiful downloaded learning resource. In order to solute the mentioned problems, an auto-adjustment cache algorithm is purposed in a Remote Learning System. [C835]

"User Satisfaction Evaluation of GPRS Network Using PCA"

In this paper, we proposed a new approach, based on principal component analysis (PCA), to evaluate user satisfaction of packet service in GPRS network. Based on our experiment, correlations between different QoS parameters are provided. At the same time, a PCA based user satisfaction factor is defined which reflects the user experience. [C836]

"The design of intelligence supervisory system of greenhouse based on GPRS/3G"

The traditional remote data collection has the shortcomings such as the cover scope is small and the corresponding is unreliable, and the wireless network communication has better timeless and does not have the space limitation. The remote data collection and supervisory system based on GPRS/3G (General Packet Radio Service/The 3rd generation communication) network is discussed and designed in the text. It discusses chiefly a scheme which uses JZ4730 microcontroller to control TC35i module and make use of MMS (Multimedia Messaging Service) and SMS (Short Messaging Service) to complete remote data collection and supervision, and supplies a design program of the hardware and software, and then a conclusion is given at the end of paper. [C837]

"Enabling GSM/GPRS/EDGE EVM testing on low cost multi-site testers"

The key motivation for this work is to enable the use of low cost multi-site testers that exhibit both high transmit test stability and high throughput suitable for massive production of a 2/2.75G GSM/EDGE multi-mode cellular single-chip radio. Due to stringent performance compliance test requirements, transmitter (TX) testing consumes more time on expensive automated test equipment (ATE) and therefore it is critical to develop cost efficient multi-site test schemes, which can exploit parallelism to achieve production testing cost goals. This paper illustrates our low-cost self-contained test methods for both GSM phase trajectory error (PTE) and EDGE TX error vector magnitude (EVM) testing in a TX. We compare our test results with those of the R&S vector signal analyzer (VSA) to demonstrate the achieved test accuracy. Current production solutions allow us to simultaneously test and process up to eight devices using multi-site hardware with eight ATE RF receiver cores. Through scaling and careful hardware/software co-design we are able to realize a sixteen site solution using a combination of serial capture and parallel processing scheme. [C838]

"Development of an autonomous robot for ground penetrating radar surveys of polar ice"

This paper describes the design and fabrication of a low cost, battery-powered mobile robot for ground penetrating radar surveys in support of Polar science and logistics. Key features of the design include lightweight construction for low resistance and high energy efficiency in deformable terrain; a passive, articulated chassis for high mobility; and design simplicity for low cost. Deployment in Greenland in spring 2008 over crevasse fields demonstrated the ability of the robot to traverse rough terrain characterized by both firm and soft snow, while gathering data from a ground penetrating radar to detect crevasses. A simple navigation and control algorithm provides low-bandwidth path planning and course correction. Mobility assessment during deployment highlights the need for non-visual means of assessing mobility autonomously. A proprioceptive sensor suite and sample data for autonomous detection of terrain traversability are described. [C839]

"Wavelet-based pulse design for UWB vehicular radar"

UWB vehicular radar has the potential to be a powerful tool in improving vehicle safety. The Gaussian monocycle pulse, commonly used in the UWB vehicular radar system, can not satisfy the bandwidth constrains. So a new pulse shape based on wavelet is presented, which selects factors of Morlet wavelet to meet the FCC spectral mask by searching the peak frequency which lies in bandwidth between 22 and 29 GHz. Contrasted to the traditional method, the algorithm changes the searching method from two dimensional random variables to one dimensional random variable. Simulation results show that the method can generate pulse shapes which comply with FCC regulation. [C840]

"Design of remote locomotive real-time monitoring system based on GPRS"

For the sake of locomotive running safely and predicting potential fault of locomotive. This paper introduces a method of data transfer based on GPRS, achieving locomotive information collection, remote transfer and real-time display. Using database technique, actualizing locomotive information storage and fault analysis for technician predicting locomotive fault and eliminating fault in time. It is important to the safe running of locomotive and reducing maintenance costs. [C841]

"Application of grid-cell combination in 2D-FDTD modeling of ELF propagation and Schumann resonances of the earth"

In this paper, we have introduced a basic two-dimensional finite difference time-domain (2D-FDTD) method with TM and TE modes, and developed a model of antipodal extremely low frequency (ELF) wave propagation on the Schumann resonances (SR) of the earth. We have used an advanced algorithm, which is combining the grid-cells approaching to the certain pole points, and have improved the numerical stability and efficiency compared with those of the original basic algorithm. [C842]

"The Design and Solution for the Connection of GPRS Modem"

This paper presents the principle of GPRS (general packet radio service), realization of GPRS modem and how to embed the TCP/IP (transmission control protocol/Internet protocol) protocols. Then we describe the problems happen when the GPRS modem is online; and give some ways to solve them at last. [C843]

"Design of Wireless Intelligent Train Identification System Based on GPS/GPRS"

The wireless intelligent train identification system based on embedded system was designed with ARM9 RSIC CPU AT91SAM9260 and Telit GE863-GPS. The embedded system communicates with RFID module and Telit GE-GPS by serial ports. The embedded system communicates with CPS by serial port, Ethernet or GPRS. The real-time of train identification and data transmission was implemented by interrupt produced by pulse of wheel sensor. The flow chart was created according to system work flows. The initial process of wireless module, the collecting process of position information and the connecting process of GPRS were introduced with program. [C844]

"The Study of Ductwork Pressure Booster Distributed Control System Based on Wireless Communication Technology"

This paper describes the structure and the control mechanism of network layers based on wireless communication technology, and introduces the control requirements and realization methods for the automatic control modules. The paper first describes the realization of controlling the frequency variable system in the control unit and its serial communication with GPRS communication module. It then provides the methods for data sending and receiving in the device. [C845]

"Research and Design of Position and Navigation System Based on ARM"

Considering the disadvantages of the traditional GPS system such as position blind spots etc, a position and navigation system based on S3C2440 is researched and designed. A real-time and continuous position system is realized through the combination of GPS and the digital compass; Meanwhile, EVC is used to develop the digital map. Remote supervision and information transmission of the terminal is realized through GPRS. [C846]

"Study of Intelligent Public Transport Monitoring System Based on WebGIS"

At present, most vehicle monitoring systems are based on the client/server structure. According to their disadvantages, an intelligent public transport monitoring system based on WebGIS is constructed. System

working principle, design method and main functions are introduced in detail. A fast and practical road match algorithm, is put forward. The system has been used in two domestic cities and has obtained great social and economic benefits. It has better promoting effect on improving the service level of urban public transportation and other transportation trades. [C847]

"Study on an Intelligent Monitoring Application System of Construction Machinery"

In order to monitor construction machinery's performance and quality, an intelligent monitoring application system is presented in the paper. The system makes site monitoring cell installed on every construction machinery as its terminal, GPRS (general packet radio service) as its network carriers, intelligent monitoring center as controller. The system can supervise the running status and alarm when its works take place abnormality on line on the basis of GPRS network, ARM embedded-system and data-base design based on Lab Windows/CVI. [C848]

"Ground Penetrating Radar Wave Velocity Estimation Based on Template Matching"

The estimation of the ground penetrating radar (GPR) wave velocity underground is the base of calculating depth of objects and synthetic aperture imaging. In this paper a new GPR wave velocity estimation method is proposed based on template matching. The experimental result shows that the methods proposed are effective. [C849]

"Design of Wireless Monitor System Based on S3C2410 and GPRS"

This paper introduce a new type wireless monitor system which applied in industrial field. In the system, the main hardware includes the S3C2410 microprocessor in ARM920T core, and the software adopts Linux which is an embedded operating system, communicate by GPRS wireless transmission service. We can get real-time video data through USB camera firstly, compress and encode it with MPEG-4, ultimately complete the wireless remote monitor system with PPP dial-up and socket communication's mechanism. It is low-cost, has a small size and fast speed of transmitting data, and is easy to carry, so it is suitable for the situation of remote real-time monitor, industry control field. [C850]

"Distributed Shared Memory Architecture for NoC-Based Multi-Processor"

Network on chip (NoC) implements routers and links onto a single chip. NoC is scalable compared to bus for many-core system. When communication moves from bus to NoC, the single centric memory becomes congested node of network and bottleneck of performance. In this paper, we apply distributed shared memory architecture to a NoC-based multi-processor system. On this hardware platform, we ran a multi-thread application, and observed the improvement of network throughput and overall performance. [C851]

"Design of Wireless Gateway Based on ZigBee and GPRS Technology"

Water environment monitoring system based on WSNs consists of three parts: data monitoring nodes, gateway and remote monitoring center. The wireless gateway is communication center in the monitoring network between those data monitoring nodes (ZigBee network) and remote monitoring center (GPRS network). Based on the MSP430F1611 and CC2430 dual architectures, this paper researches on a wireless gateway for the water environment monitoring system and designs its software and hardware system. [C852]

"Frame synchronization and buffer overflow control schemes for handover in HSDPA networks"

In the high-speed downlink packet access (HSDPA) mechanism, the radio network controller (RNC) sends frames to all cells in the active set. A user equipment (UE) communicates with one cell, which is called serving cell, in the active set of cells. When the UE performs handover (switches from the old serving cell to the new serving cell), the new serving cell must be informed the status of the buffer in the old serving cell so as to transmit the next correct frames to the UE. This is referred as frame synchronization. Also, it should be assured that when the buffer of a nonserving cell is full, the previously received frames in the buffer can be safely dropped without causing any lost of frames during frame synchronization. This is referred as buffer overflow control. This paper investigates the frame synchronization and buffer overflow control mechanisms and proposes more efficient and complete schemes than the previous work. For the buffer overflow control scheme, we derive a better lower bound on the buffer size of the nonserving cell. Therefore, the system resource can be better utilized. For the frame synchronization scheme, we use the circular queue to implement the buffer of the old serving cell. With the proposed scheme, the frame synchronization information can be represented as a pointer of the circular queue and a status variable. Thus, the size of this information is very small and can be efficiently transmitted to the new serving cell through one uplink channel, which is of limited bandwidth. This scheme can reduce the time for frame synchronization processes and therefore will enhance the system performance.

Analytical analysis and illustrative examples show that the proposed scheme is more efficient and complete than the previous work. [C853]

"A PCU resource scheduling algorithm based on Nash Equilibrium"

An efficient scheduling algorithm can make full use of the network resources, particularly in the high-load network. In this paper, a new PCU scheduling algorithm is given, which is based on Nash Equilibrium, and aiming at making sure that all users in the network (both GPRS and EDGE users) can get the best speed as possible. [C854]

"A current-steering DAC-Based CMOS ultra-wideband impulse generator"

In this paper, the design and simulation of a CMOS ultra-wideband pulse generator using TSMC 0.18 mum CMOS technology is presented. The operating frequency band of the pulse generator is from 3 to 10 GHz for the application of ultra-wideband (UWB) communications. The structure of the impulse generator is based on the current-steering digital-to-analog converter (DAC). The impulse generator has the feature of high-tunability and the simulation results show that the output of the impulse generator complies with the FCC regulations and has a power consumption of 27 mW at a 50 MHz pulse repetition rate (PRR). [C855]

"The use of resource list servers in IMS presence for developing networks"

The IP multimedia subsystem (IMS) is a next-generation service delivery platform that enables operators to deliver services such as multimedia and IP content to both fixed and mobile users. One of the important services for early adopters in the IMS is presence, an application well-known on platforms such as the Internet, which can be integrated into other applications as an enhancement. A major constraint to the implementation of IMS services over developing networks is the requirement of significant bandwith, especially over the Г‚Вїlast mileГ‚Вї access network, for the delivery of multimedia and associated data. However, the availability of broadband network access for multimedia services in rural and developing areas, particularly in South Africa, is very low. The resource list server (RLS) is important to the IMS presence application, as it optimises the management of intensive presence signalling, and aggregates information to subscribers from within the IMS core network. The use of an RLS can reduce the demands of the IMS Presence application on constrained access network resources. [C856]

"Advances in fetal heart rate monitoring using smart phones"

It has been shown that the rate of preterm birth in remote and rural populations in Australia is more than twice of those in the metropolitan population, and that increased access to quality antenatal care in such communities leads to a significant improvement. This paper describes a system that supports remote fetal heart rate monitoring, thus providing a technique that addresses this need for better remote antenatal care. The application involves a smart phone, a portable Doppler ultrasound device, a remote back-end server and network connectivity provided by the global system for mobile communications (GSM) and general packet radio service (GPRS) networks. Algorithms for fetal heart rate detection were adapted to cater for the lower processing powers on the smart phone. The accuracy of this detection algorithm in the mobile application was evaluated and found to be highly comparable to that of a MATLAB implementation on a PC. [C857]

"Dynamic linking and loading in networked embedded systems"

We present a holistic dynamic linking and loading mechanism in networked embedded systems. Our design and implementation are guided by four requirements, which are to provide (i) minimal code size (ii) efficient execution and loading speed (iii) portable design (iv) isolated kernel/application development. First, we develop a tool to minimize the standard ELF format via many techniques in order to reduce the code dissemination cost. Second, we employ the techniques of pre-relocating and pre-linking (to kernel functions) to reduce the run-time linking overhead, thus improving the loading speed. Third, based on relocatable ELF and the modular design of the dynamic linker and loader, our approach can be easily ported to different platforms. Fourth, by maintaining a kernel jump table, we provide a clean isolation between kernel and application development. We have implemented the dynamic linking and loading mechanism on SenSpire OS, a micro sensor node operating system. The evaluation results show that our design and implementation meet our design goals: the code size of our SELF format is only 15%-30% of that of standard ELF, 38%-83% of that of CELF, a compact ELF format for the Contiki operating system; the loading speed improvement varies from 40%-50% compared to the standard mechanism; our design is portable to both MicaZ and TelosB motes, and we allow updating both application modules and kernel services in isolation without prior knowledge about the whole system information. [C858]

"Automatic Meter Reading Monitoring System Based on G18 Module"

The G18 module is proposed in this paper, which is used in an automatic meter monitoring system for accessing GPRS traffic from GSM network under control of a micro-controller. The principle of system, design of the hardware circuit, the control method of the single chip computer and GPRS module and the application of G18 module in this system are introduced in detail. [C859]

"SmartEye Integrated Solution to Home Automation, Security and Monitoring through Mobile Phones"

Automation is the process of having a machine or machines to accomplish tasks hitherto performed wholly or partly by humans. Home automation concerns automating the domestic tasks. There are number of applications addressing home automation and monitoring involving infrared/Bluetooth or Ethernet over Power techniques in remote controls. But there is no such publication on providing facility to control and monitor unlimited number of equipments at home via a mobile device at a very low cost using general packet radio services (GPRS) networks. This paper presents a recent research and development effort in construing a real-time home automation and monitoring system named SmartEye which uses cellular networks, Internet based server, networked hardware equipments and GPRS networks. SmartEye accomplishes two tasks; they are home automation and monitoring through mobile phone. Under automation it addresses turning on/off household electrical appliances, such as electric bulbs, door locks etc. SmartEye uses an alerting mechanism together with security cameras to safeguard homes. And also it provides an interface to monitor and control the home through mobile devices. This is a system which integrates the home with the World Wide Web and mobile devices. This paper also discusses the architecture of the system which makes it an easily expandable, user-friendly, affordable and reliable real-time monitoring and remote controlling solution. [C860]

"Remote monitoring of the microwave repeater systems with solar and wind power supply"

This paper describes realization of the remote monitoring for the microwave repeater systems with solar and wind power supply using GPRS technology. The microwave repeater systems are used instead of the passive plane repeaters. The microwave repeater systems have smaller dimensions, lower cost, easier installations and better performance then the passive plane repeaters. [C861]

"Enhanced Common Radio Resources Managements Algorithm in Heterogeneous Cellular Networks"

Deployment of new radio technologies in the mobile world has not been more critical than it is now. The customers and applications have been starving for more data throughput while operators are struggling to deliver the promised high data rates to customers. Operators are using existing traffic information from GSM/GPRS technologies to deploy WCDMA and HSDPA systems. The deployment of WCDMA in the existing GSM/GPRS cell sites has proven to enhance the network resources available to the operators. The diversity of the services and the availability at the moment of two radio access networks to choose from to deliver these services makes the management of available resources rather complex. Therefore, Common Radio Resources Management (CRRM) has been standardized by 3 GPP. Radio Access Technology (RAT) selection is a key element for CRRM. In this paper, we propose a new algorithm to optimize the available network resources in multi radio environment based on service requests. The proposed algorithm efficiently optimizes the radio resources available based on the services supported in 3 GPP standards. [C862]

"An SUPL-based Location Platform implementation in mobile network"

This paper introduces a new method to implement the SUPL Location Platform defined in the SUPL specification. SUPL (Secure User Plane Location) is designed by OMA (Open Mobile Alliance) for the deployment of Location Based Services. SUPL is an open LBS specification, which supports various positioning technologies(eg: A-GPS, cell-Id, EOTD). SLP (SUPL Location Platform) is the Entity responsible for SUPL Service Management and Position Determination in the SUPL specification. [C863]

"Holographic Registration Plates with GPRS (HRPG) network for sea-going vessels to augment the coastal security"

Unregistered fishing boats and those displaying fake registration numbers is being used for criminal activities in the coastal areas. Recent terrorist attacks in Mumbai and the warnings from the intelligence agencies necessitate tamper-proof holographic registration plates with GPRS (HRPG) networking system on all sea going vessels to augment the coastal security. The (HRPG) networking system which includes several security features is a regular reflective tetrahedron in shape, designed with holographic, laser etched and embossed security

features to protect against forgery. The system comprises of a GPRS (general packet radio services) and GPS (global positioning system), along with a micro-chip containing the whole information regarding the vessels and sailors/fisherman. The location and identity of the seagoing vessels can be easily traced and tracked out by the enforcement authority. The paper reports in details about the hologram preparation, related design considerations and it advantages. [C864]

"Development situation, problems and suggestion of Power Load Management System in China"

Power load management system (PLMS) is an important technical measure of power demand side management (DSM). On the basis of the letter survey and typical field investigation, project team analyzed the real situation in China of constructions, operating, maintenance and management of PLMS, orderly power consumption. Based on the analysis of opportunities and challenges of PLMS, concerning the real condition of China and real survey results, some suggestions of how to develop PLMS and promote its application in new era were put forward. [C865]

"Detecting airport surface movement events using ground surveillance"

The availability of high-quality multi-sensor surveillance for the airport enables new forms of surface movement analysis. The Airport Surface Detection Equipment, Model X (ASDE-X) system provides precise time-stamped position and velocity reports associated with aircraft identification codes, as required for its primary mission of improving situation awareness in the air traffic control (ATC) tower. Many additional trajectory properties can be estimated from the same source. ASDE-X has no requirements for estimating and reporting acceleration in real time. However, the ability to estimate acceleration improves the ability to detect maneuvers. For the purpose of this paper, a maneuver is defined to be any acceleration of sufficient magnitude and duration to affect operational decisions. The focus of this paper is on the feasibility of estimating acceleration as part of non-real-time analysis, the ability to relate those acceleration estimates to maneuver recognition, and the operational applications of such a capability. Deeper understanding of surface activity can be obtained by re-processing surveillance data for precise trajectory reconstruction. Changes in velocity, including starts, turns, and stops, are particularly significant for operational analysis; the timing of such events in relation to airport geometry and the movement of other traffic can indicate the reasons for the observed behavior. For example, slowing can be explained by the need to yield to converging traffic at an intersection, and stopping can be explained by proximity to a hold line or joining the end of a queue. This paper shows results on the sensitivity and precision with which these surface movement events can be detected and measured. In addition, examples of the potential use of these events in studies of operational efficiency and safety will be given. Particular examples include relating speed changes to fuel use and emissions metrics, and relating acceleration from a stop to the reco- gnition of runway entry and start of take-off roll. [C866]

"QoE-oriented edge network busy time detection and analysis"

As an important data communication technology, the purpose of EDGE (Enhanced Data Rates for Global Evolution) network is to provide rich multimedia 3G communication services by directly enhancing the rate of exist network, before 3G network completes the commercialization. Combined with the user experience-oriented characteristic of EDGE network operation, this paper first analyses the important factors of EDGE QoE(Quality of Experience) architecture, and puts forward the concept of Г‚ВїBusy Time ThroughputГ‚Вї as an important KPI (Key Performance Indicator)that impact the value of EDGE network QoE. As the period which is difficult for Service Providers (SPs) to control customers' Quality of Experience (QoE), Busy Time effective detection and analysis is an import premise to achieve the overall EDGE network QoE promotion. Then, Information Theory model is put forward to detect the Busy Time dynamically. At the end of this paper, typical EDGE data network is taken as an example to analyze this model. [C867]

"Leakage monitoring and locating method of water supply pipe network"

To solve the monitoring and locating problems of the underground booster and leakage of the supply water network, a remote leakage monitoring and locating system based on GSM/GPRS is designed. The parameters of water supply pipe network, i.e., flow, flow velocity, flow direction and pressure are collected by monitor terminal. The data transmission is realized by GSM/GPRS network and the status of tap water pipe network is monitored by the GIS based Web software. Based on the feature of the underground booster and leakage of the water pipe, negative P wave and flow detecting methods is used based on the pattern recognition. Practice shows the system can detect leakage of the water pipe timely and found the leakage location accurately. At present, it has been used in practical tap water pipe network with excellent results, and it is valuable for generalization and application. [C868]

"Subwavelength focusing in the far-field using a phase conjugating surface"

An open 2D phase conjugating surface operating as a negative refraction lens (without the need for metamaterials) and augmented with evanescent field to propagating field converters has been theoretically demonstrated to have sub-wavelength focussing properties. This opens up the way for advanced MIMO applications on restricted size platforms or for fine feature extraction by electromagnetic lensing at distances remotely located from the source objects under investigation. [C869]

"Constructive neural network for landmine classification using ultra wideband GPR"

In this paper, constructive neural network for landmine classification using ultra wideband (UWB) ground penetrating radar (GPR) is presented. GPR echo signal is composed of three parts: ground bounce, clutter and target echo signal, the target echo signal is deteriorated by the clutter. Firstly WP-based preprocessing algorithm is used to ground bounce removal and clutter reduction and feature extraction of GPR echo signal. Then wrapper based approach is adopted to feature subset selection of GPR echo signal using genetic algorithm(GA) in conjunction with constructive neural network learning algorithm, and at the meanwhile, the result of classification of landmine is obtained. Experiment result based on GPR measured data shows that the feasibility and advantage of the presented algorithm. [C870]

"Image formation techniques for Vehicle-Mounted Forward-Looking Ground Penetrating SAR"

A vehicle-mounted forward-looking ground penetrate synthetic aperture radar (VMFL-GPSAR) is newly developed in China for real-time mine detection. The VMFL-GPSAR is an impulse radar system. With a 6 meter long antenna array, the radar can output 0.15 m by 0.15 m real-time images at a velocity of 15 Km/h. This paper presents some key techniques in developing the system, including antenna dispersion compensation, channel equalization, RFI suppression, fast backprojection image formation algorithm and along range multi-look image enhance algorithm. Tests conducted in Changsha last year indicate that the system can detect both metallic and plastic landmines. [C871]

"Polarization filtering enhancement of buried landmine"

Here the optimum polarization of antenna for buried landmines detection in soil surface clutter is investigated theoretically to enhance radar target back scattered power. An expression of the Mueller matrix from this fractal surface is obtained. The optimum polarization to reduce clutter is given. Then, the variations are found of power density of buried landmines with polarization state, and the optimum polarization is given to increase power density. In the end, the paper researches the polarization filtering enhancement of buried landmines in soil surface clutter. [C872]

"A novel preprocessing method for vehicular-mounted forward-looking UWB SAR system"

The forward-looking ground penetrating radar (FLGPR) has been widely considered as an applicable landmines detection technology, but the self-signature and the strong ground clutter will severely degrade the SAR image. We present a novel method for interference and ground clutter suppression in the image domain based on the distance-band partition and iterative operation techniques, which can realize the parallel processing and adaptive update of the parameters on line. By using the property of FLGPR systems that the same spatial region is observed several times at different standoff distances, we exploit a range multi-look processing based on the iterative technique to obtain the high quality image. The proposed method in this paper is adaptive and efficient enough to work in a real-time operational scenario, so it can effectively meet the needs of the preprocessing in the vehicular-mounted forward-looking (VMFL) detection system. The effectiveness of our approaches is demonstrated with an experimental data set. [C873]

"Real-time image algorithm for short-constant-aperture SAR"

Piecewise uniform sampling local backprojection (PUS-LBP) algorithm is presented for short-constant-aperture SAR image formation. In the PUS-LBP algorithm subaperture images are formed based on the Cartesian coordinates, which dramatically improves the computation efficiency comparing with the original LBP. Furthermore, the piecewise uniform sampling technique is applied to the LBP in Cartesian coordinates. This technique increases the subimage sampling rate at the edges, but retains a lower sampling rate on the center. As a result, a consistent focusing performance of the whole image is achieved in an efficient way. The algorithm is validated by real data processing with an 86 percents speed boosting. [C874]

"Near to far field transformation for underwater ELF simulation"

Anti-ship mines can be detonated by the electromagnetic signature of a surface ship [1]. Electromagnetic (EM)

simulation is being developed to assess the propagation of these signals using the finite-difference time-domain (FDTD) method [2-5]. A previous paper has described this and demonstrated the accuracy [6]. A near-field to far-field transformation is being utilized to extend the reach of an FDTD simulation without using extraordinary computer resources. [C875]

"Low-cost Yagi-Uda monopole array"

The Yagi-Uda antenna-invented in 1926 by H. Yagi and S. Uda at Tohoku University [1] in Japan, but first published in English only in 1928 [2]-has been extensively used as an end-fire antenna since then. Instead of the cylindrical antenna elements from the original work, radiators of small overall dimensions are presently achieved by means of other topologies, such as printed dipoles. Recently, a novel uniplanar quasi-Yagi design, combining both the compactness of resonant-type antennas and the broadband characteristics of traveling-wave radiators, was presented [3-4]. A current potential application of Yagi-Uda antennas is in GPRS (General Packet Radio Service), a packet-based data service over the existing GSM network. In general, the operation of mobile terminals requires antennas with omnidirectional radiation patterns; however, in case the mobile terminal is far removed from the base station, a directional antenna must be used [5]. In this paper, a new Yagi-Uda antenna topology, made up of printed monopoles, is proposed. The goal is achieving a compact, low cost, efficient radiator for GPRS applications. [C876]

"Applicative solution for testing the quality of data services in mobile networks"

Mobile operators nowadays have plenty of data services, since the introduction of GPRS and this number is increasing towards future 3G LTE mobile networks. There are IP-based services which were migrated from wired to mobile networks, such as HTTP, FTP and E-mail. But, also mobile specific services were created such as WAP and MMS. On the other side, behavior of mobile services is influenced from the environment, the terrain, interference, from protocols on different OSI layers, from user behavior, etc. Therefore, mobile operators need to examine their network and be assured that services are performing well. In this paper we describe an applicative solution for service quality testing system (SQTS), which provides efficient way for testing of all data services, including bearer as well as IP-based services in mobile networks from the user point of view, through a defined set of Key Performance Indicators. We define all SQTS functionalities as well as all needed networks nodes for its functioning. The proposed system is robust and scalable regarding definition of new services that will appear in future. [C877]

"Reverse time migration algorithm for detection of buried objects in time domain"

We have implemented an algorithm based on FDTD method, which achieves the reverse time procedure of electromagnetic waves. A convolution product has to be realised between this reverse wave and the incident signal that propagate in this medium without diffracting objects. The results provide high accuracy in the objects localization even with only one multisensor measure. Moving the radar at the top improves the resolution. So this method is well suited for exploiting multisensor radar measurements. [C878]

"Underwater FDTD simulation at low frequencies"

Modern anti-ship mines can be detonated by the electromagnetic signature of a surface ship [1]. For this reason, it is desirable to have simulation methods to study the propagation of extremely low frequency (ELF) electromagnetic waves under water. The finite-difference time-domain (FDTD) method [2-5] is one of the most widely used methods in electromagnetic simulation. Unfortunately, the discrete Fourier transform method used to quantify the results of the time-domain simulation is not practical at ELF. Furthermore, the Bessel/Legendre expansion method used to verify the FDTD results is also not valid at low frequencies. These two major issues are addressed in this paper. Results comparing the FDTD and an analytic method confirm the accuracy of FDTD at low frequencies. [C879]

"A novel wide-band slot antenna for ground penetrating radar"

In this paper, a novel slot antenna is designed for ground penetrating radars (GPRs). The novel antenna consists of an array of cavity backed slot elements. Compared to microstrip patches, slot antennas have a few attractive advantages, such as ease in achieving relatively larger fractional bandwidth, minimal mutual coupling between array elements, less sensitivity to substrate truncation, and higher power tolerance (Hirokawa et al., 1989; Zheng et al., 2005). When applied to GPRs, the cavity backed slot array is placed conformal to, and in contact with the ground surface. The antenna elements are designed impedance matched to the ground. As a result, direct reflection from the ground surface, which constitutes the major source of clutter in GPRs (Rappaport et al., 2003), is avoided. Moreover, the slot array in this paper operates over a wide frequency band; hence it can be used for ultra-wide-band GPRs. The antenna elements are analyzed using full wave solvers. A two-element

array is fabricated and tested over sand. Simulated and measured data agree closely with one another. Input impedance bandwidth of 35% is observed from measurements. Bistatic, step-frequency measurements are carried out to detect copper pipes buried in sand. Locations of the buried pipes are identified from bi-static scattering results, with signal-to-clutter ratio greater than 10 dB after subtraction of direct coupling between antenna elements, which demonstrates the viability of the proposed antenna to GPRs. [C880]

"A 100-960MHz CMOS Ultra-wideband Low noise Amplifier"

This paper presents the design and simulation of a CMOS ultra-wideband low noise amplifier. The amplifier exhibits a form of thermal noise canceling with a shunt-feedback topology for operating in the band of 100-960 MHz. It was designed using the AMI C5F/N (0.5 mum) process. Thorough simulations including anticipated parasitics predict a noise figure ranging from 1.84-2.45 dB, a forward gain of 11.5plusmn0.22 dB, and input and output matching metrics (S11 and S22) below -10 dB. [C881]

"SMS Receiving and Dispatching System Based on Embedded Linux"

The SMS receiving and dispatching system is designed in this paper, which consisting of embedded Linux system and GPRS module. The principle of work and frame of system are given. How to encode the message in PDU mode, decode the message from PDU and the SMS receive/send flow under the control of AT commands, is the technical difficulty in SMS terminal developing. based on the embedded Linux system, Several solutions are given. [C882]

"Low sidelobe level radar techniques using Golay based coded sequences"

A radar system operating at a carrier frequency of 500 MHz and using different coded sequences is built and tested at NMSU. A limited set of experimental results at various ranges for both sequences: pseudorandom binary sequences (PRBS) and Golay were obtained and the comparison between them was done. Our tests indicate, though not conclusively, that Golay sequence seems to offer lower sidelobe level than PRBS sequences. Moreover, Golay sequences may yield higher dynamic range and results in improvement in estimation of the delay spread. [C883]

"Firewall Based Scheme to Prevent GPRS Overbilling"

The lack of inherent security in the GPRS tunneling protocol (GTP) leaves security vulnerabilities in GPRS networks. A novel scheme to defend the network against overbilling is proposed. The scheme only requires a dynamic memory in a GTP firewall to store some information flow such as tunnel ID. It needs not work jointly with an extra firewall at the Gi port as in some existing solutions. [C884]

"Providing data integrity in intermittently connected Wireless Sensor Networks"

Intermittently connected wireless sensor networks (WSN) for scientific environmental monitoring raise the issue for reliable data gathering which is a key factor for having a consistent data stream as a result. First, measurements must be taken and securely saved on a node. Per node local repository for measurements is a basic mechanism for making possible to retransmit any block of data towards a data sink if it has been lost or damaged. Second, high reliable data communication channels are established between nodes, including MAC-layer and application-layer ldquoend-to-endrdquo acknowledgments. The last, and the most important aspect is using a multi-level data buffering mechanism based on an ldquoagingrdquo-factor for reducing power consumption taken by radio transmissions. We describe our solution, combining all these techniques, which is intended for use in a permafrost monitoring project. In our case where half-/hourly measurements are collected over a whole year and nodes can become disconnected for several months, we still manage to provide loss-free and power efficient data delivery. [C885]

"Analytical modelling of the Iub interface in the UMTS network"

The paper presents a new analytical method for blocking probability determination in the interface of the UMTS network. In our consideration we use a modified model of full-availability group with multi-rate traffic. The proposed scheme is applicable for cost-effective Iub resource management in 3G mobile networks and can be easily applied to network capacity calculations. [C886]

"Self-reconfiguration on Spartan-III FPGAs with compressed partial bitstreams via a parallel configuration access port (cPCAP) core"

This paper presents an alternative approach for dynamic partial self-reconfiguration that enables a field

programmable gate array (FPGA) to reconfigure itself at run-time partially through a parallel configuration access port (cPCAP) under the control of the stand alone cPCAP core within the FPGA instead of using an embedded processor. The cPCAP core with bitstream decompression module needs only 361 slices, which is approximately 18% of a Spartan-3S200 FPGA. The dynamic partial self-reconfiguration via cPCAP core works up to 50 Mbyte/s. The compressed partial bitstream is stored in BlockRAM within the FPGA and decompressed via cPCAP core at the time of reconfiguration of the FPGA. This approach has been implemented on a pure Spartan-3 FPGA from Xilinx, but it can also be used for any other FPGA architectures, such as Virtex-II(Pro), Virtex-4, Virtex-5, etc. [C887]

"Optimization of GSM-UMTS core network for IP convergence in 4G through Mobile IPv6"

The need for mobility, autonomy, permanent access to information and mobile computing are some of the realities of today's communication society. Considering the wide area of communication technologies, the convergence of different types of networks (WiFi, GSM/UMTS, Satellite etc.) represents the solution for the achievement of the "whenever and wherever" paradigm, that is one of the objectives of 4G networks. Maintaining the existing GSM/UMTS core networks for the transition period to the new architecture of 4G networks and integration of present 2.5G and 3G networks would reduce costs for telecom operators. The paper presents solutions for a network architecture based on Mobile IPv6 and its implementation for the GPRS core as an important way to extend the lifetime of traditional 2.5G and 3G networks. [C888]

"A novel procedure and apparatus for measuring the radon concentration in air"

An intelligent apparatus for measuring very low concentrations of radon in air is presented in this paper. It is composed of a special ionization chamber and an analogue/digital processing unit based on a microcontroller. Besides radon detection, this detector is capable of emitting an alarm signal (in case of high radon concentrations) and of transmitting the measurement data to a remote location along with the geographic position of the detector through a GPS/GPRS modem. Because of the synchronous operation (based on the GPS clock) the detector can work in a network covering a large geological fault, displaying measured data locally or over the Internet. With a simple firmware update the detector can also be used with other ionizing particles. [C889]

"Wireless Monitoring System of Vehicle Violation of Running Red Led Based on GPRS"

Running red led is an important reason for the traffic accident at the intersection and it is helpful and necessary to monitor the violation behavior of running red led. In this paper, design method of the wireless monitoring system for the violation of running red led based on GPRS (general packet radio system) is discussed, and the configuration of its hardware and software is introduced. The whole system consists of the subsystems of the vehicle monitoring stations distributed at the road intersections and the remote control center. During the period of the red state of traffic light, the interruption procedures will be activated by the output signal of the magnetic loop sensors and the two the cameras will be triggered to capture three pictures to record the course of running red led. The functions of image compression, number plate recognition and etc. are realized subsequently. Then the data of the monitoring station serial number, violation time, compressed image and etc., will be written to the wireless modem of Motorola G20 through the serial interface and sent to the remote monitoring center through the GPRS network and the GGSN gateway. Integrating the technologies of sensor, number plate recognition and GPRS, the whole monitoring system stands up the trend of vehicle violation surveillance for running red led at the road intersection. [C890]

"Design and realization of wireless remote image monitoring system based on GSM/GPRS"

This paper focuses on realizing the wireless remote monitoring Mud-rock Flow landslide in remote or complex regional geological environment, on basis of the conclusion of wired image monitoring system, proposed a wireless remote image monitoring system based on GSM/GPRS and ARMLinux developing environment. Firstly, design the overall of the system, analysis the structure of the system's hardware and software. Then, use the APIs of Video4Linux kernel to realize image acquisition of the system, through PPP dial-up to access the GPRS, through network programming to realize the transmission of the image. Finally, a prototype machine of the system developed successfully. [C891]

"A blind navigation system using RFID for indoor environments"

A location and tracking system becomes very important to our future world of pervasive computing, where information is all around us. Location is one of the most needed information for emerging and future applications. Since the public use of GPS satellite is allowed, several state-of-the-art devices become part of our life, e.g. a car navigator and a mobile phone with a built-in GPS receiver. However, location information for

indoor environments is still very limited. Several techniques are proposed to get location information in buildings such as using a radio signal triangulation, a radio signal (beacon) emitter, or signal fingerprinting. Using radio frequency identification (RFID) tags is a new way of giving location information to users. Due to its passive communication circuit, RFID tags can be embedded almost anywhere without an energy source. The tags stores location information and gives it to any reader that is within a proximity range which can be up to 10-15 meters for UHF RFID systems. We propose an RFID-based system for navigation in a building for blind people or visually impaired. The system relies on the location information on the tag, a userpsilas destination, and a routing server where the shortest route from the userpsilas current location to the destination. The navigation device communicates with the routing server using GPRS networks. We build a prototype based on our design and show some results. We found that there are some delay problems in the devices which are the communication delay due to the cold start cycle of a GPRS modem and the voice delay due to the file transfer delay from a MMC module. [C892]

"General packet radio service (GPRS) technology transfer: A case study to evaluate transferors"

The arrival of mobile phone also known as global system for mobile communications (original acronym: groupe special mobile-GSM) operators and their rapid growth may well be seen as one of the most significant developments in the field of communication and information technology over the last two decades. The aim of this study is to investigate the international transfer process of general packet radio service (GPRS) technologies, which supports the wireless access to external Internet protocol-based networks, and to propose a multi-criteria decision making (MCDM) approach to evaluate the alternative transferor companies. In order to achieve these purposes, firstly an in-depth interview was conducted with a purchasing manager of the third largest GSM operator in Turkey. Then, the major factors, which directly affect the success of a technology transfer (TT) project, are identified from the literature in order to determine the transferor selection criteria for a transferee company. The next step was to find out the relative importance of these criteria by asking the purchasing manager who was also a member of the GPRS project team. Finally, technique for order preference by similarity to ideal solution (TOPSIS), which is a MCDM method, is applied to rank the alternative transferor companies. [C893]

"Learning Robot Dynamics for Computed Torque Control Using Local Gaussian Processes Regression"

Accurate models of the robot dynamics allow the design of significantly more precise, energy-efficient and more compliant computed torque control for robots. However, in some cases the accuracy of rigid-body models does not suffice for sound control performance due to unmodeled nonlinearities such as hydraulic cables, complex friction, or actuator dynamics. In such cases, learning the models from data poses an interesting alternative and estimating the dynamics model using regression techniques becomes an important problem. However, the most accurate regression methods, e.g. Gaussian processes regression (GPR) and support vector regression (SVR), suffer from exceptional high computational complexity which prevents their usage for large numbers of samples or online learning to date. We proposed an approximation to the standard GPR using local Gaussian processes models inspired by [Vijayakumaf, 2005 and Snelson and Ghahramani, 2007]. Due to reduced computational cost, local Gaussian processes (LGP) is capable for an online learning. Comparisons with other nonparametric regressions, e.g. standard GPR, v-SVR and locally weighted projection regression (LWPR), show that LGP has higher accuracy than LWPR and close to the performance of standard GPR and v-SVR while being sufficiently fast for online learning. [C894]

"Real-time tracking management system using GPS, GPRS and Google earth"

Due to the high cost of fossil-based energy, several methods are proposed to reduce the usage of the energy in logistics and fleet management to be even more. GPS tracking system is a common approach to get vehicle location information in real-time for fleet planning. We proposed a GPS tracking system called Goo-Tracking that is composed of commodity hardware, open source software and an easy-to-manage user interface via a Web server with Google Map or via Google Earth software. The system includes a GPS/GPRS module to location acquisition and message transmission, MMC to temporary store location information, and an 8-bit AVR microcontroller. Our system prototype is shown and tested on a trip from Bangkok to Chonburi. It has shown great stability and also robust message transfer protocol that most of locations are accurately acquired and transmitted to the server in real-time. [C895]

"A practical approach to wireless Power Quality, Energy and Facilities Monitoring System"

In this paper, the authors discuss the way to adopt the cost effective Short Message Service (SMS) applications to Power Quality, Energy and Facilities Monitoring System. Also, the limited up to 160 characters will be

considered during the design, which cannot be used on high data volume such as waveform pattern is not preferred. But for simple message such as voltage dip % is good enough. [C896]

"ELF: A Constraint-Aware XQuery Engine for Processing XML Streams with Minimized Memory Footprint"

XML and XQuery have been widely accepted as the standard data representation and query language for web applications. When the input consists of a large amount of XML tokens, the main memory buffer requirement in XML stream processing can be significant, which might also lead to a significant CPU consumption due to the manipulation cost on the buffered data. To provide real-time responses, serious challenges in memory utilization are faced by the XQuery evaluation over XML streams. In many practical applications, XML streams are generated following a pre-defined semantic constraint such as the document type definition (DTD) and XML schema. [C897]

"General power transmission line on-line monitoring software system based on wireless public network"

Through analyzing problems in aspects of multi-version coexistence, data integration, system expansion and capacity expansion for the power transmission line on-line monitoring software system, a set of decentralized remote monitoring software system based on wireless public network (GPRS/CDMA) was researched and developed. It consists of six subsystems and can expand with the scale of monitored objects. In detail discussed the design concept of key subsystems: the data acquisition service subsystem divided three logic processes of data acquisition, data parsing and data saving into three expandable and isolated software units; the surveillance and maintenance subsystem adopted multicast communication method to acquire status information from each node, so as to form different surveillance data queues interiorly; the expert subsystem designed the data management container by time scale and created a uniform plug-in interface according to analysis in different fields; the hardware debugging subsystem realized a general mechanism that can carry on local and remote hardware debugging, by using of the data stream adapter principle. Compared with traditional system, this system has been improved in availability, expandability, reliability and economical efficiency. [C898]

"A scheme of telemetering and preventing electric larceny system based on GPRS communication system"

For the power supply department, the key problem is hard to find a suitable and cheap way to not only collect huge number of the vastly distributed meters, but also calculate the balance of electric quantity and detect the nontechnical loss (such as electric larceny) automatically. This paper analyzes the structure and principle of the telemetering and preventing electric larceny system based on the public mobile data communication network GPRS. This system realizes the real time and accuracy of reading meter. Meanwhile, for the unique addressing mode, the monitoring software of this system can monitor the process of power provision and consumption, compare and analyze the data in real-time to find the nontechnical loss and measure the power or water supply system weak points; The power supply department can calculate the line loss according to the real-time data; The strong monitoring software also provides some analytic information about the real-time measurements of electrical energy quantities and alarms of electric larceny. The application shows that this system has the character of cheapness, high efficiency, practicability and so on. [C899]

"Wireless monitoring system of vehicle overspeed on freeway based on GPRS"

Vehicle overspeed is an important reason for the traffic accident on the freeway and it is helpful and necessary to monitor the peccancy behavior of over speed. In this paper, design method of the overspeed wireless monitoring system based on GPRS (general packet radio system) is discussed, and the configuration of its hardware and software is introduced. The whole system consists of the subsystems of the vehicle overspeed monitoring stations that are distributed on the freeway and the remote control center. As the over speed action is detected, two images will be captured, analyzed and processed. Then the information of the overspeed vehiclepsila speed, peccancy time, peccancy place serial number, compressed image and etc, will be written to the wireless modem of Motorola G20 through the serial interface and sent to the remote monitoring center through the GPRS network and the GGSN gateway. The remote control center is responsible for data displaying and saving. Integrating the technologies of sensor, number plate recognition and GPRS, the whole monitoring system stands up the trend of vehicle overspeed surveillance on freeway. The design and application of the new type of vehicle overspeed monitoring system will undoubtedly improve the automatic and intelligent management on freeway. [C900]

"On particle filters for landmine detection using impulse ground penetrating radar"

In this paper, we present an online stochastic approach for landmine detection based on ground penetrating radar (GPR) signals using sequential Monte Carlo (SMC) methods. Since the existence of true landmines is unknown and random, we propose to use the reversible jump Markov chain Monte Carlo (RJMCMC) in association with the SMC methods to jointly detect and localize landmines in the light of observations. Computer simulations on real GPR measurements demonstrate the robust and consistent performance of the proposed method. [C901]

"Considerations and improvements of configuration and protection of a 72 kV mining resistance neutral grounded system"

This paper provides a discussion on grounding of the neutral of a 72 kV mining system supply with high and low resistance grounding (HRG/LRG), and proposes improvements to the configuration and protection associated with neutral resistance grounded (NRG) systems. For safety reasons, the ground potential rise (GPR) of the switchyards in the mine is limited to 100 Volt. In addition to the reduction of the mine switchyardpsilas ground resistance, the line-to-ground-fault current is reduced by inserting NGR between the ground and the neural of the source transformer. The paper examines the technical viability of extending techniques used for systems of lower voltages such as those used on some generatorpsilas HRG, to a 72 kV mine system. With the advancement of numerical relays and the economical availability of such relays improved protection systems could be adapted for the subject installations. [C902]

"Logistics information fusion application research based on RFID and GPS"

In allusion to the abuse of the asymmetry and retard of information and the abuse that was difficult to realize the real time coordination and regulation consisted in the process of logistics, this paper brings forward the solution that adopts RFID and GPS as the instrument of information collection, RFID middleware and GIS as the instrument of information fusion and expression, GPRS as the instrument of communications. The storage module, module attached to the van, the command center, the electronic commerce platform and the mobile intelligent terminal make up of the IT infrastructure of third party logistics. The information integration platform introduces the service-oriented architecture based on Web services, fuses the information of RFID, sensors, GPS, the logistics database and the credit database, gains the veracious describe of in-transit visibility, supervises the process of logistics through the visualization of logistics, and builds up the enterprise intelligence utilizing the multi-objective optimization evolution algorithm. All improves the ability of information system and upgrade the competitiveness of third party logistics. [C903]

"An efficient analytical model for QoS engineering in mobile cellular networks"

This paper presents a simple and accurate analytical model to dimension mobile cellular networks with QoS differentiation. QoS per applicative flow is commonly defined in GPRS/EDGE and 3G systems where streaming applications with real time properties and elastic data applications have to share radio resources. The need for accurate and fast-computing tools is of primary importance to tackle complex and exhaustive dimensioning issues. In this paper, we present a generic QoS modeling methodology developed in the context of EDGE networks but that can be adapted easily to a different technology. We develop a ldquoconditional product-formrdquo Markovian model that takes into account the QoS differentiation between real time and non-real time classes and gives closed form expressions for all the required performance parameters at a click speed. We compare our model with simulation and show its accuracy. The speed of our analytical tool allows tackling dimensioning issues that require several thousands of evaluations, which is not tractable with any simulation tool. [C904]

"The Design and Research of Remote Terminal Unit Based on Radio Technology"

This paper describes the design and research of RTU based on GPRS. The function of instrument includes field information sampling, analysis and transmission. In hardware design, the MSP430 microcontroller and GR64 is adopted to improve systemic reliability. In software design, the software development environment of the instrument is a cross compiler (IAR Embedded Workbench) which is design for MSP430 micro-controller by IAR Company. The basic principle, the system composition, and the researches on key technological problems are presented in the paper. The practical results showed the system is stable and reliable. Compared with similar products, this design is characterized with simple hardware structure, powerful software functions, high reliability and low costs. This design can work at a temperature as low as -30 degC, and has a strong anti-jamming capability. Both theoretical and experimental results show that the RTU based on GPRS has favorable performance with low power consumption and high accuracy. [C905]

"Evolution of 3GPP Core Network"

A core network of UMTS has a very long development. The first version of core network corresponds to an improved GSM/GPRS core network. The interfaces are changed and later all conception. The main changes are in using Internet Protocol, adding IMS functionality and finally in complete new packet core of technology called long term evolution. From user point of view it means increasing bit rates from tens kbit/s to tens Mbit/s, offering multimedia services, access to Internet, etc. This paper gives an overview about evolution of UMTS core network. [C906]

"Design of portable terminal device in emergency system for turnpike"

A portable terminal device is designed for emergency system in an expressway with tollgates. It has three main functions such as printing receipts, taking photographs and short-message-based wireless communication. In emergency situation, the device can take the place of common charge computer system inside check kiosks. Its hardware consists of a FPGA chip, high speed embedded microprocessor, GSM/GPRS module, million pixel camera, cipher card and IC card module. The FPGA chip provides logical connection among memory chips, peripheral modules and microprocessor. Meanwhile, it acts as a communication conversion bridge between SPI pattern and UART pattern because there are not enough UART ports in this microprocessor with a vacant SPI port. The FPGA program in Verilog HDL was verified by RTL simulations successfully. [C907]

"Design of jetty ship-moorings monitoring systems based on networks"

Design problem of jetty ship-moorings monitoring systems based on networks is discussed. Considering the requirements of security and reliability for modernization jetty ship-moorings, an new scheme of jetty ship-moorings monitoring systems based on GPRS networks is presented, that is, the long-distance ship-moorings monitoring data and the control signal from control center are transmitted by wireless networks, the monitoring data and alarm value are dynamically displayed by graph in the control center, and stored in database. The jetty ship-mooring monitoring systems based on networks, ship-mooring decentralized control and data centralized manage, not only can avoid rope-broken accidents, but also enhance security and efficiency of the jetty mooring, simultaneously, provide reference for decision of decision-maker in mooring optimization. [C908]

"Architecture for the Internet of Things (IoT): API and Interconnect"

The proposed architecture is structured into a secure API, a backbone, and separate device networks with standard interface to the backbone. The API decouples innovation of services and service logic from protocols and network elements. It also enables service portability between systems, i.e. a service may be allocated to end-systems or servers, with possible relocation and replication throughout its lifecycle. Ubiquitous service provisioning depends on interoperability, not only for provisioning of a standard QoS controlled IP bearer, but also for cross domain naming, security, mobility, multicast, location, routing and management, including fair compensation for utility provisioning. The proposed architecture not only includes these critical elements but also caters for multi-homing, mobile networks with dynamic membership, and third party persistent storage based on indirection. [C909]

"Recognition of patterns from geological structures in radar signals with the neuronal network simulator JNNS"

Aim of GPR measurements is not only to detect the spatial position of reflecting structures, but also to classify its geological reason. The reflection coefficient of a radar signal depends on the reflecting material. Numerous propeties of the recorded signal can be used to assign a reflection with geology. Necessary is the knowledge about unique parameters for a classification and the validation of the results in a known environment. Data from well explored salt mines allows this validation. Neuronal networks are a good tool to optimize parameter sets or patterns regarding to its relevance for an assignment. A neuronal network consists of simple units which transmit information weighted and directed to the next level. The connections between the units are characterized by activation functions which vary during learning processes. By validating a parameter set it is possible to connect an input level with an output level and creating an associative pattern without knowing the deterministic rules between them. Which parameters of a radar signal are relevant to get a result with this method is the topic of this paper. The neuronal network simulator JNNS used here was developed at the university Stuttgart. [C910]

"Helicopter-borne GPR systems: A way from ice thickness measurements to geological applications"

Since more then 30 years ground-penetrating radar (GPR) has become a useful tool in solving different geophysical tasks in environmental geology, glaciology, archaeology, mineral exploration and for the detection of

near-surface objects. The large variety of ground based GPR devices, even for rugged field conditions, is an effective tool for surveying small areas. GPR-equipped fixed-wing aircrafts are used mainly for surveying large areas or inaccessible regions; for example desert areas, permafrost areas or high mountain ranges. A GPR system installed in a helicopter is an effective possibility to survey large areas with high data density. Large areas, even in inaccessible regions, may be surveyed within short time and even under limited logistic demands. The high agility of a helicopter allows to increase the data density in areas of special interest. [C911]

"Development of ground penetrating radar in the geocenter Hannover, Germany-a review"

One of the first applications of GPR was geological exploration such as salt and coal, which was started 1970s. Many tests showed it is a good method to estimate the location of mineral resources. The GPR equipment at that time was quite simple, but in specific application, it was quite useful. We can find many salt deposits in north Germany. The salt deposits in natural geology are complete dry material and it is transparent for electromagnetic waves. Therefore maximum range by GPR reaches several hundred meter very easily. GPR plays an important role to find any anomalous material in salt deposit. The same concept can be used for monitoring of water flow in crystalline rock. Crystalline rock such as granite contains very little water flow in it, therefore it is also a good material for storage. At the same time, electromagnetic waves can penetrate relatively easily in this material. GPR in salt was quite successfully used, then advanced GPR systems such as directional borehole radar were also developed. In addition, salt deposits can be used for GPR experiments for fundamental understanding of electromagnetic wave propagation, and analysis of antenna performance in material. [C912]

"Advanced Contrast between GPRS and CDMA one packet data"

Proliferated needs of the growing market regarding better data packet and voice services is looking to be met by deploying packet data services. This feature involves a complete upgrade of the network. The path to achieve this greatly differs between GSM and CDMA. networks. This paper gives an advanced comparison between the GSM and CDMA networks in the path to deploying packet data with essential features of cost implications, time, infrastructure and compatibility in various handsets, speed and implementation methods. Detailed procedure of CDMA to 3G CDMA path is mentioned along with critical comparison with GSM path at each and every stage. [C913]

"UWB array-based radar imaging using modified Kirchhoff migration"

This paper presents a new modification of Kirchhoff migration algorithm for ultra-wideband (UWB) array-based radar imaging. The developed algorithm is evolved from traditional Kirchhoff migration which is based on the classical integral theorem of Helmholtz and Kirchhoff. The new algorithm is designed for array-based radar imaging with arbitrary multiple input multiple output (MIMO) configuration. The developed algorithm is compared with conventional diffraction stack migration using both synthetic data from numerical simulation and measurement data from landmine detection. The results have shown promising improvements in the aspects of beamwidth, side-lobe rejection ratio and the ability to reconstruct shapes of distributed targets. [C914]

"Multi-interfaced mobile router scheme and enhanced path selection algorithm"

Network mobility (NEMO) aims providing seamless Internet connectivity for the network which is moving around with vehicles. Multiple care of addresses (MCoA) registration was also proposed as an extension. This paper studies the seamless Internet connectivity of mobile router (MR) which is equipped with WLAN, CDMA and GPRS interfaces simultaneously. Concretely, a smooth inter-interfaces hand-off algorithm is proposed and experimented on our platform successfully, traffics are transferred smoothly between different interfaces without packet loss. We also propose a path selection algorithm based on the measured parameters for better performance. Numerical analysis is also proposed and paths are compared in term of packet delivery delay. [C915]

"An architecture Wi-fi and GPRS for efficient management of distribution electrical networks"

In this paper, a telecommunication infrastructure for faults management is proposed. The complete automation of the electrical energy distribution requires the implementation of suitable data transmission systems able to easily interface with microprocessor based systems and to handle large amount of data. In particular, reliability and speed of the data transmission system are required in the fault diagnosis and post-fault management procedures, in order to guarantee high quality standards. The proposed diagnostic system indeed works by means of a set of intercommunicating MV/LV dasiaintelligent substationspsila. In this paper, after a brief description of the fault diagnostic system, an optimized telecommunication infrastructure is proposed. It uses the potential of both Wi-fi and GPRS telecommunication systems allowing efficient management of modern distribution systems. [C916]

"A fundamental study of bistatic UWB radar for detection of buried objects"

We have developed a bistatic radar system for detection of buried objects. The targets include buried land mines, and explosive material in a wall. The system is composed of a fixed transmitting antenna and a small receiving antenna. The receiving antenna uses a passive optical electric field sensor. Due to its small size of the receiving sensor, the operation of the system is easy in various conditions. Then we propose an effective signal processing by F-K filtering. By suppressing the strong transmitting signal, we could obtain clear images of the buried objects. We think this radar system is useful in various security issues. [C917]

"A hand-held dual-sensor system using impulse GPR for demining"

A hand-held dual-sensor system for demining has been developed. The system integrates ground-penetrating radar (GPR) and a metal detector. One of the features of the system is imaging capability. The system achieves the position information by tracking the sensor head. Thus synthetic aperture radar (SAR) processing can be applied and the performance can be significantly improved. The system was tested by real deminers in Croatia 2007. The trial results confirmed that false alarms (alarms from other than landmines) were significantly reduced by using GPR, meaning total demining operation can be accelerated. Them we started a half-year evaluation test of the system in quality-control (QC) test in Croatia in December 2007. This test will be conducted in various soil environmental conditions in Croatia. [C918]

"Monostatic imaging of small objects in UWB sensor networks"

This article introduces new imaging algorithm suitable for the application in UWB sensor networks. This new algorithm outperforms UWB migration imaging algorithms known from e.g. ground penetrating radar, or through-wall applications. Proposed algorithm produces images of an inspected environment that contain fewer artifacts and are easier to interpret. This is illustrated by a measurement example. [C919]

"Experimental performance investigation of double-layer shields at power frequency magnetic shielding"

Double-layer shields have received attention in magnetic shielding at extremely low frequency. Also, cylindrical shape is one of shielding structures widely used in industry. In this study, cylindrical shaped shields with commonly available and inexpensive materials used for power frequency magnetic field shielding. The magnetic shielding performances are investigated experimentally for single and double-layer shields at power frequencies. The aim of this work is to extend the discussion in the area of shielding performance of the double-layer shields. [C920]

"Optical and radio probing of lightning-associated phenomena in the atmosphere and ionosphere"

The monitoring and/or sounding of lightning discharges and their associated phenomena (mesospheric optical emissions etc.) has been performed by radio and optical measurements. We pay attention to the winter lightning in the Hokuriku area (Japan Sea side) of Japan, because it is extremely important to investigate whether lighting discharges in the Hokuriku area (whole spatial scale is relatively small in comparison with the conventional summer lightning in the US) could trigger the mesospheric optical emissions. The optical observation of those mesospheric emissions and the corresponding radio sounding by ELF and VHF radio waves of their parent lightning, have been reported. The observing systems are firstly presented, and our latest observational facts on the mesospheric emissions in the Hokuriku area, their parent lightning and some computer simulations on the sprite initiation, are presented. [C921]

"Combating Packet Reordering in Vertical Handoff Using Cross-Layer Notifications to TCP"

In this paper we propose an enhancement to the TCP sender algorithm to combat packet reordering that may occur due to a vertical handoff from a slow to a fast access link. The proposed algorithm employs cross-layer notifications regarding the changes in the access link characteristics. Our algorithm avoids unnecessary retransmissions by dynamically changing the dupthresh value according to the bandwidth and delay of the old and new access links involved in the handoff. In addition it uses DSACK information to infer that there are no congestion-related losses and selects proper values for cwnd and ssthresh after the handoff. Simulation results show that the unnecessary retransmissions caused by packet reordering in a vertical handoff can be effectively minimized over a wide range of bandwidth and delay ratios of the access links. In addition, our algorithm is effective in reducing the congestion-related packet losses due to a decrease in bandwidth-delay product (BDP) after a handoff. [C922]

"Ionospheric monitoring by ELF signals received at Moshiri station in Japan"

The observation at Moshiri (Hokkaido), Japan of ELF transmitter signals (~82 Hz) from a Russian transmitter has been described. The detection and identification, wave characteristics. etc. have been analyzed by using the ELF waveform data at Moshiri(two horizontal magnetic fields and one vertical electric field), which are subjected to the conventional FFT (fast Fourier transform) analysis, Nuttal filter etc. The wave characteristics at Moshiri at a distance (~6 Mm) from the transmitter, are compared with those near the anti-podal points, in order to compare with the ELF full-wave propagation theory. [C923]

"Measurement of survivor location by using GPR with two dimensional array antenna"

The purpose of this study is to improve rescue radar system with array antennas so that it can quickly identify far-off survivors under rubble. Authors focused on time-variable elements from the respiration of a survivor awaiting rescue in order to remove clutter components, such as the rubble. Authors propose the method which identifies the location of the survivor in three dimension by using the two dimensional array antennas. The experimental results of measurement for subjects location by the proposed method agreed with the actual location of the subjects. [C924]

"Advance visualization of inner concrete structure using micro-wave subsurface radar"

In this report, an improved signal processing procedure with a novel measurement system is considered for advanced visualization of inner concrete structures. In order to visualize the inner concrete structures more exactly in an efficient way, a 2-step search procedure is proposed by developing an antenna scanning system which can be scanned on an arbitrary route manually and estimate its self-position automatically. In the first step of the procedure, the antenna is scanned arbitrarily on a concrete in order to visualize approximate arrangement of the inner structure by applying the principle of synthesis aperture. Then, in the second step, the antenna is scanned straightly across the buried objects respectively, in order to visualize detailed attributes such as exact positions or materials of the buried objects by an advanced signal processing method. Evaluation of the proposed signal processing procedure has been carried out experimentally by observing a concrete test specimen, which imitates a part of general concrete wall, and finally, fundamental effectiveness has been confirmed. [C925]

"CLEAN deconvolution for sidelobe suppression in random noise radar"

The term random noise radar (RNR) refers to a class of radar using random noise as its transmitted signal. Noise waveforms have proven useful in a number of radar applications; however, dynamic range performance suffers due to high range sidelobes. This paper investigates the use of the CLEAN deconvolution algorithm to suppress range sidelobes in noise radar. Simulation results are presented demonstrating the algorithms effectiveness, using both point and contiguous radar targets. [C926]

"Identification of buried unexploded ordnance"

This paper summarizes much information concerning identification of buried targets (mines and unexploded ordnance). This utilizes concepts from the singularity expansion method and symmetry as they appear in the electromagnetic scattering. See the reference list for locating many more references. [C927]

"A Single-Hop Mobile Peer-to-Peer Network Model Based on TD-SCDMA"

In this paper, we propose a new hybrid network model which is based on TD-SCDMA with P2P technology of ad hoc network. Mobile terminals can communicate directly with each other and build the single-hop ad hoc network. The proposed hybrid network can effectively improve the power consumption and smooth switching. Analysis and simulation concerning both routing protocol and system capacity have been performed. The simulation results show that with the proposed system, cellular system capacity can be enhanced and energy consumption can be reduced. The simulation results show that our approach can result in a 12% improvement in system capacity and a 37% decrease in energy consumption. [C928]

"Multi-access Mobility in Heterogeneous Wireless Networks: Today and Tomorrow"

The wireless network landscape is changing gradually from homogeneous to heterogeneous and future generation networks are envisioned to be a combination of diverse but complimentary access technologies, like GPRS, WCDMA/HSPA, LTE, WiMAX, and WLAN. One issue which has become apparent recently with the proliferation of different link layer technologies is how service providers can offer a consistent service across heterogeneous networks and also across access networks that they donpsilat own themselves. The paper

presents the current inter-working technologies and preferred ones, and schemes that provide QoS. This paper highlights some open issues that need to be addressed in order to enable multi-access mobility. The paper shows that inter-working between access technologies should be limited to only those where there exists a strong business case or operator interest. [C929]

"Context-Cognizant Service Discovery in Autonomous Decentralized Community System to Achieve Timeliness"

Advancement of wireless communication and proliferation of mobile devices have realized location-aware services. But these services don't take into consideration time aspect and user's interests. Autonomous decentralized community system (ADCS) has been proposed which incorporates time-awareness and demand-oriented contexts along with location information to revamp one-dimensional LBS into three-dimensional situation-aware community pervasive services (CPS). In ADCS, the goal is not only to find the customized service but to find the most appropriate one according to context of proximity, with most reasonable price, in real-time considering dynamic situation. Unlike conventional N-ring strategy, we present novel idea of autonomous expansion of search ring using snail's pace advancement of request message followed by swift boundary confining mechanism through reply message. Extensive simulation results are presented to corroborate proposed method for resource discovery in networks with peer to peer architecture, and discovery of most appropriate service in ADCS employing time-distance parameter. [C930]

"Local Gaussian process regression for real-time model-based robot control"

High performance and compliant robot control requires accurate dynamics models which cannot be obtained analytically for sufficiently complex robot systems. In such cases, machine learning offers a promising alternative for approximating the robot dynamics using measured data. This approach offers a natural framework to incorporate unknown nonlinearities as well as to continually adapt online for changes in the robot dynamics. However, the most accurate regression methods, e.g. Gaussian processes regression (GPR) and support vector regression (SVR), suffer from exceptional high computational complexity which prevents their usage for large numbers of samples or online learning to date. Inspired by locally linear regression techniques, we propose an approximation to the standard GPR using local Gaussian processes models inspired by. Due to reduced computational cost, local Gaussian processes (LGP) can be applied for larger sample-sizes and online learning. Comparisons with other nonparametric regressions, e.g. standard GPR, nu-SVR and locally weighted projection regression (LWPR), show that LGP has higher accuracy than LWPR and close to the performance of standard GPR and nu-SVR while being sufficiently fast for online learning. [C931]

"Ground Moving Target Tracking with context information and a refined sensor model"

For the detection of targets moving on ground, airborne ground moving target indicator (GMTI) radar is well-suited. In the tracking process, complex target dynamics, particularly stop and go maneuvers, and target masking due to Doppler blindness, often lead to track losses. By means of a refined sensor model it is possible to detect and handle such diverse target states. In addition, the generation of precise and continuous tracks from GMTI radar plots often is a demanding task due to terrain and technical obscuration and clutter. The exploitation of topographic background information such as road maps and terrain data is therefore highly desirable for the enhancement of track quality and track continuity. In the present paper these two aspects have been merged. The significant gain in track quality and track continuity is demonstrated in a number of simulation scenarios involving Doppler blindness and terrain obscuration. [C932]

"On the use of aggregation operator for humanitarian demining using hand-held GPR"

This paper applies the OWA aggregation operator to hand-held GPR data to improve the detection of landmines. Data from a number of sweeps are collected when the hand-held detector is operating in discrimination mode. The energy density spectra of the GPR signal return from individual sweeps are estimated and two OWA aggregation operations are performed to select the good quality sweeps that will be used for landmine detection. Experimental results using the real data collected from two different test sites show that the OWA operations provide significant performance improvement for landmine detection at high probability of detection. [C933]

"A new accurate approximation for the Gaussian process classification problem"

Gaussian processes is a very promising novel technology that has been applied for both the regression problem and the classification problem. While for the regression problem it yields simple exact solutions, this is not the case for the classification case. The reason is that we encounter intractable integrals. In this paper we propose a new approximate solution for the Gaussian process classification problem. The approximating formula is based on certain transformations of the variables and manipulations that lead to orthant multivariate Gaussian integrals.

An approximation is then applied that leads to a very simple formula. In spite of its simplicity, the formula gives better results in terms of classification accuracy and speed compared to some of the well-known competing methods. [C934]

"Batch-Learning Self-Organizing Map with false-neighbor degree between neurons"

This study proposes a batch-learning self-organizing map with false-neighbor degree between neurons (called BL-FNSOM). False-neighbor degrees are allocated between adjacent rows and adjacent columns of BL-FNSOM. The initial values of all of the false-neighbor degrees are set to zero, however, they are increased with learning, and the false-neighbor degrees act as a burden of the distance between map nodes when the weight vectors of neurons are updated. BL-FNSOM changes the neighborhood relationship more flexibly according to the situation and the shape of data although using batch learning. We apply BL-FNSOM to some input data and confirm that FN-SOM can obtain a more effective map reflecting the distribution state of input data than the conventional Batch-Learning SOM. [C935]

"An adaptive ground penetrating radar imaging system based on complex-valued self-organizing map-recent progress and experiments in Cambodia -"

This paper reports recent progress in an adaptive ground penetrating radar imaging system based on a complex-valued neural network (CVNN), i.e., a complex-valued self-organizing map (CSOM). In the CSOM processing, we deal with feature vectors that represent complex-amplitude texture in space and frequency domains. We developed a switched walled linearly tapered slot antenna (walled-LTSA) array for the front-end. A higher resolution results in a better classification quality. To realize a high resolution in range and azimuth directions, we utilize a wide frequency bandwidth in frequency stepping operation, and a special switching scheme for the walled LTSA. We conducted experiments in Cambodia. In this paper, we report successful plastic landmine visualization, not only for targets buried in normal sand but also for those in wet laterite soil at the Siem Reap test site. Adaptive coherent radar imaging is one of the most potential application fields of the CVNNs. [C936]

"Adaptive window size to reduce the influence of heterogeneous mobility on TCP performance"

The proliferation of wireless access technologies and the growth of demand for mobile services pose the need for seamless mobility across heterogeneous networks. Moreover, the widespread use of the TCP/IP protocol stack clearly reinforces the need to enhance its performance in such scenarios. In this paper we present an experimental evaluation of the influence of the so called heterogeneous (vertical) mobility on the behavior TCP protocol, and we propose a cross-layer solution to reduce this impact in future mobile environments. The described solution is based on the dynamic adaptation of the window size for a TCP connection, based on the related mobility conditions. We have evaluated this solution using the BIB3R testbed, which emulates the inter-working between commercial wireless technologies (e.g., UMTS, Wi-Fi, WiMAX, etc). The results showed that by adjusting the window size before the vertical handover process, TCP connections can reduce the adaptation time between 30 and 40 percent depending on the mobility scenario (heterogeneous links). [C937]

"Performance evaluation of the software download procedure in an IEEE 802.11 WLAN"

In the last years many different technologies and air interfaces have been standardized. B3G systems will allow the integration and coexistence of these diverse technologies in a common environment. It is a priority objective of this scenario of have a flexible terminal that can dynamically select the most appropriate RAT and reconfigure itself from the physical to the application layer. This reconfiguration can be carried out by downloading the various software modules that form the new RAT through the air interface on which it is currently operating. The aim of this paper is to evaluate the performance of the software download procedure when the terminal is operating in an IEEE 802.11 WLAN. [C938]

"Partial differential equation-based GPR signature discrimination for automatic detection of bridge deck delamination"

Accurate assessment of the quality of concrete bridge decks and identification of corrosion induced delamination leads to economic management of bridge decks. It has been demonstrated that ground penetrating radar (GPR) can be successfully used for such purposes. The growing demand on GPR has brought into the challenge of developing automatic processes necessary to produce a final accurate interpretation. However, there have been few publications targeting at automatic detection of bridge deck delamination from GPR data. This paper proposes a novel method using partial differential equations (PDEs) to detect rebar (or steel-bar) mat signatures of concrete bridges from GPR data so that the delamination within the bridge deck can be effectively located.

The proposed algorithm was tested on both synthetic and real GPR data and the experimental results have demonstrated its accuracy and reliability, even for diminished contrast and low signal-to-noise ratio. [C939]

"Multilayer time domain transmission line model"

The multilayer time domain transmission line model of ground penetrating radar (GPR) has been described in the paper. It is comprehensive and helpful in understanding basic principles of GPR and its main limitations. What is more one can use the model to simulate effectiveness of the radar in specific situations, as long as it can estimate the layer characteristics for the model. [C940]

"A Device Management Framework for Secure Ubiquitous Service Delivery"

In a mobile ubiquitous environment, service interactions between a user device and a service provider should be secure, regardless of the type of device used to access or consume a service. We present a secure device management framework (SDMF), designed to securely deliver services to user devices, whilst also hiding (some of) the complexity of security management from users. Key to this framework is the device management entity (DME), that manages a user device's security credentials, and interacts with service providers on its behalf. This framework also provides users with assurance that a compromised device cannot consume the delivered service, and, at the same time, prevents users from illegally sharing their credentials with other users. We achieve these objectives using trusted computing functionality and certain other security mechanisms. [C941]

"Lazy Self-Organizing Map and its behaviors"

The Self-Organizing Map (SOM) is a famous algorithm for the unsupervised learning and visualization introduced by Teuvo Kohonen. This study proposes the Lazy Self-Organizing Map (LSOM) algorithm which reflects the world of worker ants. In LSOM, three kinds of neurons exist: worker neurons, lazy neurons and indecisive neurons. We apply LSOM to various input data set and confirm that LSOM can obtain a more effective map reflecting the distribution state of the input data than the conventional SOM. [C942]

"Understanding customer behaviour"

The load-generation balance is the No. 1. Rule of the power system operation. The increasing power demand requires better exploitation of the existing system. To reach this objective a possible method is the decrease of the peak/valley ratio of the daily load curve. We dig in depth how new DSM capabilities can be found. The traditional ripple control cannot be extended on a lot of programmable household appliances, like the washing machine, refrigerator, tumble drier, etc. We also investigated typical households and found great voluntary control potential. The paper presents different analysis techniques, measurement results and gives a structure to move these loads into the ldquosmoothrdquo DSM. [C943]

"Transferred voltages in multigrounded systems"

Transferred voltages by the neutral grounding appear when a fault to ground occurs in the medium voltage network of the distribution system, when the primary and secondary neutrals are interconnected in the distribution transformers. This phenomenon is particularly important in systems with multigrounded neutrals where a local fault is "seen" by the whole circuit, because of the multiple current paths to earth. So, a ground potential rise, GPR, is presented along the circuit. The GPR magnitudes can add up to many hundreds volts even in points kilometers far from the fault. This work assesses the behavior of GPR along the circuit and identifies the main variables that influence the transferred voltage levels. Simulations are performed in the ATP program, and the results analysis reveals some behaviors not obvious at all, that offer new criteria to manage these transferred voltages. [C944]

"Remote health monitoring with wearable non-invasive mobile system: The Healthwear project"

This paper focuses on the technical solutions enabling the monitoring of health conditions by means of ECG, HR, oxygen saturation, impedance pneumography and activity patterns. The Healthwear service is based on the Wealthy prototype system. A new design has been made to increase comfort in wearing of the system during daily patient activities. The cloth is connected to a patient portable electronic unit (PPU) that acquires and elaborates the signals from the sensors. The PPU transmits the signal to a central processing site through the use of GPRS wireless technology. This service is applied to three distinct clinical contexts: rehabilitation of cardiac patients, following an acute event; early discharge program in chronic respiration patients; promotion of physical activity in ambulatory stable cardio-respiratory patients. [C945]

"The effect of GSM-like ELF radiation on the alpha band of the human resting EEG"

Mobile phone handsets such as those operating in the GSM network emit extremely low frequency electromagnetic fields ranging from DC to at least 40 kHz. As a subpart of an extended protocol, the influence of these fields on the human resting EEG has been investigated in a fully counter balanced, double blind, cross-over design study that recruited 72 healthy volunteers. A decrease in the alpha frequency band was observed during the 20 minutes of ELF exposure in the exposed hemisphere only. This result suggests that ELF fields as emitted from GSM handsets during the DTX mode may have an effect on the resting alpha band of the human EEG. [C946]

"Effects of magnetic fields on intracellular calcium oscillations"

Based on the model of the two calcium stores developed by Goldbeter, and the viewpoint that the cell membrane is a major site of interaction for extremely-low-frequency (ELF) electromagnetic fields, the permeability of ions can be changed by electromagnetic fields, a theoretical model of cytosolic calcium oscillations influenced by magnetic fields is presented. It is shown that, the field frequency condition will influence the pattern of calcium oscillation while the field strength was given, and the magnetic field strength will change the pattern of calcium oscillation when the frequency was 50Hz and 100Hz. Therefore, intracellular calcium oscillations can be influenced by ELF magnetic fields and then a series cellular response could be transformed. [C947]

"A real-time prediction system of soil moisture content using genetic neural network based on annealing algorithm"

The forecast of soil moisture is the basis of agriculture water-saving irrigation. This paper designs and implements a real-time prediction system of soil moisture based on GPRS and wireless sensor network. Front-end of system uses wireless sensor network to collect moisture data, GPRS network to transmit data; back-end uses genetic BP neural network to analyze and process data, simulated annealing algorithm to optimize result, and gives a real-time prediction. Experimental results show that this system has the advantages of low-cost, high accuracy, convenient maintenance, etc. [C948]

"Design and implementation of Intelligent Transportation System based on GPRS and Bluetooth hybrid model"

With the development of communication technology, recently, a lot of attempts related to Intelligent Transport System have come forth at home and abroad. Based on the exploration of wireless communication in the intelligent public transport system, a hybrid model of GPRS and Bluetooth is provided which is fast, stable and secure and a new model of intelligent public transportation system is established on the existing transportation model. It introduces the system of composition and working principle, and completes the design and implementation of system. This model of communication has been used in the actual project and has achieved certain results. [C949]

"The design of intelligent bus movement monitoring and station reporting system"

The paper lays out the design of intelligent bus movement monitoring system and station-reporting system. The paper consists of two parts: hardware and software. Hardware part puts forward in detail the design of the main circuit unit and introduces the application of GPRS module MC55. Hardware system uses S3C44B0 to control ISD25120 voice chip and LCD module after receiving data sent by GPS module. Meanwhile the location information will be sent to the control centre by using GPRS module. Software part includes the flow chart of station reporting and network access. It also introduces the software design of the monitoring center. Meanwhile the error factors are analyzed. It is proved that the design is not only reasonable but also applicable. [C950]

"A Framework for Dynamic Service Discovery"

Service discovery has been recognised as an important activity for service-based systems. In this paper we describe a framework for dynamic service discovery that supports the identification of service during the execution time of service-based systems. In the framework, services are identified based on structural, behavioural, quality, and contextual characteristics of a system represented in query languages. The framework supports both pull and push modes of query execution. In the approach, a service is identified based on the computation of distances between a query and a candidate service. A prototype tool has been implemented in order to illustrate and evaluate the framework. The paper also describes the results of a set of experiments that we have conducted to evaluate the work. [C951]

"Improved hardware implementation of a complementary sequences generator and correlator"

Complementary sequences are currently being applied to multiple fields of engineering. Given their particular mathematical properties, they have been widely used in applications ranging from robotics to communications, and have even been implemented in programmable logic devices (e.g. FPGA). Most of the applications proposed in the literature need to employ efficient architectures to reduce the computational load. This paper describes improved generator and correlator architectures which result in hardware requirements reduction when implemented in FPGAs. [C952]

"The design and implementation of Intelligent Network Camera"

This paper discusses a type of intelligent network camera composed of ARM and Linux Operating System. Firstly, the design of the hardware is introduced, including the Memory control circuit, Ethernet interface circuit and the GPRS module. Then the construction of the software platform is discussed, including the transplanting of system and the design of application. At last, the motion detection technology and its implementation process are proposed. [C953]

"On the Availability of GNSS and Terrestrial Location Techniques: A Field Study"

Hybridization is a hot topic in the location field. Since there is no universal location technique that is capable of positioning in indoor and outdoor environments, two or more techniques must be coupled to produce a complete location solution. Accordingly, information on the availability of each of the techniques being coupled is of great relevance in the design and implementation stages of the location system. In public cellular networks, this coupling usually involves a terrestrial triangulation technique (e.g. E-OTD, OTDOA) and a GNSS-based technique (e.g. A-GPS). The purpose of this paper is twofold. Firstly, it presents a software tool developed for studying the availability of location systems in certain environments, which is able to capture and present information on the availability of satellites in the NAVSTAR constellation (i.e. GPS) and the GSM/GPRS base stations being received in the user terminal. Secondly, it studies the coverage of these techniques using the tool described. Availability data for three routes in an urban environment are gathered and analyzed. In two of them, GPS did not cover 100% of the route, which demonstrated the need to couple the technique with another terrestrial technique to cope with the "dark" areas. [C954]

"Extensive GPRS Latency Characterization in Uplink Packet Transmission from Moving Vehicles"

The GPRS (general packet radio service) broad availability is driving a widespread development of mobile telemetry systems for fleet management, supply chain management and dangerous goods monitoring applications. In this paper we present the results of extensive measurements of the GPRS network-layer uplink latency performed over a four-month period from about fifty road trucks using telemetry service, providing an uplink latency characterization in a moving vehicle environment. The results show the relationship between vehicle speed and latency. Furthermore, the performances of the stop-and-wait in a moving vehicle environment are evaluated in order to design a variant of such a protocol based on a vehicle speed-aware retransmission timeout. [C955]

"Privacy Protected ELF for Private Computing on Public Platforms"

Private computing on public platforms (PCPP) is a new technology designed to enable secure and private execution of applications on remote potentially hostile public platforms. PCPP uses a host assessment to validate a host's hardware and software configuration and then uses 4 active security building blocks which together allow an application to remain unaltered, unmonitored, and unrecorded before, during, and after execution on the public platform. Privacy protected ELF (PPELF) is the building block used by PCPP to protect application executable code while it is stored on the public platform and to provide a secure binary load mechanism. PPELF is an encrypted binary executable format and methodology which uses just in time decryption during the executable load procedure. In this paper we describe the PPELF file format, our new PPELF binary format loader, and our updates to the GLIBC ELF interpreter to support PPELF. We also provide experimental results detailing the initial load-time and run-time penalty associated with the use of PPELF. [C956]

"Foliage Clutter Modeling Using the UWB Radar"

In this paper, we propose that the foliage clutter follows log-logistic model using maximum likelihood (ML) parameter estimation as well as the root mean square error (RMSE) on PDF curves between original clutter and statistical model data. The measured clutter data is provided by Air Force Office of Scientific Research (AFOSR). In addition to investigating the log-logistic model, we also compare it with other popular clutter models, namely log-normal, Weibull and Nakagami. We show that the log-logistic model not only achieves the smallest standard

deviation (STD) error on estimated model parameters, but also has the best goodness-of-fit and smallest RMSE. Further, the performance of detection at presence of foliage clutter is theoretically analyzed. [C957]

"Detection of 12th September 2007 Sumatra Tsunami at Goa and Kavaratti Island"

Subsurface pressure based real-time reporting and Internet-accessible coastal sea-level stations designed and established by the Indian National Institute of Oceanography (NIO) reported the 12thSeptember 2007 Sumatra tsunami waves from Goa (west coast of India) and Kavaratti Island (Lakshadweep archipelago) in the Arabian Sea. The sea-level stations sampled and transmitted the subsurface pressure data to the Internet server (IS) via GPRS cellular network at 5-minutes intervals. The subsurface pressure data received at the IS are converted to sea-level data and then the observed, predicted, and residual sea-levels in graphical format are displayed in real time on Internet. The graphical display from our sea-level station at Goa provided an indication of the presence of a distinct signal of tsunami periodicity. Spectral analysis of this data clearly reveals a dominant period of about 43 minutes. The tsunami wave arrived at the Goa site at ~00 hr: 45 minutes 1STon 13 September 2007, after traveling for ~8 hr from the tsunami source region (Sumatra). The first wave was negative (trough). The observed and the maximum trough-to-crest wave height was 29 cm. The tsunami wave which arrived at Kavarathi Island at 22 hr 1STon 12thSeptember 2007 was less prominent (trough-to-crest wave height ~5 cm) relative to that observed in Goa. Thus, tsunami signal at Goa was ~ 6-fold larger than that at Kavarastti Island. Arrival of a detectably large tsunami signal first at Kavaratti Island and 2 hr: 45 minutes later at the shallower Goa coastal region of the mainland shows the importance of having real-time monitoring and Internet-accessible sea-level stations on India's island locations for effective tsunami warning purposes. [C958]

"Design and realization of regional power quality monitoring system"

Power quality monitoring is the necessary condition that makes power supply in good working order. This paper presents a kind of new system that can monitor regional power quality. The system adopts the standard of PQDIF as the power quality data norm, expert system to analyse the status of regional power quality and the communication way of GPRS to transmit data. First of all, through this system the power quality manager can check the power quality status of each monitoring station by network from time to time, so we can analyse in time and reflect overall power quality level. Secondly, through the monitoring track record and statistic of power quality accident, the power supply and consumers both can define respective power quality administration obligation, so this system can also provide evidence which effectively settles the dissension because of power quality. Also it can monitor actual power quality of customers and is useful to establish a green electric power system. [C959]

"A Fully Integrated Quad-Band GSM/GPRS CMOS Power Amplifier"

The presented PA proves the viability of CMOS technology for watt-level fully integrated power generation for wireless applications and serves as another step toward a single-chip cell-phone. [C960]

"A wireless network based on the combination of Zigbee and GPRS"

Due to its low-power consumption, low-cost, self-organization and powerful ability to route data, ZigBee, an emerging wireless network technology, has plenty of applications; GPRS (general packet radio service) network, a convenient way to access Internet, covers widely nowadays. This paper combines GPRS and ZigBee to establish a multi-mode network structure which employs GPRS as the data transmission device in the wide-area while ZigBee in the local area. This kind of network structure, providing a simple way to setup wireless network between terminal equipment, remote devices and personal stuff, will make the data servicing people freely. [C961]

"Signalling Cost Evaluation of Mobility Management Schemes for Different Core Network Architectural Arrangements in 3GPP LTE/SAE"

System architecture evolution (SAE) is one of the key challenges for the long term evolution(LTE) of 3G research, charted by 3GPP, aiming to develop a new core network for improving the IP based packet-switched network performance. This paper considers different mobility management schemes for different SAE core network architectural options proposed in 3GPP, and evaluates their performance according to signalling cost by using analytical modelling based on the random walk model. Our analysis shows that the mobility management performance of the different options on both Idle and Active mode. Regarding the architecture, options 2 and 3 have the best trade-off in total signalling cost performance in both modes and signalling load on each network node for system scalability. For mobility management, Proxy MIPv6 has shown that it is able to effectively reduce the signalling cost for mobility management for all architecture options. [C962]

"A Seamless Vertical Handover Scheme for End-to-End Reconfigurability Systems"

The pouring of more and more attractive radio access technologies (RATs) with complementary characteristics has inspired the trends of interworking and convergence in future wireless systems. End-to-end reconfigurability (E2R) is an approach toward the convergence of diverse RATs. This paper aims at investigating an effective seamless vertical handover (VHO) scheme for E2R systems. The system model supporting the VHO scheme is brought forward. A network sort algorithm is developed enabling terminals to select the most appropriate network to handover. Particularly, we propose a novel handover trigger algorithm based on quality of service (QoS) evaluation allowing terminals to initiate a handover when the QoS is lower than their expected value. Simulation results reveal that the proposed VHO scheme enhances the user satisfaction as well as optimizes the overall network performance. [C963]

"UWB Radar Sensor Networks for Sense-Through-Foliage Target Detection"

In this paper, we propose a discrete-cosine-transform (DCT)-based approach for sense-through-foliage target detection when the echo signal quality is good, and a radar sensor network (RSN) and DCT-based approach when the echo signal quality is poor. A RAKE structure which can combine the echos from different cluster-members is proposed for clusterhead in the RSN. We compared our approach with the ideal case when both echos are available, i.e., echos with target and without target. We also compared our approach against the scheme in which 2-D image was created via adding voltages with the appropriate time offset. Simulation results show that our DCT-based scheme works much better than the existing approach, and our RSN and DCT-based approach can be used for target detection successfully while even the ideal case fails to do it. [C964]

"Pulse design of uwb short range radar for vehicular application"

A pulse design based on Rayleigh pulse for ultra- wideband (UWB) short range radar for vehicular application is proposed. Through the search of the peak frequency, initial value range of the pulse shape parameter alpha is selected. Then the upper bound and lower bound are determined by 22 and 29 GHz keen points at which the PSD is equal to or lower than spectral mask. Simulation results show that this method can generate pulse shapes which comply with FCC regulation. [C965]

"Symmetry filtering method for GPR clutter reduction"

The clutter reduction is one of the most important problems in the ground penetrating radar (GPR) applications. The detection performance of GPR is heavily limited by clutters. In this paper, a novel and simple clutter reduction method based on the design of a symmetry filter, which is adapted to B-scan, is presented. Compared with average subtraction, SaS method and two-dimensional digital filter using the experimental data, the proposed method is more effective on reducing the clutters due to undulated ground bounce, soil roughness scattering and external anomalies reflections. [C966]

"Calibration of the mono-static stepped-frequency GPR with a Vivaldi UWB antenna"

The mono-static stepped-frequency ground penetrating radar (GPR) with a Vivaldi ultra-wide band (UWB) antenna was used to non-destructive estimate the parameters (permittivity, conductivity and thickness) of each layer of a stratified subsurface medium. In this realization, a calibration procedure is necessary. This paper introduces the principle and the implementation of this calibration. The non-directive property of the Vivaldi antenna makes a challenge of the calibration of the system, because the measurement results are heavily disturbed by reflections from surrounding objects in air. However, after a suitable calibration, it can be used successfully in this radar configuration, and this was validated by the experiment. [C967]

"Modeling of metallic landmine electromagnetic characteristic in GPSAR"

Air- or vehicle-borne ground penetrating synthetic aperture radar (GPSAR) has the capability to detect subsurface objects over large area from a standoff distance quickly. In order to reduce the false alarms in object detection, it is needed the design efficient detector on the electromagnetic characteristics between mines and clutter. A method on analyzing electromagnetic characteristic on subsurface objects using FDTD method combined with Fourier transform is proposed. We model the time-domain scattered field of metallic landmine buried in soil. Numerical results fit the data computed by moment method. Finally, we model the M6A1 metallic landmine buried in soil. Numerical results fit real data based on actual measurement. Electromagnetic modeling result will improve the landmine detection performance greatly. [C968]

"A miniaturized antenna for ground penetrating radar"

A miniaturized printed log-periodic antenna (LPDA) with lateral size reduced structure is presented. The relative bandwidth of the antenna exceeds 100% when the voltage standing wave ration is less than 2.0. The constructed log- periodic dipole antenna is very useful in the ground penetrating radar due to the very wide bandwidth and relatively small size. The antenna is designed and simulated with the application of CST MICROWAVVE STUDIO software based on the finite integral method. The results show that the radiation characteristic of the antenna designed basically keeps stable over the whole operating frequency band. [C969]

"Impact Analysis of Gene Deletion on the Metabolic Flux Distribution of E.coli and on Its Flux-Backbone: Genome-Scale Simulation Approach"

Based on the gene-protein-reaction (GPR) model of E.coli_iAF1260 and the method of constraint-based analysis, we first calculated the metabolic flux distribution of E.coli_iAF1260 and determined its high-flux-backbone. Then we calculated the deletion impact of calculable 896 genes, one by one, on the metabolic flux redistribution of E.coli_iAF1260. Next we analyzed the relativity between v (describing deletion impact of one gene) and d (connection degree of one gene) and the relativity between v and vgene(flux sum controlled by one gene), and found that both of them were not of linear relativity. Furthermore, we seek out 32 important genes that most greatly affected the metabolic flux distribution, determined their functional subsystems and found that many of 32 key genes were related to "Alternate Carbon Metabolism" and "Transport Inner Membrane" subsystems. At the same time, by computation, we found these key genes affected high flux backbone(HFB) not greatly. Because the insilicomodel of E.coli_iAF1260 was tested by many experiments, thus is credible, we can conclude that the result we got has biological significances. [C970]

"Application of Time-Dependent Fault Tree Models for the Analysis of Project Schedule Failure Conditions"

This paper examines calculations of the earliest and the latest possible starting times for various tasks in a project. It considers classical precedence relationships with additional complications involving lead and lag times between tasks. Since the problem of analyzing large network diagrams with complicated relationships can become computationally intractable, there is a need for a mathematical formulation for the solution of this problem that would be transparent and easy to implement. Such a solution is proposed in this paper. It involves an introduction of the fault tree models with time dependencies. Such models were recently introduced in the context of equipment safety analysis and this paper adapts these concepts in the project management field of interest. With this approach it is possible to model by means of special gates not only logical dependencies (e.g. event A and event B must happen so that failure occurs) but also to answer a question 'when A and B should happen for the failure to occur'. Introduction of each new gate is accompanied by a numerical example from a sample project. [C971]

"A Real-Time Continuous ECG Transmitting Method through GPRS with Low Power Consumption"

In this paper, a novel real-time continuous electrocardiogram (ECG) transmitting method through GPRS network is presented, which is based on a packet-level forward error correction (PFEC) method with simultaneously considering low power consumption. This novel method is used on the user datagram protocol (UDP) for data transmission. Furthermore, a series of communication tests based on a developed experiment platform are carried out to validate this method. Results indicate that the transmitting protocol using the PFEC with a packet size of 450 bytes, 3 seconds of transmission interval per packet would achieve about 0.1% to 0.3% packet loss rate, which is more effective transmission and has lower power consumption, and conclusively match actually the requirement of the clinical mobile monitoring. [C972]

"Clutter reduction and detection of landmine objects in ground penetrating radar data using likelihood method"

In this paper, an algorithm is proposed to reduce clutter signal due to the reflection from the ground surface in ground penetrating radar (GPR) measurements. The proposed technique has been applied to a GPR, which has been used to detect subsurface anti-personnel (AP) landmines. A very simple model is used to model the GPR clutter and the target signal. This model has been used to derive a detector based on a likelihood ratio test using some estimated parameters. A new threshold formula has been derived and has been applied to the data. The data sources include 1 GHz pulse GPR data and 1 GHz to 4 GHz stepped- frequency GPR data, from laboratory measurements. In all measurements, the reflections from the surface have been removed or at least reduced in great quantities. [C973]

"HandVoD: A Robust and Scalable VoD Solution with Raptor Codes over GPRS/EDGE Network"

Considering the high packet losses ,low bandwidth of GPRS/EDGE network and heterogeneity of mobile clients, we present and implement HandVoD: a robust and scalable VoD solution with raptor codes for hand-held devices, like PDAs, smartphones, over GPRS/EDGE network. It's capable of providing 3GPP compliant end-to-end QoS support for each individual client with enhanced RTSP, RTCP, RTP protocols, priority_based encoding transmission(PET) and unequal error protection by Raptor FEC codes. Considering the high bandwidth jitter and heterogeneity of clients, we develop a PET rate adaptation scheme, which takes advantage of SVC 3-D scalability and RD optimization. To resist the high packet losses and low bandwidth of wireless link, we propose a priority_level based unequal error protection (PUEP) scheme. It uses raptor FEC codes for recovery, and protects unequally based on the NALU's priority, namely its contribution to overall distortion. The overhead of raptor codes is quite low, compared with other retransmission based schemes, while it provides high recover probability. In addition, it allows on-the-fly encoding, and therefore can co-operate well with our PET rate adaptation mechanism without yielding any meaningless repair symbols. More importantly, an implementation of our system is realized and tested over existing GPRS/EDGE network deployed in China. The test results demonstrate that our system has performance advantage in terms of higher PSNR and lower overhead. Moreover, the clients can get relatively constant visual quality even in case of varying link bit rate, handover or temporal link outage. In addition, the system's design concepts and results apply to wireless data system in general (i.e. CDMA, UMTS, etc). [C974]

"Wireless Sensor Networks for Environmental Monitoring: The SensorScope Experience"

While wireless sensor networks have been extensively studied in the past few years, most results are of theoretical nature and were obtained outside of a practical context. This can be problematic for real applications, especially in the area of environmental monitoring where many factors, such as harsh weather conditions, can greatly influence the performance of such a network, while reliable delivery and high-quality measurements are required. SensorScope is an interdisciplinary project, elaborated by environmental and networking researchers, that aims at narrowing the gap between theory and practice. Several successful real-world deployments have already been undertaken in rugged environments. In this paper, we analyze the particular requirements of environmental monitoring and how these requirements have been met in the SensorScope project. We also present an application example of a deployment, undertaken in a harsh mountain environment. [C975]

"Guardian-Personal Biotelemetric System"

This project deals with the problems of utilization of mobile equipment working in the biomedicine field, particularly telemedicine. This field is relatively new; it focuses on the observation of life functions from a distance. Practically developing system works with an ECG sensor connected to mobile equipment, such as PDA/Embedded device, based on Microsoft Windows CE class operating system. The whole system is based on the architecture of .NET Compact Framework, and other products, such as SQL Server by Microsoft too. This work also deals with the communication of mobile equipment with sensors and with the server via Bluetooth, WiFi, and GPRS/EDGE. The mobile equipments are used primarily for measuring and processing of data from the sensors and their visualization as a graph. The data is also given to the server for further processing and the analysis of current health of the patients, due to small efficiency of the mobile equipment. The main task we deal with in the server part of application is receiving of the data via Web services and further processing, management and analysis of this data. For the analysis of received data and further evaluation of the electrocardiogram, there is a self-organizing neural network [1]. [C976]

"Integration of Broadband Wireless Technologies and PMR Systems for Professional Communications"

The paper contributes to the evolution of Public Safety and Disaster Relief (PSDR) communications by specifying a solution for interoperability and integration among Professional Mobile Radio systems (TETRA and Simulcast), public systems (GSM/GPRS/UMTS), and broadband wireless technologies, such as WiMAX. A policy for PSDR services scheduling and fundamental guidelines for mapping the quality of service over heterogeneous networks are presented. Hence, the paper outlines the key issues to be debated by a regulatory authority. Operation of the devised PSDR mobile integration solution is tested to ensure complete connectivity among users adopting different communication standards, as well as to enable distributed services provisioning guaranteeing always best connection to bandwidth demanding applications provided by an IP-based core network. Finally, the employment of the envisaged integration platform is detailed in Mobile Ad-Hoc and Wireless Sensor Networks. [C977]

"Navigation In Case of Emergency (NICE): An Integrated NAV/COM Technology for Emergency Management"

This paper has the goal to present the advancements in the design, development and test of a hybrid NAV/COM platform tailored to emergency operations. In particular, the system here discussed, named NICE-navigation in case of emergency, has been defined with the support of the alpine rescue team members of the Piemonte Region (Italy) that contributed towards the system requirements definition as well as the system operational tests. It is important to highlight that NICE is a technology created to support the management of the rescuers in the field (the mountain environment). It is a network-based positioning system exploiting the advantages of both the european geostationary navigation overlay system (EGNOS) associated to GPS and the available VHF communication infrastructure. The positioning system is based on the raw GPS measurements collected by the user terminal and transmitted to a local element by VHF radio channels (or GPRS when available). Present R&D activities are also considering the integration of NICE with the terrestrial trunked radio (TETRA) communication infrastructure in use by several European civil protection agencies. [C978]

"IP over CAN, Transparent Vehicular to Infrastructure Access"

For the future we foresee each vehicle to feature wireless communication (to the Internet and/or other vehicles) over various technologies, e.g., UMTS/GPRS, and WLAN/WiFi. In this paper we show how access to such communication resources could be granted to individual components (CAN bus connected ECUs) in the car by allowing transparent data transport using the standardized Internet Protocol (IP). Our experiments show that a complete IP Over CAN implementation, providing both UDP and TCP transport over IP, running on an Atmel AT90CAN128 is capable of transfer speeds up to 200 kbits while using less than 2 kbytes of dynamic RAM. [C979]

"mSIGMA: An Efficient Handoff Scheme for Multi-Class Networks"

Wireless networks are becoming more heterogeneous; different classes of networks co-exist and users want to connect to any available network, anytime. So, it is important to have a mobility management scheme that can manage handoff for both inter-class and intra-class mobility so that the users can connect to and roam between any network. We propose an end-to- end mobility management scheme, Multi-class SIGMA (mSIGMA), that performs soft handoff for inter-class and intra-class mobility in wireless network. Our analysis shows mSIGMA performs seamless handoff across networks with low delay and packet loss. We have also shown though experimental analysis that mSIGMA is implementable with existing networking technologies and can perform handoff efficiently. [C980]

"TCP Quick-Adjust by Utilizing Explicit Link Characteristic Information"

This paper investigates the utilization of explicit bottleneck link characteristic information in order to enhance TCP behaviors. We propose the TCP Quick-Adjust algorithm as an extension of TCP Quick-Start, to allow end nodes to quickly adjust their sending rate for ongoing connections according to the reported bottleneck link bandwidth. Our scheme is considered to be especially suitable to use in a mobile operator's controlled network domain, where it is possible to provide a subscribed mobile node with reasonably accurate access link and path information. The link characteristic information is piggybacked in IP mobility signaling in this paper. Using simulations, we show that TCP Quick-Adjust provides good performance in terms of link capacity utilization in the scenarios where vertical handovers can happen between two links with very different characteristics. [C981]

"REACH: A Roaming-Enabled Architecture for Multi-Layer Capturing"

Modern mobile PCs have different kinds of network access technologies, such as wire-based interfaces (Ethernet) or wireless adapters (IEEE 802.11 WLAN, GPRS/GSM or UMTS). Ongoing research deals with the problem of performing a "vertical handover", that allows switching your currently used network access technology on-the-fly without interruption of the application sessions. The "Roaming-Enabled Architecture" (REACH) presented in this paper is a middleware-based approach that does not use IP mobility extensions and does not depend on modifications of the infrastructure. In fact, it is related to the already published mechanisms MSOCKS and the Universal Seamless Handoff Architecture (USHA). However, REACH is designed plugin-driven in order to support multiple coexistent schemes to perform vertical handovers on different layers of the Internet protocol suite. Each relay plugin is able to intercept data coming from the applications, which is necessary to route all data through the protection schemes in order to make the mobile nodes handover-aware. Hard and soft handovers are supported by REACH as well as softer handovers and channel bundling. A mobile node can connect to multiple proxy servers simultaneously in order to utilize different services, take care of some forms of performance degradation that are related to triangle routing and to do load balancing. [C982]

"Validation of VoIP System for University Network"

This paper propose an example of FMC based on IMS. Then the outline of the VoIP system which has been

experimentally developed for the university network based on the proposed FMC is described. [C983]

"Characterizing QoS Parameters and Application of Soft-QoS Scheme for 3G Wireless Networks"

In wireless communication systems, quality of service (QoS) is one of the most important issues from both the users and operators point of view. All the parameters related to QoS are not same important for all users and applications. The satisfaction level of different users also does not depend on same QoS parameters. In this paper, we discuss the QoS parameters and then propose a priority order of QoS parameters based on protocol layers and service applications. We present the relation among the QoS parameters those influence the performance of other QoS parameters and, finally, we demonstrate the numerical analysis results for our proposed soft-QoS scheme to reduce the dropped call rate which is the most important QoS parameter for all types of services. [C984]

"Seamless Mobility Across Heterogeneous Wireless Domains"

In recent years, wireless communication technologies have been pervasive. We have many wireless options to connect to the Internet: IEEE 802.11 WLANs, GPRS, UMTS and many other competing technologies. These wireless standards were designed independently of each other. Hence, these standards do not specify a common solution to perform connection handover between two different standards. Given that each of these standards has its own advantages and disadvantages, users may want to use the best available connection for their needs. In this paper, we propose a scheme that enables seamless transitions between different wireless standards through SIP protocol. With our scheme, IP mobility across both vertical and horizontal handovers is possible without any modification to the existing applications. We define a guideline for handovers between networks, and then perform experiments with our scheme implementation to confirm the feasibility of our proposed scheme. Our results show that with our scheme, connection disruption is minimized. [C985]

"A Fractional Spur-Free ADPLL with Loop-Gain Calibration and Phase-Noise Cancellation for GSM/GPRS/EDGE"

This paper presents a 3.2-to-4GHz fractional spur-free ADPLL. The ADPLL is fabricated in a 0.13 mum CMOS process and packaged in QFN76. Fractional spurs are filtered by accurate digital loop-gain calibration and digital phase-noise cancellation. The ADPLL is designed to minimize the switching noise while taking advantage of digital scaling. [C986]

"Context dependent quantization for distributed and/or robust speech recognition"

It is well-known that the high correlation existing in speech signals is very helpful in various speech processing applications. In this paper, we propose a new concept of context-dependent quantization, in which the representative parameter (whether a scalar or a vector) for a quantization partition cell is not fixed, but depends on the signal context on both sides, and the signal context dependencies can be trained with a clean speech corpus or estimated from a noisy speech corpus. This results in a much finer quantization based on local signal characteristics, without using any extra bit rate. This approach is equally applicable to all (scalar or vector) quantization approaches, and can be used either for signal compression in distributed speech recognition (DSR) or for feature transformation in robust speech recognition. In the latter case, each feature parameter is simply transformed into its representative parameter after quantization. In preliminary experiments with AURORA 2 and simulated GPRS channels, this concept is integrated with a recently proposed histogram-based quantization (HQ), the partition cells of which are also dynamic depending on local signal statistics. Significant performance improvements were obtained with the presence of both environmental noise and transmission errors. [C987]

"A Fully Integrated Quad-Band GPRS/EDGE Radio in 0.13µm CMOS"

This radio integrates all the receive and transmit functions required to support a quad-band GSM/GPRS/EDGE application into a single CMOS chip. Compared to the published work, this transceiver is implemented in low-cost digital 0.13 mum CMOS, achieves a superior receive and transmit performance, and yet has up to 2x lower receive power consumption, a key requirement in cellular applications. [C988]

"A 45nm 3.5G Baseband-and-Multimedia Application Processor using Adaptive Body-Bias and Ultra-Low-Power Techniques"

System on Chip (SoC) integration is the theme of the first integrated 3.5G baseband and multimedia applications processor fabricated using a low-power digital and analog design platform and 45nm process technology. This SoC supports mobile standards: HSUPA/HSDPA, WCDMA, EDGE/GPRS/GSM and applications such as MPEG-4 video streaming, Java and MP3 audio. The high- performance multimedia, multiprocessor engine includes an

840MHz ARM1176, a 480MHz TMS320C55x DSP, and a 240MHz image processor. [C989]

"A 24mm2 Quad-Band Single-Chip GSM Radio with Transmitter Calibration in 90nm Digital CMOS"

The RF transceiver is built on the Digital RF Processor (DRP) technology. The ADPLL-based transmitter uses a polar architecture with all-digital PM-FM and AM paths. The receiver uses a discrete-time architecture in which the RF signal is directly sampled and processed using analog and DSP techniques. A 26 MHz digitally controlled crystal oscillator (DCXO) generates frequency reference (FREF) and has a means of high-frequency dithering to minimize the effects of coupling from digitally controlled PA driver (DPA) to DCXO by de-sensitizing its slicing buffer. [C990]

"Gate-Oxide Early Life Failure Prediction"

This paper uses 90nm transistor-level experimental data, device modeling, and circuit simulations to establish the following results: 1. A transistor with defective gate- oxide, i.e., a gate-oxide early-life failure (ELF) candidate transistor, produces gradually degraded drive currents over time before it completely loses its transistor characteristics; 2. The above phenomenon results in gradual increase in delays of digital circuit paths containing the ELF candidate transistor before the circuit produces functional failures; 3. Gradual delay shifts caused by ELF candidate transistors are large enough to be detected using inexpensive digital techniques. These results can be utilized to overcome scaled-CMOS reliability challenges through ELF identification during production test or on-line during system operation. [C991]

"A distributed QoS control architecture for heterogeneous networks applied to PLC networks"

This paper will present a general architecture of a QoS Control system for a heterogeneous network environment, which has return channel for Digital TV and user access network implemented using Power Line Communication-PLC and wireless networks such GSM/GPRS. The application to low-income regions of Latin America and Europe is one requirement of the solution to be adopted that implies directly on the prices to be charged to the customers. The study and development of the presented architecture will be used in the SAMBA project (funded by European Commission) and involving test beds in Brazil and Italy. [C992]

"Enhanced detection of buried assets"

This paper reports the design of a new resonator system to enhance the identification of buried underground assets. Results from theoretical calculation, simulation, laboratory measurement, and field test are presented and practical considerations are highlighted. The proposed system has the potential to benefit future civil engineering installations. [C993]

"Compressive sensing of parameterized shapes in images"

Compressive sensing (CS) uses a relatively small number of non-traditional samples in the form of randomized projections to reconstruct sparse or compressible signals. The Hough transform is often used to find lines and other parameterized shapes in images. This paper shows how CS can be used to find parameterized shapes in images, by exploiting sparseness in the Hough transform domain. The utility of the CS-based method is demonstrated for finding lines and circles in noisy images, and then examples of processing GPR and seismic data for tunnel detection are presented. [C994]

"Design of wire bow-tie antenna for near field imaging using Genetic Algorithms"

The potentially broad application area in engineering design using genetic algorithm (GA) has been widely adopted by many researchers due to its high consistency and accuracy. Presented here is the initial design of a wideband non-dispersive wire bow-tie antenna using GA for breast cancer detection. Similar to the antenna used in a ground penetrating radar (GPR), the ultimate goal of this design is to achieve minimal late-time ringing but at higher frequencies (operate from 4 to 8 GHz) which is desire to penetrate human tissue for near field imaging. An optimum result with the half antenna length of 38.6 mm and a total flare angle of 70deg is acquired. Resistively loading method was also implemented to reduce minimal ringing cause by the antenna internal reflections. [C995]

"A CMOS variable width short-pulse generator circuit for UWB RADAR applications"

This paper describes a variable width short pulse generator circuit for UWB radar applications, designed in a 0.18mum CMOS technology. This circuit is capable of generating pulses with a duration from 0.7 ns to 3.5 ns and an amplitude of 0.7 V with a 50 Omega load. The power supply voltage can be as low as 1.5 V and uses

only 2.3 mA of power supply current. [C996]

"Impacts of RF radiation on the human body in a passive wireless healthcare environment"

In this paper, we identify the most significant problems involving the impacts of radio frequency (RF) radiation on the human body. The coming pervasive healthcare environment will rely heavily upon wirelessly communicating devices to provide the information visibility and communication capabilities required to achieve these ambitious systems. The impact of significant and continuous RF radiation exposure must be understood to ensure that we first do no harm with our new environments. The specific absorption rates (SAR) is a dosimetric measure that has been widely adopted as a method for quantifying radiation absorbed by the human body. This tool is both simple and useful. We investigate the factors that affect RF absorption in human tissues to identify the physical and biological factors that impact RF absorption. Similarly, we investigate the factors that influence biological responses to the effects of absorbed and incident RF radiation. We focus specifically on low power and passive communicating systems that will form the vast majority of the wireless devices in a pervasive healthcare environment. [C997]

"Elderly comfort and compliance to modern telemedicine system at home"

The success of integration and adaptation of pervasive computing and telemedicine technology in healthcare depends on the patients' compliance and trust to the introduced system. The aims of the present paper are to investigate, verify and evaluate the elderly heart patients' (EHP) compliance, trust and comfort in relation to a real-time wireless telemedicine system at home. A telemedicine system composed of a patient-unit, a GSM/GPRS network, a router, a data interpreter and a monitoring system was used. Twenty four non risky EHPs, aged (60plusmn5) years were recruited. A week of continuous ECGs for each of the EHPs were recorded. The experiments were carried out while the EHPs were performing their every day's activities. The EHPs' compliance, trust and comfort was verified and evaluated by three questionnaires. In average, 52% of the EHPs scored the user-friendly and usability of the system as reasonable. Only 16% sought help from the healthcare personnel in respect with the application of the patient-unit. 76% scored the reliability of the system as "reasonable" and 20% as "only now and then". It is concluded that the present system is reliable, functions with a clinically acceptable performance. The EHPs have expressed reasonable compliance and trust to the application of the system at home; however a number of the elderly were not satisfied with the weight and the user-interface of the ECG device. [C998]

"Remote power management and meter-reading system based on ARM microprocessor"

A power load management system based on ARM-7 microcontroller and GPRS is presented in this paper. The proposed system consists of electronic KWH meter, intelligent management terminal (IMT) and management centre. The intelligent terminal is sued to acquire information from KWH meter, control the energy-consuming device and communicate with management centre via GPRS network. How to implement the IMT by using ARM-7 microcontroller and GPRS telecommunication module is discussed in detail. Also the software design of the terminal with high performance embedded real-time operating system muC/OS-II is presented in this paper. [C999]

"TCP performance analysis in dynamic GPRS LA"

This paper presents the findings on TCP performance measurements in the LA process during the deployment of GPRS CS1 and CS2 coding schemes and after the activation of two more coding schemes, CS3 and CS4. The measurements are done under various network scenarios based on userspsila physical locations in one of Malaysiapsilas commercially deployed live GPRS networks. End-to-end evaluation of FTP application is used for the assessment together with tracing at the GPRS air interface. The results show that TCP works well in the LA process and can cope with the frequent switching between the coding schemes without any problem. Throughput performance is observed to be stable in all scenarios. The activation of higher coding schemes aided by TCP tuning also proves to be beneficial by the 23% increase in average throughput seen for urban areas. [C1000]

"Research for dynamic increasing transmission capacity"

The Dynamic Line Rating (DLR) system can increase transmission capacity of overhead line dynamically. The system is composed of sampling terminals installed on dead-end configuration of a line and one control instrument equipped in dispatch center. The data between the sampling terminals and the control instrument is transmitted through GPRS/GSM. Then three major limitations governing the line rating limits were analyzed and stated. This paper analyzed the force balance for overhead line concerned wind speeds and wind directionin a deflection plane. On this basis, a mechanics analysis model of linepsilas tension and sags was established.

Analyzed the advantages and drawbacks of some mathematic model used to calculate transmission capacity. In order that the DLR system received the optimum dynamic capacity curve, combined the WM and TS model. Finally, the necessity and significance to use DLR in power grid are presented. [C1001]

"Design and Implementation of Ground Peneration Radar System using Coded Sequences and Improved Target Detection using Golay Codes"

Ground penetration radar (GPR) is one of the non-destructive and non-intrusive data collecting technologies used in geophysical measurements. A GPR system operating at carrier frequency 500 MHz and a bandwidth of 250 MHz was designed and developed. The major problem in most of the existing Ground Penetration Radar systems is masking of the weaker returns by the strong sidelobes. This problem can be minimized to a great extent with the help of complementary Golay sequences. The performance of Golay sequences in terms of reduced sidelobe levels is considered better than that of pseudorandom (PN), Barker or other maximal length sequences. We have tested the performance of Golay and PRBS sequences using 4096 and 8192 length sequences, respectively. When the correlation obtained using two M length Golay sequence is compared with one 2M length PRBS sequence, sidelobe level for Golay sequence is almost eliminated. This results in better performance to detect weaker returns. However, this claim may not hold true at low SNR's. We have shown the results in anechoic chamber. Our tests indicate that Golay sequence has lower sidelobe level than PN sequences. [C1002]

"On End-to-End Mobility Management in 4G Heterogeneous Wireless Networks"

With the advent of modern technology, mobile devices with multi homed capabilities are proliferating. Existence of different network interfaces in multi homed devices enables them to seamlessly roam across heterogeneous networks. These vertical handovers however, causes to affect the TCP connections. Many solutions exist that handle this problem caused by mobility of the nodes. However, current mobility management solutions either require support of additional entities in the network or require changes in current implementation of TCP. This paper argues that mobility management service can effectively be provided without requiring the support of additional entities in the network and without changing the current implementation of TCP. On the basis of this principle, we present an end-to-end mobility management framework (EMF) that overcomes the limitations of current mobility management solutions and provides a richer set of mobility services such as location updates, soft handover, willful handover, etc. [C1003]

"Detection of buried objects using GPR change detection in polarimetric Huynen spaces"

Change detection is a useful method for detecting new events in a scene such as the placement of mines, and/or the movement of people, vehicles and structures. The basis of the approach is to examine an area via radar several times. Once, before there were targets planted there, and the other (or others) after. The change detection algorithm will notice if there are any changes after the first view was made. False alarm, that is a critical issue in this approach, can be reduced in a number of ways: exploiting additional information such as phase and polarization, and 2) exploiting critical attributes by computing changes in focused sub-spaces. In this paper we present anew approach for polarimetric change detection, whereby the target is represented not in terms of the complex scattering elements but in terms of phenomenologically-based Huynen parameters. Each element of the Huynen parameter set conveys useful physical and geometrical attributes about the scatterers thus augmenting the potential for significant false alarm mitigation. Results of the application of this approach on fully polarimetric signatures of simulated buried targets are provided. These results indicate that Huynen parameters are more effective for change detection than the scattering matrix elements in generating higher unambiguous autocorrelation peaks and less prominent cross-correlation peaks. [C1004]

"A Security Model for Mobile Processes"

Technologies like mobile devices (e.g. PDAs, smartphones, notebooks)and wireless data communication (e.g. GPRS, UMTS, WiFi) have a great potential for the improvement of mobile processes, e.g. by enabling access to time-critical information and preventing media disruptions. But the usage of these technologies leads also to specific challenges, particularly with regard to security and usability. One approach to deal with mobile-specific security concerns is to control access to functions provided by mobile information systems depending on the current location of the user, e.g. a travelling salesman should only be allowed to enter a customer's order when he currently resides at the premises of that customer. A formal model to write down such rules is called "security model". There are already some security models which take the user's location into account when deciding which functions of a system a certain user is allowed to use but they are process-agnostic, i.e. location-restrictions at process level cannot be expressed. In literature also security models for process-aware information system can be found but they don't consider location. In our work we therefore propose a security model for mobile

processes based on an elicitation of requirements. [C1005]

"A Novel SVC VoD System with Rate Adaptation and Error Concealment over GPRS/EDGE Network"

Considering the high packet losses and low, varying bandwidth of GPRS/EDGE network and limited computation power of handheld devices, we present and implement a novel SVC video-on-demand system for hand-held devices over GPRS/EDGE network. For the purpose of handling varying bitrate, we propose a priority based layer switching (PLS) adaptation scheme for SVC stream, which not only performs online 3-D adaptation more quickly by a simple parser, but also optimizes the video quality in a R-D sense under the bandwidth constraint. To resist packet losses, a motion-detection based adaptive error concealment (MDA) algorithm is proposed, which can achieve a PSNR gain of up to 3dB comparing to existing methods, while maintaining low complexity. Moreover, our proposed system was implemented and tested over existing GPRS/EDGE network deployed in China. The test results demonstrate that the proposed system and schemes have performance advantage in terms of quicker data rate adaptation, higher PSNR and lower overhead. [C1006]

"Data analysis of road pavement density measurements using Ground Penetrating Radar (GPR)"

This work describes an analysis of ground penetrating radar (GPR) measurements at frequency range of 1.7-2.6 GHz to get a relationship between attenuation and density for nine road pavements slabs with different densities. There are about two different frequencies had been tried. The method is simple, fast, contact less and accurate way to determine the density of road pavement. The most important parameter that used in this project is density where it can be used to determine the compressive strength of road pavement. In laboratory, the measurement system consists of a signal generator (250 kHz-3 GHz) as a source, spectrum analyzer (100 Hz-8 GHz), directional coupler with adapter and horn antenna. The first part of the measurement system setup is to determine the amplitude of transmitted wave (received signal strength). A few of received signal strength and attenuation for nine pavement slab samples were taken at two different frequencies. The GPR mixture model has been used to produce the simulation data and has been compared with measurement data. An instantaneous method for measuring the density of road pavement in wave propagation was developed by using microwave transmission/ reflection technique and free space method at two frequencies. The MATLAB software is used to analyze the measurement and simulation data and also for the graphs comparisons. The relative error between measurement and simulation were calculated. The results from the GPR measurement were used and were elaborated in data statistical analysis. [C1007]

"Spurious TCP timeouts in 802.11 networks"

In this paper, we investigate spurious TCP timeouts in 802.11 wireless networks. Though timeouts can be a problem for uploads from an 802.11 network, these timeouts are not spurious but are caused by a bottleneck at the access point. Once this bottleneck is removed, we find that spurious timeouts are rare, even in the face of large changes in numbers of active stations or PHY rate. [C1008]

"A Bayesian algorithm for object detection in GPR data"

An algorithm for underground object detection in GPR data is presented in this paper. It combines the advantages of Kalman filtering approach, suggested by Carevic (1999) with the robustness of hybrid Bayesian estimation technique. The objective is to increase the reliability of target detection and target-background separation while keeping a small false alarm rate. In addition, sequential change detection (CUSUM) test is studied for the purposes of ground layers segmentation and object recognition. [C1009]

"A Markovian model for mobile cellular networks with QoS differentiation"

This paper presents a realistic and accurate analytical model to dimension mobile cellular networks with QoS differentiation. QoS per applicative flow is commonly defined in GPRS/EDGE or 3G systems where streaming applications with real time properties and elastic data applications have to share radio resources. The need for accurate and fast-computing tools is of primary importance to tackle complex and exhaustive dimensioning issues. In this paper, we present a generic QoS analytical model developed in the context of EDGE networks but that can be adapted to a different technology. We develop a Markovian model that takes into account the QoS differentiation between real time and non-real time classes and gives expressions for all the required performance parameters. We compare our model with simulation and show its accuracy. [C1010]

"Streetlight monitoring and control system Part I: System structure"

The paper presents the modern street lighting control systems with microcontroller AC regulator for lighting

applications [1]. The system makes it possible to accurately control and monitor the lighting. The control cabinets are online all the time; the solution guarantees energy savings, due to the dimming option, traffic safety and lighting comfort. The basic idea of the system is for a group of street lights, typically for a stretch of road, to be controlled by a lighting office. [C1011]

"Computed torque control with nonparametric regression models"

Computed torque control allows the design of considerably more precise, energy-efficient and compliant controls for robots. However, the major obstacle is the requirement of an accurate model for torque generation, which cannot be obtained in some cases using rigid-body formulations due to unmodeled nonlinearities, such as complex friction or actuator dynamics. In such cases, models approximated from robot data present an appealing alternative. In this paper, we compare two non- parametric regression methods for model approximation, i.e., locally weighted projection regression (LWPR) and Gaussian process regression (GPR). While locally weighted regression was employed for real-time model estimation in learning adaptive control, Gaussian process regression has not been used in control to-date due to high computational requirements. The comparison includes the assessment of model approximation for both regression methods using data originated from SARCOS robot arm, as well as an evaluation of the robot tracking performance in computed torque control employing the approximated models. Our results show that GPR can be applied for realtime control achieving higher accuracy. However, for the online learning LWPR is superior by reason of lower computational requirements. [C1012]

"Design and Verification of Roaming Using MIPv6 between WLAN and 3G Network"

In this paper, we have studied standard trend of 3GPP and IETF by analyzing related documents. Also, in order to support roaming between WLAN and 3G, messages and procedure of action has been designed. For the verification, messages and procedure of action for designed roaming is modeled by Predicate/Action Net derived from the Petri Net and the safeness of designed roaming is analyzed by reachability tree. [C1013]

"Design of information display and control instrument based on SoC for AIS and GPRS monitoring system"

Automatic Identification System (AIS) is a system that enables ships to exchange static and dynamic information about ships and navigation, such as position, course, name etc., automatically by VHF radio. GPRS monitoring system can trace, dispatch and navigate ships by GPRS network. They are the two main ways of monitoring the ships. However, the two systems are independent of each other with the result of the unrealized information sharing. In addition, AIS equipments used on ships are mostly imported owing to the absence of domestic products in China. This paper analyzes the communication protocol between the foreign AIS transponder and its monitoring terminal, and basing on the practical requirement, it also discusses the design of information display and control instrument in detail. The whole design accords with the request of AIS. Additionally, the paper researches data fusion from AIS and GPRS monitoring system to share information. The information display and control instrument realizes identifying surrounding ships and displaying the shipspsila information from GPRS monitoring system. During the hardware design of the instrument, great attention is paid to electromagnetic compatibility technology and optimizing the design to guarantee the reliability of the instrumentpsilas electrical characteristics. [C1014]

"A simple algorithm for simulation of stepped-frequency GPR images of multi-layered media"

In this paper, a new convolution-based model for simulation of stepped-frequency GPR images is described. In contrary to the conventional convolution model, this model takes into account both the basic radar parameters and the basic parameters of multi-layered media and, therefore, it results in more accurate simulation of GPR images. The simulation results show that the algorithm presented can be successfully used for analysis and parameter optimization of the signal processing algorithms in stepped-frequency GPR. [C1015]

"FPGA implementation of low-frequency GPR signal algorithm using frequency stepped chirp signals in the time domain"

This paper concerns the FPGA implementation of a time-domain stepped frequency method, which is suitable for ground penetrating radar implementation. It describes the block of the algorithm from implementation point of view. The conclusion gives information about the real-time constraints, and the device utilization for the particular reconfigurable processor. [C1016]

"Singular spectrum analysis-an effective method for GPR data processing"

The aim of SSA is to make a decomposition of the original series (GPR traces in the considered case) into a sum of a small number of independent and interpretable components such as: low-frequency trends, narrowband quasi-periodic signals and noise. In this paper SSA based algorithms that ldquocleanrdquo noise from the radargram and/or enhance certain characteristics of the GPR data are presented. The results show the SSA based algorithms are well suited to impulse GPR data processing. SSA method applied to data makes GPR images more acceptable for initial interpretation and data evaluation. [C1017]

"A Clustered Real-Time Remote Monitoring System for Out-of-Hospital Cardiac Patients"

To provide more convenient and comprehensive medical monitoring, especially to the out-of-hospital patients, this paper describes the implementation of a novel clustered real-time remote monitoring system. The manufacture of portable terminal device and development of hospital monitoring center system are introduced in detail. In addition, all-around tests are made to the whole system. The experimental results indicate that the system can afford a long-term, real-time and continuous monitoring and accurate positioning to multiple patients simultaneously. An automatic diagnosis can also be undertaken. It presents a good clinical application prospect. [C1018]

"Research and Design of GIS in Vehicle Monitoring System"

With the development of satellite positioning technology and Global Positioning System (GPS), vehicle monitoring and navigation system has begun to appear. And it is a great technology revolution in vehicle monitoring field. In this task, using general packet radio service (GPRS) wireless communication technology, combined with the GPS global positioning technology and Geographic Information System (GIS) geographic information application technology, we raise component GIS secondary develop pattern based on MapX, and provide a realization of vehicle monitoring system. In this paper, application of MapX component in vehicle monitoring system is discussed. On the basis of analysis of composition and work principle of vehicle monitoring system, using Visual C++ and integrating MapX component, we realize functions of vehicles positioning, tracks replay, navigation map, objects query, and the design of digital map module of vehicle monitoring system. [C1019]

"Genome-Scale Simulation Analysis: The Impact of Gene Deletion on the Metabolic Flux of E.coli and Its Flux-backbone"

Based on the gene-protein-reaction (GPR) model of E.coli_iAF1260 and the method of constraint-based analysis, we first calculated the metabolic flux distribution of E.coli_iAF1260 and defined three types of key genes (genes related to many reactions, genes related to high flux reactions, genes related to the hubs of correlated reaction sets) which related to its metabolism. Then we analyzed the impact of key gene deletion on the metabolic flux redistribution of E.coli_iAF1260 and on its high-flux backbone (HFB). We find that the deletion of these key genes will greatly affect the metabolic flux distribution but will affect flux backbone trivially. Because the in silico model of E.coli_iAF1260 is tested by many experiments, thus is credible, we can conclude that the result we get has biological significances. [C1020]

"A large scale publish-subscribe platform for information delivery to mobile phones"

We have created a large-scale information delivery platform optimized for mobile phones and used it for many months now to run a content delivery service through SMS. We share the key findings from our experience of serving many millions of short messages each month to over 1 million subscribers. [C1021]

"Traffic management in GSM networks"

In this research work two non-borrowing frequency channel assignment (FCA) schemes, non-prioritized scheme (NPS) and reserved channel scheme (RCS), are compared. In NPS all the channels in a cell are available for both initial and handoff calls while in RCS some channels are reserved for handoff calls and the remaining channels can be utilized for both initial and handoff calls. The formulae for computing blocking probabilities for initial and handoff calls are derived using steady state balance equations defined by Markov chain model. Simulation results show that the blocking probability is a decreasing function of number of channels. When the additive white Gaussian noise (AWGN) is added then the probability of blocking is increased. We considered four values of AWGN that are -50 dB, -40 dB, -20 dB, 0 dB. For -50 dB, -40 dB, -20 dB noise has a little effect on the probability of blocking, but at 0 dB noise probability of blocking is increased. [C1022]

"Signal processing for through wall moving target tracking by M-sequence UWB radar"

In this paper, through wall moving target tracking by UWB radar is described as a complex process with all required phases of radar signal processing. For particular phases of that process, i.e. for raw radar data

preprocessing, background subtraction, detection, trace estimation, localization and tracking itself, the phase significance and its corresponding representative methods are outlined. The complete process is illustrated by the results of processing of real data acquired by M-sequence UWB radar. [C1023]

"Data transmission over voice dedicated channels using digital modulations"

With the actual expansion in communication systems, data channels are taking more importance, especially in mobile data networks. But in some cases the transmission over data channels is not possible or not convenient, which makes the data transmission over voice channel an interesting alternative. Firstly, the operators of mobile phone networks (GSM, GPRS) tend to limit the access to the Internet in order to prevent Voice over IP (VoIP) for economical reasons. Secondly, the cross- networks bridges used in VoIP (VoIP-ISDN, VoIP-GSM, VoIP-PSTN) give an opportunity to transmit data over this voice channel without any additional data bridges. Thirdly, for security matters, transiting data dissimulated in a voice-like signal is more discrete. Lastly, some communication networks such as THURAYA are dedicated to voice communications. [C1024]

"The comparison of GSM-EDGE signal transmission over AWGN and Rayleigh fading channel"

This paper is concerned with GSM-EDGE system simulation and bit error ratio evaluation of the transmitted signal over AWGN and Rayleigh fading channel. The goal is to observe the impact of radio channel on variously modulated and coded GSM-EDGE signals. The block scheme and proposed model of signal processing in the downlink direction is described step by step. Simulation results for various modulation and coding schemes (MCS) are graphically presented. In order to get the required results, the simulation tool was created in MATLAB environment. [C1025]

"Attaching an IMS Subscriber to an Unknown Foreign Network"

The networking landscape is about to change. The multitude of different kind of operators and access networks can provide access at any time irrespective of location. However, it will be less likely that every player has pre-established relationships with all the parties. Thus, there is a need for measures that allow the users to securely connect to previously unknown networks and still have the assurance of the home network for the service provisioning. In this paper we describe an architecture, which aims to secure the initial connectivity and the interaction between the involved parties by employing cryptographic identities in a roaming scenario, where the access and home operator have no pre-established agreement. It also allows the operators to take advantage of their existing multimedia service provisioning infrastructures, such as IMS. [C1026]

"Sparse incremental learning for interactive robot control policy estimation"

We are interested in transferring control policies for arbitrary tasks from a human to a robot. Using interactive demonstration via teleoperation as our transfer scenario, we cast learning as statistical regression over sensor-actuator data pairs. Our desire for interactive learning necessitates algorithms that are incremental and realtime. We examine locally weighted projection regression, a popular robotic learning algorithm, and sparse online Gaussian processes in this domain on one synthetic and several robot-generated data sets. We evaluate each algorithm in terms of function approximation, learned task performance, and scalability to large data sets. [C1027]

"Predictive design space exploration using genetically programmed response surfaces"

Exponential increases in architectural design complexity threaten to make traditional processor design optimization techniques intractable. Genetically programmed response surfaces (GPRS) address this challenge by transforming the optimization process from a lengthy series of detailed simulations into the tractable formulation and rapid evaluation of a predictive model. We validate GPRS methodology on realistic processor design spaces and compare it to recently proposed techniques for predictive microarchitectural design space exploration. [C1028]

"Statistical analysis of lightning transients in grounding grids"

An statistical description of safety aspects of grounding grids is presented in this paper. The methodology is based on the Monte Carlo simulation of the grounding grid response to the probabilistic distribution of the injected current. Frequency domain method of moments (MoM) solution of the governing electric field integral equation (EFIE) is used to simulate the grounding grid performance. The mapping of frequency domain data to the corresponding data and vice versa are achieved through using the fast Fourier transform (FFT) and inverse FFT (IFFT) techniques. The proposed simulation methodology is used to obtain the probability by which the safety limits of a given grounding grid are violated. For the current simulation we considered the maximum value

of ground surface electric field and scalar potential or namely the ground potential rise (GPR) as representatives of safety indices. [C1029]

"Input impedance adjustment on UWB antenna for SFCW-GPR application"

In ground penetrating radar (GPR) system, antennas are usually situated very close to the ground surface. Characteristic of the antenna is strongly influenced by the type of the soil. Antenna with stable impedance matching is needed to achieve a good system performance. A printed UWB monopole antenna with adaptation capability is proposed for stepped frequency continuous wave (SFCW) ground penetrating radar (GPR) application within frequency range 100-1000 MHz. The UWB monopole antenna consists of a hexagonal strip line with resistive loading and a rectangular slot that is added at the ground plane side of the printed UWB monopole antenna. Resistive load adjustment is applied for controlling the antennas input impedance due to the problem of varying soil condition. This paper presents the simulation investigation of the proposed antenna in controlling the matching condition. [C1030]

"A 0.13-μm CMOS Σ-Δ frequency synthesizer with an area optimizing LPF, fast AFC time, and a wideband VCO for WCDMA/GSM/GPRS/EDGE applications"

Use This paper presents a fully integrated fractional-N frequency synthesizer (FNFS) with an area optimizing low pass filter (LPF), fast adaptive frequency calibration (AFC) time, and a wideband on-chip LC voltage-controlled oscillator (VCO) for WCDMA/GSM/GPRS/EDGE transceivers. The FNFS employs a staked structure of MIM and MOS capacitors for LPF to economize the area. Fast AFC time is realized by using the prescaler output signal as a discriminating clock. A 3-bit 3rd order Sigma-Delta modulator serves as a fractional engine. Phase switching type prescaler is used to reduce the quantization noise of Sigma-Delta modulator. A fast switching CP is introduced. LC VCO utilizes bond-wire inductors with high Q-factor and a small area. Digitally controlled crystal oscillator (DCXO) provides a reference signal of high spectral purity. A prototype has been implemented in 0.13 mum CMOS technology. The measurements results show that the AFC time is less than 20-mus, in-band phase noise is -94 dBc/Hz, and out-band phase noise are -123 dBc/Hz at 400 KHz offset frequency and-145 dBc/Hz at 3 MHz offset frequency when the carrier frequency is 900 MHz. Reference spur level is less than -75 dBc. [C1031]

"RSR-ARQ Mechanism for Unreliable Data Communication in GPRS"

In GPRS, severe jitter due to roughness (impairment) at the air interface between mobile station (MS) and base station (BS) produces adverse impact on the efficiency of the LLC (logical link control) and TCP (transmission control protocol) layers. Natural conditions at the air interface make communication reliability more vulnerable. Here, reliability refers to efficient recovery of the lost or erroneous data. On the other hand, delays in the recovery of the data at the air interface not only decreases the efficiency of the LLC and TCP layers but also increases the chances of buffer overflows. The proposed mechanism is enhancement of the RSR-ARQ protocol that ensures better efficiency and reliability of data. The RSR-ARQ supports channel impairment and buffer sensitive mechanism without affecting the reliability of the feedback communication. The system uses two state discrete time Markov channel (DTMC). The simulation results demonstrate the better recovery of the data and better efficiency for the LLC and TCP layers with minimum chances of buffer overflow. [C1032]

"A low-noise VCO with a constant KVCO for GSM/GPRS/EDGE applications"

A low-noise LC-tank VCO with a constant KVCOfor GSM/GPRS/EDGE applications is presented. The proposed compensation technique helps to minimize the KVCOvariation within the operation frequency of interest. This VCO is incorporated with a fractional-N frequency synthesizer and a DCT and is implemented in a 0.13 mum CMOS process. The measured KVCOis 29 MHz/V with a plusmn10% tuning range for a single sub-band and the overall KVCOvariation is plusmn2.5% when the compensation technique is enabled. Based on this low-noise VCO, the achieved DCT phase noise is -165 dBc/Hz at a 20 MHz frequency offset from a 915 MHz carrier and a SAW-less DCT in the 2 G mobile application becomes feasible. [C1033]

"Software/hardware co-design of a vehicle trajectory monitoring system"

Using a GPS to navigate, a guard locates a car theft and utilizes vehicle tracking that is, at present, widely employed. In this paper the terminal device using a microcontroller combines a GPS and a GSM/GPRS to make a portable and remote controlling device, and an embedded server is used as a transfer location server. In this way one accomplishes real-time vehicle trajectory monitoring. Clients can remotely monitor a vehiclepsilas position anywhere. Besides, as we have designed the remote monitoring using a virtual comport to combine the existing commercial or free electronic map directly, we need not develop or revise the electronic map software. [C1034]

"Mobile web server for elderly people monitoring"

In this paper we propose a mobile system for monitoring of moving objects, namely tracking elderly people. This system aims to provide help for people with some kind of memory loss disease, namely Alzheimerpsilas. It is capable of providing the geographic position of the person carrying the mobile equipment, both by a patient request (pressing a key to send a message) or anytime trough a webpage consult by an external authorized person. The portable device consists of a GSM/GPRS module, a GPS module, a I/O and MCU module and a web server. It also incorporates hands free voice communication capability, which allows communication with a distant person, in the event of an unexpected incident. The problem of external web server dependency is tackled by implementing an embedded web server in the mobile device. This significantly reduces the user expenses that are limited to the data communication between any authorized person and the mobile system. Additionally, we have included a tri-axial accelerometer sensor to constrain the current consumption while the device is not moving, which can also detect the falling of the patient. However, the main achievement of this work, regardless the hardware integration, is the development of a web server supported on the relatively limited computational resources available in the module. To this extent, it is not required any dedicated software to access this equipment, but a web browser. [C1035]

"Design and implementation of a remotely controllable UPS outlet system"

In this paper we describe a remotely controllable UPS outlet system for home power management that we have developed. Our system can also control the UPS outlet system of different families by means of GPRS technology of a GSM module. The controllable UPS outlet (CUPSO) integrates multiple AC power sockets, a UPS and a low- power microcontroller into a power outlet to switch the power of the sockets On/Off, to protect a sudden loss of the AC power supply and to measure the power consumption of plugged-in electric home appliances. Using Bluetooth, our wireless system can control the home electric appliances without any new wiring. The remote control also provides the user with the ability to turn home appliances on or off by means of the Internet, and the GSM channel linked to the home server is able to receive the necessary SMS (short message service) to turn the home electric appliances on or off anytime and anywhere. [C1036]

"Three-dimensional Microwave Tomography: Waveform diversity and distributed sensors for detecting and imaging buried objects with suppressed electromagnetic interference"

Microwave tomographic techniques are described in this paper for developing high-resolution images of buried targets using 3D RF CAT Scans with frequency, angular, and polarization diversity and distributed sensors. Surface-contact sensors are used to collect the tomographic data for relay to a circling UAV and transmission to a remote control site (using layered sensing). 3D imaging algorithms have been developed to detect, image, and characterize buried targets. Distributed transmitters and receivers significantly increase unwanted mutual coupling and EM emissions (EMI) that interfere with signal reception, but also increase image resolution. For Ground Penetration (GPEN), reduced mutual coupling and EMI, and improved signal-to-noise ratios (SNR), can be achieved by embedding the transmitter/receiver sensors underground. Simple surface SAR experiments have been performed to detect deep mine shafts at the Zinc Corporation of America. 2D sensor data have been used to validate the 3D processing algorithms. Scale-model lab tests in the DETECT Chamber at AFRL have also been performed to optimize the tomographic images. In addition, WIPL-D models have been used to simulate the embedded and diverse/distributed sensors and to verify the significant enhancement in the received SNR for GPEN obtained by burying the radiating ring under the surface. [C1037]

"Landmine detection utilizing an unmanned aerial vehicle"

Landmines pose a great danger to people in many areas. It is imperative to correctly identify the location of landmines for proper removal. Hence, there is a need to efficiently and accurately identify locations of landmines. The objective of this project is to conduct preliminary system analysis of three unmanned aerial vehicles (UAVs) utilizing ground penetrating synthetic aperture radar (GPSAR) aiding in the detection of landmines. Moreover, the effort will aid in assessing the overall effectiveness of landmine detection utilizing a UAV. Three design alternatives are modeled and tested. The first design alternative is a MQ-1 Predator; a long-endurance UAV primarily used for reconnaissance and surveillance missions. The second alternative is a Shadow 600. The Shadow 600 is capable of carrying various payloads. The third design alternative is the Shadow 200 which can be launched from the ground using a catapult. Each design alternative carries an unfocused GPSAR utilizing the length of the fuselage to increase aperture efficiency. Using satellite tool kit (STK) analysis software, design alternatives are assessed by their performance in scanning a one square kilometer area of interest (AOI). Critical figures of merit used to elicit system effectiveness include time on target (time that the radar pulses the landmine), area overlap percentage, area coverage, coverage speed, and energy consumption. Acquisition cost,

operational cost, and maintenance cost of each design alternative are plotted against system effectiveness to identify the best alternative. [C1038]

"Performance improvement plastic landmine visualization system by employing local correlation method"

We have been studying ground-penetrating radars to visualize antipersonnel plastic landmines by treating amplitude and phase data of electromagnetic reflection and scattering by using a complex self-organizing map (CSOM). In this paper, we propose a new method, namely local correlation method, to extract feature quantity for higher performance. [C1039]

"Remote Management of Mobile Devices with Broadband Forum's TR-069"

The paper presents a collection of slides which discuss the remote management of mobile devices with broadband forum's TR-069. The suitability of broadband forum's TR-069 for remote management of mobile devices is investigated. In this paper, the performance of TR- 069's customer premises equipment-wide area network management protocol (CWMP) over mobile connections is being focused. It is concluded that a single management protocol for both mobile and fixed private networks can be attractive from a service operational point of view and measurements give a strong indication that TR-069 can safely be used for remote management of mobile devices. [C1040]

"Basics of microwave radar & SAR polarimetry and its applications"

The development of radar polarimetry and radar interferometry is advancing rapidly, and these novel radar technologies are revamping "synthetic aperture radar imaging" decisively. In this exposition the successive advancements are sketched; beginning with the fundamental formulations and high-lighting the salient points of these diverse remote sensing techniques. Whereas with radar polarimetry the textural fine-structure, target-orientation and shape, symmetries and material constituents can be recovered with considerable improvements above that of standard 'amplitude-only polarization radar'; with radar interferometry the spatial (in depth) structure can be explored. In 'polarimetric-interferometric synthetic aperture radar (POL-IN-SAR) imaging' it is possible to recover such co-registered textural plus spatial properties simultaneously. This includes the extraction of 'digital elevation maps (DEM)" from either 'fully polarimetric (scattering matrix)' or interferometric (dual antenna) SAR image data takes' with the additional benefit of obtaining co-registered threedimensional 'POL-IN-DEM' information. Extra-wide-band POL-IN-SAR imaging-when applied to 'repeat-pass image overlay interferometry'-provides differential background validation and measurement, stress assessment, and environmental stress-change monitoring capabilities with hitherto unattained accuracy, which are essential tools for improved global biomass estimation. More recently, by applying multiple parallel repeat-pass EWB-POL-D(RP)- IN-SAR imaging along stacked (altitudinal) or displaced (horizontal) flight-lines will result in 'tomographic (multi-interferometric) polarimetric SAR stereo- imaging', including foliage and ground penetrating capabilities. It is shown that the accelerated advancement of these modern 'EWB-POL-D(RP)-IN- SAR' imaging techniques is of direct relevance and of paramount priority to wide-area dynamic homeland security surveillance and local-to-global envi--ronmental groundtruth measurement and validation, stress assessment, and stress-change monitoring of the terrestrial and planetary covers. [C1041]

"Access Transmission Network Upgrade in a Nationwide Mobile Network Modernization Project for Edge Deployment"

A collection of slides from the author's conference presentation is given. [C1042]

"Rural cardiac healthcare system-A scheme for developing countries"

A simple, easy to implement and low cost mobile health(m-health) solution using general packet radio service (GPRS) of globally extended cellular mobile network for economically deprived countries is described in this paper. According to different statistical surveys, heart disease is a major health burden throughout the world but more importantly the third world countries like India, Pakistan, Bangladesh. We consider here a telecardiology system, where the ECG images captured by mobile camera are sent using Multimedia Massage Service (MMS) to a data extraction and processing unit. This unit can extract digitized data from those images, which may be restored as database in a dedicated server and also analyzed by an inbuilt knowledgebase as well as a rough decision generating system. Ultimately, the system will generate an automated report that will suggest the primary treatment and preventive measures to be taken by the patient. The report will be sent back to the patient by Short Message Service (SMS) through the same mobile system. The main advantage of the system is that it will not require constant monitoring or presence of a doctor at the initial stage. The ECG of the patient with

critical abnormality or unknown abnormality will be directly sent to the doctorpsilas mobile and intimation will also be sent to the patient site directly. The extreme popularity of mobile phone with camera in the third world countries makes this architecture practically realizable. [C1043]

"Do we need Next Generation Mobile Networks ? Yes"

In this presentation, the concept of the next generation mobile networks (NGMNs) is introduced. The architecture, advantages, and the proposed implementation of NGMNs are presented. [C1044]

"Multi-channel ultra-wideband short-pulse ground penetrating radar"

The new multi-channel GPR design is presented for search of metallic and dielectric objects in soil down to 1.2 meters depth. Multi-channel architecture allows to inspect 1 m width strip of ground surface simultaneously. Designed GPR parameters, its hardware and software are discussed. 3D images of subsurface objects formed by GPR as well as results of objects geometry restoration are presented. [C1045]

"Simulation of GPR returns from finite-length dielectric cylinders"

An approximate analytical solution for time-domain impulse response of low-contrast dielectric targets is derived. The Born approximation is used to calculate the scattered field. The detailed analysis is performed for a finite-length circular cylinder. The way of application of the obtained results to buried dielectric targets is proposed. [C1046]

"Gated FMCW SAR system"

This paper describes a method where a SAR system can be used with a single antenna both for transmitting and receiving. The system is using an antenna switch combined with a delayed version of the transmitted signal applied to the local oscillator of the detector. The paper discusses the different difficulties in using this method and gives an example with parameters on how such a radar system can be implemented. [C1047]

"Microwave remote sensing using space borne sensors"

Microwaves are part of radio spectrum the frequency bands in the range of 3 GHz to 30 GHz are characterized as microwave. This part of spectrum has unique capabilities for microwave remote sensing. The microwaves can be used for remote sensing of objects in day as well as in night. They have all weather capability because microwaves can penetrate clouds. The soil moisture can be determined using microwave sensors. The microwaves can penetrate vegetation as well as soil and so they can give information about the objects which are under vegetation and under ground. The microwaves can penetrate dry snow and so one can detect buried objects under snow. There are two types of microwave sensors which can be used for microwave remote sensing. They are (i) passive sensors and (ii) active sensors. The Radiometers are passive sensors where as the scatterometer, altimeter, real aperture radar and synthetic aperture radar are part of active sensors. The microwave remote sensing using these sensors (both passive and active) can be done from different platforms. The platforms which can be used are ground based (on towers) platforms, Airborne platforms and Space borne platforms. The first microwave passive sensors were put on Nimbus satellites. These sensors were radiometers for study of oceans, atmosphere and land. The first synthetic aperture Radar system operating in L-band was placed in SEASAT in year 1978. Later at different times various passive and active sensors were put by American Agency NASA, Russian Space Agency, Indian Space Agency (ISRO), European Space Agency ESA, and Japanese Space Agency NASDA. The passive sensors were having courser resolution where as resolution of the active sensors was finer than that of passive sensors. The latest passive sensors which are being used for different applications are SSMI radiometers and AMSRE providing data at different microwave frequencies. The space borne active sensors are RADARSAT-2 of Canada and Oceansat-2 of India. In fu--ture the active microwave sensors will be put in spaceborne RISAT satellite in India and cosmoSkymed of USSR All these space borne sensors will provide very useful data for operational applications. The applications of these sensors are in agriculture, soil moisture estimation, flood mapping, geology/ geomorphology forestry, snow cover and glaciers, oceanography, Topography, Terrain and oil spill detection. The sensors have to be calibrated and all these applications have to be validated. From the data obtained from sensors the data products have to be generated. In this talk the evolution of the space borne sensors will be presented and the operational, quasi operational applications will be discussed. [C1048]

"Adopting user interacted mobile node data to the Flexible Data Input Layer Architecture"

A flexible data input layer architecture (FDILA) has been designed and developed by Tavakoli et al. for providing a generic tool to transfer data from a wide series of data acquisition devices into higher levels of information

processing systems. Data collected by mobile devices such as GPS and PDA applications are among important inputs for evaluating environmental cause-effects. This work discusses issues and proposes components of connecting and interfacing the input layer of a generic decision making tool to mobile application data. Our purpose is to demonstrate issues and tasks for adapting mobile devices to a generic simulation platform that can be used for real-time discrete event simulation modelling. This is based on a tested flexible input data architecture developed in LabVIEW, a real-time inter-process communication between the LabVIEW application and a discrete event simulation in Arena. The emphasis is on interactive mobile applications which may submit their data irregularly. [C1049]

"4G: The future mobile technology"

With the rapid growth of user demands, and the limitations of third generation (3G) mobile communication systems, it is expected that fourth generation (4G) mobile systems are likely to reach the consumer market in another 4-5 years. 4G systems are expected to become a platform capable of providing increased bandwidth, higher data rates, and greater interoperability across communication protocols, and user friendly, innovative, and secure applications. This system will primarily focus on seamlessly integrating the existing systems like GSM, wireless LAN, and Bluetooth. This paper describes modulation scheme, different technologies, and network architectures that support 4G mobile systems. Challenges and some applications will also be presented. At last recommendations will be followed by conclusion. [C1050]

"Observation of Lightning Current and Ground Potential Rise in Artificially Trigged Lightning Experiment"

Lightning current and ground potential rise (GPR) results of artificially trigged lightning experiment in Binzhou of Shandong Province during the summer of 2006 are described in this paper. The variation of grounding resistance of grounding electrode is analyzed according to the data of experiment. From the waveform of lightning current, it can be found that the process of lightning flash has two return-strokes. The amplitude of the first return-stroke is 41.59 kA with 6.02/20.24 mus waveform, and that of the second return-stroke is 29.59 kA with 4.8/11 mus waveform. The previous study done by other authors on impulse ground resistance is always limited in the laboratory, which can provide the standard impulse current instead of the factual circumstance. Transient grounding resistance (TGR) including two small return-strokes response is obtained. ATP Simulation is used to calculate the impulse grounding resistance which compares to the factual circumstance. There is time difference between peak current and peak voltage, but the simulation can not tell the difference, which means their front time Tfand time to half value Ttare identical. That is because the simulation model did not take the spark discharge and its electrical parameter change into consideration. The results can help study the process of artificially trigged lightning, meanwhile it proposes the necessity to consider grounding electrode's impulse characteristics under lightning current. [C1051]

"Step and Touch Voltage Distributions at GSM Base Station during Direct Lightning Stroke"

One of the tasks of earthing system is to ensure safety for people during various fault conditions. The objective of this paper is to provide knowledge about the actual step and touch voltage distributions in and around a freestanding base station for mobile communications during direct lightning strike into the communication tower. The final purpose is to limit the danger for people that can be present in the vicinity. Scalar potential at the earth surface as well as step and touch voltage distributions were calculated based on field theory approach. [C1052]

"Stepped-Frequency Radar System in Gating Mode: An Experiment as a New Helicopter-Borne GPR System for Geological Applications"

Ground-penetrating radar (GPR) has become a useful tool in solving different geophysical tasks in environmental geology, glaciology, archaeology, mineral exploration and the detection of near-surface objects. The large variety of handheld GPR devices, even for harsh field conditions, is an effective tool for surveying small areas. A GPR system installed in a helicopter is an effective method to survey large areas with high data density. Large areas, even in inaccessible regions, may be surveyed within a short time and even under limited logistic demands. The high agility of a helicopter allows increasing the data density in areas of special interest. Using ground penetration radar for geological applications, fine resolution of near-surface structures is necessary. Stepped-frequency radar technology offers an attractive alternative to the classical pulse radar systems with opera-tional advantages for airborne applications such as, for instance, reduced interference with other on-board systems. [C1053]

"GPR Imaging Using Compressed Measurements"

A new data acquisition and imaging method exploiting the sparsity of the target space is presented for ground penetrating radar (GPR) imaging. Sparsity is enforced by solving a convex lscr1minimization problem which uses a very small number of random measurements. The method can greatly reduce the data acquisition time while producing sparse target space images. Simulation and experimental data results are provided to show that the method has excellent resolution and is robust to noise and random spatial sampling. [C1054]

"The Orfeus Project (Optimised Radar for Finding Every Utility in the Street)"

The ORFEUS (Optimised Radar for Finding Every Utility in the Street) project addresses the requirement for advanced technologies for locating, maintaining and rehabilitating buried infrastructures and, in particular, it fulfils the requirement for locating buried assets, including the use of trenchless techniques for deploying pipes and cables in an urban environment. The aim of this project is to develop two radars. The first operates on the surface for planning deployment activities; the second (a bore-head GPR) will be installed in the drilling head of horizontal directional drilling (HDD) equipment so that they may avoid collision and possible damage to existing cables and other infrastructure. [C1055]

"Study of a Planar Spiral Antenna Used in Ground Penetrating Radar System"

A planar Archimedean-spiral antenna used in UHF ground penetrating radar system is studied. How to have an effect on frequency property for antenna by changing absorbing structures placed in reflecting cavity is analyzed. According to the analytical result, a new absorbing structure is designed and actual measurement is carried out. Finally, the azimuth pattern and radiation property for antenna is analyzed in frequency domain. Results based on actual measurement show that the change of the azimuth pattern of the antenna designed is not large in concerned frequency band and the polarization property of the antenna is reliable. [C1056]

"Development of exposed environment of overhead transmission lines on mice"

In order to study the responses that occur in mice chronically exposed to power frequency electromagnetic fields of transmission lines, an exposed environment was constructed in laboratory. Charge simulation method and Biot-Savart law have respectively been adopted to compute the three-dimensional electric and magnetic fields of the exposed environment. Both methods are programmed using the MATLAB software. Simulations indicate that the maximum intensity of electric field, found at the level of 4 centimeters above ground (the height of white mice), can reach up to 0.85 kilometer voltage per meter (kV/m) at ground level, and the magnetic flux density can amount to 58 milli-Gauss (mG). Compared with typical overhead transmission lines, the paper concluded that the exposed condition for mice exposed to has been approached effectively and closely. [C1057]

"Survivability index for a GPRS network"

The GPRS network has been well integrated in global system for mobile (GSM) network, the most dominant cellular standard, to accomplish efficient spectrum utilization for data traffic. It has become a popular service which carries critical business and social information of many subscribers. The issue of survivability for a GPRS network requires more investigation. This work introduces a new measure of survivability, survivability index (SI), which takes into account following important features of a GPRS network (i) success probability in uplink contention, (ii) average wait time to get a dedicated slots (iii) throughput and (iv) availability. A weighted sum form is proposed and genetic algorithm (GA) is used to find optimum values of weights. Considering various failure scenarios the Survivability Index has been evaluated for a GPRS network. [C1058]

"Target and equalizer design for perpendicular magnetic recording at 1 Tb/in2"

This paper described the design of generalized partial-response (GPR) target and its corresponding equalizer for perpendicular magnetic recording (PMR) read channel with jitter noise. In this design the readback signal model uses transition response that its parameter is calculated based on media properties and reader head geometry specifically designed for 1 Tb/in2areal density. The GPR targets with various lengths are designed using minimum mean-squared error (MMSE) approach. The simulation results show that the BER performance of the system degrades as the ratio of jitter noise power to total noise power increases. According to these results GPR2 with 7-tap equalizer offers the optimal tradeoff between system performance and circuit implementation. [C1059]

"Performance enhancement of GPRS transmission using switched beam antennas at Mobile Station"

As the users call for the improvement of the datarate in GPRS system, so far an adaptive antenna implemented at base station is envisaged to be the solution. However, this concept introduces the problems of high expense

and complexity. Alternatively, a switched beam antenna avoiding those impairments is worthwhile considering. Therefore, this paper investigates into the use of switched beam antenna compared with adaptive antenna in GPRS system. To achieve a fraction of expense, the implementation is considered at the mobile station instead. The simulation results reveal that employing the switched beam system provides higher performance in term of carrier-to-interference ratio and throughput, compared with adaptive antenna. The obtained results also confirm the advantages of switched beam antenna even though the system is situated in non-line-of-sight environment. [C1060]

"Performance of UWB array-based radar sensor in a multi-sensor vehicle-based suit for landmine detection"

In this paper, integration of an UWB array-based time-domain radar sensor in a vehicle-mounted multi-sensor system for landmine detection is described. Dedicated real-time signal processing algorithms are developed to compute the radar sensor confidence map which is used for sensor fusion. Performance of developed algorithms for stand-alone GPR sensor and multi-sensor suit is verified experimentally. [C1061]

"Speech Recognition using Dynamic Time Warping"

Speech Recognition is a technology enabling human interaction with machines. The design of a speech recognition system capable of 100% accuracy is far from solved. This paper describes an isolated word, speaker dependent speech recognition system capable of recognizing spoken words at sufficiently high accuracy. The system has been tested and verified on MATLAB as well as the TMS320 C6713 DSK with an overall accuracy exceeding 90%. The paper shows the memory efficiency offered by using speech detection for separating the words from silence and the improved system performance achieved by using Dynamic Time Warping while keeping in view the overall design process, supported by experimental results. In future, speech recognition can serve as a means of data interoperability and distribution by allowing a mobile user (client) to retrieve information from the data networks (GPRS, WEB) using a client server architecture. The satellite system can be used as a wireless medium for accessing the data network. [C1062]

"Improved voltage-current mode feeder automation system based on GPRS"

To improve traditional voltage-time mode feeder automation system, and considering the problems of GPRS and as security vulnerability and communication interrupt and delay, an improved voltage-current mode feeder automation system based on GPRS is presented. GPRS is only for sending command of close blocking, not for telecontrolling switch to open or close. Load break switches are equipped with simplified current type FTUs. Master station performs data acquisition and fault analysis. Fault processing involves two phases: (1) Master station determines fault section and sends commands of close blocking to FTUs to complete fault isolation; (2) Feeder lines restore the healthy areas according to traditional voltage-time scheme. The shortage impact for healthy areas on restoration of traditional schemes is eliminated. Relatively high robustness for GPRS abnormal situations can be obtained to avoid incorrect switch actions. The performance can meet the practical demands, and dispatchers can monitor the situation of feeder lines. The application field of ldquolocal control typerdquo feeder automation system is expanded. [C1063]

"Gated FMCW SAR System"

This paper describes a method where a SAR system can be used with a single antenna both for transmitting and receiving. The system is using an antenna switch combined with a delayed version of the transmitted signal applied to the local oscillator of the detector. The paper discusses the different difficulties in using this method and gives an example with parameters on how such a radar system can be implemented. [C1064]

"Evaluation of mobile handset recovery from radio link failure in a multi-RATS environment"

Radio link failure (RLF) is a common phenomenon in all radio access technologies like GSM or UMTS or wireless-LAN etc., when the radio channel signal strength is weak to continue with the application. RLF is a local event detected by mobile handset (or user equipment-UE) immediately and network nodes come to know later. It is also difficult to recover for the UE due to low signal. Hence, RLF has to be dealt locally by the UE. In case of RLF, 3GPP specification indicates to release of dedicated data and signaling resources which leads to discontinuation of the application. In order to avoid discontinuation of application one of the solution proposed to use other available RAT (radio access technology) from multi-RATs in the UE. A few literatures present the possibility of single-RAT or multi-RATs RLF recovery [2-11]. However, to the best of authorspsila knowledge, none of these publications present any performance evaluation for selecting an available RAT from multi-RATs environment after a RLF. In this paper, the authors have investigated the impact of three key parameters namely, RSSI (received signal strength identifier), QoS (quality of service), connection re-establishment time for

RLF recovery across all available RATs. The analytical studies show that, two times increase in radio resources along with three times increase in number of mobile handsets experiencing RLF, the probability of success of RLF recovery increases significantly. Furthermore, one of the studies reveals that, when mean utilization of resources in the cells increases by 50% and the number of mobile handsets suffering from RLF increase by two times, the probability of success of RLF recovery decreases by 15%. [C1065]

"Wireless channel modeling in foliage environment: UWB versus narrowband"

In this paper, we study the wireless channel modeling in foliage environment, a rich scattering and timevarying environment, based on extensive data collected using UWB and narrowband (200 MHz and 400 MHz) radars. We apply two approaches to the wireless channel modeling: Saleh and Valenzuela (S-V) method for UWB channel modeling and CLEAN method for narrowband and UWB channel modeling. We validated that UWB echo signals (within a burst) donpsilat hold self-similarity, which means the future signals canpsilat be forecasted based on the received signals and channel modeling is necessary from statistical point of view. Based on the S-V method for UWB channel modeling, in foliage UWB channel, the multi-path contributions arrive at the receiver are grouped into clusters. The time of arrival of clusters can be modeled as a Poisson arrival process, while within each cluster, subsequent multipath contributions or rays also arrive according to a Poisson process. At different field (near field, medium field, and far field), we observe that the Poisson process parameters are quite different. We also observe that the amplitude of channel coefficient at each path follows Rician distribution for medium and far field, and itpsilas non-stationary for paths from near field (one of two Rician distributions), and these observations are quite different with the IEEE indoor UWB channel model and S-V indoor channel model. Based on the CLEAN method, the narrowband (200 MHz and 400 MHz) and UWB channel impulse responses have many similarities: both can be modeled as linear time-variant filter channel. [C1066]

"Design of a scalable its architecture based on IP datacast over DVB-H/SH"

Intelligent transport systems (ITS) are ICT systems that enable a more efficient and safer traffic through the use of a wide range of diverse technologies. In this paper we present a scalable ITS architecture by making use of the upcoming broadcast standards for mobile television, more specifically DVB-H (digital video broadcasting-handheld) and DVB-SH (satellite services to handhelds). Our integration of ITS services into these broadcast technologies is based on the use of the DVB-IPDC (IP Datacast) specification. This paper presents the challenges for fully deploying ITS data distribution and details how DVB-IPDC mechanisms can be used for the delivery of ITS services. [C1067]

"Mobility aware application manager for mobile networks"

Mobility aware applications have been proposed several times in the past in order to compensate for the weakness of the standard IP model in a mobile environment. Such applications are aware of the network conditions and are able to adapt themselves to such variable conditions. They can even get involved into flow routing and interface management. The solutions proposed by literature are mainly related to applications embedded into mobile nodes. This paper proposes a novel architecture that takes into account mobile network specificities and aims to propose a unified common interface for these applications. [C1068]

"Broadband Technology Management and Evaluation"

This paper focuses on technology management's strategic integration practice for the broadband service sector. It evaluates the broadband market and in particular the wireless broadband (WBB) market of Pakistan. The paper discusses why Pakistan needs WBB more than fixed broadband (DSL, Cable). It identifies the TM (technology management) concerns (3G license cost, technology selection, WBB penetration rate, and value creation) of the service providers in establishing a strong WBB market. We present new techniques and directions for addressing these concerns. We present strategies and a mathematical formula that can be used to reduce the cost of 3G license. We also provide both business and technical justifications why both WiMAX and 3G-HSPA are necessary for wireless broadband. We will also present our forecast which shows that beyond 2011 there will be more wireless broadband users than fixed ones; far more than estimated by government forecasts. The forecast also reveals that HSPA will take major share of the WBB market but at the same time importance of WiMAX cannot be ignored. Finally, an added value due to broadband for all the stakeholders is that it lays the foundation of a knowledge based economy. [C1069]

"Wireless automated digital energy meter"

Electricity is one of the basic requirements of human beings, which is widely used for domestic, industrial and agricultural purposes. There is a great demand for electricity and in spite of very well developed alternate

sources for electricity, there are lot of problems in connection with distribution and metering. The traditional electro-mechanical meters, still widely used today are prone to drift over temperature and time as a result of mechanical nature of the components in the meter. The problem worsens further in collecting the meter readings and generating the bill. In this paper we suggest a method where we utilize telecommunication systems for automated transmission of data to facilitate bill generation and payment of the same at the customerspsila place. [C1070]

"Research and implementation on the system of integrated assessment on-line of urban environmental quality"

In order to evaluate urban environmental quality scientifically, a Multiple Objective Decision-Making Ideal Interval Method (MODMIIM) is presented. This paper introduces the theory of MODMIIM, analyzes the architecture of the system and builds different functional modules. In the end, the system of integrated assessment on-line of urban environmental quality is developed by the technologies of GIS, GPRS, Data Acquisition,. NET and so on. [C1071]

"A Qualitative Risk Analysis for the GPRS Technology"

This paper presents a qualitative risk analysis of the General Packet Radio Service (GPRS) technology. GPRS presents several essential security weaknesses which may lead to security attacks that can compromise the network operation and the data transfer. We perform a detailed threat analysis by identifying the possible attacks that may result from the GPRS security weaknesses. The analyzed threats are categorized into critical areas of GPRS security exposure and further divided into threats that compromise the availability, confidentiality, integrity, privacy, authorization and authentication of the system. Each threat is associated with a qualitative risk value that incorporates the likelihood of the attack and its potential impact on the system. The understanding gained from the analysis is used to classify the threats in low and high risk threats and define the specific areas of GPRS that require additional security measures. [C1072]

"Optimal background subtraction in GPR for humanitarian demining"

Comparative study of different background subtraction methods has been performed. A criterion for quantitative comparison of different algorithms has been introduced. Based on this criterion, performance of different algorithms has been tested for scenarios with relatively smooth ground surface and very rough one. Optimal algorithms for each type of surfaces have been determined. Different ground bounce removal techniques influence GPR imaging. This dependency has been evaluated, after focusing, by means of the ratio between signal energy and remaining clutter. A very exigent scenario has served to this end. [C1073]

"Segmentation of GPR images in the case of presence of the error in measured time of signal arrival"

This paper deals with GPR data segmentation. A new method is developed for situation when time of arrival is measured with an error. In this case segmentation is considered as the detection of the random signal in the noise. Main statistics in the detection rule is likelihood ratio. This statistics is described by a system of differential equations. In the paper a solution of this system is suggested and a decision rule with its characteristics is described. [C1074]

"Full-wave analysis of cavity-backed resistively loaded bow-tie antennas for GPR applications"

In this paper, the design and full-wave analysis of cavity-backed circular-end bow-tie antennas for ground-penetrating radar applications are presented. A suitable resistive loading of the radiating structure is employed to achieve an ultra-wideband behaviour and, at the same time, to meet the occupation volume requirements of modern subsurface radars. The optimal loading distribution is determined by means of a locally conformal finite-difference time-domain numerical procedure, useful to accurately analyse electromagnetic structures having complex geometrical and electrical characteristics, taking into account the impact of the ground, modelled as a lossy homogeneous half space. Emphasis is placed on the investigation of the antenna near-field in order to gain useful information about potential EMC/EMI issues that could involve nearby electronic devices, as well as the impact of the resistive loading on radiation efficiency. [C1075]

"ALIS development for humanitarian demining and its evaluation tests"

ALIS is a hand-held dual-sensor developed for humanitarian demining. The dual-sensor ALIS is equipped with a metal detector and a GPR (ground penetrating radar). An unique and novel sensor tracking system, which can record the GPR and metal detector signal with its location is equipped in ALIS. Due to its sensor location

information, we can reconstruct buried land mine images after data acquisition. The image reconstruction, or migration processing drastically increases the quality of the image of the buried objects. ALIS evaluation test was conducted in Croatia in October 2007. Then after, we stared a half-year evaluation test of ALIS in QC test in Croatia in December 2007. This test will be conducted in various soil and environmental conditions in Croatia. [C1076]

"A review of landmine detection using GPR"

This paper reviews the current situation of landmine detection and classification using GPR techniques. [C1077]

"Investigation into GPRS Transmission Employing Switched Beam Antenna at Mobile Station"

In last few years, a smart antenna has been envisaged to enhance the GPRS system implementing at Base Station. This results in the problem of complexity and expense. Alternatively, this paper considers employing switched beam antenna at Mobile Station, such as Laptop, instead. The simulation results reveal that utilizing switched beam antenna provides higher performance in term of C/I and throughput compared with using existing antenna. As being spaced by half-wavelength of the operational frequency, the array size is too large to build in Laptop. On the other hand, the reduction of array spacing affects the system throughput because of mutual coupling effect. Also, the decoupling techniques proposed in literatures are not practical for implementing in Mobile Station. Therefore, this paper also presents the trade off between throughput and array size. From the obtained results, we can reduce the array spacing according to the desired throughput. This is considerably useful for the GPRS designer. [C1078]

"Transmission Delay Reduction in IMS by Re-registration Procedure Modification"

As a result of the evolution of computer and networking technologies, the Third Generation Partnership Project (3GPP) has proposed the IP Multimedia Subsystem (IMS) as a key element in Next Generation Networks (NGN) that supports multimedia services in the packet switched domain. To use IMS services, users should register in IMS network and to have their information be registered in IMS Databases. When transport media is mobile and user handover in the access network, the re-registeration procedure is needed. This is similar to initial register procedure and leads to excessive transmission delay. In this paper a solution is introduced to reduce the re-registration delay by reducing the number of required contacts with IMS Databases. We have compared re-registration time in our proposed scheme with the standard scheme in OPNET modeler 10.5. Simulation results have confirmed better performance for the proposed scheme. [C1079]

"SCTP-Based Bandwidth Aggregation across Heterogeneous Networks"

Nowadays more and more various networks can be used to access the Internet. But a lot of them, especially most wireless networks, only offer very limited bandwidth to the end users. In order to gain much wider bandwidth than one network can offer, we modified the stream control transport protocol (SCTP) so that it can aggregate bandwidth over multiple interfaces of a host to serve an application simultaneously. The main algorithms proposed by us include virtual association, compound congestion control window and mechanisms of transferring and retransferring packets. We also simulated our solution by the open source software Net Simulator version 2 (NS-2), the results show that the efficiency of our solution is over 80% in terms of bandwidth utilization. We still discussed the future studies that have to do before the modification can be used in real more complex topologies networks. [C1080]

"Improving Delay Performance in UMTS/WLAN Integrated Networks with Global Gateway Router"

This paper presents efficient methods of vertical handoffs from UMTS to WLAN and vice versa in a loose coupling architecture. When a mobile terminal (MT) moves from UMTS to WLAN, it performs mobile IP (MIP) registration with home agent (HA). Subsequently, HA needs to perform location update signaling with UMTS network to make the MT reachable from UMTS. If HA is deployed at gateway GPRS support node (GGSN), all incoming packets from the Internet to an MT are routed via GGSN and average packet-delay increases when the MT is in loosely-coupled WLAN. MIP registration is also affected by the traffics between the Internet and UMTS. To avoid this problem, HA can be deployed in WLAN IP network, but handoff delay from WLAN to UMTS will be more because an MT cannot send MIP-registration request to HA before the establishment of PDP context in UMTS network. We propose efficient handoff methods with simple modification in GPRS tunneling protocol (GTP) and HA functionality by placing a global gateway router. Our ns-2 based simulation results show that the proposed technique improves MIP registration during handoff from UMTS to WLAN and vice versa. It also provides lower end-to-end packet delay for Internet services when an MT is residing in WLAN. [C1081]

"Precise optical scanning for practical multi-applications"

At last decade many approaches for non-contact measurement techniques for object surfaces and approaches for 3D object recognition have been proposed; but often they still require complex and expensive equipment. Not least due to the rapidly increasing number of efficient 3D hardware and software system components, alternative low cost solutions are in great demand. We propose such a low-cost system for 3D data acquisition and fast surface registration by digitized points Cartesian coordinates matrix keeping. There is presented two examples of practical application of the passive optical scanning aperture under proposition. [C1082]

"Hierarchical Methods for Landmine Detection with Wideband Electro-Magnetic Induction and Ground Penetrating Radar Multi-Sensor Systems"

A variety of algorithms are presented and employed in a hierarchical fashion to discriminate both anti-tank (AT) and anti-personnel (AP) landmines using data collected from wideband electromagnetic induction (WEMI) and ground penetrating radar (GPR) sensors mounted on a robotic platform. The two new algorithms for WEMI are based on the In-phase vs. Quadrature plot (the Argand diagram) of the complex measurement obtained at a single spatial location. The angle prototype match method uses the sequence of angles as a feature vector. Prototypes are constructed from these feature vectors and used to assign mine confidence to a test sample. The angle model based KNN method uses a two parameter model; where the parameters are fit to the In-phase and Quadrature data. For the GPR data, the Linear Prediction Processing and Spectral Features are calculated. All four features from WEMI and GPR are used in a Hierarchical Mixture of Experts model to increase the landmine detection rate. The EM algorithm is used to estimate the parameters of the hierarchical mixture. Instead of a two way mine/non-mine decision, the HME structure is trained to make a five way decision which aids in the detection of the low metal anti personnel mines. [C1083]

"Improved GPR image quality by truncating the bandwidth of the Fourier transform in 2D diffraction tomographic inversion"

Diffraction tomography (DT) has been applied in ground penetrating radar (GPR) to obtain images of buried objects. In order to obtain a unique solution for the object function, a maximum frequency range should be used in a DT inversion routine. In this paper, a method is proposed to appropriately truncate the frequency range of the Fourier-transformed (FT) scattered field for a 2D DT inversion routine. This is achieved by determining the variation of the phase in the FT scattered field. The number of zero-crossings of the FT phase along the spatial axis is counted and a moving-average filter is applied to enable proper bandwidth selection. Numerical simulations are demonstrated using synthetic data with additive white Gaussian noise. [C1084]

"Anomaly detection of environmental electromagnetic wave based on time fluctuation and cross-correlation in magnetic field azimuth"

Anomalous radiation of environmental electromagnetic waves is reported as a portent of earthquakes. Then, we are observing environmental electromagnetic waves of the ELF range all over Japan. We have been regarding the high amplitude in the observed signal as anomalous radiation. However, the observed signal contains a lot of low amplitude anomalies hidden by background noise. These anomalies also have the possibility with significant information of a portent of an earthquake. In this paper, we propose the method of detecting anomalous radiation using time fluctuation in magnetic field azimuth which doesn't depend on the amplitude level. Moreover, we show that an anomalous radiation is the portent of earthquakes by calculating an azimuthal cross-correlation among two or more observation sites. [C1085]

"Field test validation of optimized ground enetrating Radar (GPR) mixture model at frequency range 1.7 GHz to 2.6 GHz"

This paper presents the validation of optimized GPR mixture model based on the microwave nondestructive free space method in order to determine the density of road pavement. Density is an important parameter to determine the compressive strength of road pavement for road user safety. The attenuation is a major factor for gathering the density of road pavement predictly. A few of measured attenuation were taken at nine road pavement slab samples in laboratory. The GPR mixture model has been used to produce the simulation data to predict the attenuation. The comparison results between measurement and simulation were investigated. The best performance of GPR mixture model was selected in the optimization technique due to the smallest mean error. An improved attenuation formula or optimized GPR model was obtained from the optimization technique. The validation at field test had been conducted in order to see the performance of optimized GPR model. [C1086]

"A method for subsurface metallic landmine identification in GPSAR"

A method for subsurface metallic landmine identification in Air- or vehicle- borne ground penetrating synthetic aperture radar (GPSAR) using finite difference time domain method combined with genetic algorithm is proposed. To identify the real object, the framework information on landmine is obtained according to the matching algorithm based on number and relative location of one dimensional scattering center. By identifying two kinds of metallic landmines buried beneath a Gaussian rough interface, the effectiveness of the proposed method is testified. Electromagnetic modeling result will improve the landmine detection performance greatly. [C1087]

"Impact of the design of an UWB antenna on the maximum achievable rate of the communication in presence of multi user interferences"

This paper develops an ultra wide band antenna and a new performance criterion: the communication capacity (achievable bit rate) in presence of the MUI model in a pulse shape fashion by the antenna. The development of this study would lead to the investigation of more UWB antennas and pulse shapes optimizations. [C1088]

"Replication of the ELF Magnetic field in power transformer rooms"

In this paper it is presented a software tool that allows the replication of ELF magnetic field in a region outside the transformer cells of a common Power Transformer Room in a Public Building. The magnetic field is replicated inside a 50times50times50 cm cube of insulator material which serves as structure for 6 Coils each placed in each cube facet. The formulation used for determining the magnetic field is based on the Biot-Savart law. The Coils under analysis will have different geometric configuration and electrical state. [C1089]

"Mobile load management system"

This paper presents a development of mobile load monitoring and control system (MLMCS) in application to remote load management. MLMCS consists of client monitoring and control interface (CMCI) on mobile phone screen and wireless ARM-based automatic meter reading and control system (WAMRCS). To provide a cost-effective, wireless, always-connected, two-way data link between supervisor and WAMRCS, the WAMRCS sends information of power data and outage alarm to supervisor via GPRS network. In emergency conditions WAMRCS will notice supervisor in real time, and then the supervisor can quickly make a response to clear power faults anywhere and anytime through CMCI on mobile phone screen to decrease the users' loss. [C1090]

"Design and Application of Hybrid Network Control System Based on CAN Bus and GPRS"

A hybrid network system is proposed for the dispersive of the remote heat exchange station in city heating system. The data are gathered through CAN Bus node and transferred remotely by GPRS. The system hardware configuration is introduced in detail, at the same time the design processes of hardware and software of intelligent node and wireless gateway are illustrated. Finally, a case is given, and the running result shows that the system is safe, economic, high precision and real-time, and be worth promoting. [C1091]

"Effectiveness of global signal elimination from environmental electromagnetic signals for earthquake prediction"

Anomalous environmental electromagnetic (EM) radiation waves have been reported as the portents of earthquakes. We have been measuring the extremely low frequency (ELF) range all over Japan. Our goal is to predict earthquakes using EM radiation waves. Previously, we proposed a method of detecting anomalous signals by focusing on linear prediction errors. However, this method also sensitively responds to earthquake-unrelated anomaly. For accurate earthquake-prediction, we should eliminate earthquake-unrelated signals. In this paper, we try to reduce false detection rate by global signal elimination using non-negative matrix factorization (NMF) and evaluate the effectiveness of this method. [C1092]

"Performance Evaluation of Vertical Handoff in Fourth Generation (4G) Networks Model"

The next generation 4G wireless networks is envisioned as a convergence of different wireless access technologies providing the user with the best anywhere, anytime connection and improving the system resource utilization. The integration of wireless local area network (WLAN) hot spots and cellular networks (such as GPRS and UMTS) needs a more efficient handoff process. Handoff process between WLAN and cellular networks is known as vertical handoff. In this handoff process, number of unnecessary handoff should be minimized and WLAN network should be given high priority. The main objective of this paper is to study and evaluate the handoff process between WLAN and cellular networks using two algorithms. The algorithms are based on

received signal strength, WLAN threshold value and lifetime estimation. Then, simulation model are developed to evaluate the performance of the vertical handoff algorithms using Matlab. The performance is evaluated according to the number of vertical handoff, number of unnecessary handoff and handoff delay by varying the user mobility rate. Simulation shows that the number of vertical handoff is increasing as the user mobility rate is increasing. Handoff algorithm using received signal strength (RSS) averaged and lifetime estimation shows the minimum number of unnecessary handoffs as compared to algorithm using only RSS averaged. The result also shows that the handoff delay is affected by the user mobility rate. Slower mobility rate user tends to stay longer in WLAN network as compared to high mobility rate user. [C1093]

"A ZigBee Based Mesh Network for Home Control System"

The current development and the application status of the home network are introduced briefly, then, a two-tier architecture of home control system (HCS) based on ZigBee multi-hop mesh network is presented. In addition to the basic data acquisition and processing functions, the gateway which has been designed and fabricated supports ZigBee based wireless access interface, Bluetooth based local interface and GPRS based remote interface. The hardware architecture and protocol software, as well as the communication control method are proposed in detail. Under the constructed test environment, the performance results show that the proposed scheme is more convenient for home control services, and except the gateway, all of the router nodes in the system work on sleep mode at most of the time, which will improve the lifetime of the whole system efficiently. [C1094]

"Security protection discuss of power load management (LM) based on GPRS/CDMA"

This paper analyzed the specialty of LM system based on GPRS/CDMA. The shortage of security scheme used in LM system in safety zone I/II was discussed. The reduced possibility of the safety demand is presented also. A new safety scheme in safety zone III is designed. The new scheme was more simple and it improved the safety capability of the control zone I/II more effectively. [C1095]

"Mobile phone usage and cancer"

Human beings are bioelectrical systems. Our hearts and brains are regulated by internal bioelectrical signals. Environmental exposures to artificial EMFs can interact with fundamental biological processes in the human body. In today's world, everyone is exposed to two types of EMFs: (1) extremely low frequency electromagnetic fields (ELF) from electrical and electronic appliances and power lines and (2) radiofrequency radiation (RF) from wireless devices such as cell phones and cordless phones, cellular antennas and towers, and broadcast transmission towers. [C1096]

"The design of Energy Management Terminal Unit based on double MSP430 MCU"

Energy management terminal unit (EMTU) is the main device to realize electric energy metering, reading meter analysis etc. This paper introduces the realization of EMTU based on double MSP430 and emphasizes on software design, hardware design, infrared meter reading and the methods of sampling accuracy improvement. FG4619 is used to do ac sampling, meter reading, display, data analysis, data saving, GPRS communication, TCP/IP stack and so on. F2012 is used to do infrared meter reading, range switch, parameter setting and etc. These two parts can communicate through IIC Bus. [C1097]

"Approach about the maintaining mode for distribution automation in city"

This article summarizes the functions and features of the distribution network automation system in Jinan area, analysis the operation and maintenance mode, the current situation and problems of Jinan distribution network automation system. With the maintenance experience of the distribution network automation system, submits the suggestion to large Distribution automation system design and maintenance in ordinary city. [C1098]

"Study and application on cable duct gas online monitoring system based on GPRS"

A large number of overhead power lines are transferred to underground due to city beautification recently in China. Leakage gas from the pipeline usually spreads to the cable duct. It becomes a risk issue to cable operation safety and higher demand for safe protection of the cable duct is needed. The paper describes the online auto-monitoring system of city underground cable duct, that is the design and implementation scheme of cable duct online auto-monitoring flammable and explosive gas project of Jinan power supply company. The system terminal adopts the wireless flammable gas explosion-proof detector, and the cable duct flammable and explosive gas online auto-monitoring center is established in cable duct operation and management unit. Operation and monitoring results shows that it can timely and accurately monitor the specific location of

flammable gas leakage, avoiding fire and explosion accidents due to gas leaking to the cable duct to maximum extent, and providing a good reference against similar risk. [C1099]

"A System Architecture and Its Data Communication Technology of Mobile Office Automation System"

With the development of IT, mobile OA is getting more and more important in government, enterprises and institutions. The traditional OA solutions, for the defect of its combination with mobile equipment, limit the application to mobile OA. This paper introduces a typical representative frame of mobile OA system and puts forward a Web Service communication mode based on GPRS to resolve the data transmission between background server and terminal of this mobile OA system. The system has good expansibility and is easy to upgrade and maintain. [C1100]

"Design and Application of In-Vehicle Terminal for Car Network System Based on ARM9"

A kind of in-vehicle terminal for car network system based on ARM9 has been researched and designed in this paper. The main hardware module of the in-vehicle terminal is introduced in detail and the hardware architecture has been presented as well. The software module and its implementation of the terminal have been explained in detail, including CAN (controller area network) bus module, GPRS (general packet radio service) module, GPS (global positioning system) module. The software system of the in-vehicle terminal is implemented, and a kind of practical package format and flow chart between the in-vehicle and the server is put forward. The implementation of the system indicates that cars are directed and controlled well through the terminal. [C1101]

"Improved Authentication and Key Agreement Procedure in IP Multimedia Subsystem for UMTS"

An IP multimedia subsystem (IMS) has been specified to provide multimedia services in 3GPP release5. In IP multimedia subsystem, both packet-switch domain and IMS authentications are necessary for the IMS subscriber. The IMS authentication is carried out by IMS authentication and key agreement (AKA). It is inefficient that there are so many steps in IMS AKA. Hence, this paper proposes an improved IMS AKA procedure, which can not only guarantee system security but also improve system performance. [C1102]

"Underwater behavioral study of Ganges river dolphins by using echolocation clicks recorded by 6-hydrophone array system"

Targeting the 9 Ganges river dolphins inhabiting the Narora area in Ganges river system, the first recordings using an compact acoustic observation system, which consists of a high frequency 6-hydorophone cross array connected with a PC on land-base by a wireless LAN system have been carried out during 17 to 21 February 2008. The system also uses the prototype of a GPRS modem-based real-time data transmission system to share the processed data with the world over the internet. The array structure consists of a horizontal cross array formed by 2 arms each of 1.6 meter length with a hydrophone on each corner and at the intersection forming two equi-spaced 3-hydrophone linear SBL system for omni-directional horizontal coverage, and one additional hydrophone which is fixed 0.8 meter below the center hydrophone of the cross array also forming an equi-spaced triangular SBL system for vertical measurement. The clicks of the dolphins received on each hydrophone were sampled at a rate of 500 kHz per channel. Total recording was done for approximately 40 hours due to power supply interruptions. However, the GPRS modem-based real-time data transmission system worked well during the recordings. The results of the basic analysis of the data show that the dolphins are found swimming up and down the river. The results are in accordance with the visual observation results. Underwater behavior of the dolphins approaching near to the array, which could not otherwise have been observed by visual survey, has been mainly analyzed in this paper. Based on ICI during this period of approaching to the array, we estimated ldquowhat this dolphin is seeingrdquo or interested in. We invoked the idea of lag time that the dolphin requires to perform echo-location process and to emit the next click to the target [7]. Defining the lag time as DeltaP (pre-click time) and assuming that DeltaP is constant, DeltaP and distance D to the target where the dolphin is looking at is calculated by using ICI a- nd range between the dolphin and the array, which is measured by the array. Utilizing available on-axis clicks from the data of the preliminary experiments in Budhabalanga river, the value of DeltaP is calculated. Constant DeltaP is estimated as 14.3 milliseconds. To determine D of the Narora data, we applied it when the dolphin was approaching to the array within 20 meters. The results show that the dolphin does not look at any object beyond 20 meters range. On the other hand, when ICI reduced below the constant DeltaP (14.3 milliseconds), it is estimated that the dolphin is in a different stage of the echo-location process. [C1103]

"The Research of Remote Monitoring Systems of University Building Heating Network"

This topic is based on the remote monitoring systems of university building heating network. The universities in north are large heat consumers, and have special consumption types. In this paper, a remote monitoring system for university heating network is given by the use of configuration software ForceControl 6.0 through GPRS and PLC communications. The system can realize the monitoring and regulating of heating network.In monitoring center the scene real-time data display,historical memory, real-time trends and historical trend analysis, historical statements of the enquiry, Web site publishes, and other functions are accomplished by using the configuration software. According to the characteristics of college, by using some energy-saving measures, energy-saving can be realized. The research has much economic effects and social effects. [C1104]

"Research on water quality assessment method based on multi-class support vector machines"

It has been a more complex problem for water quality assessment. And its aim is to well and truly evaluate its degree of pollution for bodies of water, which will be easy to provide some principled projects and criterions for water resource's protection and their integration application. So, it has been widely applied into water quality assessment. SVM and directed acyclic graph support vector machine (DAGSVM) are paid much attention in this paper. A water quality assessment method based on DAGSVM is put forward. The test results show that the method proposed in this paper has an excellent performance on correct ratio. Besides, a wireless water quality monitoring system is designed and developed. The system can realize the acquisition of the water parameters, and the acquisition information timely and low cost transmission by GPRS (general packet radio service, GPRS). The developed system can store and display the water quality parameters from the monitoring spots in real time. Combining the wireless communication technology with the monitoring technology, the designed and developed system can greatly improve the real-time and continuity for the water quality's monitoring and assessment. [C1105]

"SAR Remote Sensing Data for Subsurface Targets Detection and Lop Nur Lake Evolution and Extinction Study"

This paper presents the observation from SAR images of the dried Lop Nur Lake in Xinjiang of west China. Lop Nur Lake is one of the driest places in the world and finally lost its last drop of water in 1972. It is well known for its "human ear shape" feature in optical remote sensing images. Likewise, the "ear" feature is shown in synthetic aperture radar (SAR) images, and is even larger because of the penetration effect. The universal existence of lacustrine deposit with high water content and salinity are undetectable by previous remote sensing images in Lop Nur Lake. We have made some laboratory experiments about subsurface soils and developed an improved dielectric model for moist saline soil at microwave bands. A field trip was conducted from October 25 to November 8, 2006 to validate the image interpretation results. As an important indicator for environment degradation and climate change study in arid region, Lop Nur does need long-term and overall research to answer many scientific questions. [C1106]

"Automatic Detection and Classification of Buried Objects in GPR Images Using Genetic Algorithms and Support Vector Machines"

This work presents a novel pattern recognition approach for the automatic analysis of ground penetrating radar (GPR) images. The developed system comprises pre-processing, segmentation, object detection and material recognition stages. Object detection is done using an innovative unsupervised strategy based on genetic algorithms (GA) that allows to localize linear/hyperbolic patterns in GPR images. Object material recognition is approached as a classification issue, which is solved by means of a support vector machine (SVM) classifier. Results on synthetic images show that the proposed system exhibits promising performances both in terms of object detection and material recognition. [C1107]

"Fourier Array Processing for Buried Victims Detection Using Ultra Wide Band Radar with Uncalibrated Sensors"

The purpose of this paper is to propose a new way to detect victims buried in or under layers of rubble or debris in case of disasters such as earthquakes, fires or terrorist attacks. The method is based on Fourier processing and principal component analysis (PCA). It utilizes a moving array of sensors arranged in the line of motion. It combines the speed and robustness of Fourier-based processing with a capability of space-time adaptive processing (STAP) to detect objects moving at extremely low velocities. The concept is demonstrated on several experiments carried out using an ultra wide band (UWB) ground penetrating radar (GPR). A fast, yet robust and extremely sensitive technique is being tested to achieve detection of the slightest motion (such as breathing) of a subject using uncalibrated sensors. [C1108]

"Understanding the Distribution of Groundwater Resources using Synthetic Aperture Radar Data

over Southwest Egypt"

Two NSF-funded studies (OISE-0417704; OISE-0513379) carried out by the author over SW Egypt (between 20-24.5degN and 25-32degE, in the East Oweinat and Tushka regions, respectively) used C-band Radarsat-1 SAR images and topographic data to understand groundwater distributions in the local aquifers that underlie the study areas. In these studies, areas with enhanced groundwater represent the best locations for groundwater development in order to address the water and food pressures that exist in the regions. In the East Oweinat area, small-scale agricultural development is already underway, while in Tushka there are plans for development in the near future. Radar waves are uniquely able to image beneath the desert sand in the eastern Sahara to reveal groundwater-related near-surface features, that is, the courses of ancient rivers and streams and faults and fractures. The depth of near-surface imaging for the datasets used is on the order of half a meter. The distribution of groundwater-recharge near-surface features was analyzed and the variation in groundwater storage was appraised. Three new areas have been identified as promising sites for agricultural development. [C1109]

"A High performance Communication Program for a GPS-based Vehicle Tracing Mobile Platform"

This paper describes the design and implementation of a high performance terminal communication program for a GPS-based vehicle-tracing mobile prototyping platform (GPSVTMPP). First we introduce the architecture and function of our mobile platform and analyze some bottlenecks. Then, we present detailed strategies and methods for how to use Microsoft's I/O Completion Port(IOCP) model to implement the Winsock 2 communication server program. We prove that this server program can improve the efficiency, flexibility and robustness of the single communication server, especially for large-scale communication. Finally, this paper summarizes the results of some application experiments and other results using this platform. [C1110]

"Thermal Noise Analysis on the Resistive Vee Dipole Antenna for Ground-Penetrating Radar Applications"

Thermal noise characteristics of a resistively-loaded vee dipole (RVD) are numerically analyzed using a commercial method of moments software. The RVD analyzed in this paper is loaded with 28 chip resistors. The resistors are loaded such that the resistors with higher values are placed farther from the drive point than the resistors with lower values. The results show that the resistors with lower values contribute more to the total noise power accepted by a 200 Omega feed line though the resistors with lower values generate smaller noise voltage. [C1111]

"Dual Sensor ALIS for Humanitarian Demining and its Evaluation Test in Mine Fields in Croatia"

More than 60 courtiers are still suffered from land mines. ALIS is a hand-held dual-sensor developed for humanitarian demining, which has been developed at Tohoku University, Japan since 2002. The dual-sensor ALIS is equipped with a metal detector and a GPR (Ground Penetrating Radar). A unique and novel sensor tracking system, which can record the GPR and Metal detector signal with their acquired locations, is equipped in ALIS. Due to its sensor location information, we can reconstruct buried land mine images in 3D space after data acquisition. IN addition, we found that the image reconstruction or migration processing drastically increases the quality of the image of the buried objects. ALIS evaluation test was conducted in Croatia in October 2007. Then a half-year evaluation test of ALIS in QC test in Croatia was held during December 2007 and April 2008. In this test, we could obtain fruitful experience in various soil and environmental conditions in Croatia. [C1112]

"Subsurface Sensing of Near Surface Object Using Cavity Backed Slot (CBS) Antenna"

This paper presents a novel cavity backed slot (CBS) antenna for subsurface sensing applications. The CBS antenna is designed to be "matched" in the two-half-space configuration (one half space air; and the other ground) over a relatively wide frequency band. As a result, when attached onto ground surface, it is able to efficiently couple microwave power into and out of the ground. In this study, CBS antennas with operating frequency range [8.5 GHz, 13.6 GHz] are designed to detect objects buried in sand. Data acquisition is carried out using a sandpit with size (125 cm times 100 cm times 80 cm) as the test bed. One transmitting CBS antenna is fixed at the center of the sandpit and one receiving antenna is physically moved along a rectangular grid (i.e., multi-static measurement). An inverse synthetic aperture radar (ISAR) algorithm is adopted for inverse processing. A 4-inch-diameter metallic sphere is used as calibration target; and three targets are tested, including a 3-inch-diameter metallic sphere, a T-shaped copper target, and a landmine simulant. Imaging results are presented and compared with those obtained using horn antennas (which are not "matched" to the air-ground interface). Better signal-to-clutter ratios are demonstrated by the proposed CBS antennas. [C1113]

"Context-Dependent Multi-Sensor Fusion for Landmine Detection"

We present a novel method for fusing the results of multiple landmine detection algorithms that use different types of features, different classification methods, and different sensors. The proposed fusion method, called context-dependent multi-sensor fusion (CDMSF) is motivated by the fact that the relative performance of different detectors can vary significantly depending on the sensor, mine type, geographical site, soil and weather conditions, and burial depth. The training part of CDMSF has two components: context extraction and algorithm fusion. In context extraction, the features used by the different algorithms are combined and used to partition the feature space into groups of similar signatures, or contexts. The algorithm fusion component assigns an aggregation weight to each detector in each context based on its relative performance within the context. Results on ground penetrating radar (GPR) and wideband electromagnetic induction (WEMI) data collections show that the proposed method can identify meaningful and coherent clusters and that different expert algorithms can be identified for the different contexts. Our initial experiments have also indicated that the context-dependent fusion outperforms all individual detectors. [C1114]

"Statistical Models for Landmine Detection in Ground Penetrating Radar: Applications to Synthetic Data Generation and Pre-Screening"

As ground penetrating radar phenomenology continues to improve, more advanced statistical signal processing approaches become applicable to subsurface inference in GPR data. Despite the wide body of literature exploring the applications of various approaches to processing GPR data, statistical modeling of realistic soil responses is a difficult task, and the algorithms developed for real-time fielded GPR processing are rarely directly motivated by statistical models of GPR data. In this work, we present a tractable spatial statistical model for volumetric GPR data which can be used to motivate the application of various signal processing approaches to solving problems of interest in GPR data like pre-screening, feature extraction, and air/ground response tracking. [C1115]

"Satellite Data Fusion Techniques for Terrain and Surficial Geological Mapping"

Increased satellite image data availability, with different spatial, spectral, and radiometric resolutions, present some challenges for image fusion techniques to be used in many application areas. In this study, we demonstrate an improved technique combining RADARSAT (SAR), Digital Elevation Model (DEM) and Landsat (ETM+) images with surficial geology data into two complementary composite image maps within Mackenzie Valley Pipeline Corridor, Canada. The method includes four processing steps. (1) The shaded relief derived from DEM was blended with SAR data to produce 3-D effect for terrain and geological structural interpretation. (2) Image fusion using a pan-sharpened IHS technique produced a higher resolution multi-spectral (MS) image. (3) The higher resolution MS image is blended with the SAR-DEM to produce an image terrain map. (4) Two complementary composites were then produced. The first image map contains of geomorphic features/surficial geology GIS layers, and 3D terrain information derived from the SAR-DEM image. The second image map is a composite of geomorphic features/surficial geology blended with the SAR-DEM-ETM+ image map. Integrated image maps generated in steps 1 and 3 provide standardized image base maps to display surficial geological and terrain information. [C1116]

"Improvement of Earthquake Prediction by using Global Signal Elimination from Environmental Electromagnetic Signals"

Anomalous environmental electromagnetic (EM) radiation waves have been reported as the portents of earthquakes. We have been measuring the Extremely Low Frequency (ELF) range all over Japan. Our goal is to predict earthquakes using EM radiation waves. Previously, we proposed a method of detecting anomalous signals by focusing on linear prediction errors. However, this method also sensitively responds to earthquake-unrelated anomaly. For accurate earthquake-prediction, we should eliminate earthquake-unrelated signals. In this paper, we try to reduce false detection rate by global signal elimination using Non-negative Matrix Factorization (NMF) and evaluate the effectiveness of this method. [C1117]

"Layered Subsurface Radar Profiling with Combined ESPRIT and SVA Algorithms"

In this paper, a high-performance profiling algorithm with the combination of ESPRIT and SVA (Spatially Invariant Apodization) was proposed. In the algorithm, SVA is firstly used to reduce the sidelobes of compressed pulses, because they could mask the weak signals reflected from subsequent subsurfaces, and ESPRIT is then used to get super-resolution profiling. Detailed simulations for one four-layer geometry with comparison of the results obtained by FFT plus ESPRIT and by SVA plus ESPRIT were presented to show the efficiency of the proposed algorithm. [C1118]

"Design, implementation, and evaluation of TAILOR (Intelligent Handoff Decision Model for Heterogeneous Networks)"

Recent years have witnessed the development of a wide-range of wireless technologies. Next generation communication systems are aimed at integrating existing and emerging wireless systems to enable ubiquitous network access to mobile end-users. The availability of various access networks requires a mobile device to be capable of selecting the best access network with minimum user intervention. We present a design architecture called TAILOR that efficiently implements automatic network selection based on several factors such as the conditions of accessible networks, requirements of active applications, and preferences of the mobile user. We also present a case study to demonstrate the operation of the prototype TAILOR architecture in a real heterogeneous network testbed consisting of IEEE 802.11b and general packet radio service (GPRS) networks. [C1119]

"Security management in Kerberos V5 for GSM network"

Today more then ever, secure communication is a must. Most companies now user network infrastructure to conduct their business, whether internally (intranet model) or externally to reach partners or customers (extranet/Internet models). While it is utopian to consider today's networks as being safe, there are solutions to make them more secure and use them with a bit of trust. The key aspects to securing communications over a distributed environment are authentication, integrity, confidentiality and authorization. Kerberos is a network protocol that addresses the authentication part. This application aims at using Kerberos V5 to secure the communication between a J2Me MIDlet communicating over the GPRS, and a Banking Transaction Server. This project mainly covers at gaining the initial ticket provided by the authentication server. Authentication server checks its database to authenticate the user. If the username and the password matches it generates and initial ticket by which we can obtain many service tickets to access the services provided by the banking transaction server. [C1120]

"On GPRS Traffic Characteristics: Analysis with Log-Infinitely Divisible Cascades (LIDC) Model"

According to the analysis of turbulence on the log-infinitely divisible cascades (LIDC) method, analyzing the GPRS network traffic that obtained from mobile operator, we found that the flow of GPRS is accord with the log-infinitely divisible cascades therefore, we further research the flow data of GPRS. The result indicates that it is very efficiently that the method of LIDC for the flow characteristics of network data. The method which we found could not only analyze the flow of network in full scale but the single scale also. In the basis of analysis frame, we could deeply research other trait, such as the scale of GPRS network has the trait of keeping power-law relations, single scale and scale invariability, etc. [C1121]

"Optimization of Ground Penetrating Radar (GPR) Mixture Model in Road Pavement Density Data Analysis"

This paper presents an optimization of GPR mixture model based on the measurements and simulation results at frequency range of 1.7-2.6 GHz. The purpose is to get a most accurate relationship between attenuation and density for various road pavements densities. The proposed method is simple, fast, nondestructive and accurate way to determine the density of road pavement. Density is a one of the important parameter in order to determine the compressive strength of road pavement. In laboratory, a few of received signal strength and measured attenuation for nine road pavement slab samples were taken at four different frequencies. The GPR mixture model has been used to produce the predicted attenuation due to the pavement density. The calculation and selection of mixture model has been discussed thoroughly and only the best performance of GPR mixture model was selected for optimization. [C1122]

"Detection of Anomalous Environmental Electromagnetic Wave by Statistical Property in Magnetic Field Azimuth"

Anomalous radiation of environmental electromagnetic waves is reported as a portent of earthquakes. Then, we are observing environmental electromagnetic waves of the ELF range all over Japan. We have been regarding the high amplitude in the observed signal as anomalous radiation. However, the observed signal contains a lot of low amplitude anomalies hidden by background noise. These anomalies also have the possibility with significant information of a portent of an earthquake. In this paper, we propose the method of detecting anomalous radiation using statistical property in magnetic field azimuth which doesn't depend on the amplitude level. Moreover, we show that an anomalous radiation is the portent of earthquakes by calculating an azimuthal cross-correlation among two or more observation sites. [C1123]

"Effectiveness of 2D FDTD Ground Penetrating Radar Modeling for Bridge Deck Deterioration Evaluated by 3D FDTD"

Computational modeling is effectively analyzes the wave propagation and interaction within bridge structures, providing valuable information for sensor selection and placement. It provides a good basis for the inverse problem for defect detection and reconstruction. The finite difference time domain (FDTD) method can be used to model nondestructive wave based sensing using air-coupled ground penetrating radar (GPR). A full 3D model is able to capture all interactions but is limited by computational size and CPU time. In contrast, a 2D model is computationally fast and capable of studying a large computational region, but lacks a complete view of the problem. In this study, we propose to use the 2D FDTD model to simulate the GPR detection of bridge deck defects. The effectiveness of the 2D model is validated by comparison to a full 3D model. The bridge deck is a relatively uniform in the transverse direction so that the 2D longitudinal geometry analysis can therefore adequately capture most of the 3D scattering behavior. [C1124]

"Design and Analysis of UWB TEM Horn Antenna for Ground Penetrating Radar Applications"

A TEM horn antenna is usually applied to the air-launching GPR system. Traditionally, the variation of characteristic impedance of a TEM horn antenna is usually set to range from 50 Omega (characteristic impedance of a coaxial cable) to 376.7 Omega (free space wave impedance). However, a difference regularly exists between transmission-line wave characteristic impedance and free space wave impedance. In this paper, we demonstrate that there is no significant difference of performance with the different aperture impedance of the antenna. In addition, the simulated and experimental results both show that the performance of the designed TEM horn antenna matching with impedance of 200 Omega is better than that with free space impedance of 376.7 Omega. For fully understandings, a discussion is provided to explain the possible reasons. At the final aspects of this research, the other components, such as transmitter, receiver, and control units, would work with the TEM horn antennas to complete an air-launching GPR system. [C1125]

"Analysis and Classification of high Arctic Glaciers with ASAR Data"

We apply a polarimetric classification scheme to Envisat Alternating Polarisation mode ASAR images and compare to ground truth data. By analysing images with a range of acquisition conditions and comparing the classification accuracy with the ground truth data, we investigate the influence of the acquisition conditions for glacier facies discrimination. We find that the main influence is the image swath angle, which affects the image pixel geometry. There was no obvious preference for the different polarisation channels, although the dual polarisation classifications were consistently better than single polarisation classifications. [C1126]

"Study on Wireless Remote Monitoring System Based on GPRS"

Along with continuous development and promotion of WEB and GPRS, application of GPRS gradually becomes a research focus in the supervisory control field. This article, which uses wireless network advantage of GPRS telecommunication, combining with the traditional industry control system, offers a wireless remote control system based on GPRS. The system has been proved to have advantages over the traditional industry control system. [C1127]

"Optimized Deployment of Cluster Head Nodes in Wireless Network for the Greenhouse"

Applying wireless techniques in the greenhouse is one of the most important trends of the agricultural development. In the clustered wireless network with definite network level, the deployment of cluster head nodes has a great influence on the performance of the network. This paper discusses a three-level network model of the wireless monitoring and control system based on the multi-span in greenhouse. The cluster head nodes in network with traits of wireless sensor network and wireless motion network are designed with GPRS Module and Zigbee Module CC2430. Taking single multi-span greenhouse as an example, we adopt the improved LEACH clustering algorithm to analyze the influence of the cluster head nodes number on latency and energy consumption., The optimized cluster head nodes deployment strategy based on the multi-objective optimization method is given to ensure the highly efficient data transmission. We optimize the cluster head nodes deployment, determine the best number of the cluster head nodes in single multi-span greenhouse based on MATLAB and analyze the influence of the low lever cluster head nodes number on latency, energy consumption and the total nodes number. The network has great improvement on the real-time and lifetime with the optimized cluster head nodes deployment compared with one clustered network. [C1128]

"Wireless Communication Design in Water Factory Monitor System by Sockets"

In the research, it present a wireless communication method for water factory environment monitor system. It

sends and receives wireless data by GPRS, and processes the data in sockets software, which setup both in server and client computers. In the research, it designs the remote terminal, the wireless TCP/IP protocol, SMS (short message serve), and C/S (Client/Source) model. Also a VC++ program for wireless communication by socket in server computer and client computer was written in the research, which realizes the wireless communication by the VC++ socket program. [C1129]

"Standardization and Integration of Information System in International Container Logistics"

Container logistics plays a significant role in today's international trade. Advanced information system and equipments have been more and more employed in international container logistics in line with thriving international commerce and stricter regulations on anti-terrorism. Study on integration of information system in international container logistics is made based on the standardization of logistics information and e-tag, RFID, GPS and GPRS technology to avoid redundant information processing and unreasonable utilization of current equipments. Topology structure is brought forward on the basis of ebXML. [C1130]

"An Automatic Supervisory Control System Based on Real-Time Embedded Technology and GSM or GPRS Network"

An automatic supervisory control system of power system based on GSM/GPRS Network is presented and designed. This system adopts multi-communication medium, the advance wireless communication is included, such as GSM and GPRS. The system not only reduces the labor cost and increases information reading accuracy, but also make utilities to provide accuracy load parameters and billing data to advise customs. The distributed structure of the system makes extension possible. The applications in several media utilities showed its efficiency. [C1131]

"The Design and Realization of Embedded Wireless Video Monitoring System Based on GPRS"

The paper introduces a method of Embedded Wireless Video monitoring System based on GPRS (General Packet Radio Service). First the S3C2410 platform is given based on the Embedded Linux, and the develop software environment on the platform. And then describe how to achieve the image collection on the platform, introduce the program of video capture, accomplish the JPEG (Joint Photographic Experts Group) compression achievement and realize MMS (Multimedia Messaging Service) transmission based on GPRS. It can be widely used in agriculture monitoring system. [C1132]

"A Shape Reconstruction Method Using IR-UWB by Illuminating the Target from Multiple Aspects"

The impulse radio ultra wide band (IR-UWB) signal has been applied to many imaging systems such as through-wall-imaging, ground penetrating radar etc., due to the ultra wide frequency band and the simplicity of IR-UWB. Several imaging schemes, such as delay-and-sum (DAS), Capon beamforming-based method etc., were proposed in the previous literatures. But there is few method whose aims were to reconstruct the shape of the target. In this paper, a shape reconstruction method employing IR-UWB signal was proposed. The proposed method is based on the DAS imaging algorithm. Multiple aspects of the target were illuminated in the proposed method to obtain more information about the target than what can be obtained through only one aspect in the traditional imaging systems. The finite-difference time-domain (FDTD) method was employed to simulate the received data for the 2-D imaging using the proposed method. From the image results, the shape of target can be recognized. The capability of the proposed shape reconstruction method is verified, and it can be concluded that the more aspects were illuminated, the more precise shape of the target can be obtained using the proposed shape reconstruction method. [C1133]

"Time Frequency Representations for Classification of Landmine Using UWB Impulse GPR"

In this paper, Time Frequency Representations (TFRs) for classification of landmine using Ultra Wideband (UWB) impulse Ground Penetrating Radar (GPR) is presented. GPR signal is composed of three parts: ground bounce, clutter and target echo signal, the target signal is seriously deteriorated by ground bounce and clutter. To extract intricate structures of target signal, wavelet packet transforms (WPT)-based algorithm is used to ground bounce removal and clutter reduction. Then the Fisher Dsicriminant Ratio (FDR) for feature subset selection method is used to select the suboptimal feature subset of target signal, thereby a Learning Vector Quantization (LVQ) classifier is designed. Experimental results based on GPR measured data are presented, showing that the feasibility and advantage of the presented algorithm. [C1134]

"Feature Extraction and Recognition Based on SVM"

As a mature detection technique, ground penetrating radar (GPR) is applied into many fields. The GPR signal

explanation and recognition is so important that it affects the result reliability and accuracy of the detection. The support vector machines can obtain the overall optimal solution in sample less situations. It has solved the inevitable partial minimum problem and overcome the disadvantage, which the traditional neural network cannot avoid. In this paper the GPR signal explanation model is established based on the support vector machine and the dyadic wavelet transform (DyWT) theory. It is applied in the counterfort of railway disease detection. The experiment result proved the method is valid, and it can enhance GPR explanation precision and efficiency. The recognition ratio can reach 91.2%. [C1135]

"Design of LXI Bus Interface for High-Frequency Ground Wave Radar Based on ARM"

According to the requirements of modularization and standardization, a general LXI bus interface based on ARM is presented in this paper and can be employed for HF ground wave radar (HF GWR). The design takes AT91RM9200, DM9161, IDT7027L20PF as basic hardware, Linux as operating system, and considers about the working environment of multi-users and multi-processes. The reliability of system can be extremely kept by kernel synchronization mechanisms in driver. This LXI bus interface, which meets the requirements of HF WGR, adopts full-duplex mode and bidirectional interrupts to exchange a large amount of data in packets with host computer. And this paper discusses in detail the protocol of data transmission and the effective method to measure the whole system. The measurement results show that this LXI bus module can keep efficient and steady, and the average data transfer speed is about 45 Mb/s. The whole design meets the need of HF GWR real-time measurement. [C1136]

"Compact Printed Dual Ellipses Monopole Antenna for UWB System"

A novel printed monopole antenna with two ellipses is proposed to operate from 3 to 11.5 GHz, which is fed by a microstrip line. The antenna is very small in size with dimension of 20 by 24 mm and has an approximate omnidirectional pattern across the major bandwidth. This antenna can be especially applied as the element of ultrawide-band(UWB) antenna arrays for UWB application. [C1137]

"The Real Code Migration on portable devices for personal biotelemetric systems"

This project deals with the problems of utilization of mobile equipment working in the biomedicine field, particularly telemedicine. This field is relatively new; it focuses on the observation of life functions from a distance. Practically developing system works with an ECG sensor connected to mobile equipment, such as PDA/Embedded device, based on Microsoft Windows CE class operating system. The whole system is based on the architecture of .NET Compact Framework, and other products, such as SQL Server by Microsoft too. This work also deals with the communication of mobile equipment with sensors and with the server via Bluetooth, WiFi, and GPRS/EDGE. The mobile equipments are used primarily for measuring and processing of data from the sensors and their visualization as a graph. The data is also given to the server for further processing and the analysis of current health of the patients, due to small efficiency of the mobile equipment. The main task we deal with in the server part of application is receiving of the data via web services and further processing, management and analysis of this data. For the analysis of received data and further evaluation of the electrocardiogram, there is a self-organizing neural network [1]. [C1138]

"Magnetic field calculation for indoor substation busbars based on analytical-numerical method"

Power frequency magnetic field (PFMF) has possible health hazards for persons. In resent years PFMF of indoor substation has been paid more and more attention. Busbars with heavy current are the main source for PFMF. The paper presents the calculational model for the PFMF. Analytical approach and numerical approach are combined to calculate the magnetic flux density in the space nearby the busbars. The influencing structure factors of the busbars such as their length, spacing and breadth are discussed. This proposed method is more accurate and effective to evaluate the magnetic environment in the substation. The research results can be used as the reference to set the restrictive maximum values of power frequency magnetic flux density for construction. [C1139]

"Improving Perceived Streaming-Video Quality in High Speed Downlink Packet Access"

High Speed Downlink Packet Access (HSDPA) is an enhancement to UMTS networks that supports data rates of several Mbps, making it suitable for applications such as video streaming. Nevertheless, the shared downlink radio channel used in HSDPA is a challenging environment for such applications. In this paper, we focus on the issue of subjective video quality, and design a novel estimator of the user-perceived quality that operates in real time. We propose to integrate such estimator in User Equipments (UEs) so that it can provide regular feedback and help the UMTS resource management procedures. Then, we use it to study the impact of a recently proposed HSDPA scheduler directly on the perceived video quality. HSDPA scheduling is one of the salient

points of HSDPA and is used to perform resource management (i.e., bandwidth allocation between terminals), taking into account the radio channel conditions of all users. [C1140]

"Long-distance monitoring system on galloping of transmission lines"

A long-distance monitoring system on galloping of conductor of transmission line is researched, which is to obtain data of galloping of conductor. The construction, technical features, software function and experiment results of this system are introduced. The whole system is from monitoring unit, GPRS, Internet network, supervision center to constitute. The system can monitor galloping of conductor of transmission line in real time, provide science basis for control characteristics, regulation, theories research of galloping, project of prevent from galloping and provide consult of technique means for circulating of electric power. [C1141]

"Paving the path for high data rates by GERAN evolution EDGE2 with dual-carrier"

The introduction of the upcoming GERAN evolution feature package in current GSM/EDGE deployments offers operators significant boost in network capacity and mobile data users UMTS/HSPA like high speed packet data services along with competitive latency. Intelligent radio resource management supports novel dual-carrier capable mobile stations by dynamic configuration of GPRS/EDGE packet data channels (PDCHs) on multiple non-BCCH carriers. In addition the currently standardized EDGE2 level B (EDGE2-B) concept provides enhanced PDCH data rates up to 118.4 kbps per timeslot. In this paper system level simulation results for the end-to-end performance of GERAN over TCP/IP are presented assuming conventional 4 timeslots up to future potential 14 timeslots capable EDGE and EDGE2-B mobiles showing up to 800 / 1600 kbps peak data rates. FTP-application throughput has been investigated with respect to both download file size and important TCP settings such as e.g. receiver window size. The GERAN dual-carrier performance has been evaluated for EDGE and EDGE2-B both under ideal radio conditions and in regular hexagonal cellular deployments depending on system load, exemplifying FTP 500 kbyte download with 8 timeslots capable mobiles. At medium system load EDGE2-B compared to EDGE reveals about 100% capacity gain and more than 60% gain in mean user throughput. [C1142]

"UFA: Ultra Flat Architecture for high bitrate services in mobile networks"

The challenge in the coming years for mobile networks will be to offer high bit rate data services to customers in mobility. Future mobile architectures are being standardized to offer mobility between heterogeneous access technologies. The design of these architectures does not take into account scalability requirement since they are centralized with many network levels and dependency. This paper proposes a new architecture, called ultra flat architecture (UFA), that integrates scalability requirement. The key idea of UFA is the reduction of the number of network nodes to one node which is the base station, by the distribution of traditional user and control plane functions in this node. We detail UFA architecture and show how it optimizes service establishment and mobility procedures. We perform a first performance evaluation of the solution performance and expose the first requirements that guarantee seamless handover for real-time services. [C1143]

"Performance analysis of the notch filter for RF Interference suppression in ultra-wideband SAR"

Radio Frequency Interference (RFI) suppression is an important technique in the ultra-wideband synthetic aperture radar (UWB SAR). In this paper, we mainly analyze the performance of a notch filter for RFI suppression. The theoretical output from notch filter is presented based on the properties of narrowband RFI. The results indicate that the notch filter has little effect on the resolution, but it has significant effect on sidelobes, which can be considered to be false targets. This theoretical result is verified by simulation and experimental UWB SAR imaging. [C1144]

"MES wireless communication networking technology based on 433MHZ"

To trace and track enterprise assets (man, machine, materials and orders), record and carry real-time, accurate, complete and consistent shop-floor data, an effective wireless network communication method based on 433 MHz is proposed in this paper. The needed network equipments, network architecture and some examples are also introduced. Application results show that it is a very effective method to reduce/eliminate error-prone and tedious manual data processing activities and discover bottleneck, diagnose process errors, adjust schedules for unexpected disturbances by 433 MHz wireless network technology in the situation of MES application. [C1145]

"A probabilistic scheduling algorithm for providing Proportional Delay Differentiation in content-based online charging system"

The emergence of new data services in 3G networks is driving the support of advanced content-based billing

mechanisms whose unique characteristics require that the OCS (online charging system) provide relative differentiated services based on different contents. The OCS can be modeled by the PDD (proportional delay differentiation) structure and it aims to maintain the prespecified mean system response-time delay ratios between different classes of requests. A novel request scheduling algorithm is proposed in this paper. The basic idea is that one of the requests from all classes of service queues is chosen with some priority probability which is based on the system queue-length, the request arrival rate, and the preassigned delay differentiation parameter. The experimental results show that this new algorithm significantly outperforms some other traditional PDD scheduling ones when request service delays increase and vary greatly from each other. Furthermore, it can efficiently meet 6 QoS requirements proposed in this paper. [C1146]

"Research on GPRS interface based on DM6446 for H.264 standard stream media files"

H.264/AVC is the current video standardization project of the ITU-T video coding experts group (VCEG) and the ISO/IEC moving picture experts group (MPEG). H.264/AVC represents a major step forward in the development of video coding standards. In this paper, the authors briefly introduced a technical overview of H.264/AVC standard and proposed the related coding tools, using DM6446. Then, the paper give the hardware and software design of a simulation system, this system could acquire the multimedia information and send the information by GPRS technology. At the last section, the authors compared the H.264/AVC standard with other prior coding standards. The results show that H.264/AVC standard will enable new applications and business opportunities to be developed. [C1147]

"Development of mine detection system for mobile robot system"

This paper introduces a development process of a manipulator that is installed to a mobile robot system and used to detect explosive ordnance and dispose it. Based on system requirements, its boundary conditions are analyzed and the minimum driving ranges and RPMs of each joint are calculated. To choose the optimum actuators including reduction ratiopsilas of the gearbox, the advanced Straete et al.psilas normalization method is used after conducting dynamic analysis. Two kinds of dynamic analyses are executed to confirm the result, one is MATLABpsilas SimMechanics and the other one is PRO-Engineerpsilas Mechanism. Finally, structural analysis is conducted to verify the robustness of the designed system. [C1148]

"Development of Remote-Controlled Home Automation System with Wireless Sensor Network"

A remote-controlled home automation system basing on the wireless sensor network, embedded system and GPRS was developed. This system allows the user to control the equipments in home, collect data about the appliance status and weather condition, and receive the alarm information of home intruder and fire through Chinese instant message of mobile service. The test result shows that the system can work according to deigned function. The advantages of this system are easy to set up, convince to use and interface friendly to Chinese people. [C1149]

"Magnitude of Earthquake Prediction Using Neural Network"

This paper presents a new method for earthquake prediction. In the proposed method the variation of geomagnetic field declination, horizontal component and hourly relative humidity, temperature ground, rainy rate per day such as hum, rrr (the average of rainy hours time per day), and tgtg (temperature ground) are used to predict magnitude of earthquake 2 days before the occurrence of earthquake occurrence by using a neural network. As a case study, earth geomagnetic field measured data is used. The data are driven from the measurements collected in Tehran Geophysics Research Center in 1970-1976. Simulation results are very promising. [C1150]

"Service outsourcing to support virtual home environments (VHE)"

In a virtual home environment (VHE), mobile users may access all services available on their home network, in the same manner and with the same level of service performance. Interaction between users, their home networks and candidate visited networks should be planned for service discovery, and QoS and price negotiation. A further aspect for consideration is the use of networks owned by unaffiliated operators that are candidates for facilitating the VHE, when the affiliated visited does not support the requested service. In this paper we explore VHE aspects and scenarios with the aim of introducing service outsourcing. We extend our earlier work on service outsourcing to VHE where services are outsourced to a candidate network if the custodian visited network cannot meet critical VHE requirements for a user. Through numerical analysis we show that if agreed roaming prices are charged for services delivered on an unaffiliated candidate network wider service usage will occur in VHEs. [C1151]

"Title page"

The following topics were dealt with: UWB antennas; electromagnetic compatibility; GPR; radar; propagation and scattering in natural and artificial media; electromagnetic metrology. [C1152]

"Radiation properties of ultra-wideband printed-board antennas: Simulations and experimental verification"

This paper presents some results of the work done within the frameworks of the ISTC project #B-922. The simulation data and experiments demonstrate possible techniques of improving characteristics of planar ultra-wideband (UWB) antennas based on the tapered slotline. To this end, four ultrawideband baluns, namely the 4th-order Marchand balun, microstrip to slotline transition with open cavity, two designs of radial stub baluns, and three types of aperture such as exponential Vivaldi type, elliptical flare with corrugated edges and elliptical open flare had been studied. Several planar UWB antennas with dimensions of 23 to 12 centimeters were simulated using electromagnetic simulation software, and then designed, fabricated and tested. The simulation and experimental results on the evaluation of the bandwidth and radiation pattern of the antennas are presented. [C1153]

"GPR, radars"

{no data available} [C1154]

"Innovative approach for improving access to wireless services in high occupancy vehicles"

With the maturation and acceptance of broadband wireless technology and standards (e.g. mobile WiMAX, EVDO, HSPA), forward-looking service providers are beginning to augment their coverage with new broadband wireless networks and offering new higher-speed services. At the same time, we see that on-the-go transit and ride-sharing vehicles are beginning to see a market for offering wireless access throughout a voyage. Such vehicles, however, given their aggregate bandwidth requirements, pose serious load balancing issues for service providers. Providers with multi-network deployments will be in a better position to satisfy such networked high-occupancy vehicles (HOVpsilas) and, through policies, will be able to affect admission control such that the HOVpsilas presence is accounted for. Our solution helps to solve this issue and in this paper we describe the solution components and how they interact. We also describe additional value-adding policies that will further enhance such wireless-to-HOV services. [C1155]

"Analytical Formulas for Calculating Reflections on Finite Multilayer Structures"

Simplified equations for calculating the total reflection and transmission from a multilayer infinite and finite dielectric structure are presented. These formulas are based on examining the reflected rays within such a structure and working out an explicit form where possible. The purpose of this study is to build a simplified simulator for ground penetrating radar. [C1156]

"The Videotex Hot Line Lottery-Ticket-Buying Solution Based on Mobile GPRS System"

This paper raised a visual hot line lottery betting system based on China mobile GPRS. This scheme carries on a certain form of improvement and extension on the foundation of the existing GPRS platform, and it can fulfill the functions of receiving visual information and sending messages to the information terminal. There are three problems solved in this paper: add lottery business flow sever and database in the lottery center; realize the data connection between lottery center and the mobile system platform via DNN, which can ensure the data is deposited in the lottery center; raise the function of visual lottery betting terminal, and extend the lottery betting protocol through GPRS. Different from the existing lottery betting system in China today, this system is also a kind of hot-line betting system, it greatly postpones the deadline of betting, which increases the lottery sale volume. [C1157]

"Initial In-Mine Position Estimation Using RFID Tags"

Determining the real-time position of an underground mining vehicle relative to a global map is a very important problem facing the mining industry. Unfortunately, techniques such as Global Positioning System (GPS) cannot be used in underground mines. Alternate approaches must therefore be explored. Promising research from the field of robotics provides a possible approach to in-mine positioning, using a technique known as Simultaneous Localization and Mapping (SLAM). It is crucial that the initial position given to the SLAM algorithm is accurate. This paper investigates the concept of using an array of Radio Frequency Identification (RFID) tags placed at know positions to provide the initial position to the SLAM algorithm. A Least Squares based position estimator is

presented and evaluated in an experiment. The estimator's average error is calculated for a number of cases. It is shown that the estimator presented in this paper compares well with an estimator presented previously but uses less than 8 times as many tags. The results suggest RFID based positioning, using this Least Squares approach, has the potential to provide accurate and low-cost initial position estimation. [C1158]

"Design and Implementation of Mobile Short Message Service System of Terminal Mode"

Sending and receiving SMS messages through the mobile phone have their faults. For making use of the PCpsilas good handling ability, this paper proposes the design method of a mobile short message service system of terminal mode. Connected a PC with a mobile phone through a serial port or a USB port, used VC++6.0 as the development platform, and based on windows serial communication, AT commands, PDU mode, database programming of ADO smart pointers etc., the system is designed and implemented. In order to improve the sending efficiency and real-time performance of SMS, a short message real-time parallel sending algorithm based on multithreading is proposed. This system can be used in many mobile value-added service applications, which implemented sending, receiving, group sending and transmitting mobile short messages real-timely and efficiently. [C1159]

"An AMI System for the Deregulated Electricity Markets"

In the competitive electricity structure, the data exchange between supplier and customers becomes more important for efficient and secure operation of power systems. Automated meter reading (AMR) technology has played a role in helping Utilities overcome their meter reading challenges. However, it is not enough in today's environment. Utilities need an advanced metering infrastructure (AMI) to gather and utilize metered data in more intelligent and cost effective manner. In this paper, a flexible and cost-effective AMI system is proposed. The AMI system adopts multi-communication medium, such as GSM and GPRS. The AMI system not only reduces the labor cost and increases meter reading accuracy, but also provides accurate load profile information and billing data to help customers managing their power consumption. The distributed structure of the AMI system makes it easy to be adopted in different sizes of utility system. The effectiveness of the proposed system has been demonstrated in several utilities in Shandong Province, PR China. [C1160]

"High decoupled antenna for UWB pulse GPR "ODYAG""

A principle of operation and arrangement of UWB antenna system which differs from other with very high frequency independent electromagnetic decoupling are described in the paper. Peculiar design of the antenna makes it possible to use it in two different modes-horizontal scanning mode and accurate definition of local object location mode. The antenna system is designed for the ground penetrating radar ldquoODYAGrdquo monitoring of subsurface structure of asphalted roads. [C1161]

"Broadband multimedia network on the base of the TD-CDMA wireless equipment"

Results of a broadband multimedia network construction are submitted on the basis of the TD-CDMA standard wireless equipment in Ukrainian territory. The analysis of theoretical and experimental researches of planning of base stationspsila cover zone of a wireless multimedia network in Kiev and Vinnitsa is given. [C1162]

"Explorative analysis of one-way delays in a mobile 3G network"

In this paper we investigate the dynamics of one-way delays in an operational mobile core network. Our final goal is to develop anomaly detection schemes for the packet delay process in order to reveal network and equipment problems. This requires a preliminary exploration of the delay distribution in the core network, which we undertake in this study. We present one-way delay measurements extracted from passive traces captured at an operational General Packet Radio System (GPRS)/Universal Mobile Telecommunications System (UMTS) network. We find that queuing is the only source of delay at Gateway GPRS Support Nodes (GGSN), while for Serving GPRS Support Nodes (SGSN) the mobility and flow-control further complicate the characterization of the ldquonormalrdquo delay behavior. Moreover, the presence of unwanted traffic has an impact on the delay statistics and should be taken into account. We find that information about actual bandwidth conditions in the Radio Network may be inferred by investigating packet delays in the core network. Our explorative results are promising about the possibility of leveraging one-way delay measurement for troubleshooting in such networks. [C1163]

"Research and development of electric vehicle data collection and calibration platform based on GPRS and INTERNET"

The limitation of most traditional methods of electric vehicle driving data collection is that they depend on

techniques which are restricted under finite distance. This paper presents a new data collection and calibration platform based on general packer radio service (GPRS) and INTERNET to collect the driving data of electric vehicles remotely. The platform adopts an in-vehicle device to acquire driving data of electric vehicle through CAN or LIN bus and communicate wirelessly with central server by GPRS network and INTERNET. With the help of wide coverage of GPRS network, there is no limitation of distance and area to transmit the electric vehicle driving data. The in-vehicle device is used to collect driving data, energy consumption data and fault data transmitted from controllers by CAN bus then this information is received by central server and recorded in electric vehicle driving database. The analysis of driving database provides a rich resource of information on driving pattern, driving cycle, control strategy, fault and reliability. The study shows that the platform is effective and reliable. In the sample application, it takes an important role in evaluating the performance of electric vehicle. [C1164]

"Control strategy optimization of the hybrid electric bus based on remote self-learning driving cycles"

In order to obtain the globally optimal solutions, dynamic programming (DP) technique have been investigated. But one major difficulty lies in the need of global /preview information about the trip to be made and the difficulty in obtaining the specific driving cycle for each trip. Another difficulty is the computational load for global optimization algorithms in the micro-processor inside the vehicle. In this paper a new control scheme called control strategy optimization based on the remote self- learning driving cycles is presented. The remote driving cycle self-learning system adopts an in-vehicle device to acquire driving cycle data of electric vehicle through CAN bus and communicate wirelessly with data server by GPRS network and INTERNET. The vehicle driving cycle performance analyses is performed using a database server and then the optimum data is transformed to update the control parameter of hybrid electric vehicle control unit(VCU). As hybrid electric bus is driven in fix-up driving course, the actual driving cycle may be different from that produced by the trip model because of the stochastic nature of the traffic flow. The control strategy optimized by dynamic programming (DP) should be modified according to the vehicle state, battery state. When the vehicle start to run, the optimized control strategy will be transmitted to the vehicle control unit(VCU) and In-vehicle Device will transmit the vehicle message to the central server. While the vehicle state and battery state are different from the pre- optimized, a new optimized computation with dynamic programming (DP) will be executed on the central server and result transmitted to VCU in time. [C1165]

"Remote self-learning of driving cycle for electric vehicle demonstrating area"

The analysis of statistic data collected from real-time driving cycle of electric vehicle in demonstrating area is providing evident that some driving cycle conditions have significant influence on vehicle performance. In addition, vehicle performance results derived from driving cycles data show relationships that help to optimize control strategy. Statistical acceleration and deceleration distributions are developed as a function of speed and road type [1].This paper presents a remote driving cycle self-learning system based on data stream collected from in-vehicle device using general packer radio service (GPRS). The remote driving cycle self-learning system adopts an in-vehicle device to acquire driving cycle data of electric vehicle through CAN bus and communicate wirelessly with data server by GPRS network and INTERNET. All this data can be stored in data server and be analyzed to classify as different driving cycle using SOM network. According to analyzed result, corresponding driving control strategy [2] is switched to optimize electric vehicle performance. The study shows that the remote driving cycle self-learning system is effective method to define and characterize driving cycle in electric vehicle in demonstrating area. In the sample application, the remote driving cycle self-learning system plays an importance role in optimizing the control and energy management strategy of electric vehicle. [C1166]

"DLX HOTOKADA: A design and implementation of a 32-bit dual core capable DLX microprocessor with single level cache"

Data access in main memory units can be sufficient for processors but due to demands for faster computers nowadays, implementation of multiple cores as well as the usage of a cache to increase performance, are necessary. These two solutions were implemented using a 32-bit pipelined DLX microprocessor, resulting to a dual core capable (DCC) DLX with single-level cache in a Uniform Memory Access Architecture type. This project made use of the Shared Cache System divided into an Instruction Cache and a Data Cache to solve processor structural hazards due to coincident instruction and data access. [C1167]

"An approach of detection the structure of subsurface layers using reflected GPR signals"

An approach, allowing correct detection of the structure of the sounding ambience using GPR signals is suggested. [C1168]

"Analytical representation for 3D fields of antenna radiation in problems of georadar sounding"

This paper describes algorithmization representations for field of radiation of the antennas applied in GPR scanning of subsurface structures, in stratiform and two-layer soils in three-dimensional approach. Results include asymptotic representations for fields on small distances from the antenna and analytical representation for a superficial wave. Asymptotic representations of field allow eliminating singularity in numerical modeling, to consider field influence on a current in the antenna during solving of three-dimensional inverse problem of GPR-location. Asymptotic representation of superficial wave field allows to reduce time of solution finding in inverse problems of GPR scanning and to clear data of the observable reflected field. [C1169]

"Pulse electromagnetic wave scattering by plane dielectric interface"

Results of numerical simulation of pulse cylindrical electromagnetic wave scattering by a dielectric half-space with a plane interface have been presented in the given work. This simulation has been done by the finite-difference time-domain method (FDTD). A change of field characteristics with changing the radiator position and observation points as well as radiated pulse duration and dielectric characteristics of the scatter has been investigated. A possible effect of these parameters on the probability of subsurface object detection in radar problems has been considered. [C1170]

"SiP for GSM/EDGE in CMOS technology"

The development in the field of RF and baseband (BB) integration in nanoscale CMOS technology for cellular systems over the last recent years has shown significant progress. The successful integration of the RF transceiver with digital baseband processor enables mobile phone manufacturer to build ultra-low cost phones for GSM/GPRS in CMOS technology. This trend towards continuous system integration for mobile phones with an advanced feature set providing high data rate communication, multimedia and camera capabilities. The support of various features requires a system solution including the power-management unit (PMU) with highly efficient DC-DC converters to reduce the overall power consumption. However, this imposes a major challenge for the integration of the RF due to crosstalk and thermal heating effects caused by the PMU and BB part. [C1171]

"Procedures to improve the performances of a Sfcw radar used for landmine detection"

In the last decades a lot of research has been done to develop different types of ground penetrating radars to be used for antipersonnel landmine detection, archaeological investigations, search for underground pipes etc. They have to provide a resolution comparable with the dimension of the smallest landmine and the needed penetration for each application. To comply with high resolution requirement a ultra wide band system is required and it can be manufactured to work either in time domain or in frequency domain. In this paper two procedures to improve downrange and cross range resolution of stepped frequency continuous wave (SFCW) radar are described. The two procedures are applied to experimental data collected with SFCW radar and the improvements in the radar performances are described in the paper. [C1172]

"Dynamic bargaining of content shares in wireless cooperative systems"

Mobile devices provided with cellular and short-range radio network interface cards offer the user potentials for new communication paradigms based on a cooperative behavior. The idea is that devices in close proximity exchange, through available short-range links, complementary shares of information downloaded from the cellular connections. Results in the literature have proven equal benefits for all partners in terms of energy consumption, achieved data rate, and transfer time, under homogeneous conditions. Notwithstanding, there could be heterogeneous cooperative scenarios in which gains are not perceived, unless novel smart policies for the content splitting among cooperating entities are implemented. In this paper we design a novel cooperation strategy based on a multi-criteria optimization algorithm for the bargaining of the content fraction each cooperating unit shall download according to the predicted cellular throughput. It will be shown that it is able to always match the expectations of the cooperating partners. [C1173]

"A Novel Wireless Sensor Networks Platform for Habitat Surveillance"

Wireless sensor networks are more adaptive to habitat surveillance applications than other technique due to high distribution density and self-organization of tiny sensor nodes. This paper introduced a framework of wireless sensor networks combined with GPRS (General Packet Radio Service) for habitat monitoring. Detailed presentation of a novel sensor node making use of ARM technology and IEEE502.15.4 standard was given. This paper concerned on energy management issue, realizing a light-weight and constant duty cycle energy

management policy similar to S-MAC (Sensor Medium Access Control). Minimum, maximum and average power consumption of sensor node, under different CPU and VPB frequency, were measured when node was running test program to finish networking and application function. The results help users choosing the most appropriate frequency to optimize power consumption. [C1174]

"Reliable and Efficient Adaptive Streaming Mechanism for Multi-user SVC VoD System over GPRS/EDGE Network"

In this paper we propose and then implement a novel H.264/AVC Scalable Video Coding multi-user video-on-demand system for hand-held devices over GPRS/EDGE network. We design a reliable and efficient adaptive streaming mechanism for QoS support. The major contributions come from three folds: firstly, accumulation-based congestion control model is used for bandwidth estimation to ensure fairness among all the users. Secondly, for the purpose of handling time-varying bitrate, we propose a PLS algorithm which performs rate adaptation as well as optimizes the video quality in a R-D sense under the bandwidth constraint. Finally, to minimize adaptation delay, IDR frames are online inserted in the pre-encoded stream at the server by using transcoding. Furthermore, to improve system userspsila overall performance, transmission of packets is optimally scheduled through exploiting the multi-user diversity. More importantly, a practical system was implemented and further tested over existing GPRS/EDGE network deployed in China. The results demonstrate that the proposed mechanism achieves outstanding performance in terms of higher perceived video quality, smoother video playback, higher utilization of wireless link and fairer share of resources, compared to RTP Usage Model defined in 3 GPP Release7. [C1175]

"Experimental Monitoring and Dispatching System for Logistics Distribution-Based on GIS, GPS and GPRS"

Experiments are not only the teaching means to improve studentsГ‚Вї practical ability, but also the source to engage them in doing scientific research. Therefore, this paper constructs an authentic vehicle monitoring and dispatching experimental system for logistics distribution with the integrated information technology. The system consists of two parts, one is vehicle terminal system which transmits the information about vehicles and goods to monitoring center system for formulating policy to make plans; and another is monitoring center system, which not only monitors the vehicles status but also identifies distribution routes and dispatching plan by GIS and optimization technique. Eventually, this paper proposes a flexible modularized application system for teaching and scientific research. [C1176]

"A Fast Suffix Matching Method in Network Processor"

IMSI (International Mobile Station Identity) is a unique number associated with all GSM and UMTS network mobile phone user. IMSI filtering-a prefix filtering, is an important function in the 3G firewall. It is an indefinite filtering which affects the efficiency of the security device. This paper brings forward a parallel processing method which uses vector coding and structure of bloom filter. This method is realized in Intel network processor-IXP 2850. The features of parallel multithreads and hash unit in network processor are taken advantages. The experiments show the excellent performance of the method in 3G firewall. [C1177]

"A Self-Adjusting Course Caching System in Field of Mobile Learning"

One of the main challenges of using mobile devices as a learning platform is the impermanent network environment due to the wireless coverage or wireless link fail. On the other hand, GPRS or 3G telecommunication protocol offer the persistent connectedness of learning, but comparative weak computing power and very limited network bandwidth cause the learning as time-consuming process. Besides, the learning contents become more and more miscellaneous with on-line multimedia presentations, and it is necessary for learners to wait for the learning resources to be downloaded from the remote learning management server. In this paper, we propose a solution, called self-adjusting course caching system, to solve those issues in the field of mobile learning. [C1178]

"Classification of landmines using GPR"

This paper describes a study carried out into the discrimination and classification of anti-personnel landmines using the MINEHOUND GPR. Other techniques, well reported in the literature, are not considered in this study. The techniques investigated enabled the classification of landmines to be achieved on a restricted set of targets. The approach proposes a method whereby a library of radar signatures of landmines is acquired under controlled conditions and then used to classify unknown signatures. Initial results show that this method enables clutter targets to be well separated from landmine targets, with the exception of air voids, such as pipes. The

technique offers the potential of a reduction in false alarm rate to 10% of the current performance. [C1179]

"A new approach to moving terrestrial targets recognition using ground surveillance pulse doppler RADARs"

In this paper we propose a new automatic target recognition algorithm to recognize and distinguish of three classes of targets: personnel, wheeled vehicles and animals, using a low-resolution ground surveillance pulse Doppler radar. Using the chirplet transformation, a time-frequency signal processing technique, the parameterized radar signal is then used by the Zernike moments (ZM) for the pertinent features of the targets. The current work provides a new approach for multiresolution analysis and classification of non stationary signals with the objective of revealing important features in noisy and cluttered environment. The algorithm is trained and tested on real radar signatures of multiple examples of moving targets from each class. The results shows the proposed algorithm invariancy against speed and orientation of the targets. [C1180]

"Propagation model, optimal geometry and receiver design for RF Geotomography"

A novel RF Geotomography system is introduced. RF Geotomography may become a powerful technique to detect tunnels and underground cavities. A RF Geotomography system requires a set of transmitters and receivers deployed above the ground according to a known geometry. Using the concept of diffraction tomography, an image of the ground is constructed, thus providing the capability to easily detect tunnels and cavities below the ground. This paper addresses the issues of 1) Propagation model specifically designed for RF geotomography 2) Appropriate frequency ranges for detection of tunnels and cavities 3) Design procedures for receivers. 4) Investigation on the optimal geometry to maximize the resolution and minimize the displaced units. [C1181]

"NEMO-Based Multiple Interfaces Scheme between Overlay Heterogenous Access Networks"

Network mobility (NEMO) aims managing seamless connectivity for a group of mobile terminals as a whole mobile network. Multiple care of addresses (MCoA) registration scheme was also proposed to address seamless Internet connectivity issue. In this paper we first analyze the upload and download packet loss of mobile router (MR) in NEMO basic support protocol. Then the seamless Internet connectivity of MR which is equipped with WLAN, CDMA and GPRS interfaces is studied and experimented on our platform successfully. Finally, we analyze and compare the performance of packet loss ratio between uni-interfaced and multiple-interfaced MR, and results indicate that multiple interfaced MR can increase the performance of MR obviously when it moves across heterogenous overlay access networks. [C1182]

"Adaptive tomographic sensors for below ground imaging"

In this paper, ground penetrating radar and tomography are combined to detect and identify hidden targets, such as underground facilities and hard and deeply buried targets. Past experience in below-ground imaging is described, current measurement results are presented, and future plans are discussed. [C1183]

"Hardware Compilation from Machine Code with M2V"

Hardware compilation flows use a high-level language like C++ or Java and translate it directly to an HDL. In this paper we propose to split the problem in two; first use a regular compiler to do the front-end processing, then use the generated machine code to produce the HDL. The MIPS-to-Verilog (M2V) compiler translates blocks of MIPS machine code into a hardware design represented in Verilog. M2V is a three-pass compiler that accepts as input basic blocks extracted from MIPS ELF images and emits synthesizable Verilog for the eMIPS dynamically extensible processor. The compiler was implemented from scratch in C++. The quality of the synthesizable Verilog output compares favorably with hand-generated code for the same input. [C1184]

"Study on bistatic (multi) radar system using navigation satellites"

The operational principle of passive detection radar based on outer radiation source is introduced. Based on the in-depth research study on operational principle of non-cooperation bistatic(multi) radar and the requirement for air target detection especially stealth target detection, a space-ground bistatic(multi) radar system based on navigation satellite signal is presented. The paper has analyzed the feasibility of target detection using navigation satellite signal and the problems for system function realization. The system operational principle and detection performance has also been studied. [C1185]

"MPSTD analysis of metal resonators"

In this paper, the MPSTD algorithm is applied to model the metal resonators, such as rectangular resonators and coaxial resonators. The resonant frequencies of the metal resonators are analyzed by MPSTD. The numerical results indicate that the MPSTD algorithm is accurate and efficient to analyze the metal resonators. [C1186]

"An Intelligent Packet Marking Algorithm Based on Extended Huffman Coding"

Packet marking technology has excellent response ability in tracing network intrusion, declining intrusion damage and preventing intrusion diffusion. Lacking of alarm preprocessing, current packet marking technologies can't autonomously and effectively provide reliable packets to intrusion tracing. Aiming at the problems, an intelligent packet marking algorithm based on Extended Huffman coding (EH-AM, for short) is proposed. And false alarm density is adopted to implement the autonomous confidence study of specified alarm, which endows some intelligence with EH-AM. At last, a simulation is carried out to verify the performance of packet marking procedure, confidence study process and tracing response of EH-AM. [C1187]

"A method for subsurface metallic landmine identification in GPSAR"

A method for subsurface metallic landmine identification in air- or vehicle-borne ground penetrating synthetic aperture radar (GPSAR) using finite difference time domain (FDTD) method combined with genetic algorithm is proposed. To identify the real object, the framework information on landmine is obtained according to the matching algorithm based on number and relative location of one dimensional scattering center. By identifying two kinds of metallic landmines buried beneath a Gaussian rough interface, the effectiveness of the proposed method is testified. [C1188]

"A GTP stateful inspection method based on network processor"

GPRS tunnelling protocol (GTP) is the protocol used in general packet radio service (GPRS) Core network, and it will also be used in the 3rd Generation (3G) network. In view of that few study concerns about GTP stateful inspection at present, this paper introduces a method of GTP stateful inspection on the foundation of analyzing the GTP protocol and provides the implementation of the method based on Intel network processor IXP28xx. In the implementation, the method employs a data structure adapting to the memory managing and accessing of the network processor. Furthermore, a new hash algorithm named hash_fold_16_4 algorithm is put forward to achieve fast index to the data structure. Experiment results show that the method is practicable and effective. [C1189]

"Research on the Acquisition Terminal for Intelligent Instrument"

The terminal design of a data acquisition system based on GPRS is designed in this paper. It works out the hardware design of GPRS terminal equipment, including the minimum system design based on the Samsung ARM7-core microcontroller S3C44B0X, and the hardware design adding the GPRS engine MC35i produced by Siemens and RS485 interface to the minimum system. According to dial-up procedure, describes how to design the MC35i dial-up program. Here introduces some important subsets of AT command sets, and also describes how to use them to dial up MC35i; analyzes the principle of the point-to-point protocol, and also demonstrates how to establish the wireless link to GPRS by practical example. [C1190]

"An Efficient Concrete Bridge Disease Identification System Based on Sample Database"

As complex and varied concrete structures and their disease characteristics, it is difficult to extract a stable identification feature. Interpretation of the ground penetrating radar(GPR) scanned image is mostly based on experts experiences. Thus we designed an efficient concrete bridge disease identification system based on sample database(CBDI). The CBDI is based on principal component analysis the radar scanned image to extract features and minimum Euclidean distance classifier to defects classification. After a great deal of analysis on typical defects of the image feature and the establishment of a typical defects sample database, the technical difficulty of dealing with the diversity reflection features of one defect interface was solved. [C1191]

"The Design of the Embedded Wireless Vehicles Monitoring Management System Based on GPRS: Evidence from China"

Unifying the embedded system, the GPRS networking and the car license recognition technology, this article designs and realizes one kind of a embedded wireless vehicle management system which using the ARM9 microprocessor from the hardware and the software. In terms of the hardware, completed the design and connection of arm embedded system, video frequency gathering compression module and GPRS module; in terms of software, completed the systempsilas construction of embedded Linux, MPEG-4 compression and encoding programing, CGI programing design and the algorithm optimization of car license recognition module.

By the way of real-time image's gathering and the car-license's recognition and transmits the obtained real-time information to the long-distance administrative center for more further processing through the GPRS module, the system can achieve the purpose of long-distance's real-time monitoring and the management of the vehicles. It can be widely applied in the area of vehicles entrance guard, parking, crossroads, public security traffic control and so on. [C1192]

"Analysis of H-T junction in rectangular waveguide using the MPSTD algorithm"

In this paper, the MPSTD algorithm is applied to model the H-T junction in rectangular waveguide. The S parameters of the H-T junction are analyzed by MPSTD. The numerical results indicate that the MPSTD algorithm is accurate and efficient to analyze the H-T junction. [C1193]

"Ka -Band dielectric lens antenna for resolution enhancement of a GPR"

This paper focuses on the analysis and design of a dielectric lens antenna and its application for ground penetrating radar (GPR) at millimeter waves. The work investigates the influence of different design parameters on the resolution performance of GPR using a dielectric lens for focusing. The performance of the optical focusing of the dielectric lens is compared to a synthetic-aperture-Radar (SAR) algorithm. Our purpose is to optimize the spatial resolution of a Ka-Band (26-40 GHz) GPR. A dielectric lens is designed to minimize the footprint of the antenna. The lens focuses the radiated energy from the feeding point to a small spot onto the soil surface. A commercial time-domain solver based on finite-integration-technique (FIT) is used to simulate the electromagnetic characteristics of the lens antenna model. A lens prototype is fabricated and tested at our GPR test site. The investigation of the microwave images for special targets shows that both focusing methods, namely the proposed lens antenna and SAR algorithm, improve the image resolution. However the experimental results reveal that SAR applied to the unfocussed data outperforms the dielectric lens. [C1194]

"Efficient Web Services in Mobile Networks"

Efficient solutions for Web services on mobile devices would allow truly global, platform independent, and interoperable information access, anywhere and at any time. While Web services are continuously gaining ground, they are commonly reserved for use on personal computers and high-capacity servers. However, mobile devices are gradually becoming more advanced in terms of processing resources and wireless communication capabilities, making it feasible to use Web services on such devices as well. Some of the challenges related to mobile Web services are limited bandwidth, high communication latency and high communication cost. In this paper, we focus on techniques for reducing XML overhead as a solution to overcome these challenges. Compression is a well known technique for reducing bandwidth consumption. Our contribution is an evaluation of compression techniques for use with Web services in mobile networks. In addition to performing simulations, we have verified our results using real GPRS and UMTS network connections. [C1195]

"Design and implementation of ZigBee based gateway for environmental monitoring system"

This paper proposed a three-part framework for deploying an environmental monitoring system (EMS). An enhanced gateway which supports Bluetooth based local wireless access and GPRS based remote communication is designed to be an interface between the client tier and a deployed ZigBee wireless sensor network. The binding mechanism which associates a service on one node with a service on another node is used so as to allow communication between two services to be performed without the need to specify the address. An implementation for verifying the EMS including the gateway as well as the sMotes is presented, and experimental results show that, the proposed architecture can achieve the environmental monitoring performance, and except the gateway, other nodes in the system work on sleep mode at most of the time, which will improve the lifetime of the whole system efficiently. [C1196]

"University of Maine GK-12 Sensors! Program benefits a local community"

Since 2003, University of Maine (UM) GK-12 sensors! Fellows and Bangor High School (BHS) teachers and students have been addressing community issues for various agencies and organizations in the City of Bangor, Maine. Through GK-12 involvement a community need was identified by teachers, students and emergency service agencies for comprehensive maps of city resources and hazardous material sites to be used in emergency and disaster response planning. GK-12 Sensors! participants in partnership with Bangor Police and Fire Departments, Bangor Emergency Response Unit and Bangor International Airport, built a geographic information system (GIS) for emergency service providers and produced planning maps. These maps contained locations of all emergency shelters, hospitals, police and fire stations, as well as all known hazardous materials sites within city limits. Other identified community-needs projects included spatial analysis of the incidence of OUI arrests. These activities led to the development of a GIS course at BHS in 2006, one of only a few GIS

courses in the U.S. aimed specifically at high school students. Since that time, GK 12 Fellows have assisted students and teachers in other projects based on identified community needs such as spatial analysis of the incidence of teen driving accidents in Bangor and detection of spatial patterns of burglaries for the Bangor Police Department. Currently, students are involved in projects to document burial patterns of a 19th century Irish cemetery using Ground Penetrating Radar and creating walking tour maps of historic ethnic neighborhoods for the Bangor Museum and Center for History and the Bangor Daily News. These highly visible partnerships and resultant products, which raise community and parental awareness of GK-12 Sensors! activities at BHS, may serve to increase interest and support of STEM career pursuits for students. [C1197]

"Developing a Trusted System for Tracking Asset on the Move"

With the advances of technologies in RFID, sensors, GPS, GPRS, IP networks and wireless networks, monitoring asset on move is becoming feasible. In this paper, we develop a trusted system for tracking asset on the move based on an integrated service network. Challenges and requirements for tracking asset on the move are discussed. An RFID based sensor data integration is proposed with integrated service network for reliable information access and delivery. We illustrate the feasibility of this system via food delivery tracking. Approach evaluation is presented to help understand the approachpsilas uniqueness. [C1198]

"Organization of Mobile Agents for Heterogeneous Network QoS Control Architecture"

This paper will present a general architecture of a QoS control system for a heterogeneous network environment composed by digital TV return channel and interactive services delivery with end-to-end QoS requirements. The mobile agents of such architecture are organized in a hierarchy in which agents have some behavior and knowledge to deal with several kind of communication infrastructure service delivery characteristics. The paper presents the type of agents, its behaviors and processes in order to reach the objectives of QoS control architecture of SAMBA. [C1199]

"An airborne Collision Avoidance System for low altitude flights using Radio Data System"

Radio data system (RDS) is a mature technique which has been developed over the past 20 years. Due to the common use of FM radio, the traits of low estate requirement and the convenience in broadcasting, RDS is suitable for using in wireless transmission of large-range and low-load data. This article proposes the application of RDS in the traffic collision avoidance system (TCAS) for low altitude flights. The real-time surveillance information from the airport control center of low altitude flights can be wirelessly transmitted in real time to the RDS receiver in the aircrafts. Because of the low-price of RDS broadcast station and the widespread of RDS receiver contributed by the application of RDS-TMC for cars navigation system in recent years, using RDS as the redundancy communication system in low altitude flights is plausible in almost every aspect. Nevertheless, one thing leaves to be desired is the slow transferring speed (1187.5 bps) of RDS, which is amended in this research by particularly designed data format to reduce the information load in each transmission. As a result, the application proposed in this paper can be feasible. [C1200]

"Electronic barometric altimeter in real time correction"

The barometric altitude measurement using modern electronic sensors has significant error due to atmospheric pressure variations with respective to weather and time. Based on the altimeter setting concept, the barometric altimeter should be corrected according to hourly QNH data to maintain accuracy. This paper presents an airborne altitude measurement technology using barometric measurement and real time calibration through GPRS uplink. The proposed method is practical in correcting the time variant error of the electronic barometric altimeter automatically. After these corrections, the static and dynamic accuracy of the electronic barometric altimeter can be much improved into less than 2% errors in real time. The proposed system is suitable for ultra light aircrafts (ULA) or unmanned aerial vehicles (UAV). [C1201]

"Wavefront reconstruction of 3D cylindrical subsurface radar imagery: A study on synthetic phantoms"

In recent years, the use of radar technology has been proposed in a wide range of subsurface imaging applications. Traditionally, linear scan trajectories are used to acquire data in most subsurface radar scenarios. However, novel subsurface radar applications, such as breast microwave imaging and wood inspection, require the use of non linear scan trajectories in order to adjust to the geometry of the scanned area. This paper proposes a novel reconstruction algorithm for subsurface radar data acquired along 3D cylindrical scan trajectories. The spectrum of the collected data is processed in order to locate the spatial origin of the target reflections and remove the spreading of the target reflections which results from the different signal travel times along the scan trajectory. The proposed algorithm was tested using experimental data sets, yielding promising

results. [C1202]

"Fast radar signal simulator for SAR ground penetrating applications"

In the last years, in order to investigate the distribution of water in the upper part of the Matianpsilas crust, two different instruments have been developed, and operative up to now: Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS) and SHA allow RADar (SHARAD). Both the instruments are low frequency (1.8-5 MHz for MARSIS and 20 MHz for SHARAD) Ground Penetrating Radar (GPR) in altimeter configuration which use the synthetic aperture technique. In this work will be presented an efficient procedure to detect the possible presence of specific subsurface features using the available surface topography data. In particular a fast radar signal simulator approach, designed in order to reduce the large computational time that represents the greatest application limit to this detection procedure will be presented. After a theoretical discussion of this technique and its validity, an example of application is presented using the Mars Orbiter Laser Altimeter (MOLA) data. [C1203]

"Hough transform based automatic pipe detection for array GPR: Algorithm development and on-site tests"

GPR is one of the most reliable instrument to obtain information on underground assets. Since its diffusion, many efforts have been made in order to overcome one the main limitations of this technology: the ldquohuman factorrdquo in data interpretation. Actually, operators have to look and interpret a huge number of radargrams. This requires an enormous effort, about 2 days are usually needed for analyzing radar data gathered from a 3000 m2wide site Some useful tools like tomography has been developed, but their quality and reliability is related to the migration algorithm which is heavily depending on knowledge of the propagation velocity of EM wave in the soil. Hyperbolas automatic detection algorithm reduces human factor in radar data interpretation and aims to strongly lower the amount of time needed for data analysis. The algorithm works on each radargram, recognizes the presence of target by looking for the hyperbolic patterns and marks them. Then the operator can correlate those results from different radar maps and extract the position of the underground assets. The algorithm also gives an accurate evaluation of the propagation velocity of EM waves in the soil, so this estimate can be used by migration algorithm in order to obtain an improved tomography. Using both Hyperbolas Automatic Detection and tomography, time needed to analyze a 3000 m2wide area can be reduced up to less than 4 hours. [C1204]

"Along track interferometry for foliage penetration Moving Target Indication"

Moving target indication radars for detection and tracking ground vehicles has received significant interest in the radar literature. However, when the vehicles are moving slowly and in foliage, microwave frequency radars such as X-band are not effective. Foliage penetration (FOPEN) radars using ultra high frequency (UHF) synthetic aperture waveforms have demonstrated consistent detection of stationary ground vehicles. In most applications, the vehicles are stationary to support wide angle, high resolution SAR processing. Along track interferometry (ATI) has been proposed for space based radars to detect moving targets due to the high velocity of the radar. This study will examine the target and processing requirements to detect slowly moving ground vehicles using ATI approaches. A detailed simulation of the target and clutter phenomenology is carried out to illustrate the effects of internal clutter motion and signal decorrelation effects on minimum discernable velocity. [C1205]

"Mars north polar cup subsurface materials property estimation using GPR SHAllow RADar data"

Since September 2006 SHARAD (SHAllow RADar) is mapping the distribution of water, liquid and solid, in the upper portions of the Martian crust, the SHAallow RADar (SHARAD) is active. Upon the instrument data acquisition an appropriate processing has to be performed to discriminate the Martian subsurface echo from the surface one. The detected subsurface signal is then processed with a dual frequencies techniques in order to estimate the materials loss property. Using the system parameters the surface material dielectric constant can be evaluated. Finally, using a data inversion procedure the subsurface material property of the Mars subsurface are estimated by taking into account the geometric clutter contribution. [C1206]

"Portable temperate ice depth sounder radar (TIDSoR)"

Glaciers in several parts of the world are reported to be retreating and thinning rapidly over the last decade. Radar instruments can be used to provide information on the internal and basal conditions of large and small ice masses. Radars operating in the lower part of the HF spectrum are required for sounding temperate glaciers. Also, low-frequency sounders are useful for measuring thickness of fast-flowing glaciers in Greenland and Antarctica. This is due to the composition, attenuation, and back-scattering from large pockets of water present in temperate ice. We are developing a dual-frequency temperate-ice-depth sounder radar (TIDSoR) for determining

ice thickness and basal conditions. The most significant features of this novel sensor are its portability as well as its low-power consumption. The system operates at 7.7 MHz and 14.0 MHz with 1 MHz bandwidth and 20 W of output peak power. The radar will be installed in a small aircraft such a DCH-6 (Twin Otter) or carried in a backpack for surface-based measurements. In the first case, the radar will be supported by the airplane power supply and in its backpack configuration by a compact 12 VDC power supply. TIDSoR is expected to be deployed during the summer 2008 for surface-based observations. In this paper, we discuss our design considerations and current progress towards the development of this radar. [C1207]

"High Order Spectral Estimation Methods in Ground Penetrating Radar Applications"

In ground penetrating radars (GPR) using stepped frequency continuous wave (SFCW), for an estimation of objects depth the inverse discrete Fourier-transformation (IDFT) of signals (image and real parts) on an output of the receiver is applied. As a result frequencies of spectral components corresponds to time delays (or to depths) of signals reflected from buried objects. In applications, in particular, in engineering geology surveys at the decision of problems with use of SFCW GPR, the spectrum width of a probing signal is choosing so that dispersive properties of medium not strongly deformed signals. [C1208]

"Statistical Data Enabled Navigation System Experiment in Beijing"

The paper introduces the research on statistical and live traffic information aggregated navigation experiment in Beijing. Around 7000 taxies running on roads send GPS data to the traffic information center to produce live traffic data, and the center accumulates the probe data for months. By analyzing historical probe data, statistical database is generated, and in-vehicle navigation system can search route based on live traffic data downloaded through CDMA network and the statistical database produced offline. The field test is carried out in January 2007 in Beijing. [C1209]

"Performance analysis of intervehicle Communication for Collaborative Traffic Applications"

In the past years, though communication became more and more available and efficient (GPRS, UMTS, Win...), very few traffic applications have been implemented in the real life, all of them using a central server (V2C). Cooperative systems using inter-vehicular communication (V2V) represent the next step, but the deployment roadmap remains unclear, even though safety is strongly pushed. This paper aims at presenting current integration and testing work performed at the LaRA lab for inter-vehicular communication. From the characterization of communication performance, we analyze the suitability of a set of applications. Our aim is to show what kind of application can be deployed with current hardware and software. [C1210]

"Diurnal Pattern of ELF Radio Signal Detected at the `Bellinshausen' Antarctic Station"

Diurnal amplitude variations were found in the man-made ELF radio wave recorded at the Antarctic station "Bellinshausen". The propagation path was 16.25 Mm long. Average level of the field corresponds to the literature data. Diurnal amplitude variations in the record arise from the day-night non-uniformity of the waveguide. The ambient day level is by 5-6 dB lower than that at the ambient night conditions in the vertical electric field component, it is by 4-5 dB lower in the horizontal magnetic field. Computational results are presented for the fields in the spherical Earth-ionosphere cavity with the 'whole day' and 'whole night' ionosphere models taken from literature. Model data contradict to observations indicating on inexact literature value of the phase velocity of radio waves. Model data match the experiment after the phase velocity is corrected by 10%. Since the 'whole day' and the 'whole night' ionosphere models do not account for the wave diffraction at the day-night interface, we conclude that more exact modeling is desirable. [C1211]

"Integration of Arm-equipped Mobile Robot GRYPHON for Humanitarian Demining Operation"

Our project to develop arm-equipped mobile robot GRYPHON for humanitarian demining operation will be introduced. The mobile base of the GRYPHON is the off-the-self buggy vehicle and it is modified to be tele-operated by wireless control system. The GRYPHON is mounted specially designed robot arm of about 4m long with counterweight at the rear side of the arm. The arm is equipped with 2 dof wrist mechanism and mine detector including metal, GPR (Ground Penetrating Radar), and NQR (Nuclear Quadropole Resonance) sensors. The GRYPHON can be manually driven from the base camp to the mine field and it is changed to the tele-operated mode at the site. It is then accessed to the border of the mine field and measures the surface of the ground by stereo-vision to generate the scanning trajectory for the arm. Execution of the scanning is then done to generate signal map of the terrain. The deminer judge the generated signal map and marks some of the suspicious points on the CRT screen of the control box located far away from the GRYPHON. The GRYPHON then automatically marks the locations of the ground by paint or paddles to show the places for the final prodding operation. The dynamo of the buggy vehicle is designed to provide all the electric power required for

this operation in full day. [C1212]

"Two-Dimensional Generalized Partial Response Equalizer for Bit-Patterned Media"

The use of bit-patterned media is one of the approaches being investigated to extend magnetic recording densities to 1 Tbit/in2and beyond. In patterned media, track pitch may be small causing adjacent tracks to have significant interference on the replay waveform from the main data track. To mitigate the effect of such inter-track interference (ITI), we propose the use of a two-dimensional (2D) generalized partial response (GPR) equalizer. We select both the equalizer and the partial response target using the minimum mean squared error (MMSE) criterion. However, we avoid the need for a 2D Viterbi algorithm by imposing a constraint on the 2D target that forces the adjacent track contributions (in the ideal case) to zero. Simulation results show that this 2D equalizer significantly improves the bit error rate (BER). In this work, the effect of a 2D GPR equalizer on the performance of a patterned media system in the presence of track misregistration (TMR) is also investigated. Based on the simulation results, the 2D equalization method appears to be more tolerant to TMR than the conventional GPR The main drawback of the proposed method is the need for simultaneously acquiring the signals from three adjacent tracks. [C1213]

"Research ofthe Methods of Increase of Data Rate for GSM Networks"

The methods of increase of data rate in networks GSM/GPRS using of EDGE technology are considered in this article. Introduction of this technology represents "superstructure" above the existing model of radio access GSM. This isn't demanding transformation of an infrastructure of networks GSM/GPRS, and using the same spectral range, thus allows providing high data rate under low initial capital investments. [C1214]

"A Duopoly Pricing Game for Wireless IP Services"

This paper addresses the behavior of the selfish service providers in the form of IP sinks providing high-speed IP access. Service providers compete for mobile users by adjusting the price they charge for their services. Their aim is to maximize the total collected profit. Mobile users are also selfish choosing the service provider offering the best quality of service and price combination. As the service providers come closer to each other, we show the existence of three critical phase transitions in their behavior. Depending on the separation between them, there may exists a unique Nash equilibrium, or a continuum of Nash equilibria, or no Nash equilibrium. We completely characterize the pricing strategies of service providers at Nash equilibria. We also prove that the total social welfare in the presence of selfish providers is close to the maximum social welfare that can reached through non- selfish optimization. [C1215]

"End-to-End Architecture for Cognitive Reconfigurable Wireless Networks"

Reconfigurability is set to be an important facet in the evolving world of mobile and wireless communications, through which technologies such as cognitive radio are greatly facilitated. Given advances in the scope and applicability of software functionalities, reconfigurability is increasingly becoming possible at many layers of the protocol stack which would until recently have been maintained only by intransigent fixed hardware components. Moreover, given the complexity and range of emerging reconfiguration possibilities, it would be useful for devices and networks to be able to efficiently partake in reconfiguration procedures with reduced-or even zero-human input. This would maximise the realisation of potential performance improvements through reconfiguration-associated technologies. This paper therefore discusses the development of an end-to-end system architecture that incorporates cognition and autonomics aspects into reconfiguration procedures. The architecture, its overall context, and its mapping to the emerging 3GPP System Architecture Evolution (SAE), are discussed. [C1216]

"Cellular Network Performance Aspects of Monitoring End-to-End User Experience"

Mobile terminals during typical operation have inherent access to a variety of network and application performance related data. Within IST-MOTIVE project, our objective is to implement terminal applications that collect and upload such data to performance monitoring servers for further processing. The end-to-end user experience can be thus evaluated by the network operator and possible network upgrades to improve low QoS as experienced by the users, may be easily identified. However, uploading terminal measurements is not a trivial issue; subject to the number of MOTIVE enabled terminals and hence the volume of generated data, it may degrade network performance of voice calls or other packet data sessions. In this paper we present simulation results when enabling the monitoring functionality in case of terminals attached to a GSM/GPRS network. Typical cell configurations were selected and we simulated a variety of different scenarios with respect to voice and packet data traffic. [C1217]

"Reducing the Transmission Power Requirements of the Multimedia Broadcast/Multicast Service"

The multimedia broadcast/multicast service (MBMS) was designed to support the economical distribution of multimedia content to large numbers of receivers in 3rd generation cellular networks. In this paper we present and evaluate an MBMS extension that reduces the transmission power requirements while increasing the number of potential users of such services, by supporting the distribution of multiple variants of the same content to heterogeneous receivers. We first describe the standard MBMS model, along with its state management and signaling procedures, as well as our extended MBMS model, in terms of the modifications that it imposes on the standard. We then present an analytical and simulation evaluation of the transmission power requirements of our approach against alternatives based on standard MBMS, showing that our approach maximizes the number of potential users, without excessive transmission power requirements. [C1218]

"End-to-end Scheduling Techniques for Mobile Broadcast and Multicast Services"

Several mobile operators offer "broadcast-like" services based on the classical radio and TV channel delivery model. In order to efficiently support mobile multicast and broadcast services 3GPP has standardised MBMS (Multimedia Broadcast Multicast Services) for UMTS (Universal Mobile Telecommunication System) and GPRS (General Packet Radio Service) in Release 6. MBMS aims at providing a richer set of multimedia experience to its subscribers and is able to serve many more subscribers than its unicast counterpart. The delivery of multicast/broadcast channels over capacity limited radio links requires intelligent scheduling mechanisms that make best use of the available resources. This paper highlights the need for the design of an end-to-end scheduling framework for MBMS by studying scheduling at both the RAN (Radio Access Network) and CN (Core Network) level. The methodology involves introducing a distribution of the identified scheduling sub-functions among all involved entities and includes feedback strategies as well as proposals for the architectural evolution. [C1219]

"Sounding Mars with SHARAD & MARSIS"

MARSIS (Mars Advanced Radar for Subsurface and Ionosphere Sounding) is a low frequency nadir looking sounding radar selected by ESA as a payload of the Mars Express mission, whose primary Scientific Objective is to map the distribution of water both solid and liquid, at global scale on the Martin crust. MARSIS is the first instrument to be able to detect what lies beneath the surface of Mars (up to about 5Km). The Mars Shallow Radar Sounder (SHARAD), a facility instrument provided by the Italian Space Agency (ASI), is embarked on board the NASA Mars Reconnaissance Orbiter spacecraft. SHARAD began science operations on October 3rd 2006: it has been collected data from surface and subsurface. This instrument penetrates to roughly half a kilometre below Mars' to search for information about underground layers of ice, rock and, perhaps, melted water. In this paper, some interesting comparisons between these sounders are proposed. Data confirm that MARSIS and SHARAD are complementary instruments. [C1220]

"Detecting Features using Random Sample Theory"

This paper aims to detect features in 2-D and 3-D highly noisy images using random sample theory fast and with high detection performance. The proposed method yields faster results than standard feature detection algorithms, such as the Hough transform (HT) or its variants, while keeping the the performance level of HT. Proposed method first finds possible feature areas by creating random hypothesis and testing them. Features are re-estimated by only searching these possible areas which reduces the total search space.The proposed algorithm is tested on both simulated and experimental subsurface Seismic and GPR images for searching linear features like pipes or tunnels. Results show that the proposed algorithm can detect features accurately and much faster than conventional methods. [C1221]

"The Application of KL Transform to Remove Direct Wave in Ground Penetrating Radar Records"

In ground penetrating radar (GPR) records, because of different kinds of noises, especially direct wave of ground surface, the real target is not seen clearly in the radar echo section, which makes the detection of real targets difficult. Considering that the direct waves among traces are not change greatly and have strong correlation, so it can be restrained by certain methods. KL transform often be used to pick up coherent noises and random noises in multi channel seismic records[U 4]. In this paper, KL transform is used to GPR data processing, which fully uses the different second-order statistic characteristics of their correlations on the direct wave, target signals in multi channel GPR data. The target signals are successfully separated form noises according to the corresponding relation of the eigenvalue's magnitude of the correlation matrix and correlation strength of each component in the multi channel GPR data. [C1222]

"QoS-enabled Internet-on-train network architecture: inter-working by MMP-SCTP versus MIP"

Internet-on-the-train is a rising concept in the last few years. Several trials in different countries have proved the feasibility of offering Internet access to train commuters, but none of them combines broadband access, scalability, seamless handover and quality of service guarantees in one solution. In this paper, we propose a new architecture to satisfy these needs. Using real handover measurement data of several common broadband wireless technologies, we compare two possible inter-working mobility solutions: Mobile Multi-Path SCTP (MMP-SCTP) and Mobile IP (MIP). [C1223]

"A Processor Development in Programmable Logic Basis"

The features of microprocessor design with specified commands set is considered. The RISC architecture for realisation was chosen. The structure of processor taking into account the architectural characteristics is described. Two possible ways of processor implementation (in basis of standard IC and FPGA) is discussed. The practical results of processor realisation in FPGA basis are described. [C1224]

"Application of Topographic State Constraints in Ground Target Tracking"

In this work, tracking performance affects of the application of topographic state constraint information was investigated in a ground target tracking scenario utilizing a GMTI radar by using unscented Kalman filter based VS-IMM algorithm as well as VS-SIR particle filter and the tracking results of the aforementioned filters were compared to the results achieved by an unconstrained IMM filter. It was observed that application of topographic state constraints helped the performance of tracking algorithms for tracking onroad targets. However, it was also seen that constrained trackers showed error spikes greater than those of the unconstrained filter when either targets left roads or approached junctions. [C1225]

"Peer-to-peer Multipoint Conferencing using Layered Video: Multi-objective Optimization for Extra Requests"

A multi-objective optimization formulation for considering multiple view requests in a peer-to-peer multipoint video conferencing system is described. The system aims end-points with varying bandwidth connections to the Internet and makes use of layered video to assure that each participant can view any other participant's video at anytime. However, this may cause some of the peers to receive lower quality video. We allow multiple video requests from the participants with sufficient bandwidth. Formulations to minimize the number of lower quality video receivers while maximizing the number of additional requests are presented. A multi-objective optimization assigning importance weights to each of these objectives is described and explained with a practical scenario. Sensitivity analysis of the optimization approach, to changes in the weights is made. [C1226]

"Performance Analysis of Downlink GPRS Traffic after a BTS Failure"

The data traffic is burstier and has longer connection time as compared to voice traffic. Global system for mobile (GSM) was developed to carry the voice traffic and it is not suitable for carrying data traffic. General packet radio service (GPRS) has been well integrated in the GSM networks to accomplish efficient spectrum utilization for data traffic. Serving GPRS support node (SGSN) is the main module of GPRS network which is responsible for delivering data packets to mobile stations via base transreceiver station (BTS) and vice versa. Depending upon coding scheme, each packet has some forward error correction capability and retransmissions are also done if errors are more. If a BTS stops functioning (i.e. fails) then packets could not be delivered to users of this area. In this work, it is suggested to use the PDCHs, which were assigned to the failed cell, by transmitting them from neighbor BTS. It will assure some service in the failure affected area at the cost of increased cochannel interference, thus bit error rate (BER), decreased throughput etc to cochannel users. Quantification of the impact of BTS failure on the performance of GPRS downlink traffic is main goal of this paper. [C1227]

"Endpoint Vibration Control of a Mobile Mine-Detecting Robotic Manipulator"

The procedure for humanitarian land mine removal varies greatly. However, one central element is detecting and marking suspected mine locations using sensors such as trained dogs and metal detectors. This step is expensive, tedious, and dangerous. In order to improve the land mine detection process, a reliable, low-cost robotic manipulation system has been constructed. The system consists of long-reach manipulator mounted on a commercially available All-Terrain Vehicle. The system is capable of autonomously scanning for mines with different types of sensors. An electromagnetic induction metal detector is used in conjunction with ground-penetrating radar to detect metal and larger heterogeneities in the ground, i.e. mine detonators and mine casings, respectively. This sensor combination greatly reduces the number of false alarms over the traditional single-sensor approach. Given the long reach of the arm, the endpoint is susceptible to unwanted oscillations that corrupt the scanning information. This paper describes a control system that utilizes input shaping to

improve endpoint tracking. The result is a system that generates high-quality sensor information for precise mine identification. [C1228]

"EM characterization of bituminous concretes using a quadratic experimental design"

This paper describes the characterization of bitumen concretes by measurement cells, within the ground-penetrating radar frequency band, on mixtures defined by a specific experimental design. This one is from a fractional Г‚BS plan (41. 24) which limits the design to 32 mixtures. The parameters, classically used and chosen by road specialists for this specific study, are the nature of the aggregates, the binder richness modulus, the compaction, the maximum size of the aggregates and the continuity of the granulometry. The model, associated with the experimental design, tends to fit a multiple linear regression describing the relationship between measures and the chosen parameters. Two successive levels of calculation have been realized, independently for either the real part and the imaginary part of the relative permittivity. Globally, The first calculation, taking into account all the parameters and their interactions, shows, in the frequency band [100-1300 MHz], that the model explains about 84 % of the measured permittivity. When limiting to a reduced design, keeping only the significant parameters and interactions, results tend to about 85%. [C1229]

"Testbed for 21st Century Wireless Networks Applications"

This paper outlines the design of an integrated research test bed for 21st century wireless networks applications. This test bed has been designed to facilitate research activities currently carried out in Anglia Ruskin University. The test bed design has incorporated mobile networks satellite navigation and location based services (LBS) available technologies for future applications of wireless technology. [C1230]

"Performance Analysis of Uplink GPRS Traffic after a BTS Failure"

The data traffic is burstier and has longer connection time as compared to voice traffic. Global System for Mobile (GSM) was developed to carry the voice traffic and it is not suitable for carrying data traffic. General packet radio service (GPRS) has been well integrated in the GSM networks to accomplish efficient spectrum utilization for data traffic. In uplink, users are required to reserve the slot for sending packets using slotted ALOHA protocol. Depending upon coding scheme, each packet has some forward error correction capability and retransmissions are also done if errors are more. If a base transreceiver station (BTS) stops functioning (i.e., fails) then the users of its area will not get any service. In this case, absolute radio frequency channel number (ARFCN)s, which were assigned to the failed cell, should be transmitted by neighbor BTS such that some service should be available to users of the failed cell. It will affect the blocking probability, the cochannel interference thus bit error rate (BER), throughput etc. GPRS users will be adversely affected but it is far better than the case of no service. In this paper, the overall impact of BTS failure on the performance of GPRS uplink traffic has been quantified. The role of various parameters is discussed such that end users as well as cellular operator will get maximum benefits. [C1231]

"An innovative on-board processor for the real-time GPR monitoring of railway substructure conditions"

The SAFE-RAIL system and the relevant processing unit are hereafter described as a success case for the solution of an electromagnetic inverse problem in real-time applications. The SAFE-RAIL system on-board processing unit is conceived for providing functionalities for real-time exploitation of raw data deriving from microwave sensing action through innovative GPR equipment. In particular, the main objective, as per European STREP project SAFE-RAIL statements, is focused on automatic interpretation of microwave sensed data relevant to rail-track subsurface, aiming at characterizing the ballast and sub-ballast layer properties with consequent extraction in real-time of geophysical parameters. A neural network based approach has been exploited as an efficient way for solving the inverse problem through a "learning-by-examples" approach. The capability of the SAFE-RAIL system in matching real-time performance requirements has been investigated. System operability and cost-effective implementation issues have also been deeply addressed. [C1232]

"Prediction of structural damages of road pavement using GPR"

A new methodology has been proposed to extract the hydraulic permittivity fields in sub-asphalt structural layers and soils from the moisture maps observed with GPR. It is effective at diagnosing the presence of clay or cohesive soil that compromises the bearing capacity of sub-base and induces damage on the road. The numerical algorithm has been yet discussed in the 11th International Conference on Ground Penetrating Radar [5]. Here some experimental confirms have been presented. [C1233]

"Characterizing Railroad Ballast Using GPR: Recent Experiences in the United States"

Recent work has been conducted in the United States with 2 GHz horn antennas to characterize railroad ballast. There were a number observations made during the course of the project that derive from gaining a more thorough understanding of ballast and the interaction of GPR with the ballast matrix. The major observations from over 238 km of track data at four different geographical locations include: (1) it cannot be assumed that there will be a reflection from the bottom of clean ballast or that there will be a reflection from the ballast-subballast interface; (2) the presence of a strong reflection in the data generally, but not always, infers moderately-fouled to clean ballast above the reflecting boundary; and (3) no observable ballast-subballast interface reflections are generally, but not always, associated with gradational fouling or a fully-fouled ballast section. [C1234]

"Author Index"

{no data available} [C1235]

"GPR signal attenuation vs. depth on damaged flexible road pavements"

The findings of a GPR survey carried out on damaged flexible road pavements built on embankments and in cutting sections were reported. The survey was carried out to recognize correlations between: (i) types of damage, (ii) height of embankments or depth of cutting sections, (iii) traffic load and (iv) GPR scan results. Two types of damages, inducing loss of load bearing capacity, were investigated: transversal cracks and ramified cracks. Sixteen sites were chosen, describing the different combinations of the variables to be analyzed. The sites were selected among secondary non-urban roads in the area of L'Aquila (central Italy). Road integrity was evaluated by a GPR quantitative analysis (GPR signal attenuation vs. depth), using an antenna array with a nominal frequency of 1600 MHz. It investigates media till a depth of 1.5 m which is also the maximum depth of influence of the induced traffic stress. The results carried out from two sets of scans (affected and unaffected parts) were compared in order to identify GPR signal changes. These changes made it possible to trace the causes of the damage to the road pavement vs. embankment height, cutting depth and traffic load. [C1236]

"A Stakeholder Led Accuracy Assessment System for Utility Location"

In the UK alone there are many millions of miles of underground utilities and records concerning their location are often inaccurate, incomplete, or non-existent. As well as posing significant health and safety problems to construction personnel, this problem brings with it large social and financial costs. This has led to increasing use of Ground Penetrating RADAR (GPR) for utility location, but without detailed consideration of its efficacy in terms of location accuracy. Therefore, Mapping the Underworld (MTU), a multi-university research project aimed at ensuring improved accuracy in utility location, has been actively engaged in stakeholder consultation. As well as providing much useful data on stakeholder needs, this is also providing a methodology for the assessment of GPR utility location in terms of the factor of most importance to them-the degree to which the equipment provides location within their own accuracy requirements. Also, in order to provide consistency in the assessment methodology, MTU intends to construct a state-of-the-art test facility for assessing location equipment accuracy within tight tolerances. This will yield a combined methodology for reliable testing of location equipment, coupled to an accuracy assessment system weighted in a manner acceptable to stakeholders. [C1237]

"A Secure Authentication Policy for UMTS and WLAN Interworking"

We propose a security authentication policy, Dynamic Session Key Policy (DSKP), for a secure handoff between the UMTS and IEEE 802.11 WLAN. This policy is founded and improved from Dynamic Key Exchange Protocol (DKEP). It redeems the confidentiality of the communication association using the asymmetric and symmetric encryption. The one time password system is used for the key exchange of the sessions. The transition of the communication states in DSKP are seamless and cannot be personated. From the security analysis, using the DSKP can avoid possible attack in wireless circumstance. EAP-SIM and EAP-AKA, commonly used for authentication protocol in present WLAN, were also studied to compare with DSKP. From our security analysis, DSKP shows better security grades. [C1238]

"A prototype for the WISDOM GPR on the ExoMars mission"

This paper will describe a GPR prototype for the WISDOM-(Water Ice and Subsurface Deposit Observations on Mars) experiment on the ExoMars mission. The operation principle as well as the instrument design is explained. Simulations of the radar response to realistic geologic models of the Martian sub-surface are presented. Measurements with a commercial GPR system in Mars analog geology on earth are shown. [C1239]

"VoIP Performance in SIP-Based Vertical Handovers Between WLAN and GPRS/UMTS Networks"

This paper experimentally analyzes the handover performance of VoIP sessions in a wireless overlay of 802.11 WLANs and GPRS/UMTS networks when mobility is handled at the application layer by SIP. It also assesses the impact of handovers on the VoIP call quality perceived by the user by means of the extended E-model. The study reveals that good performance values are achieved when handing over from GPRS/UMTS to WLAN. Additionally, acceptable quality is obtained for handovers from WLAN towards UMTS. On the other hand, unacceptable values are achieved when moving towards GPRS. The main reason is the delay experienced by SIP messages when traversing the cellular network. [C1240]

"A 3GPP-IMS Based Approach for Converging Next Generation Mobile Data Networks"

This paper presents a promising architecture for converging third-generation (3G) cellular data networks and wireless local area networks (WLANs) by using the IP multimedia subsystem (IMS), proposed by the 3G Partnership Project (3GPP), as an arbitrator. The IMS provides real-time session management, and unified session control. Within the scope of the presented framework, terminal and session handoffs are investigated for two different roaming scenarios. The first scenario investigates handoff from UMTS to WLAN and the second scenario investigates handoff from WLAN to UMTS. The paper concludes by presenting some simulation results obtained for these handoff scenarios using an OPNET based simulation model. [C1241]

"Severely Fading MIMO Channels: Models and Mutual Information"

In most wireless communications research, the channel models considered experience less severe fading than the classic Rayleigh fading case. In this work, however, we investigate MIMO channels where the fading is more severe. In these environments, we show that the coefficient of variation of the channel amplitudes is a good predictor of the link mutual information, for a variety of models. We propose a novel channel model for severely fading channels based on the complex multivariate t distribution. For this model, we are able to compute exact results for the ergodic mutual information and approximations to the outage probabilities for the mutual information. Applications of this work include wireless sensors, RF tagging, land-mobile, indoor-mobile, ground-penetrating radar, and ionospheric radio links. Finally, we point out that the methodology can also be extended to evaluate the mutual information of a cellular MIMO link and the performance of various MIMO receivers in a cellular scenario. In these cellular applications, the channel itself is not severely fading but the multivariate t distribution can be applied to model the effects of inter-cell interference. [C1242]

"Feature Detection in Highly Noisy Images using Random Sample Theory"

A novel feature detection algorithm utilizing random sample theory is proposed for 2D and 3D images. The proposed method works on both binary and gray-scale images and yields faster results than standard feature detection algorithms, such as the Hough Transform (HT), while keeping the performance level of HT. The proposed method creates random hypothesis features and tests them to select candidate features in the image. The selected candidate features are then re-estimated within a smaller search space around the candidate feature. The proposed algorithm has been tested on both simulated and experimental subsurface seismic and GPR images to locate linear features like pipes or tunnels. Results show that the proposed algorithm can detect features accurately and much faster than conventional methods. [C1243]

"Mining of Reuse Patterns in CDMA Network Optimization"

CAP, a classical problem in cellular mobile communication networks such as GSM/GPRS or CDMA cellular mobile networks, refers to assigning a limited number of available channels to many mobile voice or data users while minimizing electromagnetic interferences. Most existing researches on CAP focus mainly on channel separation constraints, but pay little attention to geometric constraints defined by reuse patterns that is of great value in engineering applications. An extended CAP model named RCAP (reuse-pattern-oriented CAP) is proposed, which takes account of both of these two constraints. A systematic solution to RCAP is elaborated, which includes two sequential steps, i.e., partition of reuse groups and channel assignment in the groups. Partition of reuse groups is reduced to subgraph isomorphism and can be tackled by subgraph mining while channel assignment in groups is solved in a heuristic manner. The effectiveness of RCAP and its solution was verified by three benchmarks. RCAP was applied to PN offsets assignment in the CDMA networks in several cities of Liaoning Province, and a case study is illustrated in the paper. These results indicate that the proposed RCAP scheme is a very promising solution to channel assignment problems in practical CDMA networks. [C1244]

"The inspection of large retaining walls using GPR"

In hilly regions, retaining walls along roads and motorways are numerous. In some cases the knowledge of the details of the construction is limited. If rehabilitation work becomes necessary, a detailed knowledge of all details of the construction is desirable for an improved planning In a pilot study a GPR inspection of retaining walls was carried out. This included the development of an apparatus for the controlled positioning of the radar antennas on the faces of the walls as well as an evaluation of different antennas and acquisition parameters for this application. This paper describes the approach for data acquisition, acquisition and processing parameters and the results obtained on a retaining wall situated at a Swiss motorway. [C1245]

"MARSIS Data Inversion Approach"

In this paper we describe an inversion approach in order to analyze data from the MARSIS (Mars Advanced Radar for Subsurface and Ionosphere Sounding) instrument on Mars Express. The inversion process allows the dielectric constant of the subsurface material to be estimated provided the dielectric constant of the surface is known. In addition, if impurity are present, it is possible to estimate the dielectric constant of any inclusions as well as the percentage amount of material in the inclusions relative to the host material provided knowledge of the host material up to the depth where the interface has been detected is available. The data inversion method is based on the analysis of the surface to subsurface power ratio and the relative time delay as measured by MARSIS. The data inversion has been performed at several frequencies in order to estimate the frequency dependent parameters affecting the behavior of the radar echoes. It is necessary that the surface and subsurface interfaces have the same roughness in order to estimate the Subsurface Fresnel reflectivity. As a preliminary approach, only flat surface have been selected. MOLA (Mars Orbiter Laser Altimeter) has already provided detailed data on the visible Martian surface and a simulator, with a facet model, has been utilized to use MOLA data in order to verify the correct selection of the frames that will be used for the data inversion (absence of clutter echoes). [C1246]

"SHARAD radar signal processing technique"

SHARAD (SHAllow RADar) is the sub-surface sounding radar provided by the Italian Space Agency (ASI) as a facility instrument to NASA's 2005 Mars Reconnaissance Orbiter (MRO). SHARAD has been launched on August '05 and has started its nominal observation phase since November '06. Primary objective of its investigation is to map, in selected regions, dielectric interfaces to depths of up to one kilometer in the Martian subsurface and to interpret these interfaces in terms of the occurrence and distribution of expected materials, including rock, regolith, water, and ice. SHARAD which is a wideband low-frequency nadir-looking pulse limited radar sounder is expected to map Mars surface with a theoretical range resolution of 15 m in free space propagation, an along-track horizontal resolution of 300-1000 m and an across-track horizontal resolution of 1500-8000 m, depending on spacecraft altitude and terrain roughness. These performances can be reached by means of a focused synthetic aperture processing. The processing chain has been specifically designed and developed by CORISTA within SHARAD Ground Data System development activities with the aim of generating Level 1B products. This paper will be focused on of Level 1B SHARAD data processing description. Some results will be presented using SHARAD first data. [C1247]

"Mechanism of Permeation in Calcium Channels Activation by Applied Magnetic Fields"

In this paper, a Brownian dynamics model of cell membrane calcium ion channels exposure to ELF magnetic fields has been proposed for the first time. Based on the model, the permeation of calcium channels activation by applied magnetic fields is given here. The number of opened calcium channel is increase with magnetic fields. The currents of calcium ions in the channel in controls and exposure to ELF magnetic fields are almost the same. These results are consistent with experiments. Thus it can be seen that the current of single calcium channel was nearly unaffected by applied magnetic fields, the increased number of opened calcium channel may be the reason of increased intracellular calcium concentration. [C1248]

"Lost Sample Recovering of ECG Signals in e-Health Applications"

This paper shows the interest of an interpolation method based on parametric modeling to retrieve missing samples in ECG signals. This problem occurs more and more with the emergence of telemedicine applications. The different links (fixed access network (PSTN), mobile access network (GSM/GPRS and future UMTS) or satellite interfacing (DVB-RCS technology)) involved in e-health applications are liable to induce errors on the transmitted data. These errors/losses can occur anytime and anywhere (according to the channel availability, memory overflows, protocols, etc) during a transmission process. Therefore the recovering of missing samples for biomedical signals is of great interest. The method used in this paper is based on a left-sided and right-sided autoregressive model, i.e., the interpolation algorithm uses the samples before and after the sequence of missing samples. An objective measure is used to assess the method performance. Results show that this

interpolation method represents a really suitable technique to ECG signal reconstruction in a possible corrupted transmission. [C1249]

"Modelling and Design of Extremely Low Frequency Uniform Magnetic Field Exposure Apparatus for In Vivo Bioelectromagnetic Studies"

Helmholtz coils are regularly utilised for various extremely low frequency (ELF) bioelectromagnetic experiments. The evaluation was conducted for the Helmholtz coil magnetic field frequency and uniformity, characterised by frequency-domain and geometric ELF magnetic exposure characteristics. An established approach which consisted of the mathematical calculations of the geometric parameters, computational modeling, and experimental development measurements of the Helmholtz coil's magnetic field frequency and uniformity, improved the quality of magnetic field uniformity and minimised the magnetic field intensity losses. [C1250]

"Inter and Intra-Hemispheric EEG Coherence Responses to Visual Stimulations"

This study investigated whether the visual stimulation at extremely low frequency (ELF) could possibly induce changes in the electroencephalographic (EEG) responses. The functional connectedness was examined between the brain regions when the minimum variance distortion-less response (MVDR) coherence algorithm together with Wilcoxon signed-ranks test statistical method was applied. The results showed that functional significance of EEG alpha rhythms at parietal, and occipital cortex, respond to oscillatory 13 Hz and 16.66 Hz light stimulation, respectively. [C1251]

"J2ME and smart phones as platform for a Bluetooth Body Area Network for Patient-telemonitoring"

A prototype of a system based on a Bluetooth body area network (BAN) for continuous and wireless telemonitoring of patients' biosignals is presented. Smart phones and Java (J2ME) have been selected as platform to build a central node in patients' BAN. A midlet running in the smart phone compiles information about patient's location and health status. The midlet encrypts and retransmits it to the server through 802.11 or GPRS/UMTS. Besides when an alerting condition is detected, the midlet generates a MMS and a SMS to be sent to patients' relatives and to physician, respectively. Additionally, the system provides to physicians the possibility of configuring BAN's parameters remotely, from a PC or even a smart phone. [C1252]

"A Conceptual Framework for a SIM-based Electronic Transaction Authentication System"

This paper presents a SIM-based tool for user authentication in various service areas such as financial transactions in e-commerce. Other remote services can use SIM as an authentication tool over existing GSM technology through GPRS, which is an additional packet data feature for the GSM network. It allows both packet-switched and circuit-switched traffic to exist in the GSM infrastructure. As GPRS is designed to support packet based protocols, such as the Internet Protocol (IP) based bursty and uneven traffic flow, it enables new services such as reasonably fast access to the Internet, electronic mail and other data oriented services, that have been too inefficient in traditional circuit-switched digital mobile networks. Using GPRS features, the e-commerce applications can use SIM as user authentication for transactions. SIM can also be a tool for user identity and authentication around the corporate intranets. This can reduce security infrastructure setup and investment overhead for the security concerned organizations. This paper depicts an electronic payment protocol by means of SIM based authentication with the illustrations of its formal modelling & verification results. [C1253]

"Design of Logic Control for Micro-power A/D with a Serial Interface Using FPGA"

To realize the low-power consumption and miniaturization of the remote power quality monitor, a kind of parallel multi-channel acquisition scheme using micro-power A/D with a serial interface is presented. After the designing ideas of total acquisition scheme based embedded microprocessor is introduced in the paper, the implementation of complex logic control for the micro-power A/D using FPGA is given in detail, and the correctness of sequential design to control the A/D is verified by simulation experiments with EDA tool. The scheme also has great practical values for the design of portable test instrument. [C1254]

"Real-Time Demonstration of Mobile Broadcasting Services via MBMS"

MBMS (Multimedia Broadcast/Multicast Service) is a unidirectional point-to-multipoint (p-t-m) service which allows to transmit data from a single source entity to a group of mobile users in a certain coverage region. In order to investigate the performance of this IP datacast (IPDC) type of services over packet-switched cellular networks like UMTS or GPRS, a real-time MBMS system demonstrator has been developed jointly by Nomor Research, Siemens Networks GmbH, and Siemens AG. The unique setup covers most of the functionalities

specified for the various MBMS network elements, as well as realistic channel models for the specified MBMS bearers. In addition, several advanced features are supported, including Application Layer Forward Error Correction (AL-FEC), system-internal switching between p-t-p and p-t-m radio bearers, and user-defined selection of different media services during operation. The whole setup is complemented by a streaming server and multiple PDA clients connected via IP to the simulator. Hence, realistic multimedia content can be broadcasted via the simulator in real-time, and the received quality at different mobile terminals can be visualized immediately for different system parameter settings and media contents. Besides its live demonstration capabilities, the presented platform can also be used as a valuable tool in research and development. [C1255]

"Measured WEB Performance in GPRS, EDGE, UMTS and HSDPA with and without Caching"

In this paper we present results from a measurement campaign evaluating the web performance of different mobile Internet access technologies with and without caching. We measured in GPRS, EDGE, UMTS and HSDPA radio access networks of a mobile operator in Austria. The operator has implemented a web-proxy for performance improvement. To evaluate the impact on the different technologies we ran the setup with and without the web-proxy. We defined the download time of web pages as the performance index for our work. We developed a tool to capture this parameter and derived the index for a set of web sites frequently used by the customers in the network. Beginning with an over-all comparison we will present detailed analysis for special cases. We evaluated the impact of the proxy system to different site configurations using the performance index. Finally we compared the performance numbers for HTTP with results collected from FTP transfers. [C1256]

"Advanced Multimedia Services for Fast Moving Users on Trains."

An important current topic is the provisioning of multimedia services to users in fast moving vehicules (e.g., trains or cars). As an example, the focus of the paper is on services to train-users. Different important open challenges will be highlighted. First, an overview of current architectures for network connectivity to trains is presented. An Ethernet-based solution with moving tunnels is detailed. Next, the business case of delivering video services to train users is introduced and critically assessed. A dependable video provisioning service is detailed, together with an overview of the practical deployment of the service. [C1257]

"Eigenvector Methods for Analysis of Human PPG, ECG and EEG Signals"

This paper presents eigenvector methods for analysis of the photoplethysmogram (PPG), eigenvector methods for analysis of human PPG, ECG and EEG signals Electrocardiogram (ECG), electroencephalogram (EEG) signals recorded in order to examine the effects of pulsed electromagnetic field (PEMF) at extremely low frequency (ELF) upon the human electrophysiological signal behavior. The features representing the PPG, ECG, EEG signals were obtained by using the eigenvector methods. In addition to this, the problem of selecting relevant features among the features available for the purpose of discrimination of the signals was dealt with. Some conclusions were drawn concerning the efficiency of the eigenvector methods as a feature extraction method used for representing the signals under study. [C1258]

"Microwave Imaging of Objects Inside Concrete"

Considered in this paper is microwave imaging of objects inside concrete. The method for the medium refraction index definition is proposed. Experimental results are presented. [C1259]

"Estimation of Focusing Images for GPR Antenna Array Data"

Preliminary tests of antenna array for ground penetrating radar have been carried out. Three methods of air-ground interface deembedding have been tested. Images have been obtained using synthetic aperture radar and Stolt migration techniques. [C1260]

"Performance Comparison of SOM Based Hybrid Hardware Classifiers"

This paper compares two hardware classifiers in various aspects. Both systems are hybrid network with SOM or Scalar SOM (SSOM) combined with Hebbian network. The SSOM is a simplified version of the SOM, which handles a single variable instead of vectors. The additional programmable network with the Hebbian learning capability, performs the category acquisition and naming. Two systems are described by VHDL and their classification performance as well as the circuit size and operating speed are compared. The results show that the SSOM based classifier exceeds the SOM based classifier in the circuit size and speed, while from the classification point of view, the performance of the SOM based classifier is better. [C1261]

"Anomalous Seismo-Electromagnetic Emission Related with Seismic Waves"

This paper reports the rare high intensity electromagnetic pulses associated with earthquakes, with different to atmospherics spectrum signature. On the base of actual data records, the cases of generation of anomalous seismo-electromagnetic emission founded. These natural sub-millisecond electromagnetic pulses have been associated with passage of seismic waves through the place of electromagnetic field observations. The waveform, spectrum and time characteristics of sub-millisecond electromagnetic pulses have been described. The deeper the source the lower frequencies can be observed in the spectrum on the surface. [C1262]

"An Influence of Geomagnetic Field on Stimulated and Free Oscillations in Schumann Resonator"

Penetration of electric and magnetic fields of the first global electromagnetic ELF resonance in the cavity Earth-ionosphere into the ionosphere is investigated numerically. In the case of stimulated oscillations possessing the real frequency a penetration height for magnetic components is 2-3 times greater than for electric ones and it depends essentially on the value of the geomagnetic field and its orientation with respect to the normal to the Earth's surface. A penetration height for the electric field is of about 50-70 km, for the magnetic field it is 120-240 km. In the case of free oscillations the frequency is complex, and the quality factor of the mode can be estimated from the condition of minimal leakage of magnetic components. [C1263]

"Test bed for Remote Environmental Monitoring in Northwestern China"

In this paper we design the heterogeneous network instead of homogeneous one to reduce the load of single node and as a result it could eliminate probability of wireless sensor network (WSN) overload. For wide feasibility in China northwestern area we choose the Global System for Mobile Communications (GSM) to transmit monitoring data to server and implement a protocol stack like TCP to get a reliable short message service(SMS) from local telecom provider. Finally we show some test result of this test bed and discuss about the next step. [C1264]

"A Communication and Information Technology Infrastructure for Real Time Monitoring and Management of Type 1 Diabetes Patients"

This paper is focused on the integration of state-of-the-art technologies in the fields of telecommunications, simulation algorithms, and data mining in order to develop a type 1 diabetes patient's semi to fully-automated monitoring and management system. The main components of the system are a glucose measurement device, an insulin delivery system (insulin injection or insulin pumps), a mobile phone for the GPRS network, and a PDA or laptop for the Internet. In the medical environment, appropriate infrastructure for storage, analysis and visualizing of patients' data has been implemented to facilitate treatment design by health care experts. [C1265]

"Robot Teleoperation System Based on GPRS"

In this paper we present a strategy for using the cellular network, and specifically the general packet radio service, to teleoperate a mobile robot. This allows the system user a wider mobility range and coverage. The system application is developed using Java programming language, implementing two teleoperation methods: predefined sequences and instant actions. [C1266]

"Models of Navigational Data Transmission Systems for Monitoring of Mobile Objects"

The developed models of Earth-based and satellite navigational data transmission systems (NDTS) of mobile objects are presented. The results of analysis of the delivery time depending on the amount of mobile objects in the system of monitoring are shown. [C1267]

"Step-by-Step Modification of Printed Wideband Balun for GPR Antennas"

Several designs of ultra-wideband (UWB) micro-strip to slotline transitions for tapered-slot antennas (TSA) have been considered. A fourth-order Marchand microstrip-slotline balun and two transitions using wideband slot stubs and micro-strip stubs have been simulated using CST Microwave Studio. TSA employing these baluns had been designed, fabricated and tested. The results of simulations and experimental data are presented. [C1268]

"ET Gravimeter Data Collecting System Based on GPRS"

To meet the needs of researches in earth tides, polar motion, free oscillation of the earth, etc., we design an long-distance data collecting system for the ET gravimeter. The system collectes the data of the ET gravimeter and the temperature, humidity, atmospheric pressure etc., to which the ET gravimeter is exposed, and then saves them to multimedia card. The system can receive the command from and transfer data to an observation

center by wireless. The rapid development of modern wireless communication technology has brought great convenience to long-distance data collecting systems. In the research of geophysics, the ET gravimeters are often placed in the observation stations far away from cities for long-term observation. In these places, not only the observers' lives are inconvenient, but also the observation costs are greatly boosted. Therefore, we have developed the ET gravimeter data collecting system based on GPRS. GPRS is the short name for general packet radio service, which is a kind of packet exchange data load and transmission mode developed on the basis of GSM, has the merits of high data transmission speed, high communication quality, 'always on-line', charging according to flow, etc., and is widely used. This article is divided into 5 parts: in the first part, the motivation and the purpose of this job are introduced; in the second part, the constitution and working principles of the system are described; in the third part, introduction are made for the implementation approaches of GPRS in the system, as well as the hardware design of communication modules; in the fourth part, the program design of system is stated, including the communication program of data collecting systems and observation center; in the last part, it's the conclusion for this job. [C1269]

"A New Short Pulse Generator for Ground Penetrating Radar"

By analyzing the feature of short pulse used in short-pulse ground penetrating radar, the method of pulse generating is presented. The basic structure of pulse generating circuit involves avalanche transistor, step recovery diode and transmissions line. In order to analysis and operate the circuit, some methods and principle are given in the paper, Measured results confirm the design is versatile and may be used in the ground penetrating radar system. Some traits have been demonstrated by experiment, as follows: high amplitude, short pulse duration time, good symmetry and low distortion. [C1270]

"MIMO noise radar-element and beam space comparisons"

The noise radar concept is extended to an array of K transmit antenna and M receive antenna. When independent noise sources are transmitted from each antenna the approach may be viewed as a special case of MIMO radar. Two transmission approaches, termed element space (ES) and beam space (BS), are considered together with both conventional and MVDR beamforming on receive. [C1271]

"A Design of Low-Cost Low-Bandwidth Mobile Video Surveillance System Based on DM6446"

Facing, challenges of bandwidth limitation, high realtime and high computing, we propose a novel design of mobile digital video surveillance system (MDVS) in virtue of hardware-software co-design approach and TI DaVinci technology. GPRS is adopted as communication network without infrastructure installation. The hardware based on dual-core DM6446 and software design based on H.264 tackle bandwidth and real-time challenges excellently. With other peripherals, the design implements a wide range of MDVS functionalities such as motion detection, PTZ control, etc. The merits of low cost, low bandwidth, high flexibility, ease installation, convenient operation make the application can be applied in a variety of scenarios. [C1272]

"Heart Rate Analysis and Telemedicine: New concepts & Maths"

Our paper deals with some new aspects of ambulatory (Holter) ECG monitoring extending its indications and using for risk management purpose. Remote sensing consists of the transmittal of patient information, such as ECG, X-rays, or patient records, from a remote site to a collaborator in a distant site. Our earlier developed internet based ECG system was unique for on/off-line analysis of long-term ECG registrations. After the 5-year experience in a smaller region of Budapest, Hungary involving a municipal hospital and the surrounding outpatient cardiology departments and general practitioners, we decided to integrate into our new ECG equipment, the CardioClient the results. In the first clinical study of the four was a wavelet, non-linear heart rate analysis in sudden cardiac death patients using the Internet and the GPRS mobile communication. After the wavelet transformation by the Haar wavelet and the Daubechies 10-tap wavelet, the phase-space of the wavelet-coefficient standard deviation and the scale parameters showed an excellent separation in the scale-range of 3-6 between the two groups: in that region, the average scaling exponents was 0.14plusmn0.04 for Group-A, and 1.22plusmn0.27 for Group-B ($p<0.001$). In the next study, we used the Internet database of long-term ambulatory, mobile, GPRS electrocardiograms for the for risk stratification of patients through the cardiovascular continuum. From our ambulatory mobile GPRS ECG database the following a priori groups were defined after a 24 months follow-up: G1: N=227 patients (without manifest cardiovascular disease, clusterized "boxes" based on the age, sex, cholesterol level, diabetes, hypertension); G2: N=89 patients (postinfarction group); G3: N=66 (patients with chronic heart failure) with (+) or without (-): all-cause death (acD), myocardial infarction (MI), malignant ventricular arrhythmia (MVA), sudden cardiac death (SCD). The actual vs. predicted values were analyzed with chi-square test. The best- significance levels ($p<0.001$) were found with method in G1/MI+, G2/SCD+, G3/acD+, G3/SCD+ groups. In the third study a wavelet analysis of late potentials based on

long-term, high-resolution, mobile, GPRS ECG data was performed. These pathological changes were also detected by the Haar and Daubechies_4 wavelets, but in a narrower space (110-128 ms and 180-240) and with lesser significance (p<0.01). Late potentials were found in Group-A (N=21) in 18 cases with Morlet, 16 with Haar, 19 with Daub-4 analysis, and in 15 cases using all the 3 waves; for Group-B the data were 5, 9, 8, 5, respectively. In the fourth clinical study the prognostic value of the nonlinear dynamicity measurement of atrial fibrillation waves detected by GPRS Internet long-term ECG monitoring were analyzed. The multivariate discriminant model selects the best parameters stepwise, the entry or removal based on the minimalization of the Wilks' lambda. Three variables remained finally: x1 = CI mean-value at log r=-1.0 (m9-14), x2 = CI mean-value at log r=-0.5 (m12-17), and x3 = CD_cg. The Wilks' lambda was 0.011, chi-square 299.68, significancy: p<0.001. [C1273]

"A General Telematics Framework for Autonomous Service Robots"

Many environment and task specific methods and systems for building Service Robots exist. However vast strides in the evolution of smart device technologies and telematics create the need for a Telematic Framework that is generic, scalable, modular and dynamic. This Framework though generic in nature can be applied quite successfully to specific problems like robot navigation and sensor fusion as discussed here. The fundamental design aspects and implementation issues encountered during the development are discussed. Experiments were conducted and the results of the deployment of three major peripheral modules of the telematics framework namely the GSM/GPRS based communication module, GIS based decision support module and smart client integration modules (for GPS sensor) are reported in this paper. [C1274]

"Feature Detection in Images by Adaptive Random Sampling"

Random sample theory is an effective tool for detecting features in images. This paper presents an adaptive random sampling scheme that clusters random samples into candidate features. The required trial number is reduced by adaptive sampling, thereby reducing the run time of the algorithm. The proposed method quickly finds rough regions in the image that may include features using adaptive random sampling and re-estimates the features using the Hough Transform (HT) within the smaller regions. The proposed algorithm is tested on both simulated and experimental subsurface seismic and GPR images to search for linear features like pipes or tunnels. Faster results are obtained as compared to standard feature detection algorithms, such as the HT or its variants, while maintaining the similar performance level as the HT. [C1275]

"An Ubiquitous Testing System for m-Learning Environments"

Nowadays, e-learning technologies can be combined with mobile computing in order to create a new educational paradigm called m-learning or mobile learning. This new paradigm improves the cooperation between students and teachers, overcoming the classroom borders. This paper proposes an ubiquitous testing system (UbiSysTest) for m- Learning environments. The goal of UbiSysTest is to provide an infrastructure for creating, storing, applying and correcting academic tests. Through UbiSysTest, students can download and execute these tests by means of cell phones. This application runs off-line and only connects through Internet whenever should be required. The UbiSysTest is being developed as part of an infrastructure named MoCoTo (Mobile Collaborative and Educational Tools). [C1276]

"Evolution of GSM into the Next Generation Wireless World"

GSM is the most widely deployed 2ndgeneration digital cellular standard, with over 2 billion subscribers in some 213 countries and adding about 1000 new users per minute! Originally developed in the 1980s, and first deployed in 1991, GSM is a TDMA+FDMA system, providing wide area voice communications using 200 KHz carriers. Subsequently, GSM evolved into a 2.5G standard with the introduction of packet data transmission technology (GPRS) and higher data rates via higher order modulation schemes (EDGE). More recently, GERAN standards organization has been evolving further to coexist with and provide comparable services to 3G technologies. In this paper, we first provide an overview of the traditional 2G and 2.5G GSM, and then discuss the so-called "GERAN Evolution" into the 3G world. We conclude by detailing a few selected aspects of the GERAN Evolution. Overall, we aspire to demonstrate that GERAN is a vibrant, living and growing technology that exploits the latest advances in communications and signal processing. [C1277]

"The Design of Vehicle Emergent Calling System Based on GPRS"

Combining with the working principle of Intelligent Transport System, and with the purpose of enhancing the security of modern traffic, this paper brings forward a project of building a kind of automobile emergent calling system which starts-up with the starting of airbag, the wireless date transport modem, which is droved by serial interface, transmitted the acquired data to the remote monitoring center. The design of the hardware circuit

implement, the design of software and the design of building monitor and control center are demonstrated. And finally, the key technique of the system is also discussed. [C1278]

"Design of a Communication Service System for Vehicle Monitoring"

To develop a general and high compatibility communication service system is the key to build vehicle monitoring centre successfully. In this paper, a design method of the general communication service platform based on GIS/GPS/GPRS for vehicle monitoring system is proposed, which uses non-blocking I/O technology, J2EE design mode and open source technology. The application in practice indicates the high efficiency, stability, reliability, and expansibility of this communication platform. [C1279]

"TCP Behaviour with Changes in Access Link Bandwidth and Delay During Vertical Handoffs"

In this paper we study TCP performance in the presence of vertical handoffs between access networks with widely varying link characteristics. TCP being an end-to-end protocol has performance problems as its behaviour depends on the end-to-end path characteristics which are likely to be affected by a vertical handoff. We carry out a systematic study of TCP behaviour and the consequent problems that arise in various handoff scenarios between networks with different bandwidth and delay characteristics. This study can serve as a basis to evaluate any modifications to the TCP algorithm to adapt to a vertical handoff. [C1280]

"Design of Portable Personal Positioning System Based on SoC Technology"

In this paper, considering the disadvantages of traditional GPS products, large size, high price, inaccurate positioning and single function, etc, a portable personal positioning system based on SoC technology is designed, which adopts a combined positioning technology using GPS and digital compass .The reliability and feasibility of system are proved by many experiments . [C1281]

"Technology Readiness Characteristics of 3G Subscribers in Indonesia: A Preliminary Study"

The technology of 3G (Third Generation) mobile communication was launched in Indonesian market in September 2006. Studies have been conducted to discover contents frequently accessed by subscribers and their satisfaction level to operators' services. However, little is known about the subscribers' technology readiness characteristic. Knowing this characteristic is important since it will help 3G operators designing a proper marketing program in widening the customer base. A preliminary survey was conducted to obtain this information and it was discovered that a significant number of users possessed technology readiness characteristics different than those originally presented in literature. [C1282]

"Wireless Monitoring and Assessment System of Water Quality Based on GPRS"

Based on the knowledge about today's systems of water quality auto-monitoring and managing at home and abroad, a wireless monitoring system of water quality based on GPRS has been designed in this paper. And the model for water quality state recognition is established by BP neutral network based on water monitoring data. The software for wireless monitoring and assessment system of water quality is developed by using C++ Builder language and Matlab. The database is developed by using Microsoft SQL Server 2000.The experimental results show that the developed system which combines the wireless communication technology with the monitoring technology can greatly improve the real-time and continuity for the water quality state monitoring. [C1283]

"Research on Remote Data Acquisition System Based on GPRS"

Data acquisition plays an important role in the field of modern industry control. In many cases, remote data should be transferred to monitor center which is far from the manufacturing field. Traditional data acquisition system by wired means could not meet the needs. This paper presents a new data acquisition and analyzing system based on GPRS technology. The result of the experiment shows that system works well for data acquisition and wireless transferring based on GPRS rapidly which has a reference value for remote diagnosis, remote monitoring and so on. [C1284]

"Research and Implementation of Hydrology Telemetric System Based On GPRS Technology"

It is very important to remotely measure and monitor hydrology information real-time so as to improve modern management of water resource. In this paper, a new hydrology telemetric system is introduced. The system mainly consists of remote terminal units (RTUs) and monitoring center. The RTU based on ARM is mainly designed to collect, store and transmit the water information to the host computer in the monitoring center. The host computer receives the data from the RTUs and makes correct decision after analyzing, which provides the

water conservancy with immediate and exact water information. The remote communication between RTUs and the monitoring center is realized over GPRS. The basic principle, the system composition, and the researches on key technological problems are presented in the paper. And the main idea about improving information security in remote monitoring would also be given. The practical results showed the system is stable and reliable. [C1285]

"A Railgun System for Supersonic Launch of 120 mm Mortars"

Summary form only given. This paper reports on the design and fabrication efforts of a supersonic, high-mass electromagnetic launcher. The program goal was to efficiently accelerate an existing M933/934 mortar round to over 400 m/s. The basic electromagnetic architecture chosen was a railgun, with a detailed system study undertaken to determine the optimal railgun configuration. Operational limits required that the overall launch package have a mass of less than 18 kg and a length of less than one meter. The peak acceleration was required to be less than 10 kG, and no launch package components could be discarded in flight. In addition, the program required a laboratory demonstration, which when coupled with the schedule and budget constraints, required that the existing IAT electromagnetic launch facility (ELF) be capable of providing the prime power. [C1286]

"Providing SIP services support on Mobile networks"

The telecommunications market is changing and it makes that telecommunications operators search for a way to offer new and attractive services for its users. This is even more important when the mobile networks infrastructure update process is considered. Latin-American operators are planning to introduce 3G networks technology on the region. However, these changes imply great inversions too. This paper presents a proposal to offer services based on session initiation protocol (SIP) with a low cost platform based on market tendencies adopting initiatives as 3GPP IP multimedia subsystem (IMS). [C1287]

"Synchronization Control of Hodgkin-Huxley Neurons Exposed to Sinusoidal Electric Field"

In this paper, Hinfinvariable universe adaptive fuzzy control is derived and applied to synchronize two modified Hodgkin-Huxley (HH) neurons exposed to external sinusoidal electric field. Firstly, the modified model of HH neuron exposed to extremely low frequency (ELF) external electric field is established and its periodic and chaotic dynamics in response to sinusoidal electric field stimulation are described. And then the statement of the problem for unidirectional synchronization of two HH neurons is given. Finally Hinfinvariable universe adaptive fuzzy control is designed to synchronize the HH systems and the simulation results demonstrate the effectiveness of the proposed control method. [C1288]

"Fire Patterns of HH Neuron under External Sinusoidal ELF Stimulus"

Neuron as the main information carrier in neural systems is able to generate diverse fire trains in response to different stimuli. In this paper, the stimulus frequency is taken as the bifurcation parameter, and the ISI is considered to be one of the state variables. Via numerical simulation, we mainly concentrate on investigating the kinds of fire patterns that the HH neuron model displays such as period-n, bursting, and modulation fire patterns, etc. under the effect of external sinusoidal ELF electric field, and the relation between the ISI sequences and the external stimulus just like synchronization. In addition, an explanation is put forwards from the electrophysiology point of view to try to interpret why neurons generate so many different kinds of ISI sequences. [C1289]

"Design and Implementation of Remote Supervisory Control and Fault Diagnostic System for Construction Equipments"

To meet information oriented demand in construction machinery and equipment industry, a kind of design and implementation of remote supervisory control and fault diagnostic system for construction equipment is proposed in this article. With the technologies of embedded server design based on CAN bus technique, C/S and B/S Hybrid Architecture, GSM/GPRS, GIS application services, multi-sensors information fusion algorithm and fault tree, the faults of construction equipment would be diagnosed as soon as possible to avoid economic losses. [C1290]

"Analysis of GPRS Radio Channel Access Delay"

We present an analysis of delay encountered in successfully accessing the random access channel (RACH) of general packet radio service (GPRS) Radio Interface by mobile stations that want to initiate data transfer. The process of RACH access is described and the MS state modeled as a discrete-time Markov chain (DTMC) in order to derive the delay. We evaluate the variation of the radio channel access delay with the maximum

attempts, inter attempt time interval, number of mobile users, number of backlogged users, radio priority, rate of incoming data and rate of retransmissions. The blocking probability or the probability of complete channel access failure is also evaluated. [C1291]

"Mobile Terminal Device Architecture: Present and Future"

This tutorial presents a comprehensive coverage of software & hardware architecture of 2G/3G/B3G mobile terminals. The tutorial includes a brief overview on mobile handset architecture covering the major blocks and the software layers, detailed functionalities of the Software layers like MMI Framework, middleware components like BREW, J2ME and their importance in terms of developing Mobile applications. It explains how to develop personalized services like messaging, video and push-to-X services for 3G and GPRS mobile handhelds. The various operating systems are used in the mobile handset (Symbian, Windows Mobile 5.0 and Montavista Linux). Functional block diagram on the handset hardware and its functionalities (RF front-end transceiver, baseband, power management unit, power amplifier) are discussed as well as wireless protocol stack architecture and its working principles (GSM / GPRS / UMTS / WLAN / CDMA2K / Wi-MAX), Call establishment scenarios like voice call, packet call & SMS. NEXT GEN mobile terminal software architecture and its new protocols/layers such as IMS client framework, handover layer, cross-layer design, 4G MAC layer, common data link layer, and unified hardware abstraction layer are explained. Ensuring seamless mobility for continuous data transfer while the subscriber moves across various cellular networks during on-line service and provision of smooth data transfer switching between various cellular networks based on user preferences and the available network resources are core problems to be solved. The tutorial also tackles the new emerging trends like reconfiguration technology, NFC, DVB-H etc.. [C1292]

"The Effects of Fast Sodium Current Upon Action Potential of Cardiac Cells Exposed to External Electric Fields"

The effects of the external electric fields upon action potential of cardiac cells are studied in this paper. Results indicate that external electric fields can influence the current of sodium ions channel by adding an induced component voltage on membrane, which might be the reason of heart rate anomaly under the high-voltage electric fields. [C1293]

"Wireless Telemedicine Physiological Monitoring Center Based on Virtual Instruments"

This paper presents a new model of wireless telemedicine physiological monitoring center, which is developed by the Laboratory Virtual Instrument Engineering Workbench (LabVIEW) and integrates current general packet radio service (GPRS) technology and signal processing with DSP processor. At the patient's location, a wireless PDA-based monitor is used to continuously acquire the patient's vital signs, including heart rate, ECG, SpO2and so on. Through the internet, the patient's physiological signals can be transmitted in real-time to a telemedicine monitoring central management unit, and the unit can access the data and the case history of the patient, either by the central management unit or the wireless devices. This paper presents our prototype implementation of signal processing based on a high-performance DSP-based personal server. The results also show that the wireless telemedicine physiological monitoring center model is superior to the currently used monitors both in mobility and in usability, and, therefore, is better suited to patient transport. [C1294]

"Monte Carlo Simulation of the Permeability of Calcium Channels Exposure to Electromagnetic Fields"

In this paper, a new approach is proposed to model permeation of calcium channels activation by applied magnetic fields. The curves of average velocity and displacement of calcium ions in the channels exposed to ELF magnetic fields are obtained, and they are higher than the controls. The relative numbers of calcium ions in ELF magnetic field stimulated channels is no different from that of controls. The increased number of opened calcium channel may be the reason of increased intracellular calcium concentration. [C1295]

"Near Field Imaging at Microwave and Millimeter Wave Frequencies"

Near field imaging at microwave and millimeter wave frequencies is useful for a wide variety of applications including concealed weapon detection, through-wall and inner-wall imaging, ground penetrating radar imaging, radar cross section analysis, and non-destructive evaluation of materials. A variety of novel imaging techniques have been developed for many of these applications at the Pacific Northwest National Laboratory (PNNL) . These techniques make use of wideband holographic wavefront reconstruction methods, and have been developed to optimize the image quality and resolution. This paper will summarize several of these techniques and show imaging results for several interesting application areas. [C1296]

"Remote Monitoring of Vehicle Diagnostics and Location Using a Smart Box with Global Positioning System and General Packet Radio Service"

This paper presents a distributed system for remote monitoring of vehicle diagnostics and geographical position. This is achieved by using on-board microcomputer system, called on-board smart box (OBSB), general packet radio service (GPRS) and a remote server. The OBSB which is equipped with an integrated global positioning system (GPS) receiver is empowered by a software application that manages the processes of local data acquisition and transmission of the acquired data to the remote server via GPRS. When programmed with speed limits in a certain geographical region, the OBSB allows the traffic control authority to supervise violations of speed limits from inside vehicles rather than outside supervision via certain check points. Appropriate vocal and text warning messages are issued when a vehicle exceeds the permitted speed limit at a certain location. A prototype system is designed and implemented with a small number of sensors. On-road experiments have demonstrated the robustness, efficiency and applicability of the proposed system. [C1297]

"Fast Extraction of Hyperbolic Signatures in GPR"

The hyperbola exhibited from the local target in B-scan of GPR can contribute to estimate the propagation velocity and locate target. In this paper, a new method of fast extracting hyperbolas and apex is presented. The method is based on peak tracing and the symmetry of hyperbolas. The method was tested on experiments, and the results indicate that it can be achieved in near real-time. [C1298]

"Asymmetric DC Offsets and IIP2 in the Presence of LO Leakage in a Wireless Receiver"

We present mathematical analysis to prove that LO leakage at the input of RF circuits in the presence of finite IIP3 results in asymmetry in DC offsets and IIP2 between in-phase and quadrature channels in a wireless receiver. The asymmetry in IIP2 causes effective IIP2 of the receiver to be at best only 3 dB higher than the smaller of two IIP2 values. Measurement data from a quad-band GSM/GPRS receiver implemented in 90-nm digital CMOS process is also presented to support mathematical analysis. [C1299]

"Single Chip Cellular Radios for GSM, GPRS, EDGE"

Nowadays CMOS Baseband-radios for GSM/GPRS application are running in high-volume production. The next step for higher integration is the integration of the Power-Management Unit (PMU) and extending the functionality towards EDGE capabilities. This extended integration promises lower production cost, easier board design and the highest flexibility in system optimization. In this paper we will present both features as highest integrated solutions for cellular phones. [C1300]

"General representations of electromagnetic interferometry"

The theoretical and experimental developments in interferometry have advanced spectacularly over the last five years and are still expanding at a rapid pace. With interferometry we mean the retrieval of the Green's function by cross-correlating or cross-convolving two (wave) field recordings. Over the last year several contributions have included interferometric representations for media with losses, in absence of wave phenomena, like in thermal and electromagnetic diffusion or viscous flow, and for moving media. In this paper we use the reciprocity theorems of the time-correlation and time-convolution types to formulate general representations for electromagnetic fields and waves, and give explicit expressions for different possible GPR applications involving controlled or uncontrolled sources, which can be transient or noise sources. [C1301]

"Development of the Hand held dual sensor ALIS and its evaluation"

GPR has been thought a useful sensor for detection of buried land mines, but no GPR has been practically deployed in humanitarian demining. Since 2002, we have developed a new hand-held land mine detection dual-sensor ALIS. ALIS is equipped with a metal detector and a GPR, and it has a sensor tracking system, which can record the GPR and Metal detector signal with its location. It makes possible to process the data afterwards, including migration. The migration processing drastically increases the quality of the image of the buried objects. ALIS uses two different GPR systems, namely VNA (Vector Network Analyzer) based GPR and an Impulse GPR. VNA based GPR can provide better quality GPR images, although the impulse GPR is faster and light weight. ALIS evaluation tests have been held in mine affected courtiers including Afghanistan, Croatia, Egypt and Cambodia. In the two-month evaluation test in Cambodia, ALIS worked without any problem. After some demonstrations and evaluation, we got many useful suggestions. Using these advises, we have modified the ALIS and it is now more easy to use. ALIS will be commercialized in 2007. [C1302]

"Array-Based GPR for Shallow Subsurface Imaging"

Recently we have reported development of an UWB array-based time-domain Ground Penetrating Radar for landmine detection. The radar is designed to be used within a vehicle-mounted multi-sensor system for humanitarian demining and produces 3D images of subsurface by ID mechanical scanning. In this paper, we demonstrate imaging capabilities of the developed system. The imaging capability of the radar is realized via electronic steering of the receive antenna footprint in cross-scan direction and synthetic aperture processing in along-scan direction. Imaging via footprint steering allows for drastic increase of the scanning speed. [C1303]

"Analysis of Dipole Antenna Eccentered in a Borehole for Borehole Radar"

In this paper, we analyze response of borehole radar that use an electrically small dipole antenna in an eccentric borehole. Our approach is an extended version of the pseudoanalytic formulation, which was previously applied for analysis of an induction logging tool. In order to verify the calculation method, we did two experiments. The first one is measurement of monopole antenna response inside an eccentric air cylindrical layer in another water cylindrical layer on a ground plane, when a wave is incident on the antenna. The second experiment is crosshole measurement in a field test site. We controlled position of a dipole antenna in a borehole, and made it eccentered in a water-filled borehole. In both experiments, we compared the calculated data and the experimental one, and we will show the validity of the developed pseudoanalytic formulation. [C1304]

"Directional Borehole Radar Calibration"

We are developing an innovative low noise borehole radar system that is designed for a single borehole providing 3D imaging capabilities. Harsh and changing operating environments are challenges to the electronic design. Low noise systems are particularly sensitive to operating conditions. After a brief introduction, testing and calibration methods are introduced. Included are new measurement results and figures depicting the practical results achieved so far. [C1305]

"Optimum grounding grid design by using an evolutionary algorithm"

A new application is proposed for getting the optimum design of grounding grids. The basic design quantities of the grounding grids are the ground resistance (Rg), the ground potential rise (GPR), touch and step voltages. These mentioned quantities depend on the grid parameters, which are its side lengths, radius of grid conductors and length of vertical rods. The dependence of the design quantities of the geometric parameters is given by field computation based on equivalent charges by using a combination of charge simulation and image methods.The effect of the location profile that the earth surface potential through it is calculated, and also the vertical rods length, and its position is studied. Numerical example is introduced to explain the performance of this method and its ability to give valuable information about the grid configuration that satisfies optimization. [C1306]

"An Overlay Simulator for Interdependent Critical Information Infrastructures"

Modeling and simulation of heterogeneous interconnected critical infrastructures and of their (inter)dependencies is essential to get a clear understanding of their behavior. Current solutions are generally dedicated to one sector and do not provide means for information exchange with other simulators. This paper tries to fill this gap by introducing a simulation environment overlaying existing simulators. The simulation environment we propose reuses existing simulators within various sectors (instead of defining a completely new environment) and coordinates the execution of simulators with timing constraints so as to represent the interconnected system in a simple and efficient way. We present the architecture of the simulation environment and the results obtained with a first version of its implementation. The results exhibit dependencies between the electrical and the GPRS networks. [C1307]

"A Practical Approach to Wireless GPRS On-Line Power Quality Monitoring System"

In this paper, the authors discuss the way to adopt the cost effective GPRS applications. Although there have been lots of theories and concepts on the GPRS applications but the real applications applying to a large network, distributed power generation or building energy/power distribution monitoring are limited. The authors focus the application of the GPRS to this on-line system application and the techniques. A practical scheme is proposed and its use to real-life system will be introduced. A practical implementation for an wireless GPRS on-line Power Quality Monitoring System will be illustrated. Results and benefit to the end users in some practical applications will be discussed. [C1308]

"Opinion"

{no data available} [C1309]

"Voice over Internet Protocol on Mobile Devices"

Voice over internet protocol (VoIP) is a way to carry out a telephone conversation over a data network. VoIP products promise converged telecommunications and data services that are cheaper, more versatile and provide good voice quality as compared to traditional offerings. Although VoIP is widely used, VoIP on mobile devices is still in its infancy. Currently, there are a number of VoIP solutions for mobile phones. However, VoIP solutions developed using Java 2 platform micro edition(J2ME) are not available. Java based solutions are widely compatible with many devices. In this paper, strong focus has been granted to cross-device compatibility through the use of the widely supported J2ME framework. The implementation details of VoIP client using J2ME are illustrated. [C1310]

"Multi-Channel Receiver for an E-band FMCW Imaging Radar"

A 16-channel receiver module operating at E-band frequencies (80 GHz) is presented. This receiver module is a key component in our 3D FMCW imaging radar. The receiver, with an RF band of 78 to 81 GHz, employs a dual-conversion architecture with an IF band of 4.5 to 7.5 GHz. With a conversion gain of 48 dB, it has demonstrated a noise figure of typically 8 dB. This receiver, employing 115 MMICs and 8 alumina MICs, has established a new level of integration for mm-wave multi-chip modules (MCMs). The size of this module is only 2.375 times 1.355 times 0.63 inch with 16 waveguide inputs spaced 85 mils center-to-center. [C1311]

"General Packet Radio Service Performance Evaluation Based on CIR Calculation, Considering Different Radio Propagation Models"

General Packet Radio service (GPRS) is a step on the evolution path towards 3rdGeneration (3G) mobile radio networks. This paper investigates the effect of using varied Coding Scheme (CS) based on Carrier to Interference Ratio (CIR), that is computed using different radio propagation models. A comparison between these models and a fixed CS is evaluated. A simulator model was developed to study the behavior of data transmission between a GPRS server and data terminals via air interface. Simulation results show the convergence between different radio propagation models, and the capability of using a less protective CS. [C1312]

"Multipass SAR Processing for Urbanized Areas Imaging and Deformation Monitoring at Small and Large Scales"

A new processing chain that allows monitoring ground deformations, both at small scales and large scales, is discussed. Core of the chain is the spatial differencing (SD) algorithm that allows very quick estimation of the small scale (low resolution) mean deformations velocity and residual topography by means of the use of spatial differences between adjacent and non-adjacent pixels. Small scale deformation time series is then generated by using the Enhanced spatial differences (ESD) that permits separating atmospheric phase contribution, linear and non-linear deformation velocity and residual topography. Deformations and target localization at large scales (full resolution) is provided by the application of a multi-dimensional (4D) imaging (differential-tomography) that exploits the complex nature of the received signal to focus the data in the space-time domain. [C1313]

"Training Method for Ground Bounce Removal with Ground Penetrating Radar"

Downward looking ground penetrating radar (GPR) has been considered a viable technology for landmine detection. For such a GPR with the antennas positioned very close to the ground surface, the reflections from the ground surface, i.e., the ground bounce, are very strong and can completely dominate the weak returns from shallowly buried non-metallic mines. Hence, one of the key challenges of using GPRs for landmine detection is to remove the ground bounce as completely as possible without altering the landmine return. The ground bounce varies with surface roughness and soil conditions and leads to performance degradation for many ground bounce removal algorithms without reference data selection. In this paper we introduce NHD-based reference data selection methods for ground bounce removal. Experimental results are provided to illustrate the performance of the proposed method. [C1314]

"Seamless Connectivity in WLAN and Cellular Networks with Multi Criteria Decision Making"

The evolution of today's wireless and mobile technologies and personalized hand-held devices has increased the challenge to handle the trade-off between mobility, performance and cost. The user simply needs to be Always Best Connected (ABC). To make this happen, different types of criteria reflecting relevant characteristics of wireless and mobile access networks such as WLAN, UMTS and GPRS have to be established and judged. In

this paper the criteria are divided into three main groups, performance, cost and accessibility. The criteria are fed into a Multi-Criteria Decision Making (MCDM) tool which is able to deliver a ranking of network links in order to become ABC. Finally, a case study with two different Generic Services (GSs) illustrates the decision making process and its outcomes in different situations. [C1315]

"A Low Phase Noise Quad-Band CMOS VCO with Minimized Gain Variation for GSM/GPRS/EDGE"

A differential LC VCO is presented for commercial quad-band GSM/GPRS/EDGE applications. The VCO is designed in 0.13 mum CMOS process and meets stringent phase noise specifications. A technique to minimize the VCO gain variation is presented which reduces the Kvcovariation to plusmn14%; more than three times smaller than the previous solutions. This technique results in reduction of the delay mismatch between the amplitude and phase paths in a polar loop transmitter. [C1316]

"Particle Swarm Optimization of Antenna Elements for Foliage Penetrating Radar"

Foliage penetrating radar systems typically operate in the VHF or UHF segment of the RF spectrum, and often require the use of ultra-wideband antennas. Often time, the design of such antennas requires an extensive 'trial and error' effort to meet the design requirements. In this study Particle Swarm Optimization was used to automate the design process. [C1317]

"Effect of an Ultra Wideband CPW Fed Monopole Antenna on Impulse Transmission"

Characteristics of an ultra wideband CPW fed monopole antenna excited by short duration pulses have been reported. Theoretical results have been verified through experiments using a practically available pulse generation circuit. [C1318]

"Cryptographic Method of 3G Firewall Based on IXA2850"

Through discussing the security problems of a key network protocol-the GPRS tunneling protocol (GTP), this paper points out 3rd generation network is at risk from both its own subscribers and its partner networks. So the 3G firewall should encrypt the GTP. State-of-the-art high-speed network processor-IXA2850 is described. And its features of crypto unit hardware is fit for encrypt the GTP. Cryptographic method is brought forward based on this network processor, and the experiment proves its high performance. [C1319]

"An Efficient QoS Control Mechanism for IMS based Convergence Network"

In this paper, we propose a novel QoS control mechanism called IPFIX (class fixing in IP option header) which is intended to identify IMS user residing in conventional Internet for resources reservation in DiffServ core network. The work was motivated by the need of interoperability between QoS-enabled UMTS network and conventional Internet unable to support QoS for NGN (next generation network). IPFIX does not force user in Internet to be equipped with any resource reservation protocol such as PDP or RSVP. Instead it utilizes the option field of IP header that contains the minimum information of QoS. Our numerical analysis and implementation results show that IPFIX outperforms PDP and RSVP in terms of control overhead. [C1320]

"Synchronized Interactive Services for Mobile Devices over IPDC/DVB-H and UMTS"

DVB-H (digital video broadcasting-handheld) is a technical specification for bringing broadcast services to handheld receivers. IP datacast integrates DVB-H in a hybrid network structure consisting of both a mobile communications network such as GPRS or UMTS and an additional DVB-H downstream. This paper introduces two different approaches for providing interactive services to DVB-H terminals. It is assumed that the terminals dispose of a MIDP compliant runtime environment. The mobile information device profile (MIDP) is a J2ME profile for the use of Java on embedded devices such as mobile phones and PDAs. It is shown how these services can be synchronized with the multimedia data that is broadcasted over the DVB-H channel. A first approach will only use the DVB-H broadcast channel as bearer of both the audiovisual data and the interactivity-related data. The second approach combines the broadcast path with a bidirectional unicast channel in order to implement the interactive services. [C1321]

"Design and Analysis of Wideband Antenna with Application to Ground Penetrating Radar System"

In this paper, a wide band antenna is proposed for ground-penetrating radar (GPR) system. This antenna consists of dipole antenna housed in a rectangular conducting reflector whose inner walls are coated by an absorbing material. The coating is composed of a number of layers with a conductivity profile designed to

achieve the minimum voltage standing wave ratio (VSWR) of the dipole antenna over the frequency band of operation. The antenna impedance and VSWR are calculated using the finite-difference time-domain (FDTD) method. The antenna impedance and VSWR are presented over a wide-band of frequency. The capability of buried target detection by the proposed antenna is examined by investigating the coupling between the transmitting and receiving antennas in the presence and absence of buried targets. The operating bandwidth of the antenna is shown to be about 50%. The effect of the ground soil on the antenna characteristics is studied when the GPR system is placed at different heights above such a soil. The GPR system with the proposed antenna is shown to be capable of detecting the existence of buried targets. [C1322]

"Development problems of large area, web accessible, environmental pollution monitoring system"

The main purpose of the paper is to present the www hydrocarbon pollution monitoring system which is under development at the Warsaw University of Technology (WUT). The dedicated system server collects data from mobile GSM/GPRS accessed observation points, and delivers information on potential pollution to the authorized www clients. The emergency alarm information is planned to be send directly to palmtop/mobile phone equipped emergency teams to assure short response time to environment contamination. The moving observation points property and country wide GSM operator coverage makes the system flexible and universal. The principles of system realization are presented. The structure of the system and some problems concerning its development are discussed. Two realizations of system software are presented and compared: one with the use of Microsoft .NET IDE, and the other with LAMP/WAMP approach. [C1323]

"A Low-Cost Ultra-Wideband Indoor Ranging Technique"

This paper presents the development of a low-cost indoor ranging technique based on time-of-arrival (TOA) estimation, using short-pulse ultra-wideband (UWB) signals. The realized system includes two identical UWB transceiver devices, in which the receiver section is based on a tunnel diode detector and the pulse generation is performed by a common bipolar transistor driven in avalanche mode. An indirect measurement of the distance between the devices is obtained by measuring the frequency of the generated pulse train. A theoretical model of the system is described and a statistical analysis is presented, including the evaluation of the Cramer-Rao lower bound (CRLB) on the distance estimation. Furthermore the principle of operation of the realized system prototypes is described, along with some implementation issues. Finally experimental results are shown and discussed. [C1324]

"Some aspects of design and measurements results prediction for a Mobile Observation Point for a hydrocarbon pollution monitoring system"

The idea of mobile observation point (MOP) dedicated for a hydrocarbon monitoring system is presented. The main technical problems related to the monitoring system and MOP are described. Special attention was paid for a results of measurements prediction procedures. The main advantages and disadvantages of proposed solution are discussed. [C1325]

"A Framework for Low Data Rate, Highly Distributed Measurement Systems"

Specific types of distributed measurement and virtual instrumentation systems periodically acquire data from a large number of geographically distributed field terminal devices. Such systems are used in environmental monitoring or in monitoring of various commonalities such as electrical power distribution, gas or water networks. In this article we present a framework for low data rate, highly distributed measurement systems based on the publicly available GSM and GPRS services. By using the framework, it is possible to build a system which is capable to perform local measurements on a large number of geographically distributed measurement points, to collect measured data by using the mobile network, to store them on the server computer and to publish gathered data by providing XML web services interface. The framework is robust, scalable and suited for long-term autonomous operation. The tests showed that the framework is stable and operates properly. [C1326]

"Vehicle Positioning in Underground Mines"

This paper describes the problem of locating a vehicle relative to a digital map of an underground mine. The mines of interest produce potash, and they are at a depth of approximately 1000 meters, being relatively large, covering an area greater than 10 kilometers by 10 kilometers. A major application of vehicle positioning is in tracking ground penetrating radar. Ground penetrating radar is used to ascertain the current condition of the mine ceiling and evaluate its risk of delamination (i.e. collapse). A ground penetrating radar system is driven along a tunnel and measurements are logged. It is necessary to record position information along with the radar signal, and this can be an expensive task without a positioning system, since there are many kilometers of mine tunnels. Two possible problem solutions are proposed each using different absolute measurements. For the first

case the distance to the mine walls is used. In the second case an existing wireless ethernet network furnishes the positioning system with distances from local access points. The system model is the same for both formulations and uses a state space representation. Both formulations also make use of inertial measurements such as acceleration. A particle filter, which is a recursive Bayesian technique using sequential Monte Carlo sampling, is used to estimate the state and, therefore, the position of the vehicle. [C1327]

"Performance Evaluation of Integrated Voice/Data Services Over GSM/EGPRS With Radio Resource Dimensioning"

In this paper an analytical model for GSM/EGPRS is developed. It is based on the performance of M/M/C/co/N queueing system with FCFS queue discipline. This model is adapted to guarantee GPRS/EGPRS system constraint and Internet traffic (ON/OFF traffic) over a single cell. The interaction of voice calls with GPRS/EGPRS connections is studied. Different performance parameters are calculated which are blocking and delay probability, average throughput, average number of waiting users and queueing time. These performance parameters are obtained under different coding schemes (C-Sc) and three main radio resource strategies which are Complete Partitioning (CP), Partial Sharing (PS), and Complete Sharing (CS). The obtained results show that the (CP) strategy is better than the (PS) and (CS) strategies. [C1328]

"A Novel Earthquake Warning System Based on Virtual MIMO-Wireless Sensor Networks"

An earthquake is caused by the sudden release of strain in the Earth's crust which results in waves of shaking that radiate outward from the earthquake source. During the last decade, several satellite experiments discovered new phenomena in the ionosphere and magnetosphere that had preceded earthquakes. In this research, we suggest a novel early warning system for earthquakes based on wireless sensor network (WSN). A WSN based on single antenna wireless sensor nodes are cooperating to establish a multiple-antenna WSN that is called virtual MIMO-WSN. Virtual MIMO-WSN has adjustable and tuning capabilities to monitor different frequencies based on the number of the cooperative wireless sensor nodes. An electromagnetic map could be generated by activating a virtual MIMO-WSN in specific direction (North-South, East-West, North-West, North-East, South-West, South-East) by switching (ON/OFF) certain sensor nodes based on their location. Cost effectiveness, system scalability, ease of deployment, adjustable frequency tuning, and reliable ELF/VLF direction finding are key design factors in virtual MIMO-WSN, overcoming the existing techniques for ELF/VLF monitoring systems. Simulation results show the effectiveness of the proposed virtual MIMO-WSN in adjustable frequency system tuning, and reliable ELF/VLF direction finding. [C1329]

"Ground Penetrating Radar: A Smart Sensor for the Evaluation of the Railway Trackbed"

Ground Penetrating Radar (GPR) has become an increasingly attractive method for the engineering community, in particular for shallow high-resolution applications such as railway trackbed evaluation. It is a non-destructive smart sensing technique, which can be applied dynamically to achieve a continuous profile of the trackbed structure. Due to recent hardware and software improvements, real time cursory analysis can be performed in the field. Based on collected field data, the present paper investigates the applicability of the GPR smart sensor system in terms of the railways trackbed assessment and concludes on the capability of the GPR sensing technique to assess adequately the ballast quality and the trackbed formation. [C1330]

"Performance Evaluation of Separated Aperture Sensor GPR System for Land Mine Detection"

In this paper, the performance of the separated-aperture sensor working as ground- penetrating radar (GPR) is assessed over the operating frequency band. The capability of the separated-aperture sensor to detect buried targets is examined by evaluating and comparing the electromagnetic coupling between the transmitting and receiving antennas in two cases: (i) when the system is placed over an empty ground and (ii) when it is placed over a ground inside which a practical target is buried at the proper depth. The finite-difference time-domain (FDTD) method is used for electromagnetic simulation and the results concerning the coupling between the transmitting and receiving antennas are presented considering various practical parameters such as the operating frequency, the electric properties of the ground soil and the buried target, and the depth at which the target is buried under the ground surface, it is shown that target detectability using the separated-aperture sensor is strongly dependent on all of the above parameters. [C1331]

"Principle of a direction sensitive borehole antenna with advanced technology and data examples"

Underground, in mines it is important to get spatial information about the geology on limited profiles. In low conductive material, like salt, ground penetrating radar (GPR) is a valuable method to find structures in the environment. For radar measurements in boreholes a direction sensitive antenna can solve the problem of

getting spatial information. A new development of a direction sensitive antenna with an advanced technology to calculate the direction increases the resolution of this method. The idea of this technique will be illustrated and examples of measurements are shown. [C1332]

"Localization of small PEG spheres by multiview/singie-frequency data: numerical results"

In this paper the problem of determining the number and the locations of "small" PEC spheres from the knowledge of the scattered far-field is addressed. A multi-view/single-frequency configuration is considered. The multiple scattering between the spheres is neglected and their locations are represented as the supports of Г‚Вї-functions. This allows to cast the problem as the inversion of a linear integral operator with tbe Г‚Вї-functions being the unknwons of the problem. The inversion of the linear integral operator is achieved by means of the Truncated-Singular Value Decomposition (TSVD). The performances of the linear inversion algorithm against the model errors (i.e for situations where the multiple scattering is not negligible) and the presence of an Additive White Gaussian Noise (AWGN) are investigated by numerical simulations. [C1333]

"A Full Waveforminversion Algorithm for Interpreting Crosshole Radar Data"

Ground-penetrating radar (GPR) is a useful tool for civil and environmental engineering fields because of its high resolving power and non-destructive measurements. This paper presents a method of full-waveform inversion of borehole GPR data for imaging permittivity structures. The inversion algorithm is based on a conjugate gradient search for the minimum of an error functional relating to the difference between measured and predicted data. A small model perturbation in the functional can be efficiently calculated by propagating the data error back into the model in reverse time and correlating the field generated by the back-propagation with the corresponding incident field at each point. A finite difference time domain (FDTD) method is used for solving Maxwell's equations to obtain incident electromag-netic wavefields. Back-propagated wavefields satisfy adjoint Maxwell's equations, which are stable in reverse time and can be solved by the same FDTD scheme. The imaging scheme is applied to crosshole radar configuration, thereby demonstrating its capability to reconstruct permittivity structures. Tests on a two-dimensional synthetic model produce good images of target scatterers and show stable convergence. [C1334]

"Shape reconstruction of three dimensional buried objects from stepped frequency data"

In this communication the problem of reconstructing the shape of 3D buried targets from stepped frequency GPR data is addressed by exploiting an improved formulation of the Sampling Methods (SM). These latter are simply and efficient methods which may retrieve the geometrical features of dielectric or metallic targets from multiview, multistatic data measured at a fixed frequency. However, while accurate results may be achieved when full-aperture data are available, their effectiveness is quite unsatisfactory in case of aspect-limited data and lossy media, which is the usual case in GPR applications. In order to overcome this drawback, we propose a new formulation, which is able to improve the reconstruction of the deeper part of the investigated region and it is an original extension of the SM to the case of multi-frequency data. [C1335]

"Investigation of Convenient Antenna Designs for Ultra-Wide Band GPR Systems"

This paper proposes the planar and 3-dimensional ultra-wide band (UWB) antenna types suitable for hand-held and vehicle mounted impulse GPR systems. On this scope, bow-tie, spiral, TEM horn, dielectric-loaded Vivaldi, multi-sensor adaptive and array model antenna configurations are designed, simulated and measured. The numerical and experimental results are presented with performance comparisons. [C1336]

"Vertical and Horizontal Resolution of GPR bow-tie antennas"

Since the characteristics of the detected reflections depend on the issued signal properties, a key factor for carrying out a successful GPR survey is to know as much as possible about the transmission features of the antennas. This information is essential when deciding the antenna and which is the most appropriate parameter configuration setting for a specific study. These characteristics vary for the different available GPR equipments. Numerous experimental tests have been developed in this way. In this paper we present the first results of set of experiments about the resolution capabilities of two commercially bow-tie antennas (1GHz and 800 MHz). The propagation media was air in this first study and the experimental results are compared with the theoretical estimations. The obtained conclusions are the first step in order to establish the real bounds for the detection capability of these antennas. [C1337]

"Solving the full nonlinear inverse problem for GPR using a three step method"

In order to extract accurate quantitative information out of Ground Penetrating Radar (GPR) measurement data,

one needs to solve a nonlinear inverse problem. In this paper we formulate such problem as a nonlinear least squares problem which is non convex. Solving a non-convex optimization problem requires a good initial estimation of the optimal solution. Therefore we use a three step method to solve the above non-convex problem. In a first step the qualitative solution of the linearized problem is estimated to obtain the detection and support of the subsurface scatterers. For this first step Synthetic Aperture Radar (SAR) is proposed. The second step consists out of a qualitative solution of the linearized problem to obtain a first guess for the material parameter values of the detected objects. The method proposed for this is Algebraic Reconstruction Technique (ART), which is an iterative method, starting from the initial value, given by the first step, and improving on this until an optimum is achieved. The final step then consists out of the solution of the nonlinear inverse problem using a variational method. [C1338]

"Frequency-Dependent Attenuation and Velocity Characteristics of Magnetically Lossy Materials"

In many situations, the magnetic properties of sub-surface materials are often considered unimportant when compared to their 'dielectric' characteristics (i.e., permittivity and conductivity). However, if significant amounts of magnetic minerals exist, such as magnetite, hematite, maghemite and/or iron in its free state, then the relaxation phenomena of these magnetically lossy particles can have an overriding effect on the complex effective permittivity spectrum of the material. In this paper, the effective permittivity, attenuation and propagation characteristics of a range of nano-to-micro scale quartz/magnetite mixtures are investigated with the aim of determining how lossy magnetic minerals affect the macroscopic properties of the material as a whole. In addition, the measured results are compared to popular 'dielectric-based' mixing models (such as the Complex Refractive Index Model CRIM) and the nature of the magnetic relaxation mechanisms is discussed from the aspect of composite mediums. Results indicate that even relatively small amounts of magnetite can have a considerable effect on both signal attenuation and wave propagation velocity and that the current range of mixing models are inadequate for the description of magnetically lossy mixtures. [C1339]

"Electromagnetic scattering by buried cylinders"

A spectral-domain method, for the solution of the two-dimensional electromagnetic plane-wave scattering by a finite set of perfectly conducting or dielectric cylinders buried in a dielectric half-space, has been developed. The scattered field is represented in terms of a superposition of cylindrical waves, and use is made of the plane-wave spectrum to take into account the reflection and transmission of such waves by the interface. The problem is solved for both the near-and the far-field regions, for TM and TE polarizations. The validity of the approach is confirmed by comparisons with results available in the literature. The technique is applied to scatterers of arbitrary cross-section simulated by a suitable configuration of circular cylinders. Our method is employed to study the scattering from buried objects of a pulsed plane wave, that may have a rather general shape in the time domain, by performing a sampling of the incident-field spectrum, and solving the problem in the frequency domain. [C1340]

"Subsurface localization of interfaces"

The localization of a slab embedded within a homogeneous half-space is dealt with. A multi-frequency plane wave incidence is assumed and the locations of the slab interfaces are represented as the support of "distributions". A linear model of the electromagnetic scattering is adopted and the inversion is regularized by means of the Singular Value Decomposition (SVD) tool. Numerical tests performed via SVD allow to analyze the reconstruction capabilities of the reconstruction algorithm, i.e. the maximum depth of investigation and the resolution limits, which depend on the properties of the investigated medium and on the exploited work frequency band. Experimental results are shown. [C1341]

"Time-frequency domain signature analysis of GPR data for landmine identification"

In this paper, the problem of detecting buried antipersonnel (AP) landmines is tackled in the broader context of target identification: determining relevant features, extracted from impulse ground-penetrating radar (GPR) signals, which can be used to classify landmines. These features are extracted in the time-frequency domain using the Wigner-Ville distribution (WVD) and the wavelet transform (WT). Radar data are collected using the MINEHOUNDTM hand-held dual-sensor system over two types of soil and for different landmines and objects. The Wilk's lambda value is used as a criterion for optimal discrimination. Results show that time-frequency signatures from WVD contain more valuable information than the features extracted using WT. Therefore, they could improve landmine and false alarm classification and help to differentiate between two different landmines. [C1342]

"GPR Antenna Test Facility at IRCTR-IB"

This paper describes the GPR antenna test facility developed at the research branch of IRCTR at ITB Indonesia called IRCTR Indonesian Branch (IRCTR-IB). The facility consists of a GPR test range, a PC-controlled scanner, a UWB sensor, and measuring equipment. The test range was constructed as a wooden sandbox of 3 m ГѓВ— 3 m ГѓВ— 1.6 m and filled with dry sand with relative permittivity of 5.1. The scanner is used for accurate antenna positioning above the sand and fully controlled from a PC. A control software has been developed to allow automatic data acquisition and antenna positioning, important for measurements of antenna footprints. The measuring equipment consists of a vector network analyzer, a sampling converter and pulse generators to allow accurate measurements in frequency as well as time domain. [C1343]

"Design of a GPR for deep investigations"

This paper describes the design steps in producing a GPR for deep, mainly geological and environmental investigations. A phase coded spread spectrum pulse is used with high power transmitters to an antenna array. The receiver has a real time data converter with a correlator giving 125dB dynamic range. Initial results are shown. [C1344]

"Experimental Verification of LOZA-V GPR Penetration Depth and Signal Quality"

Experimental GPR survey data obtained in Yingshan and Tianmo parks (Beijing) are presented. The purpose was to estimate actual penetration depth and signal quality of LOZA-V GPR in generic Chinese soil conditions. This subsurface monopulse radar, using spark discharge transmitter and resistively loaded dipole antennas, reliably detects underground objects at 14-20 m depths without sophisticated signal processing. [C1345]

"Calibration report of the SHARAD instrument"

The Mars Shallow Radar Sounder (SHARAD) is an HF (20 MHz) Sounding Radar embarked onboard the Mars Reconnaissance Orbiter (MRO) spacecraft. SHARAD on-ground calibration activities have been limited to the characterization of the SEB (SHARAD Electronic Box), not having been possible to perform extensive characterization of the flight antenna nor end-to-end calibrations on ground. Scope of the present document is to define the activities to be carried out in-flight in order to ensure SHARAD products calibration. The calibration needs are assessed and an overall calibration strategy is then defined, leading to the identification of the data sets to be collected and relevant processing to be applied. The document also address how to exploit the available calibration data (from both on-ground and in-flight calibration) to correct SHARAD products, and the organization of the calibration database. [C1346]

"Metal-sheet test to estimate shape and frequency content of the radar pulse"

Appropriate GPR data processing and inversion require a reliable estimation of the radar pulse. In particular the knowledge of the shape and frequency content of the wavelet sent into the ground is an important issue not only for processing an interpreting reflection profilles, but also for GPR tomography, especially for amplitude tomography. Common practice considers the nominal antenna frequency as a measure of the bandwidth of the radar wavelet in the air, which in turn is assumed to be equal to the peak (dominant) frequency. Raising the antenna above a totally-reflecting metallic slab is the simplest way to gain information on the shape of the radar pulse in the air. This is the experimental calibration method generally used for correcting zero-time drift and to obtain a reference signal for amplitude analysis. This method was applied in this study to extract information on the frequency content of the emitted radar wave. Experimental errors related to ambient noise and positioning inaccuracies impose great care for a correct extraction of the needed attributes. The same test was also useful to gain insights into the influence of the filters applied in the acquisition stage. [C1347]

"Analysis of a non Electrical Resistive GPR Antenna"

In order to avoid oscillations in a GPR antenna, logarithmic resistive patterns throughout the arms of the dipoles are used. This consumes the energy generated by the transmitter, but significantly reduces the efficiency of the antenna and of the radar. This work analyses the possible effects of eliminating resistors by simulating the delayed potentials from the electromagnetic equations. The antenna is modelled as a modified transmission line with open end. A new transmitter is required to avoid the generation of new pulse reflections from the antenna arms. With that, the efficiency of the radar would increase and the broadcast electromagnetic pulse would be more symmetrical. [C1348]

"Improved Bow-Tie Antenna for Pulse Radiation and Its Implementation in a GPR Survey"

In our previous works we developed an improved UWB bow-tie antenna for high-resolution GPR applications. The antenna has been designed to detect small shallow-buried objects for which it should be able to transmit

short pulses with very small late-time ringing. It has been shown theoretically that in comparison with conventional bow-tie or dipole antennas, this antenna radiates significantly stronger pulses in its broadside direction with very small late-time ringing. In this paper, experimentally we compare the antenna with a resistively-loaded planar dipole which is commonly used for GPR. It has been found that the antenna exhibits superior characteristics in terms of significantly larger amplitude of the transmitted pulses and much smaller late-time ringing. Furthermore, the antenna has been implemented in a commercial GPR system and tested in real GPR surveys. In this paper we demonstrate that the implementation of this antenna results in clear B-scan images which allow one to easily observe the detail of the shallow subsurface. [C1349]

"Look-Ahead Radar and Horizon Sensing for Coal Cutting Drums"

Safe and efficient coal extraction requires advanced radar subsystems that can be mounted on cutting drums of coal mining machines. A look-ahead radar (LAR) must solve the radio geophysics problem of transmitting an electromagnetic (EM) wave through at least 6.1 m (20 ft) of coal to detect an air- or water-filled void. An up- or down-looking radar must determine the distance to the coal bed sedimentary rock boundary. The reflected EM wave from the void or boundary rock must be processed in real time in the radar electronics to determine the physical distance to the void or coal bed boundary. The distance determination requires the in situ measurement of the coal electrical conductivity or relative dielectric constant. Up or down (horizon) sensing enables selective cutting near the undulating sedimentary rock boundaries of the coal bed to address coal quality and ground control issues. Both sensors require subsystems for dynamic electric power generation, real-time measurement of antenna rotation angle, detection of weak coal-boundary reflected EM waves concurrently with the suppression of the significant larger first air-coal reflected wave, processing to determine distance through coal, and RF modem transmission of measured data from the cutting drum to the body of the mining machine and along the segmented or coiled-tubing drill pipe. This paper describes the development of the GPR subsystems and field test results. [C1350]

"The broadband device for nondestructive measurements of dielectric permeability of lossy media"

The opportunity of creation of the device and a corresponding method for measurement of complex dielectric permeability of solid, liquid, loose environments in ultra short wave and in microwave ranges without breaking of their structure is investigated. The given problem is actual in many areas, including geophysics, radio physics, underground radio sounding and the like. For nondestructive materials testing it is necessary to use only flat constructions of the measuring cell, for example, as unbalanced strip line (SL), slot line or coplanar waveguide. Use of shielded coplanar waveguide (SCPW) as a measuring cell of the complex dielectric permeability tester is base. Results of development of a broadband Instrument on basis SCPW for measuring an electrical parameters of lossy materials, methods of its calibration and testing are presented. [C1351]

"A Clutter Canceller for Continuous Wave GPR"

In this work an innovative clutter canceller for Continuous Wave GPR (Ground Penetrating Radar) has been designed and implemented. An IQ modulator has been used to build up the central part of the device. The IQ modulator replaces more expensive components like digital controlled phase shifters and attenuators. This device also have wider dynamics with respect to linear vectorial modulator. To prove the feasibility of the system, the effect of signal feedthrough for IQ modulators is studied. Tests and measurements of the complete device are exposed. [C1352]

"Characterization of inhomogeneous cylinders from transient data"

In this paper we propose a non linear inversion approach, which is able to characterize a scattering system from the knowledge of the transient scattered field measured when only one electromagnetic source is used to illuminate the objects. Such a source radiates a double-frequency Gaussian incident pulse, that is a pulse shape whose spectrum assumes its maximum value around two different frequencies. The inversion problem is formulated in the frequency domain rather than directly in the time domain and an iterative method is exploited to retrieve the unknown permittivity and conductivity profiles. The proposed strategy works in the canonical two-dimensional scalar case and its reconstruction capabilities are tested against experimental data concerning inhomogeneous targets. [C1353]

"Applications of GPR to archaeology and geology: the example of the regio III in Pompeii (Naples, Italy)"

GPR investigations has been collected in Pompeii, in an area of the regio III not yet fully excavated. In this area, as in many other parts of this roman city, large portions of archaeological features are still buried under thick volcanic deposits. The radar survey has been conducted on the top of a long scarp parallel to Nola Street. This

site was chosen because some remains are well visible on the front of the scarp, so they can be use to calibrate the radar sections. The results allowed us to reconstruct the subsurface structure of the area, and to locate the main roman ruins buried in the volcanic deposits. Moreover, the analyses of the radar sections highlighted the geometry of the volcanic deposits overlain the roman ruins, and made possible the correlation between the shallow geological stratigraphy and the reflectors sequence shown in the radargrams. [C1354]

"Multi-frequency ground-penetrating radar method for revealing complex sedimentary facies"

We attempted to resolve deltaic facies in Taylor Valley, Antarctica by using pulses centered near 120, 300 and 880 MHz, the latter of which has not yet been tried in this setting. The 120 MHz profiles clearly defined gross material changes, while the 300 MHz profiles added significant resolution to the topset, foreset and bottomset beds. The additional, higher frequency provided only about 2.5 m penetration however, the 10-15 cm pulse length revealed and defined multiple, fine-scale features that were not observed with the lower frequencies. The dip of these features is, in some instances, opposite to that of larger features profiled with the lower frequencies. Profiling with 880 MHz not only confirmed the greater complexity of the sedimentary architecture, but also allowed more robust interpretation of depositional processes. Generally, we recommend pulses centered near 300-400 MHz for detailed sedimentary profiling to about 6m depth. [C1355]

"Low Frequency GPR in Difficult Terrain"

Many subsurface investigations are requested in areas unsuitable for most geophysical methods. In some instances, difficult terrain prevents surface coupling with transmitters, receivers, or other instrumental components. In other instances, such as in urban areas, spatial restrictions prohibit the use of seismic methods. Ground penetrating radar (GPR) is one method that can be used to attempt data collection in these difficult areas. In this paper, we will demonstrate the application of low frequency GPR to map a sloping bedrock surface configuration in an urban setting with the aforementioned site limitations. The sloping bedrock surface with a relief of approximately 21.5 meters underlies a stabilized slide area resulting from a failed retaining wall. 40-MHz and 100-MHz antenna systems were employed on boulder rip-rap (used to stabilize the slide area) and within an apartment house complex. Seismic refraction and surface wave investigations were performed to help constrain the GPR data interpretation and to provide bedrock integrity information. [C1356]

"Geophysical investigations in the Castle of Crotone (Calabria Region, Italy)"

This work is about geophysical investigations carried out in the Carlo V king's castle, in Crotone village (Calabria Region, Italy). A magnetic method (M), ground penetrating radar (GPR) and electrical resistivity tomography (ERT) surveys have been used to locate buried remains and old walkway. Each interesting area was investigated with a map survey, which is obtained acquired along several parallel profiles. Therefore, a 2D magnetic maps and a 3D GPR and resistivity data have been obtained. Finally, the ERT and GPR results showed some features associated to buried military walkway. [C1357]

"Masonry investigation through Very Large Bandwidth CW-SF radar"

In this paper, a number of experimental tests aimed to evaluate the potential of Very Large Bandwidth Continuous Wave Step Frequency (CW-SF) radar for investigating masonry structures, are reported. Furthermore, an innovative polarimetric technique able to detect the double-bounce signal due to corner inside a masonry is proposed and tested. [C1358]

"Influence of Mode Conversion at Borehole on Direction Finding with Dipole Array Antenna"

We investigate influence on DOA estimation with the circular dipole array antenna in a borehole (CAB), when the TE plane wave incident on the CAB. According to calculation of electromagnetic fields of the TE plane wave, vertical component of the electric field is excited by the cylindrical layers around the antenna, and these phenomena are called mode conversion in this paper. This increases error of DOA estimation, if we assume that the TM wave is incident on the CAB like in [4] during the array signal processing. We introduce the index Γ‚Bï(t) in order to represent quantity of component excited by the mode conversion. According to the experiment in air and field experiments, we confirmed that the mode conversion occurs, and this would influence DOA estimation with the CAB. [C1359]

"Analysis of Directional Borehole Radar Measurement Data"

We developed a new directional borehole radar system with an array of optical electric field sensors as receivers. The system was tested in a field test site in order to assert its ability to detect three dimensional (3D) location of a subsurface tunnel. In this paper, the result is shown with a comparison to a result obtained by

RAMAC directional borehole radar system. It is found that the optical electric field sensors are able to obtain highly coherent signals, that is necessary for the accurate estimation of a target azimuth direction, over the RAMAC system. The mutual coupling effect that deteriorates the coherence is also discussed. The azimuth estimation of the subsurface tunnel, which is located 5.5m apart from the tunnel, showed good agreement with the actual direction to an error of within 10 degree. [C1360]

"Using GPR to Monitor Cracks in a Historical Building"

The paper treats the application of GPR to detect and monitor cracks induced on a historical building by a landslide. The data were acquired on a floor inside the building with profiles 10 cm apart recorded at three different times. A 2GHz bipolar antenna was used, which allows the acquisition of multi-component data. The data were processed to produce vertical profiles and a 3D cube for each component and survey. The interpretation of the profiles is in good correlation with the structure of the floor. The profiles and time slices have detected two different kinds of anomalies, only a few of which can be due to utilities and the metallic mesh. The others were associated with cracks induced by the landslide. The time slice obtained from the last survey shows anomalies not detected before. [C1361]

"Ground penetrating radar imaging of a 4th Century Roman Fort, Humayma, Jordan"

A suite of geophysical surveys were conducted on and around the site of a 4th Century Roman fort in Southern Jordan from 2002-2005 as part of the Humayma Excavation Project. Presented here are the results of the ground penetrating radar (GPR) data. Data were collected in a series of 1-m-spaced profiles within the 150m by 200m Fort and collated to generate 3D volumes. These GPR data volumes are sliced horizontally at optimized depths to yield map-view images of buried structures that have beenand will beused to guide future excavation and develop usage plans. Data yielded good detail of interior structures (walls and potential tiled floors) and exterior features (defensive ditches, claviculae, the Via Nova). Ongoing excavations will provide additional information as to the specific nature of the observed features. [C1362]

"Inversion of dispersive APVO GPR curves: a thin-layer approach for fracture characterization on a vertical cliff"

Reliability of stability assessment of prone to fall rock masses suffers from the lack of information about the geometry and the properties of the fracture networks. GPR profiles associated to Common Mid-Point (CMP) data, all recorded on the cliff wall, recently proved their efficiency to image correctly the extension of fractures with a satisfying resolution. However, besides velocity, CMP data also contain information generally not used, i.e. Amplitude and Phase variations of the reflectivity for a given reflector as function of Offset (APVO) and frequency. In this study, we analyzed the potential of these curves in the context of thin layers, where multiple reflections generate interferences and complex patterns. We notably present an inversion of real APVO curves derived from a CMP profile acquired directly on a limestone cliff wall. The reflected wave was primary deconvoluated in order to correct wave propagation effects and to evaluate radiation patterns. In a second step, APVO curves were inverted considering a neighborhood algorithm. This procedure permitted to obtain the Jonscher parameters describing the complex permittivity of the thin-layer and of the limestone formation, as well as the aperture and depth of the studied fracture. [C1363]

"Localization of thin metallic scatterers by experimental data"

The problem of detecting and localizing "small" scatterers by the knowledge of the field scattered under a known illumination is dealt with. According to the distributional model shown in Ref. [2], the problem is cast as the inversion of a linear integral operator acting on 6-distributions whose supports are representative of the scatterers' locations. In this paper, we present some experimental results of such an approach. To this end, we perform the reconstructions by exploiting experimental scattered field data collected in controlled conditions at the Electromagnetic Diagnostic Laboratory of the Second University of Naples. The multi-static/single-view/multi-frequency and the multi-static/multi-view/multi-frequency configurations are both considered. [C1364]

"Estimation of Electromagnetic of Libyan soil Properties by Stepped Frequency Radar"

A vector network analyzer was used to measure the electromagnetic properties of two types of Libyan soil. The vector network analyzer was used to act as a stepped frequency ground probing radar. The frequency that was covered is from 1 to 3 GHz. A TEM horn antenna was used for transmission and reception. From the experiments the attenuation and time delay was measured. Then conductivity, permittivity and moisture content were estimated from the measurements. The samples were taken before and after it rained by a week following a long dry season. The experiments gave a reasonable estimation of the parameters and showed that clay retained its moisture for a longer period that sandy soil. [C1365]

"An Investigation into the Implementation of ADI-FDTD Subgrids in FDTD GPR Modeling"

The implementation of subgrids in the traditional finite-difference time-domain (FDTD) method is often required, especially when structures of fine geometry need to be modeled. Since the FDTD method is conditionally stable, different time-steps should be employed in the main grid and in the subgrid. To overcome the requirement for time interpolation at the boundary between the two grids, an unconditionally stable method, the alternating-direction-implicit (ADI-FDTD) method, has been used in the subgrid. As a result both the main FDTD grid and the subgrid use the same time-step. This paper presents an investigation into the performance of an ADI-FDTD subgrid when it is implemented into the conventional FDTD method. [C1366]

"FirstArrival Traveltimes Inversion Based on Minimal Number of Parameters in shallow crosswell GPR Tomography"

Ground-penetrating radar is often used for the characterization of subsurface properties. In this paper, we present a cross-well tomographic inversion algorithm of first-arrival traveltimes which uses only a limited number of parameters. This methodology has been developed for media with significant contrast of electrical permittivity, for example for near-surface sedimentary media. The aim is to determine the distribution of the electromagnetic wave velocity between two wells. We consider that the media can be decomposed into several homogeneous layers, with horizontal or gently dipping interfaces. It is described by a vector of parameters which includes one velocity and one or two thicknesses per layer. This methodology allows to obtain a 1D velocity profile of the medium between the two wells. This inversion scheme was tested on synthetic data. The head waves which appear due to the velocity contrasts are taken account in the inversion. Our inversion methodology was also tested on real data and the obtained velocity models were compared to those obtained using surface acquisition data only. Our results show that the velocity profiles issued from cross-well and surface acquisition appear to be very similar. [C1367]

"Advanced forward modeling and tomographic inversion for leaking water pipes monitoring"

The timely detection of damage and leakage from pipelines is of extreme importance both environmentally and from a economic perspective. Accordingly, we address the problem of imaging leaking pipes by exploiting single-fold, multi-receiver GPR data. In particular, we devise a tomographic imaging method which, taking advantage of the available knowledge on the investigated 'scenario' (pipe position and size), allows us to detect the presence of a leakage already in its first stages of development. In order to properly design the features of the imaging approach, and test its capabilities in controlled conditions, we make use of synthetic data generated with an advanced full-wave 2.5D Finite-Difference Time-Domain forward modeling solver capable of accurately simulating real world GPR scenarios. Numerical examples obtained in this way show the effectiveness of the developed imaging method. [C1368]

"Evaluating GroundPenetrating Radar use for water infiltration monitoring"

Ground-Penetrating Radar (GPR) was used to monitor water infiltration in sand. Water was injected down an 81 cm long tubed hole with a piezometer recording the depth of water and a tap valve used to adjust it to 15 cm Г‚В± 2 cm above the bottom of the tube. During the 20 minutes of infiltration two GPR antennas (transmitter and receiver) were recording a trace every second from an offset position on the surface. The signal, enhanced by differential correction allows to trace the evolution of top and bottom limits of the water bulb in space and time. Comparison with hydrodynamic model of the infiltration process proves that the GPR reflections trace the wetting front and not the saturation bulb. An exact, quantified estimation of the evolution of the top border of the wetting zone is provided. For the bottom border, further work on the estimation of the velocity of radar wave in the infiltration bulb will be needed. [C1369]

"Incorporating near-surface layering in GPR data inversion for improved surface water content estimates"

We analyze the retrieval of soil surface dielectric permittivity in presence of shallow dielectric contrasts using full-wave inversion of off-ground monostatic ground-penetrating radar (GPR) data. Shallow soil layers affect the surface reflection and lead to constructive or destructive interferences which result, respectively, in overestimated and underestimated surface dielectric permittivity values. Synthetic GPR Green's functions were generated for a series of model configurations with different contrasts and different layer thicknesses. Green's function inversions were then performed to retrieve the initial parameters and analyze the sensitivity of the different parameters in the inverse problem. Two global optimization algorithms were used and compared, namely, a genetic algorithm and the multilevel coordinate search. The results showed that, depending on the contrast and layer thickness, it

is not always possible to identify the original soil model. This depends in particular on the width of the frequency range. Both algorithms led to comparable results and did not converge properly in all cases, given their standard parameterization. Yet, the proposed method appears to be promising to improve real-time mapping of surface water content using off-ground GPR and full-wave inversion. [C1370]

"Determination of soil permittivity from GPR data and a microwave tomography approach: a preliminary study"

In this paper we present a new strategy to retrieve the dielectric permittivity of the soil starting from B-Scan GPR data, gathered on a pipe buried on purpose and processed by means of a microwave tomography algorithm. The validation will be performed by making use of synthetic data, obtained from an FDTD code. The results of the proposed approach shall be compared with those achieved from the hyperbolas of the radar traces and from the Hough Transform based approach. [C1371]

"Design and construction of a large test site to characterize the GPR response in the vadose zone"

In this work Ground Penetrating Radar (GPR) and Time Domain Reflectometry (TDR) measurements are carried out on a test-site. The test site consists of a pit filled with gravel and sand in which a pipe system for water inflow is buried. The data are collected under different water charge conditions and the water level is monitored by piezometers. TDR measurements are performed at various depths using a multilevel probe system. GPR measurements are performed by using the single-offset reflection method with a system equipped with 250 MHz and 500 MHz antennas. The results pertaining to the water table depth estimations, obtained by calibrating time GPR section with TDR velocity data, have shown a good agreement with the piezometric responses. [C1372]

"Constraining GPR data inversion using hydrodynamic laws for noninvasive soil hydraulic and electric property determination"

We constrain full-wave inversion of time-lapse radar data using hydrodynamic modeling to simultaneously identify the shallow subsurface hydraulic properties and continuous vertical electric profiles. Radar data are acquired in the frequency domain using a vector network analyzer combined with an off-ground monostatic antenna. This permits to accurately filter antenna effects and to derive Green functions from which the inversion is initiated. In order to demonstrate that enough information is contained in the radar data so as to ensure unique estimates, hydrodynamic events were simulated for three different textured soils, namely, coarse, medium, and fine. The corresponding time-lapse radar data were subsequently computed and inverted to find back key soil hydraulic parameters, i.e., Г‚Вї, n, and Ks in Mualem-van Genuchten's model. For the three scenarios considered, the three hydraulic parameters were exactly retrieved, and hence, the corresponding time-dependent electric profiles as well. Provided that the soil-specific relations between the soil water content and its electric properties and the hydrodynamic initial and boundary conditions are known, the proposed method appears to be promising for proximal mapping of the shallow subsurface hydraulic properties and monitoring of the water dynamics at the field scale. [C1373]

"Wireless Content Management (WiCoM) for Mobile Device"

A Content Management System (CMS) is a software system used for the management of computer files, image media, audio files, electronic documents and Web contents. A Wireless CMS in contrast is administered through a mobile device wirelessly. This paper details the development of a wireless content management system (WiCoM) which works in real time, using wireless programming and J2ME development platform. The focus of our work is to enable secure cyber content administration using smart mobile device. The novelty of the WiCoM system is-it provides cost-effective implementation of real-time news reporting system and e-commerce sites. [C1374]

"Wavelet-Based ECG and PCG Signals Compression Technique for Mobile Telemedicine"

One of the emerging issues in telehealth care system is how effectively the limited and well established mobile technologies that are now almost globally usable are exploited. The main challenge is to develop a mobile telemedicine system to transmit biosignals directly to a specialist in an emergency medical care unit for monitoring/diagnosis using an unmodified mobile telephone which provides the patient's information on the spot without unnecessary delays in seeking care, access to health facility and provision of adequate care at the facility. To provide a practical mobile telemedicine in GSM/GPRS/EDGE/UMTS limited capacity for transmitting the cardiac data for the diagnosis of cardiovascular diseases (CVD) which are widespread health problems with unpredictable and life-threatening consequences in most regions throughout the world, the implementation of biosignals compression technique is focused in this paper. Therefore, a new and simple target data rate (TDK)

driven Wavelet-threshold based cardiac signals compression algorithm is presented for mobile telemedicine applications. The performance of the compression system is assessed in terms of compression efficiency, reconstructed signal quality and coding delay. This algorithm is tested using MIT-BIH ECG databases and qdheart PCG database records and the experimental results are compared with other Wavelet based ECG coders. The presented algorithm is less complex because it does not require QRS detection, amplitude and period normalization and period sorting. [C1375]

"An Intelligent MRAS Platform for IP-based Mobile Networks"

The key difference between conventional short message service, so-called SMS, and instant messages of instant messenger, denoted as IM, is that SMS is based on conventional GSM systems while as IM is IP-based on the Internet. The auction system has been a popular customer to customer (C2C) and business to customer (B2C) e-commerce application in the Internet. However, the mobile commerce also fast growth with wireless network. In this paper, we based on the mobile reverse auction system (MARS) and extended its capability that supported the mixed-traffic data type that included the text, audio, video and so on. Moreover, in the future, the cellular phone will integrate the interface that consists of GPRS, WCDMA, WLAN (802.11), and WiMax (802.16). Based on unlicensed mobile access (UMA) technology this system can provide the users with to change the wireless interface. It has the advantages of the higher transmission rate, lower transmission fee, and multiple digital contents in the various mobile environments. Meanwhile, the users would upload the audio and video file about the products that described in the detail. Further, we provided the answering machine that is used by the sellers and buyers to communicate. [C1376]

"An Adaptable Service Overlay for Wide Area Network Service Discovery"

Chameleon is a service-oriented peer-to-peer (P2P) overlay which employs a unique 2-tier maintenance system, adaptable to variations in the available bandwidth of the hosting device. For devices with low available bandwidth, Chameleon uses an opportunistic maintenance technique, and for high bandwidth devices, an active maintenance technique. This allows Chameleon to adapt to environmental changes of mobile device, such as switching between 802.11 and GPRS depending on network availability. Chameleon's suitability for use in mobile networks is further augmented by its support for Meta Service Discovery, our technique for discovering multiple service discovery mechanisms in P2P networks, hi this paper we show how Chameleon can be used with this service discovery technique in a wide area network. [C1377]

"A time-domain beamformer for UWB through-wall imaging"

A time-domain beamformer using ultra-wideband short-pulse (UWB SP) signal for through-wall imaging (TWI) applications is proposed in this paper. The impact of the wall on the performance of through-wall radar imaging, such as wave refraction and velocity change, is considered in the design of the beamformer. Proof verifying the proposed beamformer is provided using the finite-difference time-domain (FDTD)-simulated high fidelity through-wall radar data. Simulation results demonstrate that hidden targets behind the wall can be located accurately in both range and angle by using the presented time-domain beamformer. [C1378]

"UWB antenna array development for GPR applications"

Theoretical and experimental studies of the influence of mutual arrangement of wideband tapered slot antennas (TSA) in the array are presented. Major attention is paid to reducing antenna coupling. The modeling was done using a transient solver realized in the CST Microwave Studio software. It was found that a parallel displacement of the antennas in the array when the distance between antenna planes is kept, allows to suppress unwanted lateral coupling that leads in turn to reduction of clutter. The antenna array consisting of the TSA had been fabricated and tested in a test site for the detection of low-contrasted objects like anti-personnel mine. [C1379]

"Ultra-wideband tapered-slot antenna with non-uniform resistive loading"

Several designs of tapered-slot antennas for ultra-wideband applications such as ground penetrating radar are described. The antennas for subsurface imaging must be damped to decrease clutter arising from the ringing of the antenna. The ringing is caused by the internal or open-end reflections as well as multiple reflections between the antenna and ground surface. In the proposed design, the ringing has been partially suppressed by corrugations and/or resistive films applied on the antenna flares in different ways. Performance of the antennas has been estimated using the electromagnetic simulation software. It was found that resistive loading of the antenna flares results in decrease of the return loss and increase of the directivity at low frequencies that diminishes the clutter. This is demonstrated also in the simulations by the impulse waveform received by a small probe placed in the antenna near field. [C1380]

"Enclosed coaxial waveguide antenna array for a ground-penetrating radar"

In this paper the phased array of enclosed coaxial waveguides has been theoretically considered as antenna for ground-penetrating radar. The reflected and transmitted signals were obtained using the inverse Fourier transform. The reflection and transmission coefficients for the elements of array with monochromatic excitation can be founded using the variational principle in single-mode approximation. Some numerical results for array of two enclosed coaxial waveguides with a pulse excitation are presented. [C1381]

"A New Multi-objective Fully-Informed Particle Swarm Algorithm for Flexible Job-Shop Scheduling Problems"

A novel Pareto-based multi-objective fully-informed particle swarm algorithm (FIPS) is proposed to solve flexible job-shop problems in this paper. Firstly, the population is ranked based on Pareto optimal concept. And the neighborhood topology used in FIPS is based on the Pareto rank. Secondly, the crowding distance of individuals is computed in the same Pareto level for the secondary rank. Thirdly, addressing the problem of trapping into the local optimal, the mutation operators based on the coding mechanism are introduced into our algorithm. Finally, the performance of the proposed algorithm is demonstrated by applying it to several benchmark instances and comparing the experimental results. [C1382]

"Radiation, scattering and receiving of pulse signals for subsurface object identification"

In many papers there are approaches for solving subsurface sensing and identification of subsurface objects based on FDTD methods with original method of identification (Pockok et al., 1998, Rao et al., 2002). There are not efficient for complex objects and lengthy object (its geometrical size is larger than pulse longitude). In this paper a numerical model for calculating far field scattered by complex objects is described. An evaluation is based on analytical evaluations. The results for some testing objects are represented. [C1383]

"Automated troubleshooting of mobile networks based on alarm and performance data using bayesian networks"

In this paper, we present an automated troubleshooting method for mobile networks based on alarm and performance data using two Bayesian Networks. The method provides online, reactive diagnosis of malfunction alarms using the Bayesian Network with alarm correlation and diagnosis of cells' bad performance using another Bayesian network. The proposed method and models were used in a trial with history data of commercial GSM/GPRS network. The results of the trial show that diagnosis accuracy of proposed method is better by about 10% than in current researches, especially in identification of base station's hardware faults -better by about 20%. [C1384]

"Wireless pre-paid Phone cards distributing system based on SMS"

There are so many kinds of pre-paid phone cards from several telecom service providers. But how to distribute them in a safe, prompt, and cheap manner seems to be a challenge. This paper proposes a wireless distributing system based on SMS (short message service) which consists of a database centered Server and several mobile hand-held terminals. The Server's structural scheme and the data consistency problems confronted and their solutions are discussed. The terminal which is manipulated by an embedded system provides a convenient User Interface to the agents and it communicates with the Server through SMS in an interlocked protocol. To reduce the data redundancy in the transmission, an encoding algorithm is presented, and 8 pre-paid phone cards could be sent in one Short Message. [C1385]

"Applicative quality testing system software for IP-based services in mobile networks"

Mobile operators nowadays have plenty of data services, since the introduction of GPRS and this number is increasing towards future 3G LTE mobile networks. There are IP-based services which were migrated from wired to mobile networks, such as HTTP, FTP and E-mail. But, also mobile specific services were created such as WAP and MMS. On the other side, behavior of mobile services is influenced from the environment, the terrain, interference, from protocols on different OSI layers, from user behavior, etc. Therefore, mobile operators need to examine their network and be assured that services are performing well. In this paper we describe an applicative solution for Service Quality Testing System (SQTS), which provides efficient way for testing of all data services, including bearer as well as IP-based services in mobile networks from the user point of view, through a defined set of Key Performance Indicators. We define all SQTS functionalities as well as all needed networks nodes for its functioning. The proposed system is robust and scalable regarding definition of new services that will appear in future. [C1386]

"Evolutionary Filter for Mobile Robot Global Localization"

Mobile robot global localization aims to determine the robot's pose in a known environment in absence of initial robot's pose information. This article presents an evolutive localization algorithm known as Evolutive Localization filter (ELF). Based on evolutionary computation concepts, the proposed algorithm search stochastically along the state space the best robot's pose estimate. The set of pose solutions (the population) represents the most likely areas according the perception and motion information received. The population evolves by using the observation and motion errors derived from the comparison between observed and predicted data obtained from the probabilistic perception and motion model. The resulting global localization module has been tested in a mobile robot equipped with a laser range finder. Experiments demonstrate the effectiveness, robustness and computational efficiency of the proposed approach. [C1387]

"Performance evaluation for integrated high altitude platforms-terrestrial General Packet Radio service system"

General packet radio service (GPRS) is a part of the evolution path towards 3G. This paper investigates the effect of using two representative scenarios: a macro cellular system operating from a high altitude platform line of sight system and a terrestrial non-line-of-sight system, in each case a packet-based such as GPRS system is considered. The macro cellular layer will serve as second server to the mobile data terminals located in a microcellular layer, both layers form a Multi-layer cellular system. A comparison between GPRS system using only microcellular structure and when using both microcellular and macro cellular structures is evaluated. A simulator model was developed to study the behavior of data transmission between a GPRS server and data terminals via air interface. Simulation results show the validity of using macro cells to serve as a second layer, and how this can enhance the GPRS system performance. [C1388]

"On the concatenation of LDPC and RS codes in magnetic recording systems"

In this paper, we investigate the sector failure rate (SFR) and the burst-error correction capability of two coding solutions in magnetic storage systems. The two-level solution involves concatenating an outer RS code with an inner LDPC code whereas the one-level solution is an RS-only or an LDPC-only system. Although the outer RS code incurs an additional rate loss, it is expected to gain in the presence of burst errors. The rate of the LDPC code and the i-level of the RS code can be chosen optimally to suit the operating condition of the channel. These solutions have also been studied in various technical papers in literature. Previously mentioned performance measures are used to evaluate strengths and weaknesses of these two solutions. [C1389]

"Self-powering wireless sensors in typical building environment"

Electromagnetic Radiation found in a typical building today is an integral part of technology evolution. Electric power distribution networks are present in every building producing time variable magnetic and electric fields in a low frequency range (50 Hz-100 KHz) commonly named as Extremely Low Frequencies (ELF). On the other hand wireless networks and other high frequency activity, in the range of Radio Frequencies (RF) 100 KHz up to 6 GHz produce ElectroMagnetic Fields (EMF) that radiate in the indoor environment. In this work the potential to take advantage of such electromagnetic pollution to provide power supply to micro-devices (such as wireless sensors) is examined. This is based in real EMF measurements in a typical office environment. [C1390]

"Supporting information management in digital libraries with map-based interfaces"

The self-organising map (SOM) has been proposed as an alternative interface for exploring digital libraries (DL), in addition to conventional search and browsing. With advanced visualisations assisting the user in understanding the contents of the map and its structure, as well as advanced interaction modes as zooming, panning and area selection, the SOM becomes a feasible alternative to classical search and browse interfaces. Several applications show the SOMs utility for this task. However, there are still shortcomings in helping the user understanding the map-there are insufficient methods developed for describing the map to support the user in the analysis of the map contents. In this paper, we give an overview of existing techniques and applications of SOMs in digital libraries, and present recent work in assisting the user in exploring the map by automatically describing maps using advanced labelling and summarization of map regions. Therewith, the SOM becomes an attractive tool for information management. [C1391]

"Wrapper approach for feature subset selection using GA"

In this paper, wrapper based approach is presented to feature subset selection of ground penetrating radar (GPR) echo signal using genetic algorithm in conjunction with constructive learning algorithm. GPR echo signal inherently has the non- stationary characteristic and the target echo signal is deteriorated by the clutter. Firstly,

WP-based preprocessing algorithm is used to clutter reduction and feature extraction. Then wrapper based approach is adopted to find optimal feature subset, and at meanwhile obtain the result of classification. Experiment result based on GPR landmine data shows the feasibility and advantage of the presented algorithm. [C1392]

"SPHERE-A Simulation Platform for Heterogeneous Wireless Systems"

This paper presents SPHERE, a Simulation Platform for HEterogeneous wiREless systems, and describes its motivation, methodology and implementation approach. This advanced system level simulation platform emulates simultaneously the transmission of GPRS, EDGE Multi-slot, HSDPA and WLAN at the packet level, which allows conducting novel investigations on common radio resource management for beyond 3G systems or on the optimization of radio resource management techniques. This paper presents the simulation platform, validates it and introduces its research potential. [C1393]

"Transient spherical wave front steadying in the near zone of an antenna"

Some concepts of transformation of a transient wave front in the near zone of an antenna into a spherical one in the far zone are considered. The characteristics of an antenna relevant to the wave front like amplitude decay centre, time delay centre and prompt impedance that can be useful in modeling short range radar are discussed. [C1394]

"Semi-Analytic Mode Matching (SAMM) algorithm for efficient computation of nearfield scattering in lossy ground from borehole sources"

The 3D semi-analytic mode matching (SAMM) algorithm is used to determine nearfield scattering from underground targets in lossy soil, where the source is a dipole placed within a borehole in the ground. Scattering is described by moderately low-order superpositions of spherical modes placed at multiple user-specified coordinate scattering centers (CSCs); the mode coefficients are found numerically by least-squares fitting all boundary conditions at discrete points along the relevant interfaces while at the same time obeying radiation conditions. SAMM results are compared with a completely different method: the Half-Space Born Approximation (HSBA). Good agreement between methods serves as algorithm validation. [C1395]

"Application of 3D-SAR nearfield imaging algorithms to GPR data"

This contribution addresses the utilization of near field 3D-SAR imaging algorithms applied to radar data from an ultra wideband (UWB) ground penetrating radar (GPR) system. The measured data were collected at the test field of the multi sensor mine signature (MsMs) group at the European Joint Research Centre (JRC) in Ispra/IT. The layout of this test field was designed for the more difficult problem of detecting targets representing anti-personnel mines. The 3D-SAR imaging algorithms can be implemented in time-domain or frequency domain. This contribution focuses on the time-domain implementation. The influence of the quality of the 3D-SAR imaging algorithm on the performance of an automated detection process is evaluated. [C1396]

"Pulse electromagnetic sounding of the petroleum- containing layered medium"

In this research, propagation of super wide-band pulse in a frequency dispersive medium representing the oil-saturated collector. The capability of their use for geonavigation in techniques of lateral drilling is discussed on the basis of the results of simulation obtained. The complex dielectric constant of oil-saturated rock was calculated on the basis of refraction mixing dielectric model, the oil, sodium chloride solution, methane, quartz and bentonite being contained in each layer. The thin cylindrical vibrator of finite dimensions was used as antenna, being excited by voltage the like one period sinus pulse of nanosecond duration. The time-domain structure of pulse propagation in a plane-layered medium was calculated. Attenuation of power flow pulse reflecting from oil-bearing bed was studied. The gain-frequency characteristic relating to each particular layer was analyzed proving the medium of petroleum collector to operate like a low-pass filter. [C1397]

"SHARAD design and operation"

This paper describes the operating principles and the design of the Mars shallow radar sounder (SHARAD), an HF sounding radar devoted to the mapping of sub-surface features of Mars and currently operational on board the NASA/JPL's Mars reconnaissance orbiter spacecraft. Compared to its predecessor MARSIS, currently operating from ESA's Mars Express, SHARAD is characterised by an higher carrier frequency (20 MHz vs a max of 5 MHz for MARSIS) and a much wider signal bandwidth (10 MHz vs 1 MHz of MARSIS). This allows SHARAD to achieve a finer range resolution (15 metres unweighted in free space) at the expenses of ground penetration, which makes the instrument ideal to probe the shallow subsurface layers (to depths of hundreds of

meters) which cannot be resolved from the surface by the much far- reaching MARSIS. SHARAD uses a 85 usec chirp signal with a PRF of 700 Hz and a peak power of 10 W, and radiates by means of a 10 meters fiber foldable tube (FFT) dipole antenna, with a wide-band matching network in charge of impedance matching with the transceiver. The most challenging requirement(especially considering the large fractional bandwidth of the system) is the level of the range sidelobes, which shall be below -55 dBc after the 6th lobe, to allow proper detection of the weak subsurface echoes in presence of strong surface returns. On this side, the design takes advantage from the wide download bandwidth made available by the MRO Spacecraft to keep the on-board processing to a minimum level (basically, only a programmable coherent presuming), and leave most of the processing (range compression and synthetic aperture) on ground. In this way it is easy to use Tx chirps and Rx transfer functions characterised on- ground as reference for range correlation, with the range sidelobes limited, basically, only by the stability of the RF hardware. The limited amount of on-board processing also helped in limiting the complexity of the instrument design and, therefore, its mas- s and power consumption. SHARAD uses a very simple architecture, with the transmit chirp generated directly on the RF frequency (using a digital chirp generator) before being amplified to the transmit level by a class C amplifier. The receiver is even more essential, providing direct amplification of the received signal (with programmable gain and band filtering) to an A-to-D converter operated in downsampling mode by digitising the signal at 26.6 MHz rate. In this way, the complete 10 MHz signal bandwidth can be represented unambiguously with only an acceptable amount of oversampling (30%) minimising the required hardware. Instrument control and processing tasks are performed by the same AD-21020 DSP (with the help of a couple of FPGAs). The presuming can be varied from 1 to 32 in powers of two steps, and the resolution of science data can be selected to be 4, 6 or 8 bits, to allow optimisation of the data rate vs the operating scenarios. The receive window position can either be controlled in open loop, using an a priori knowledge of S/C orbit and surface topography (which demonstrated to be a very robust approach) or in closed loop. [C1398]

"Potential of forest height estimation using X band by means of two different inversion scenarios"

Polarimetric SAR interferometry (Pol-InSAR) is a powerful remote sensing method for forest height estimation by using the random volume over ground model (RVoG). At higher frequencies implementation of forest height estimation in X band is limited to less dense and low forest types where X band is able to penetrate through the volume to the ground. However, the penetration depth at X band is insufficient to cover all forest types. In the paper, forest height inversion at X band using two different approaches is demonstrated with focus on the impact of extinction on forest height estimation. [C1399]

"Hand held dual sensor ALIS and its evaluation test in Cambodia"

Since 2002, we have developed a new hand-held land mine detection dual-sensor ALIS. ALIS is equipped with a metal detector and a GPR, and it has a sensor tracking system, which can record the GPR and Metal detector signal with its location. It makes possible to process the data afterwards, including migration. The migration processing drastically increases the quality of the image of the buried objects. ALIS uses two different GPR systems, namely VNA (Vector Network Analyzer) based GPR and an Impulse GPR VNA based GPR can provide better quality GPR images, although the impulse GPR is faster and light weight. ALIS evaluation tests were held in mine affected courtiers including Afghanistan, Croatia, Egypt and Cambodia. In the two-month evaluation test in Cambodia, ALIS worked without any problem. After some demonstrations and evaluation, we got many useful suggestions. Using these advises, we have modified the ALIS and it is now more easy to use. ALIS will be commercialized in 2007. [C1400]

"Possibilistic multi-sensor fusion for humanitarian demining"

We propose a method for combining humanitarian mine detection sensors based on possibility theory. Firstly, different features are extracted from the sensor data. Possibility distributions are then derived from the features based on prior information. After that, the combination of possibility degrees is performed in two steps, on separate sensor level and between the sensors. Combination operators are chosen to account for the different characteristics of the sensors. The final decision is obtained by thresholding the fusion result. Promising results have been obtained on a set of real mines and non-dangerous objects. In particular a 100% mine recognition rate was achieved, with a limited number of false alarms. [C1401]

"Use of an application-specific dictionary for matching pursuits discrimination of landmines and clutter"

The HSTAMIDS handheld landmine detection system has been used in a number of humanitarian demining activities. Existing algorithms used with this system to assist human in discrimination process do a better job than the operator alone. However, they are unable to model mine and clutter signatures completely, leading to

inaccurate mine confidence assignment. This paper presents a matching pursuits (MP) based landmine detection system using an application-specific dictionary. Prototypes for mine and clutter classes are built using MP decomposition of class members. A fuzzy K-nearest neighbor rule is used to assign confidence values for mine and clutter discrimination. The proposed algorithm is demonstrated on data acquired from three different landmines test sites. [C1402]

"Performance results of the SHARAD instrument"

SHARAD (SHAllow RADar)is a subsurface sounding radar provided by ASI as a Facility Instrument to NASA's 2005 Mars Reconnaissance Orbiter for the characterization of the upper part of the Martian crust. The design of the instrument reflect a balance of scientific requirements versus SHARAD mission and Hardware constraints. One of the most difficult point in SHARAD design was the choice of the radar wavelength, since longer wavelengths have the potential for deeper subsurface penetration at the expense of depth resolution. Shorter wavelengths enhance the ability to generate surface images and accurate profile. A radar sounder needs a system requirements for large dynamic range and precise sidelobe control. Very low range side-lobes are mandatory to allow detection of weak sub-surface echoes in presence of the strong surface return. The approach of limiting to the minimum the amount of processing performed on-board was selected in order to allow the pulse compression process (critical from the point of view of range side-lobes) to be performed on ground, using the computed instrument Point-Target-Response (PTR) as correlation reference waveform. One of the main goal of this paper is to describe the design of the experiment design of SHARAD and the selection of the instrument parameters. An assessment of radar performance has been obtained by using both on-ground and on- flight measurements. Some preliminary results from the mars mission have been reported. [C1403]

"Polarimetric feature fusion in GPR for landmine detection"

A polarimetric multi-feature framework for the detection of antipersonnel landmines with ground penetrating radar (GPR) is suggested. The features result from independently acquired and processed GPR measurements in co- and cross-polar configurations. The initial detection in the confidence maps is made independently after which the coordinates of the detected targets are co-located. The marginal feature distributions are normalized via Johnson's transform prior to the fusion process and a Maximum Likelihood based linear-quadratic classifier is used as a fusion rule. The framework makes use of secondary data acquired from an open test site to train the classifier. The framework performance is illustrated on the data acquired over a specifically designed test- site. [C1404]

"Calibration of the SHARAD Instrument"

The Mars Shallow Radar Sounder (SHARAD) is an HF (20 MHz) Sounding Radar embarked onboard the Mars Reconnaissance Orbiter (MRO) spacecraft. SHARAD on-ground calibration activities have been limited to the characterization of the SEB (SHARAD Electronic Box), not having been possible to perform extensive characterization of the flight antenna nor end- to-end calibrations on ground. Scope of the present document is to define the activities to be carried out in-flight in order to ensure SHARAD products calibration. The calibration needs are assessed and an overall calibration strategy is then defined, leading to the identification of the data sets to be collected and relevant processing to be applied. The document also address how to exploit the available calibration data (from both on- ground and in-flight calibration) to correct SHARAD products, and the organization of the calibration database. [C1405]

"Numerical simulation of electromagnetic-wave propagation for land mine detection using GPR"

The ground penetrating radar (GPR) has demonstrated good potential for the remote imaging of surface-laid or shallow-buried landmine-like objects (typically ~ 5-30 cm) and its use is currently receiving much attention. It has turned out to be a promising alternative technology for low dielectric contrast objects, a difficult detection situation that is often encountered in practise (e.g. detection of plastic mines in dry or sandy soils environment). This paper examines numerically the imaging of buried objects using ultrawide-band (UWB) time domain radar. We develop a simplified model to characterize the system, air-ground-buried targets-antennas and simulate the electromagnetic wave propagation and scattering at a bandwidth of 0.5-2.5 Ghz. All the elements need to be modelled simultaneously in order to obtain an accurate estimation of our radar performance and surface response to the incoming radar pulses. The final goal is to improve the detection rate of plastic antipersonnel mines, reducing the false alarm level. We show some simulated results in 2D and 3D assuming plane waves and afterwards we introduce a model for our GPR antennas to characterize the real source. [C1406]

"Methods for power quality analysis according to EN 50160"

The main aim of the paper is design and implementation of measuring and information system for analysis of

power quality in compliance with EN 50160 in different points of power supply network. Designed information system provides communication between distributed databases and central information system in using Internet and GPRS/GSM network. [C1407]

"The effects of supermajority on multi-parent crossover"

Multi-parent crossover allows more than two parents participating in crossover. The increase of parents in crossover intensifies exploitation or exploration or both; however, the intensification is often unbalanced and consequently causes deterioration in performance. In this paper we propose the use of supermajority to address the issue of lopsided intensification on exploitation and exploration in multi-parent crossover. The proposed crossover, called biased occurrence-based scanning crossover (bOB), controls the tendency toward exploitation or exploration by the threshold in supermajority. Two adaptive strategies are developed to adjust the threshold of bOB. Experimental results indicate that bOB can achieve significant improvement on uniform crossover and occurrence- based scanning crossover in both solution quality and convergence speed. Precisely, the improvement in mean best fitness ranges from 4-89% on our test problems. The preferable results validate that bOB crossover can not only enhance the performance but also provide an effective way to control the exploitation and exploration in crossover. [C1408]

"Differential evolution for multiobjective optimization with self adaptation"

This paper presents performance assessment of differential evolution for multiobjective optimization with self adaptation algorithm, which uses the self adaptation mechanism from evolution strategies to adapt Fand CRparameters of the candidate creation in DE. Results for several runs on CEC2007 special session test functions are presented and assessed with different performance metrics. Based on these metrics, algorithm strengths and weaknesses are discussed. [C1409]

"GPR missions on mars"

Recently in order to investigate the distribution of water, liquid and solid, in the upper portions of the crust of Mars planet two different instruments are actives, the Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS) and SHAallow RADar (SHARAD). Both the instruments are a low frequency (1.8-5MHz for MARSIS and 20 MHz for SHARAD) Ground Penetrating Radar (GPR) in altimeter configuration which uses the synthetic aperture technique. The manly differences between the two instruments are the spatial resolution (150 m vertical resolution, 5-10 Km along track resolution for MARSIS and 15 m vertical resolution, 300-500 m along track resolution for SHARAD) and the penetrating capability (about 5 Km for MARSIS and 1 Km for SHARAD). After the instrument data acquisition from the Martian surface an appropriate processing shall be performed in azimuth (unfocused for MARSIS and focused for SHARAD) and range dimension to produce the scientific final data. In this work will be presented an efficient procedure to detect the possible subsurface presence using the available surface topography data. After the performance evaluation of this technique an example of application will be presented on real SHARAD data [C1410]

"Application of random set-based clustering to landmine detection with hyperspectral imagery"

We apply a population-based classifier to Long Wave HyperSpectral Imagery (LWHSI) for the purposes of landmine detection. In LWHSI, there are many environmental factors that are correlated with groups of samples (pixels in an image) in sample populations (individual images). These factors greatly affect samples' values making it difficult for standard classification models to perform well on a consistent basis. Population-based classifiers capture information correlated with sample populations. We perform classification experiments over a range of LWHSI imagery and compare results between the population-based classifier and standard kNN. After analysis, we show that the use of population-correlated information in LWHSI greatly improves classification results and consistency. [C1411]

"Focusing problems of subsurface imaging by a low-frequency SAR"

ONERA radar RAMSES was recently upgraded with low frequency band (P-band, 435 MHz). In P-band, frequencies penetrate through the ground and through forest canopy. Unfortunately, the formation of the subsurface radar images presents a number of new specific challenges that include algorithm validity, calibration methods, radio-frequency interference, and image focusing and analysis. This paper addresses the aspects of focusing images from an airborne low frequency SAR of buried targets in a lossy and dispersive soil. The hydrological model (Richards' equation) was used to model the multilayer case. [C1412]

"Inversion of a layered rough surface model: maximizing the number of retrievable parameters for

the design of future subsurface sensing radar systems"

We previously applied an optimization technique known as Simulated Annealing (SA) to the inverse problem associated with a 3D two-layer dielectric structure with slightly rough interfaces and showed that simulated annealing methods are capable of globally minimizing cost functions with many local minima [1]. Nonlinearity of the cost function is a major factor that decreases the performance of the inversion algorithm. With a fixed set of measurement and inversion parameters, as the number of unknown model parameters increases, the cost function nonlinearity becomes more severe, decreasing the efficiency of inversion and making the annealing process perform like an inefficient brute force search. The focus of this work is on strategies to choose the optimal set of measurement parameters for retrieval of the largest possible number of parameters of a layered dielectric structure. [C1413]

"Experimental validation of a Kirchhoff based shape reconstruction algorithm in realistic conditions: a test case for buried pipes"

A two dimensional shape reconstruction algorithm is applied to experimental GPR in-situ measurement data. The reconstruction algorithm is based on the Kirchhoff approximation and is exploited to process data collected under a multimonostatic configuration by a pulsed GPR. Thus the need to pass from time domain measurements to frequency domain data suitable for the inversion algorithm is also addressed. [C1414]

"E-SLAM solution to the grid-based Localization and Mapping problem"

A new solution to the simultaneous localization and modelling problem is presented. It is based on the stochastic search of solutions in the state space to the global localization problem by means of a differential evolution algorithm. A non linear evolutive filter, called evolutive localization filter (ELF), searches stochastically along the state space for the best robot pose estimate. The proposed SLAM algorithm operates in two steps: in the first step the ELF filter is used at a local level to re-localize the robot based on the robot odometry, the laser scan at a given position and a local map where only a low number of the last scans have been integrated. In a second step the aligned laser measures together with the corrected robot poses are use to detect when the robot is revisiting a previously crossed area. Once a cycle is detected, the Evolutive Localization Filter is used again to re- estimate the robot poses in order to integrate the sensor measures in the global map of the environment. The algorithm has been tested in different environments to demonstrate the effectiveness, robustness and computational efficiency of the proposed approach. [C1415]

"UWB antennas for ground penetrating radar application"

Presented paper describes results of comparison study on antennas for ground penetrating radar (GPR, undersurface radar) operating in frequency band from 500 MHz to 3 GHz. Typical representatives of elementary antennas, planar monopoles, dipole antennas, tapered slot antennas, TEM horns and frequency independent antennas are firstly optimized for the operation band in CST design environment. Then structures are described and compared from the impedance, radiation and time characteristic point of view to enable a simple choice of suitable structures for manufacture. Selected antennas are prepared for the manufacture and comparison with their models. [C1416]

"Substation Grounding Grid Analysis with the Variation of Soil layer depth Method"

This paper presents a substation grounding grid analyzed with the variation of soil layer depth. The grounding grid system of a practical 22 kV substation, in which the ground grid is made from copper, is calculated by virtue of the CDEGS software. The study, supported by Provincial Electricity Authority (PEA), Thailand, is based the on grounding system of Royal Flora RATCHAPHRUEK substation. The supporting soil resistivity data has been obtained from actual field tested at the substation. The result has shown that soil resistivity at the substation was interpreted to a two-layer earth structure. Moreover, the burial depth of the grid affects the Ground Potential Rise (GPR) to some extent as well as the ground rod, connected with the grid, and also plays an important role in GPR reduction. In case that the top soil-layer resistivity is more than the bottom-layer, the ground grid with and without ground rod will greatly reduce the value of GPR. On the contrary, in case that the top soil-layer resistivity is less than the bottom-layer resistivity, the ground grid with and without ground rod will slightly reduce the value of GPR. This indicates that the current density over the grid affects directly to the current distribution to the soil layer. Therefore, the design and construction of grounding grid in the area which the top soil-layer resistivity is less than the bottom-layer resistivity, can lessen the number of ground rod used in the grid because the value of GPR is insignificantly different. Finally, the deeper the grid buries in the layer, the less of the GPR value is. [C1417]

"High-resolution walled-LTSA-array ground penetrating radar system using adaptive complex-valued self-organizing-map processing"

We present a newly developed high-resolution adaptive imaging system using switched walled linearly tapered slot antenna (walled-LTSA) array and complex-valued self- organization-map (CSOM) processing. In the CSOM processing, we deal with feature vectors that possess complex-amplitude texture in space and frequency domains. A higher resolution results in a better classification quality. To realize a high resolution in range and azimuth directions, we employ a wide frequency bandwidth in frequency stepping operation, and a special switching scheme for the walled LTSA. We have realized successful plastic landmine visualization not only for targets buried in normal sand but also for those in wet laterite soil. [C1418]

"A hybrid MOMFD-FDTD ground penetrating radar modeling technique to detect multiple buried objects"

A hybrid method is presented for modeling realistic ground penetrating radar systems to detect multiple underground conducting or dielectric targets. The model combines the method of momentpsilas solution of the frequency domain thin-wire electric field integral equation to treat the dipole antennas and the finite difference time domain technique to handle medium stratification and buried targets. The capabilities of the moment method solution of the thin-wire electric field integral equation and general finite difference time domain solution of Maxwellpsilas equations regarding the scattering of arbitrary shape objects in multilayered media are combined to efficiently simulate the electromagnetic behavior of the system. Some problems of practical interest are simulated using the proposed method and the capabilities of this technique to detect multiple buried arbitrary shape targets are discussed. [C1419]

"Polarimetric SAR observation by ALOS"

The Japanese microwave remote sensing satellite ALOS/PALSAR was launched successfully in January 2006. We are carrying out polarimetric calibration of the PALSAR sensor, which has the full-polarimetric function of L-band SAR. We set corner reflectors in Ulaanbaatar in May and August 2006, and the acquired data was used to confirm the polarimetric calibration coefficients, which will be used for the data sets delivered from October 2006. In addition, the acquired polarimetric SAR data will provide new possibility in remote sensing. Since this is the world first satellite borne full-polarimetric SAR system, we cannot show many examples in this moment, but from airborne SAR data, which we have studied, we show some examples of polarimetric SAR, which include tree type classification, and estimation of the orientation angle of scattering targets. [C1420]

"Ground Layer Depth and the Effect of GPR"

This paper presents a substation grounding grid analysis with the variation of soil layer depth. The grounding grid system of a practical 22 kV substation, in which the ground grid is made from copper, is calculated by virtue of the CDEGS software. The study, supported by Provincial Electricity Authority (PEA), Thailand, is based on grounding grid system of Royal Flora RATCHAPHRUEK substation. The supporting soil resistivity data has been obtained from field tests at the substation. The result shows that soil resistivity was interpreted to two-layer soil structure with low resistivity top layer and high resistivity bottom layer. The studied ground grid system is installed with constant 3 m ground rods. When the ground layer depth of the grid is increased, it directly affects to reduce the value of ground potential rise (GPR). On the other hand, with the same grid configuration buried in the high resistivities bottom layer, its GPR is not reduced, that is, the more layer depth of high resistivities bottom layer, the more value of GPR. In addition, the grid with the different ground rods length also gives the different results. GPR is continuously reduced when the rod length is lengthened even though the bottom layer resistivity is higher than the top layer. [C1421]

"Application of GPRS Techniques for Wide-Area Power Quality Monitoring"

This paper tries to use USB and personal digital assistant to develop a novel power quality (PQ) monitoring platform and then integrates GPRS technique into the proposed PQ platform to realize wide-area PQ monitoring. The works of this paper can be divided into three parts. First, a small-scale PQ monitoring platform with appropriately designed I/O interfaces and peripherals is designed and implemented. Next, a GPRS module which can be integrated into the designed PQ monitoring platform is developed. Finally, a web server with well-designed database used to record abnormal PQ data is designed. The proposed GPRS based wide-area PQ monitoring system can be used for PQ monitoring with minimum cost and maximum efficiency All the functions implemented in this paper can realize the novel, real-time and wide-area PQ monitoring. Experimental results demonstrate the validity of the proposed system. [C1422]

"Mobile Chatting Server for GPRS networks"

This paper addresses the extension of single mobile-to-mobile to multiple client supporting server design capable of acting as a an hand held mobile server, routing the messages between clients, through general packet radio ser- vices(GPRS) networks without involving internet based servers. Extension is achieved by adding multi-threading architecture in the server. An SMS, containing the server's IP, is sent to the selected client by the server using Wireless Messaging API. Thinlet based user interface is used to develop the client and server applications. The paper describes an application example of Real-time chatting between two clients through our mobile chatting server. [C1423]

"An unsupervised multi-feature framework for landmine detection"

A multi-feature framework for the detection of antipersonnel landmines with Ground Penetrating Radar (GPR) is suggested. The features result from independently acquired and processed GPR measurements. The initial detection in the confidence maps is made independently after which these detection coordinates are co-located. The marginal feature distributions are normalized via Johnson;s transform prior to the process of their fusion. A Maximum Likelihood based classifier is used as a fusion operator. The operator takes a quadratic form due to the enforced normality of the feature distributions. The framework trains the classifier using secondary data acquired at an open site. The framework;s performance is illustrated using the data acquired over a specifically designed test-site. [C1424]

"Monitoring Detection and Security Maintenance using WMS-Webcam Mobile Surveillance"

Computer webcams have been used only for video chats and nowadays almost every internet user has a webcam with his/her computer. Similarly GPRS in mobile phones is often used to surf internet through mobile phones. As security is a big issue for a peaceful life a new technique has been suggested to use webcam and GPRS for visual security purpose. WMS is a new, easy and efficient video surveillance system. A new technique is introduced here to use webcam and GPRS of WAP enabled mobile phone for visual security purposes. The main software runs on PC, which acts between webcam and its controllable base and mobile phone through internet. This software receives requests from mobile phone and sends WAP WML page to mobile phone. [C1425]

"Road pavement density measurements using Ground Penetrating Radar (GPR): Simulation analysis"

This paper describes a simulation of ground penetrating radar (GPR) nondestructive method at frequency range of 1.7-2.6 GHz to predict density for various road pavement samples. The method used is very simple, fast, contactless and accurate way to determine the density of road pavement. In this work we used frequency range between 1.7-2.6 GHz due to the high penetration in road pavement. The MATLAB software is used to analyze the simulation data and also for the graphs comparisons. An instantaneous method for measuring the density of road pavement was developed by using microwave transmission/reflection technique and free space method at the chosen frequency. The GPR Mixture Model was used to predict the correlation between the attenuation to the parameters related such as effective permittivity, density and thickness. [C1426]

"Extremely low frequency electromagnetic field (ELF EMF) survey of residential areas around transmission lines"

Extremely low frequency (ELF) electromagnetic fields (EMF) are categorized as non-ionising radiation (NIR). They are generally generated by overhead transmission power lines. A study of ELF EMF was conducted at residential areas around the transmission line located at Kelang Valley. The objectives of the study were to determine the strength of the ELF EMF present besides to assess the potential exposure received by future residents. The surveys were carried out using PMM model EHP50A and EMDEX instruments based on standard measurement procedures and protocol recommended by IEEE. The results obtained were compared against the permissible exposure limits recommended by International commission of non-ionising radiation protection (ICNIRP) for members of public to ensure that they are acceptable in term of safety. This paper highlights some of the findings at the Study site. The results obtained indicates that the ELF EMF radiation level within the study area (outside ROW) generated by the power lines but their field strengths were within the permissible exposure limits by ICNIRP which were 0.03% and 5.26% for magnetic and electric field respectively. Both field strengths were found to drop very significantly against distance from the power lines where closer distances always showed higher field strengths. [C1427]

"Preliminary study on GPRS throughput at Northern Region of Malaysia BSC network"

General packet radio service (GPRS) is bearer service of Global System for Mobile (GSM) that has been deployed worldwide and is widely considered a technology precursor to the evolving third generation (3G) wireless network. In order to improve the GPRS traffic performance, the study on the factors contributed to the low performance of GPRS is carried out. This paper applied the data analyzing method of the real practice of GPRS services in Celcom (M) Berhad which covers the Northern Region. One of the factors contributed to low performance in GPRS traffic is the throughput performance. The parameter that interested to be focused in this paper is throughput performance whereby it including both uplink and downlink throughput. [C1428]

"Enhanced protocols for pedagogical through mobile learning"

This paper is intended for on how mobile technologies can play an important role in the evolution of M-learning. In Second Generation, GSM can be introduced in three ways such as general packet radio services, continuous connection to the internet not requiring dial-up connection reaching up to 171.2 Kbits /s. Secondly, Blue tooth is a chip technology, that allows short range data and voice transfer among mobile devices. Thirdly, multimedia messaging service, which incorporates graphics and images into text messages. 2G services are frequently referred as personal communications service (PCS) and SMS messaging is available for data transmission. In third generation, EDGE can be introduced in two ways: as a packet-switched enhancement for general packet radio service (GPRS), known as enhanced GPRS or EGPRS, and as a circuit-switched data enhancement called enhanced circuit-switched data (ECSD). The services associated with 3G provide the ability to transfer both voice data (such as making a telephone call) and non-voice data such as downloading information, exchanging e-mail, and instant messaging. 4G will be the successor to 3G. It will feature high-speed mobile wireless access with a very high data transmission speed. It also addresses the notion of pervasive networks, an entirely hypothetical concept in which the user can be simultaneously connected to several wireless access technologies and can seamlessly move between them. [C1429]

"TCP performance measurement in different GPRS network scenarios"

This paper presents the results of measured TCP performance in one of the commercially deployed live GPRS network in Malaysia under various network scenarios based on userspsila physical locations. End-to-end evaluation of FTP application is used for the assessment. Tracing at the GPRS air interface is done simultaneously, using a proprietary GSM/GPRS air interface testing tool and software. The results show that TCP performance is stable in all scenarios and can adapt fairly well to GPRS mobility and bad channel condition, although at the expense of reduced throughput. TCP imposes its slow start/congestion avoidance mechanism in such situations where packet loss is common. Tuning the TCP parameters to optimise its performance also proves to be beneficial. [C1430]

"Pre-paid account gauge for mobile multimedia systems"

Pre-paid subscribers in mobile networks frequently check their account balance. Presently the subscriber is notified regarding the balance by voice or SMS resources, which cannot be billed by the service provider. In this paper authors have presented a novel concept, by which a subscriber is informed his real-time balance without using the above resources. Moreover, the authors have developed a user friendly gui, which looks like the fuel gauge, on the screen of the mobile end point. Furthermore, a subscriber can use various services like voice, video etc. and continue observe the change in his balance on the gauge. The user can also minimize the gauge to the system tray and look for icon changes to indicate changes in the level of the balance. The above ideas have been implemented on a HP iPAQ PDA using Windows Mobile 2005 and tested successfully over a wireless network. [C1431]

"Mobile interactive game interworking in IMS"

Advent of Beyond 3G or 4G wireless communication network envisions broadband wireless data access and there by rich multimedia services experience to the mass market. This wireless evolution to 4G network has the potential to reduce end to end latency and round trip delay, by consolidating and ldquoflatteningrdquo the wireless core network. This network evolution is germane to IMS architecture to support new multimedia services with lower latency characteristics. One of the key service envision to take the market is the high-end real time mobile interactive gaming which is rich in multimedia experience, hence need very stringent real-time/latency requirements. The researches to make Interactive Mobile game the ldquoKiller Applicationrdquo was mainly focused to work around the latency and bandwidth limitations of mobile network. One of the unexplored areas is handling the interworking of mobile services and real time interactive gaming effectively for the multi-vendor, multi platform mobile network. This paper identifies that one of the key challenge in the future mobile gaming is the Service Interaction between games and other mobile services. This paper analyses the gap in the current user equipment based implementations to resolve some of these interworking issues. This paper goes further

and discusses in detail how the IMS architecture can resolve these interaction issues at the network level and come up with a generic solution which is access agnostic and device independent. [C1432]

"Building an IMS Client test bed with open source tools"

Requirements are growing faster than ever. Keeping a product in sync with ever growing requirements is a big challenge and IMS is a classic example for the above statement. 3GPP IMS standards are evolving and the client side requirements bulge every month. It is important to ensure an IMS client is tested during the time of development with a platform that simulates the IMS network. As it is an expensive preposition to rely on operator's live network for testing and a live network cannot simulate error conditions, an IMS client test bed becomes essential. This paper explains our experiences in using open source elements like OpenIMSCore, OpenIKEv2, Strongswan, Open Sigcomp and SIPp to build an IMS client test bed. This paper describes vividly, a test bed that can be used to test an IMS client across usecases that include simple 3GPP call flow, call flow with signaling compression, call flow over TLS, call flow with security and a call flow from a device behind NAT with STUN server. The test bed is built to accommodate IMS clients operating on varied access types like LAN, GPRS/EDGE/UMTS and Wi-FiMtrade. [C1433]

"A Multi-Level Mobile Video Surveillance Notification System"

This paper describes a multi-level mobile video surveillance notification system that provides access to the monitoring system from anywhere there is a mobile handset with wireless connectivity. The system automatically identifies motion abnormalities within the monitored scene and starts recording any suspicious movement. The output is recorded in a lightweight animated GIF file. The system provides multiple levels of alerts (by Email, SMS or Phone Call) based on the amount of motion activity at the monitored scene. The output file can be sent to the user using MMS or stored on the server and accessed via a URL that is exchanged to the user via SMS. The system is fully configurable from the user handset application, making it suitable for various surveillance environments. [C1434]

"Gaussian vs differentiated gaussian as the input pulse for ground penetrating radar applications"

The input signal for ground penetrating radars (GPR) is as important as the radar hardware such as the antenna and the receiving unit. The pulse duration, peak value and pulse profile are the main time domain features of a pulse that have to be considered in GPR applications. The most popular pulse signal used in GPRs is the Gaussian pulse and in this paper its performance is compared with that of the differentiated Gaussian pulse. The clutter level and the scattered signal strength of the GPR response are assessed in the comparison. [C1435]

"Compressive Sensing for GPR Imaging"

The theory of compressive sensing (CS) enables the reconstruction of sparse signals from a small set of non-adaptive linear measurements by solving a convex lscr1minimization problem. This paper presents a novel data acquisition and imaging algorithm for ground penetrating radars (GPR) based on CS by exploiting sparseness in the target space, i.e., a small number of point-like targets. Instead of measuring conventional radar returns and sampling at the Nyquist rate, linear projections of the returned signal with random vectors are taken as measurements. Using simulated and experimental GPR data, it is shown that sparser and sharper target space images can be obtained compared to standard backprojection methods using only a small number of CS measurements. Furthermore, the target region can even be sampled at random aperture points. [C1436]

"Bifurcation Analysis of the Hodgkin-Huxley Model Exposed to External DC Electric Field"

Based on the modified Hodgkin-Huxley (HH) model exposed to extremely low frequency (ELF) electric field, we study Hopf and saddle-node bifurcations of the modified HH model in two dimensional parameter space of externally applied DC current and trans-membrane voltage induced by external DC electric field. The bifurcation sets are calculated by employing the generalized algebra criterion in high dimensional system. The obtained bifurcation sets partition the two dimensional parameter space in terms of the qualitatively different behaviors of the HH model. Thus the neuron's information encodes the stimulus information, and vice versa, which is significant in neuron control. The study is of some biological significance and suggest that the aberration of dynamics in bio-systems may account for diseases caused by electric exposure. [C1437]

"Tunnel-accessed NATs for always-best-connected and application mobility"

We describe the design, implementation and performance of a Remote NAT that can be used to provide an 'always-best-connected' service. In this service a mobile host will connect through the best possible network. Switching between the networks (even with IP address changes) will be transparent to the application. The

solution that we propose is different from traditional mobility solutions like MSOCKS and Mobile IP and requires no support from the networks to which the mobile host connects. The solution involves an 'ABC daemon' on the mobile host and a 'remote NAT' that is used to provide a consistent interface to the remote host during a connection oriented application. We also describe the prototype implementation and preliminary experimental results. [C1438]

"IMOGA: An Architecture for Integrating Mobile Devices into Grid Applications"

Integrating mobile devices into Grid technologies and server applications can give ability to command power of supercomputers with a mobile device on one hand and can allow big applications to reach important data anywhere, anytime, on the other. IMOGA is planned to be an example to gather and share data that can be collected by ubiquitous mobile devices which can employ different kind of sensors such as Global Positioning System (GPS), temperature, health monitoring and pollution. In this project location and speed information that is produced by GPS enabled mobile devices such as mobile phones, is used. The developed client application running on mobile devices located in vehicles, such as the mobile phone of the driver, sends location and speed information to the server application in short time intervals via GPRS in the forms of Extended Mark-up Language (XML) like messages. The developed server application, which is preloaded with the highway coordinates via files in Geographic Data Files (GDF) format, locates the street that the vehicle is moving along and the received speed information is recorded along with a timestamp. A display application has also been implemented to calculate average of speeds that any vehicle may have at that very moment and post it on the Internet and WAP. If there is no actual data, i.e. there is no vehicle moving on a specific street, statistical data is utilised to produce such information. [C1439]

"Design, Simulation and Implementation of UWB Antenna Array and it's Application in GPR Systems"

Most of the shallow buried object detection techniques by ground penetrating radar (GPR) use a monostatic type radar system. The shallow target is difficult to be detected by the conventional GPR due to its low range resolution. Recently, we have developed GPR system based on single-plate monopole antennas operating in the frequency range between 1 GHz and 20 GHz. A total of seven monopole elements have been used to form an antenna array. The antenna and the array have been designed and simulated using CST microwave studio. Their impedance and radiation characteristics have also been simulated and measured. By using the designed antenna array, the GPR system has been constructed. The developed GPR system is able to acquire, save and analyse the data measured in frequency domain. Common source or wide-angle reflection and refraction (WARR) technique has been used for acquiring and processing the data. This technique is effective for the rejection of the ground surface clutter. The system has been tested in the laboratory. It shows its ability to detect metallic objects by using A-scan technique. Furthermore, we could localize a mine-like target buried in dry soil by applying the B- scan technique. Further details of the antenna simulation results and the application of the system in buried object detection will be discussed. [C1440]

"An Architecture for the Interoperability of Multimedia Messaging Services between GPRS and PHS Cellular Networks"

This paper proposes an architecture integrated with P-mail Deluxe Protocol (PDX) and Multimedia Message Service (MMS) to provide the Interoperability of the multimedia messaging between Personal Handy System and General Packer Radio Service (GPRS) networks. The proposed architecture includes an MMS-P-mail Gateway (MPG), within three messaging services units, i.e., multimedia messaging relay, adaptation and configuration unit. Through the MPG gateway provides bi-directionally seamless routing, protocol conversion, reformatting, and transmission of the multimedia message. The proposed architecture leverage on the integration with PHS and GPRS networks to expand the MMS usage volume. An implementation of the MPG is described in this paper as an illustration of the feasibility of the proposed architecture. [C1441]

"Configurable adaptive Viterbi decoder for GPRS, EDGE and Wimax"

Error correction codes are used widely in all wireless communication systems to reduce data corruption. The most widely used decoding algorithm is the Viterbi decoder which is used with different parameters for different standards requirements. This paper analyses the different Viterbi decoders and implements a reconfigurable adaptive Viterbi decoder for GPRS, EDGE and Wimax technologies. The high performance generic soft input hard output Viterbi decoder is prototyped on a FPGA. [C1442]

"An integration platform for developing digital life applications"

This paper describes how we develop a digital life service system by integrating developed separately applications. A lot of Internet appliances are implemented and integrated to evaluate this integration platform. Users can control these appliances by a web browser. We integrated seamlessly these appliances as a whole on the web platform. A home gateway is used as the integration platform. A GPRS modem and a Bluetooth module are connected to the home gateway. The home gateway can thus communicate with all the appliances through the Bluetooth module, and provide a way to approach each appliance from Internet. For each appliance there is a corresponding CGI program to provide as the user interface. Users of the appliance can control each appliance through the web browser. Users can access the appliance through Internet at any place and any time. The GPRS modem can send SMS to user when there are any emergency events. [C1443]

"Bonding & grounding a digital world The most significant new issue is the cost of failure"

The intent of this paper is to show why Bonding, Grounding and Electrical Protection are increasingly important elements of any telecommunications equipment installation and to illustrate the kinds of mistakes often made by engineers and installers deploy systems. [C1444]

"A OFDM module for a MB-OFDM receiver"

The rules defined by FFC, for marketing and operation of UWB products, permitted the use of orthogonal frequency division multiplexing (OFDM) to implement UWB communications. MB-OFDM is taking place as good approach to UWB, for instance for wireless USB. The latest generations of FPGAs, including DSP capabilities, embedded processors and special features for I/O streaming, are being efficiently used in wireless high-data rate applications. Therefore, FPGAs can be used for UWB technology implementation. This paper discusses the implementation of a specially tailored FFT to demodulate OFDM in a UWB receiver. Special emphasis is put on the design to fulfill the critical time requirements. [C1445]

"IP based telecom power system monitoring solution in GPRS networks"

A trend in telecommunication has been to make steps towards centralized management of networks including power systems. The main motivation is operational cost saving. Technical specialists are only located in network management centers. The diagnostics and maintenance of power systems is done remotely using Internet protocol (IP) based access. Due to historical reasons, most of the sites do not have network access. The general packet radio service (GPRS) offers a simple and flexible solution to overcome this limitation. This paper describes the architecture of a GPRS based remote monitoring solution for power systems in GPRS networks. Furthermore, it presents and discusses results of a field trial carried out in a mobile service provider's GPRS network. [C1446]

"Target of Imaging Observation Based on The Wavelet Transform and GPR"

A data analysis methods for frequency modulation continuous-wave ground penetrating radar targets near-fields images using wavelet transform are proposed. And discussing the instant characteristic of zero intermediate frequency detected from frequency modulation continuous-wave ground penetrating radar echo signals using wavelet transform. Based on the wavelet transform algorithm features: constant Q, fit algorithm and fit mother wavelet improved the accuracy of echo signals' time- difference detecting and the image bound of target. And obtained the better results from the computing simulation. [C1447]

"Low Voltage Distribution Transformers: Analysis of the Exposure to ELF Magnetic Fields"

Modern residential, industrial or commercial buildings may be grounded through a system defined as "TN- Island grounding system". This is an effective way to protect both persons from shock hazard in installations and to greatly limit electrical interferences among power systems. This earthing system, which is aimed to promote electrical safety, better functionality, and lower costs, utilizes single-phase separation transformers installed in the unit grounded at the mid-point of their secondary side. By introducing a new source of power frequency (i.e. extremely low frequency) magnetic fields into the premises, the presence of such additional pieces of equipment in the environment, might expose persons to their potential adverse health effects, as well as, sensitive electronic equipment disturbances. This paper seeks to clarify this matter by evaluating the ELF magnetic fields, as produced by the user's own equipment and by other units eventually present in the vicinity. [C1448]

"PLC as a return channel for interactive digital TV"

This paper will present a general architecture of the return channel implemented using power line communication-PLC for interactive services delivered through digital TV broadcasting, such as e-health and e-learning. The application in low-income regions of Latin America and Europe is one requirement of the solution

to be adopted that implies directly on the prices to be charged to the customers. This implementation will be used in the SAMBA project (founded by European Commission) and involving test beds in Brazil and Italy. [C1449]

"RF Tomography with Application to Ground Penetrating Radar"

RF tomography and ground penetrating radar are combined to detect and identify hidden targets, such as underground facilities and hard and deeply buried targets. Past experience in below-ground imaging is described, current measurement results are presented, and future plans are discussed. [C1450]

"Survivability Index for GSM Network"

The cellular mobile technology has been emerged astonishingly over the last decade. Global system for mobile (GSM) is most dominant among various cellular standard. It was developed in Europe and deployed in many parts of world. Now a day it carries critical business and social information of many subscribers thus proper quantification of quality of service must be done. In this work, survivability index (SI) has been proposed for above purpose. Survivability is one of many words which were coined as a measure of degree to which a system is able to provide critical services. Traditionally, survivability of cellular systems is measured in terms of one of following parameters: the number of functioning units, the maximum traffic capacity, blocking probability and the service restoration time, etc [1][2]. The available measures of survivability do not cover many inherent features simultaneously. This work is a step towards development of a compact and effective measure of cellular network survivability. SI has a weighted sum form which takes into account following features of a cellular network (i) blocking probability, (ii) dropping probability, (iii) voice quality, in terms of carrier to cochannel interference ratio (C/P) and (iv) availability. Its analysis has also been done for GSM network by considering two different failure scenarios. The evaluation of a GSM network has also been for different failure scenarios. [C1451]

"On the Design of a Thin-Wire Bow-Tie Antenna for GPR using Evolutionary Optimization Algorithms"

In this communication we compare the performance of classical genetic algorithms (cGA) with a new type of evolutionary algorithms named hybrid Taguchi genetic algorithms (HTGA) when they are applied to the design of a a new ultrawideband (UWB) thin-wire bow-tie antenna for GPR applications. The broadband performance of the antenna is achieved by resistive loading and by optimizing the number of wires and the angular distances between those wires. [C1452]

"GPR Absorbing Material Characterisation Using an Open-Ended Coaxial Probe"

RF (radio frequency) absorbing materials are widely used for electromagnetic applications. The uniformity and repeatability are very important for application such as GPR (ground penetrating radar) antenna loading-a method to improve the system performance. There is a demand for a good method to assess the uniformity and reputability of the material. Various methods have been developed for material characterisation. The open-ended coaxial probe is one of them which has been developed for non-intrusive measurements of small samples and was chosen as the best candidate for this study. Commercial probes are very small and not really suitable for our investigation. A large open-end coaxial probe with an outer diameter of 4 cm, which was developed at Liverpool, was employed for this work. Five flat sheet absorbing materials were selected by IDS. A special calibration method and data interpretation algorithm were developed and employed for this work. It is shown in this paper that the results clearly demonstrate that the approach used for this study is accurate and effective. [C1453]

"Reconstruction of the Field Radiated by GPR Antenna into Ground"

A probe-deconvolution technique for a buried probe is developed. The technique is based on an accurate electromagnetic model of a buried probe, which predicts voltage at the output terminals of the probe for any impinging wave. The model is based on analytical solution of a Pocklington equation describing surface current on the probe. The model does not take into account presence of air-ground interface close to the probe. The model has been successfully verified against direct numerical simulations based on Mixed Potential Integral Equation with an appropriate Green function. Special attention has been paid in the verification to the impact of the so-called head wave which is excited by GPR antennas operating in a close proximity to the ground and propagating along air-ground interface. [C1454]

"A Clutter Reduction Technique for Microwave Reconstruction of Shallow Underground Targets"

This paper presents a signal pre-processing technique for the stepped-frequency ground penetrating radar that

is aimed at suppressing clutter related to antenna effects and variation of the ground surface response. Both the ground bounce and the clutter can obscure shallow underground objects such as landmines making difficult their detection. At the preprocessing stage, the measurement system has been calibrated using a free space and metal sheet as standards. Both the modulus and the phase of the signal obtained for metal sheet have been approximated by polynomials, and this synthetic signal is used to derive approximate transfer functions of the antenna. This technique utilizes calibration measurement for only one position of the metal sheet and yet reduces clutter related to the antenna effects. Besides, the calibration simplifies further subtraction of the ground surface response. The 2-D image of the subsurface is built then using B-scan data from which the ground bounce is eliminated. The performance of the method is demonstrated in several examples employing the frequency-domain data collected by a transmitting-receiving antenna pair. [C1455]

"Ultra Wideband Antennas for In-Pipe Ground Penetrating Radar"

The design of an ultra wideband antenna for a ground penetrating radar system presents additional challenges to those for communication systems. In particular a novel in-pipe deployment requires the antenna to be placed in a buried pipe, and its width is greatly restricted. In this paper several antenna configurations are examined to meet these requirements. A dielectric loaded base tapered dipole configuration and a loaded folded dipole are seen to offer the best performance for this application. [C1456]

"Ground Penetrating Radar Image Focusing using Frequency-Wavenumber based Synthetic Aperture Radar Technique"

In the classical B-Scan ground penetrating radar (GPR), the collected data represented in the image domain, depict undesired hyperbolic effects and have low resolution features. In this work, we present frequency-wavenumber based Synthetic Aperture Radar (SAR) focusing technique to solve this problem. The formulation of algorithm is given and applied to both the simulation data obtained by a physical optics shooting and bouncing ray (PO-SBR) code and to the measured GPR data from real soil environment. Simulation and the measurement results demonstrate that proposed algorithm is very effective in achieving well-focused GPR images with high lateral resolutions. [C1457]

"Simple and Collected Targets Radar Cross Section"

The goal of this paper is to analyze the scattering properties of different kind of targets, from simple shapes to collected targets made up of several objects, from 400 MHz to 7400 MHz to be used as patterns in a Ground Penetrating Radar in the classification stage. The data have been collected in an anechoic chamber with a vector network analyzer (VNA) set to work as a stepped frequency continuous wave radar (SFCW). The data are analyzed in frequency and time domain in order to picture the radar cross section dependency of frequency, incident angle, polarization and target's shape. The measurement have been carried out using a bistatic arrangement with two TEM horns for linear polarization and two spiral antennas for circular polarization. [C1458]

"Identification of Hidden Mines"

This paper reviews the state of knowledge concerning the identification of buried mines and unexploded ordnance using techniques based on the singularity expansion method, supplemented by symmetry. It includes a list of important references which, in turn, give a very large list of references. This is supplemented by some more recent specific references. [C1459]

"A Geometrical Feature Based Sensor Fusion Model of GPR and IR for the Detection and Classification of Anti-Personnel Mines"

The Ground penetrating radar (GPR) and Infrared (IR) imaging have become two established sensors for detecting buried anti-personnel mines (APM) which contain no or a little metal. The paper introduces the GPR and IR techniques briefly and compares the two sensors with respect to their strengths and weaknesses for target detection and emphasizes the necessity of fusion to harness the advantages of each of the methods. We propose a geometrical feature based sensor fusion framework, combining GPR and IR, as an effective technique for detection and classification of APM, which will reduce the false alarm rate significantly. We consider the basic geometrical shape descriptor features of an object and construct a feature vector for each of the objects. These feature vectors are used to train a Probabilistic Neural Network (PNN) for the classification of APMs. The method gives almost perfect detection accuracy. [C1460]

"The Region-Exhaustive Fault Model"

Device failure mechanisms of today's deep sub-micron processes are not well-modeled by single stuck-at faults,

and hence several advanced fault models have been proposed in the past. Gate-exhaustive fault models were proposed to exercise a gate completely and then observe the resultant response at an observable output. This paper extends the gate-exhaustive fault model to target bigger regions (a collection of gates) with the hypothesis that exercising a region with an exhaustive pattern set can yield coverage on a larger proportion of unmodeled defects. To test out this hypothesis, we use the logic proximity bridge (LPB) fault model as a surrogate for unmodeled defects and grade the region and gate exhaustive patterns against the LPB fault model to gauge their efficacy. We show that region exhaustive patterns are better at detecting untargeted LPB faults compared to patterns obtained using gate exhaustive or traditional stuck-at fault models. [C1461]

"The Hardware Design of Three-channel EIG Monitoring System Based on S3C2410X and GPRS"

A kind of ECG monitoring system, which can monitor ECG all the time and can give an alarm when the abnormal ECG signals are found, is described in this paper. The system is designed using S3C2410X and GPRS, and its software is designed based on Linux. The system can monitor the patient's ECG all the time. When the abnormal ECG signals are found, the system will send the short message automatically through GPRS. [C1462]

"An EGG wireless Monitoring Instrument Based on GPRS"

An ECG wireless monitoring system was introduced in this paper. The core unit of instrument is MSP430 micro-controller. The function of instrument includes ECG sampling, analysis and alarm. When the system detects the abnormal ECG from a patient, it will send an alarm message via GPRS wireless module. It is very important for the patient to be salvaged promptly. [C1463]

"Telemedicine Center"

This paper describes a stationary unit at the Telemedicine Center (TMC) which is one part of the advanced care and alert portable telemedical monitor. The TMC is software based on a JAVA server platform running on a Windows PC with a GPRS data link and installed in hospitals. It facilitates, tracks, monitors, and reports the patient condition anytime anywhere. It can run on the platform continuously and constantly and can be used to trigger emergency health alerts immediately when abnormalities are detected. Additionally, we help a physician identify useful information from a huge amount of sensor data collected by the body sensor network on a patient and hence to reduce communication costs. Another important is the sensor data can be auto-backuped in case of accidental broken . [C1464]

"Antenna Arrays and Propagation Models for Advanced Wireless Systems"

The development of advanced phased array antennas and new propagation models that address wireless applications in challenging propagation environments have and will continue to be a critically important component in the development of future wireless systems with applications in communications, radar, and Satellite technologies. In spite of the significant advances in these technologies, challenges continue to preclude their low cost, reliable, and high speed application in tough propagation environments including urban areas, UAVs, and other DoD applications. In this paper we describe some of the ongoing research activities at the University of Hawaii in the area of advanced wireless systems. In the antenna array design technology, two complementary antenna arrays designs will be described and the development of an ultra-wideband ground plane for foliage penetrating radars will be discussed. For the propagation modeling area, new models for characterizing indoor/outdoor transmission and for evaluating wireless coverage in urban areas taking into account the radiation patterns of the transmitting and receiving antennas will be presented. In all cases simulation results will be presented and validation with experimental observations will be included whenever available. [C1465]

"The Evaluation of Performances of Automatic Method for the Object Detection in GPR Images"

The problem of automatic interpretation of GPR images containing several local objects has been considered. The method based on the Hough transform is used for object detection. The estimation of accuracy of the objects' coordinates determination and the evaluation of detection probability have been performed for the case of automatic interpretation of videopulse subsurface sounding results. The possibility of zero error for coordinate determination has been shown. The relations between object detection probability and false alarm probability are presented using the ROC curves. [C1466]

"Teletraffic Analysis for the Performance Evaluation of De-Allocation/Re-Allocation Strategies in GSM/GPRS Cellular Networks"

A teletraffic analysis for the performance evaluation of the joint use of dynamic resource allocation (DRA), channel de-allocation (DAS), and channel re-allocation (RAS) strategies in GSM/GPRS networks is developed. In addition, an efficient DRA strategy with a link quality awareness policy, channel de-allocation and re-allocation policies as well as user prioritization (called DRA LA DAS RAS) is proposed. To the authors' knowledge, most related works have either studied link adaptation (LA) or dynamic resource allocation (DRA) strategies as independent topics but have failed to address their combined effect on GSM/GPRS systems. DRA LA DAS RAS uses both call degradation and call compensation techniques. Calls with the largest number of channels allocated and the worst link quality are degraded first. Conversely, calls with the lowest number of channels allocated and the best link quality are upgraded first. This allows upgraded calls to release resources more rapidly, making them readily available for new calls. Numerical results show that the proposed DRA LA DAS RAS strategy significantly improves system performance, i.e. up to 82% (74%) {58%} [37%] <27%> less blocking probability relative to the DRA (DRA LA with p=0.75) {DRA DAS} [DRA LA DAS with p=0.75] <DRA DAS RAS> strategy. [C1467]

"Enabling IMS with Multicast and Broadcast Capabilities"

The evolution of third generation cellular network focuses on the provision of enriched multimedia services and the support of QoS (quality of service) guarantees. The IMS (IP multimedia subsystem) is specified as subsystem providing resource, admission and charging control. Enabling GPRS (general packet radio service) and UMTS (universal mobile telecommunications system) to support multicast and broadcast transmissions, 3GPP (third generation partnership project) has recently standardised the MBMS (multimedia broadcast multicast services) framework. Up to now, IMS and MBMS are separated subsystems sharing no common interfaces in order to utilise each other. However, 3GPP is working currently on release 7 to integrate IMS and MBMS. In this paper we present an efficient integration of IMS and MBMS which supports several phases of unicast, multicast and broadcast transmissions. Furthermore, an integrated solution framework is introduced. Several end-to-end signalling procedures are finally discussed. [C1468]

"Modeling E-Mail Traffic for 3G Mobile Networks"

Traffic models are to provision the increasing load of packet switched traffic in mobile 3G networks. However, most traffic models were designed to fit the need of low delay wired connections. In this paper we propose a new traffic model for POP3 e-mail traffic generation in 3G mobile networks scenarios. The model is based on traces which were extracted in a live 3G network of a mobile operator. The main improvement of the model is the explicit modeling of the login process that takes place between the client and the server. We implemented the model in the network simulation tool ns-2 and based on this we simulated various scenarios to visualize the impact of a leading initialisation phase in high RTT environments. The results proof that the extension can reproduce the effect from the login in a more precise way. Finally a comparison between the measured and the simulated service footprints were compared. The new model performs better than common models in this scenario. [C1469]

"Secure Interworking in Multi-Operator, Multi-Technology Wireless Communication Environment: Issues & Challenges"

Taking into account the recent advances in wireless communications with the deployment of various technologies that cover the same areas, secure interworking in multi-operator, multi-technology wireless communication environments is a critical issue that should be considered by all operators. This is primarily linked with risk analysis and it is the process that each operator should go through to determine the risk exposure. It indicates mainly the possibility of a damage that could happen either by intruders or by misuse of the resources. The goal of risk analysis is to determine the probability of potential risks and estimate the overall damage at an annual basis in order to define new policies and measures. This is the main contribution of this work. [C1470]

"Tools and Practices for Measurement-based Network Performance Evaluation"

As networks and applications running on them become more complex, there is a need for an efficient framework supporting experimental performance evaluation based on real measurements. Towards this end, this paper presents: a) an advanced architecture for a traffic generation tool capable of producing complex traffic profiles, b) the architecture of a traffic analysis tool, and c) methods that allow for efficient monitoring and measurements of delay and loss-oriented metrics in packet networks. The effectiveness of these tools and the applicability of the measurement methodology are illustrated through experiments that evaluate the performance of vertical handovers between GPRS and WLAN networks. [C1471]

"Vehicular GPS Monitor System Based on GPRS Network"

The new vehicular monitor system is combined with Global Positioning System (GPS) and general packet radio service (GPRS) by researching the GPS navigation technology and the shortcomings of current vehicular GPS monitor system. The design characteristics of vehicular GPS monitor system based on GPRS network are analyzed in the thesis. [C1472]

"Techno-Economic Analysis of Beyond 3G Mobile Technology Alternatives"

As also the mobile traffic is starting to migrate to All-IP, new requirements are set for the radio technologies in the competition. The choice of alternative paths is widening as new technologies from different backgrounds are emerging. This paper presents a techno-economic comparison of European mobile telecom business players position, whether building on UMTS plus HSPA, or migrating to the WiMAX path for mobile broadband. The cases considered in this study are network operators having an already existing nationwide CSM/GPRS/EDGE network coverage. The time span of the study is 2006-2013. The work includes full quantitative modeling of both cost and revenue sides, and is done so that the network provisioning business has been separated from the service provisioning. In this way, the economical differences of versatile network deployments can be better compared. Special emphasis in this paper is on the risk and sensitivity analyses, which reveal more of the case dynamics than bare economic key figures. The study gives support for operators to decide on deployment plans of the available manifold advanced network technologies. [C1473]

"Footprint Adjustment On SFCW-GPR With Modified Dipole Array"

Antennas footprint is an important parameter for good detection result in ground penetrating radar(GPR) survey. The various condition of soil under which a target is buried may change the footprint of an antenna. An antenna with a capacity to adapt, with different soil condition is therefore needed. This type of antenna is capable of keeping the footprint constant in different soil condition. The footprint of an antenna is related to the antennas dimension. In this paper, Modified dipole array is proposed as an adaptive antenna for GPR. With RF Switch circuit, we choose the element on the antenna that will be fed considering to footprint that will be produced. If coupling between element in the array is significant, the array for GPR application will fail to create its adaptation capability. Resistive loading is used to reduce coupling level between elements in the array. [C1474]

"GPRS based Real-Time Reporting and Internet Accessible Sea Level Gauge for Monitoring Storm Surge and Tsunami"

Development and implementation of a real-time reporting and Internet-accessible sea level gauge is described. The paper addresses the application of mobile communication technology and particularly the use of General Packet Radio Service (GPRS) for accessing data from remote sea level gauge. By using a microcontroller and existing mobile phone network with a GPRS support, a continuous connection to the Internet is implemented for real time update of sea level data on a web server. The system provides a graphical illustration of the predicted fair-weather sea level, the current sea level, and the residual sea level (i.e., measured minus predicted fair-weather sea level). Thus, a cost-effective and easily maintainable platform is realized for real-time reporting of sea level and providing the requisite input for efficient implementation of any alert and warning mechanism in the event of oceanogenic natural disasters, particularly storm surges and tsunamis. The system described herein is operational in Goa, India since 24th September 2005. [C1475]

"Diffraction Tomography Algorithm for Ground Penetrating Radar"

A fast diffraction tomography algorithm for ground penetrating radar is derived in this paper. The algorithm uses the first born approximation and the dyadic Green's function for a two layer medium to get a linear forward model that takes into account the planar air-soil interface. The forward model is then inverted using Fourier transform and this can be implemented with FFT, so the algorithm can reconstruct object rapidly. Numerical examples are provided to illustrate performance of this algorithm. [C1476]

"The Development of Embedded EGG Recorder Based on ARM9"

An embedded ECG recorder based on ARM9 and Linux RTOS is introduced in this paper. It is based on S3C2410X which is a 32-bit low power micro-controller manufactured by Samsung Company. We transplant Linux RTOS into S3C2410X and develop the application based on Linux. MiniGUI is adopted to design the user interface. This system could acquire ECG signals, display and analyze ECG and send alarm via GPRS when ECG signal is abnormal. [C1477]

"Remote Wireless Calibration of Equipment in the Distributed Measurement Systems"

This paper presents possibilities of the GSM/GPRS communication network for remote wireless calibration of the

measurement equipment used for metrological assurance of the distributed measurement systems. An automated calibration procedure is performed by the measurement data transmitting between calibrator unit in the control center and fixed or mobile remote measurement stations, using synchro timing distribution system. Such calibration procedure is implemented in distributed system for metrological support of power quality monitoring and analyzing, aimed to increase an efficiency of energy delivery and consumption. By means of the Lab VIEW application software, a virtual instrument for the measurement, recording and statistical processing of the measured power quality parameters, defined according to the relevant European quality standard EN 50160, is developed and implemented in this system. [C1478]

"An image segmentation algorithm for the detection of rebar in bridge decks from GPR scans"

Ground penetrating radar (GPR) scans of rebar embedded in concrete structures produce distinct hyperbolic signatures. These signatures can be removed from the data as a preprocess to the identification of other embedded objects. This work is a step towards achieving an unsupervised detection of defects in concrete bridge decks. The proposed algorithm detects the signature of rebar(s) in a GPR scan through image segmentation, arc detection, and a thresholding process. The position and depth of the rebar(s) and the dielectric properties of the concrete are derived. [C1479]

"Information Fusion System with GPRS module for Monitoring the Status of Driver"

This paper presents the advanced system with GPRS module and information fusion approach for real-time detecting the status of driver. It uses infrared cameras to simultaneously monitor the fatigue symptoms of driver for determining the fatigue status. The vision information consists of the trend of pupil change, the times of blinks, the times of yawns, and the angle between the head and the plumb line. The veracity of the system will be strengthened to determine the status of fatigue driving through information fusion technology. In addition, the system is capable of automatically drawing the conclusion that the driver is falling asleep and issuing different warning signals depending on the level of the fatigue status. The system will transmit the conclusion automatically to the traffic control department with GPRS module. [C1480]

"Ground Penetration Radar Using Golay Sequences"

In most of the existing ground penetration radar (GPR) systems, the major problem is low signal-to-noise ratio (SNR) and the masking of the weaker returns by the strong side-lobes. These twin problems can be minimized to a large extent with the help of Golay sequences. Golay sequences are complementary sequences; the sum of these yield twice the value of the autocorrelation at zero lag and zero elsewhere. In terms of improved SNR and reduced sidelobe levels, the performance of these sequences is considered to be better than that of pseudorandom binary sequences (PRBS), Barker or other maximal length sequences. Some of the results from a bench-top Golay based GPR system using PRBS and Golay codes are presented. [C1481]

"Hand Off Issues in 3G UMTS Networks"

Universal Mobile Telecommunication System (UMTS) is a third generation mobile communication technology based on wideband CDMA (WCDMA) and can facilitate the users in much better way as compared to the second generation of mobile communication. UMTS is superior to second generation in terms of bandwidth efficiency, quality of service, speech quality, speed and capacity. At present, more than 60 countries using WCDMA technology are operating commercially in 25 countries. In this paper, we focus on soft and hard handover issues in UMTS networks. In order to simulate a typical UMTS scenario we use OPNET modeler where a number of users are generating traffic and are free to move in various cells. [C1482]

"Determination of ELF Magnetic Field Penetrated Into Human Body"

In this paper a simulation of ELF magnetic field penetrated into human body is considered. This problem is modelled using the Finite element method. The proposed human body model is placed in working and living surroundings wherein the power lines exist. The obtained results for penetrated magnetic field will be presented graphically. Also, a magnetic flux density values for different distances from the power lines, i.e. from the wall, will be determined. [C1483]

"Analysis of Physiological Changes in Human Caused by Local Exposure of ELF Electric Field"

To clarify the mechanism of the biological effects of ELF electric fields on a human body, we have investigated the physiological changes precisely caused by the local exposure of the field. The temporal changes in skin temperature, skin blood flow, and other physiological parameters were measured when a left forearm was exposed to the field. As a result, noticeable changes were observed in the peripheral skin temperature in the

field exposure. Further, some other effects were observed through the experiments, and they suggested that the mechanism of the field exposure was associated with body hair vibration and autonomic nerve activity. [C1484]

"Effect of 8.43 Hz Frequency Magnetic Field on the Single Neuron"

Electromagnetic field (EMF) of the GSM cellular telephones affect on the living tissues thermally. In this communication system radiofrequency EMF is modulated by extremely low frequencies (ELF) -8,43 and 217 HZ. On the other hand bulk of investigations proves existence of non thermal effects of the ELF EMF on the biological systems. The current controversy lies on the possibility that the ELF-EMF could produce biological non-thermal effects. We present in vitro experimental data which show that neurons from the brain ganglia of the mollusk HelixPomatia are sensitive to ELF magnetic field of 8.34 Hz in the ranges of 0.2-10 mT. [C1485]

"L-VCONF: A Location-Aware Infrastructure for Battlefield Videoconferences"

Audio and videoconference technologies make complex coordination processes easier, especially when mobile participants need to synchronize their action in critical environments. The need for an infrastructure providing such a functionality may arise in complex scenarios where an IP network is not available, as for instance in battlefield or other critical environments. This paper describes L-VCONF, an architecture for geo-located conferencing based on a mobile/cellular network (i.e. GPRS, UMTS, WiMax technologies), quick-and-dirty mobile/cellular geolocation, SIP protocol and presence server. Our architecture supports IP audio/videoconferences enriched with geo-located coordination functionalities in complex environments. The approach described in the paper is robust w.r.t. uncertainty while handling location update notification for SIP presence server. [C1486]

"Building Learning Communities in Blended Classrooms Through an Innovative mLearning System"

Chinese classrooms have long suffered from a lack of interactivity. Many online classes simply provide recorded instructor lectures for students to listen to. This format only reinforces the negative effects of passive non-participatory learning. At a major university in Shanghai, researchers and developers actively seek technologic interventions that can greatly increase interactivity in online classes. They developed a cutting-edge mobile learning system that can deliver live broadcast of real-time classroom teaching to online students with mobile devices. This system allows students to customize means of content-reception.. The system also supports short text-messaging and instant polls. Through these venues, students can ask questions and make suggestions in real time, and the instructor can address them immediately. This paper describes this system in detail, and also reports results from a test implementation of the system with a blended classroom of 1000 students (250 campus and 750 online). [C1487]

"Development of Antennas for Subsurface Radars within ACE"

The paper gives an overview of the joint activities of the ACE-2 partners in the area of antennas for surface penetrating radar. Main areas of joint research and development are discussed and main results of joint activities are presented. Special attention is given to experimental verification of proposed antenna designs. [C1488]

"Theoretical and Experimental Analysis of a Rolled-Dipole Antenna for Low-Resolution GPR"

In this paper a rolled dipole antenna for low-resolution impulse ground penetrating radar (GPR) is theoretically and experimentally investigated. The antenna has been designed for transmission of monocycle pulses with duration of 5 ns (200 MHz central frequency) suitable for low-resolution GPR applications. The dipole is rolled to considerably reduce its length and resistive loading with the Wu-King profile is applied for suppression of late-time ringing, important for GPR. It is shown theoretically that the antenna radiates the pulse with no late-time ringing. Furthermore, by rolling the wires the antenna length is reduced by a factor of 4 with no evident negative impact on the antenna's characteristics. A shield for the antenna has been designed, constructed and integrated with the antenna. Furthermore, it has been found that a tapered bow tie can be combined with the antenna in such a way that a significant increase in the antenna efficiency is obtained, resulting in a unique hybrid of a dipole and a bow-tie antenna. [C1489]

"Footprint Adjustment On SFCW-GPR With Modified Dipole Array"

Antennas footprint is an important parameter for good detection result in ground penetrating radar (GPR) survey. The various condition of soil under which a target is buried may change the footprint of an antenna. An antenna with a capacity to adapt with different soil condition is therefore needed. This type of antenna is capable of keeping the footprint constant in different soil condition. The footprint of an antenna is related to the antennas dimension. In this paper, modified dipole array is proposed as an adaptive antenna for GPR. With RF switch

circuit, we choose the element on the antenna that will be fed considering to footprint that will be produced. Resistive loading is used to reduce coupling level between elements in the array. The simulation results show that different active element produce different near field area. The size of near field area is proportional to the dimension of the element. [C1490]

"An End-to-End Wireless QoS Architecture Evaluation"

This work presents and evaluates an end-to-end wireless network QoS architecture, named DiffMobil. DiffMobil is composed by DiffServ over the IP core network and by the following modules over the circuit switched network: QoS negotiation, congestion control (composed by diagnosis and admission control) and flow control. DiffMobil [9, 11] can be implemented over any kind of wireless network: GPRS, UMTS, IMS/NGN. The concepts proposed by each module, do not depend on the network technology. As ns-2 (Network Simulator) [14] was used, experiments to evaluate the DiffMobil guarantees were conducted with simulations of service requirements by GPRS users. GPRS was the technology chosen because we have implemented a complete GPRS network over ns-2. Performance metrics of a GPRS environment simulated through ns-2 show that DiffMobil offers end-to-end QoS. [C1491]

"Search for Survivors Buried in Rubble by Rescue Radar with Array Antennas-Extraction of Respiratory Fluctuation -"

The authors have developed a Doppler-type ground penetrating radar (GPR) unit to find survivors buried in houses that have collapsed in an earthquake or other disaster. The purpose of this study is to improve the dynamic range of radar consisting of an array antenna so that it can quickly identify far-off survivors under rubble. The authors focused on time-variable elements from the respiration of a survivor awaiting rescue in order to remove clutter components, such as the rubble. A healthy individual's respiratory frequency varies from 0.2 Hz to 0.5 Hz, so the authors propose a signal processing method to extract these frequency elements in an effective manner. The authors also examine the effectiveness of this method experimentally. [C1492]

"The Research Activities of Ultrawide-band (UWB) Radar in China"

The UWB signals for radar applications can be generated from time domain or frequency domain. Because of the limited energy, the time domain UWB signal or impulse signal is usually applied for short range radar, such as ground penetrating radar(GPR) and through-wall-imaging radar(TWIR). In opposition to it, the frequency domain UWB signals can be applied both for short-and far-range imaging radar, such as GPR, TWIR or airborne UWB synthetic aperture radar(SAR). The UWB radar research has been carried out from 1980s in China. But its really flourishing and mature era was from the middle of 1990s. This paper reviews the Chinese archives and the most recent results in UWB radar both for time domain and frequency domain. [C1493]

"UWB-GPR Data Processing for Identification of Anti-personnel Landmines under Rough Ground Surface"

A process for finding buried landmines by using GPRs is divided into two stages, detection and identification. In the detection stage, all buried objects including the desired landmines together with other clutter objects are detected. In the identification stage, the detected objects are classified and the landmines are differentiated from the other objects. In this research, we focus on the identification stage and propose a GPR data processing for identification of shallow!) buried antipersonnel landmines. After suppressing the ground surface reflection, we extract features related to waveform correlation from the GPR data. As an identification algorithm, an approach based on a matched filter is employed. In order to check the identification performance, Monte Carlo simulations are carried out using dataset generated by a 2D-FDTD method. Results are shown in the form of ROC curves and AUC values, and effects of soil condition (i.e. ground surface roughness, inhomogeneity, and moisture in soil) on identification performance are assessed. [C1494]

"UWB measurement, complex-amplitude texture, and Walled-LTSA array in plastic landmine visualization"

We describe the importance of ultra wideband (UWB) reflection measurement in the adaptive target visualization. We use a complex-valued self-organizing map (CSOM) to deal with complex-amplitude texture obtained by stepped-frequency UWB reflection measurement. We distinguish targets from clutter by paying attention to the difference in texture in space and frequency domains. In the technique, a wideband measurement is desirable to obtain precise texture. We employ a newly developed antenna, walled LTSA, with which we can construct a wideband, dense array for high-resolution imaging. [C1495]

"Subsurface Imaging with UWB Linear Array: Evaluation of Antenna Step and Array Aperture"

This paper presents the investigation of antenna step and aperture size for an ultra-wideband (UWB) ground penetrating radar (GPR) with a linear array. The procedure includes the optimization of receiving array, verification of optimization results by EM simulation and experimental measurement for both surface and subsurface imaging. The imaging algorithm used for the evaluation combines the focusing of the array and the synthetic aperture radar technique in the mechanical scan direction. [C1496]

"Bistatic UWB Radar System"

A new GPR system using an optical electric field sensor was proposed. The system has a bistatic radar configuration, which is consisted from a TEM horn antenna as a transmitter and an optical electric field sensor as a receiver. The new system employs a time-domain data acquisition, and it made the data acquisition very fast. Laboratory measurements showed that a metallic sphere can be detected by the new system. Applications of this system will include landmine detection and through wall imaging. [C1497]

"Enhancing Quality of Experience in Next Generation Networks Through Network Selection Mechanisms"

The evolution of telecommunications during the last decades has been enormous and as a result, nowadays, people find themselves before the challenge of 4G networks. Consequently, network selection techniques play a vital role in ensuring quality of experience (QoE) in heterogeneous networks. The main scope of this paper is the development of a process in order to compare packet-switched networks in terms of QoE offered and finally select the network that offers the highest standard of QoE. For this reason, main QoS parameters are identified and a scheme is proposed to identify each parameter's importance based on network performance. The proposed methodology combines the analytical hierarchy process (AHP) to decide the relative weights of evaluative criteria set according to the network's performance, as well as the grey relational analysis (GRA) to rank the network alternatives. The proposed methodology is then applied for GPRS and WLAN. [C1498]

"Use of the Ground Penetrating Radar Methods for paleontology on example of the mammoth fauna investigation"

In the paper, methods of ground penetrating radar (GPR) are investigated with the purpose of wild animal remains detection, in particular, borders of the mammoth valley and character of the bone fragments. Object of researches are radar methods and GPR systems, a method of detection of the mammoths burial zones, algorithms of processing and representation of the paleontologic data. GPR researches in total amount of 12,000 meters of the GPR profiles are carried out by Radar R&D on terrain "Lugovskoe" (25 kms from Khanty-Mansiysk). As a result of investigations, the congestion zone of the bone remain of mammoths are found out. From the results of experimental researches, the GPR method is practically approved for monitoring of subsurface media with the purpose of revealing the zones interesting for paleontology. The technique of GPR researches is fulfilled and its efficiency is appreciated. [C1499]

"Experimental evaluation of an array GPR for landmine detection"

This paper presents an experimental evaluation procedure for a landmine detection GPR with a single transmit antenna and a receive antenna array. The procedure includes calibration of the ultra-wideband array, estimation of its footprint and cross-range resolution for different size of the aperture, checking the capability to image landmines buried within the array aperture. For the evaluation, the authors developed an imaging algorithm combining a synthetic aperture focusing in the mechanical scan direction with a focusing of the array in the cross-scan direction. [C1500]

"On IIP2 Improvement by Injecting DC Offset at the Mixer in a Wireless Receiver"

We present a digital calibration technique for improving IIP2 by injecting DC offset at the mixer. Most receivers offer DC offset cancellation circuitry, and a targeted non-zero DC offset at mixer output is up-converted to RF carrier frequency due to poor reverse isolation of the mixer switch. By controlling amplitude of the injected DC, IIP2 degradation due to LO leakage at the input of RF amplifiers can be compensated. Mathematical analysis and measurement data for a quad-band GSM/GPRS receiver implemented in 90-nm digital CMOS process are presented. Calibrated IIP2 of 50 dBm is reported at LNA input. [C1501]

"Service-Oriented E-Learning System"

Instead of building an e-Learning system from scratch, it can be assembled by choosing the required

functionalities from a set of web services related to e-Learning. Web services eliminate many interoperability issues between components written and running on different hardware and software platforms. This study aims to construct a set of e-Learning web services. With these web services, new e-Learning system(s) can be constructed by choosing the services which are required. The developed web services include assessment, course management, grading, marking, metadata, registration and reporting web services. These web services are highly in demand as the functionalities for each of the web services are very useful and important in e-Learning systems. In Marking web service, rubrics can be defined to assist in assessment evaluation. In Metadata web service, learning object metadata (LOM) is applied to capture the description of the learning objects. [C1502]

"Mobile Information System, Health Work and Community Health Workers in Less Developed Countries"

This paper explores the use of mobile technologies for healthcare work by community health workers (CHWs) in less developed countries. The paper draws upon existing literature to identify issues that can affect the success of such projects. This is further supported with a case study of the use of personal digital assistants to support local and remote working of CHWs in a developing country. Key issues related to the physical, practical and social contexts are likely to have an impact on successful mobile support projects. [C1503]

"A Novel CPW-fed Optimized UWB Printed Antenna"

An optimized coplanar waveguide (CPW)-fed, ultra-wideband (UWB) printed radiator is presented. Balanced shapes are incorporated to the radiating section so that the impedance is matched in a balanced manner over the intended bandwidth. Both the CPW-feed and the antenna sections are realized on one single layer of standard RT5870 high frequency laminate. The radiator possesses good UWB-characteristics in the designed spectrum (4.2 to 14.2 GHz). These include nearly perfectly symmetrical patterns, no side-lobes, no cross-polar components in the symmetrical axial plane and low cross-polar components in all other planes, balanced impedance bandwidth, and almost 4 octaves impedance bandwidth. [C1504]

"A SIP Based Next Generation Services Platform"

Mobile network operators aims are offering new services to be competitive in the telecommunications market. However, the migration cost towards the third generation (3G) network is so high. This paper presents a proposal to offer a next generation services platform based on session initiation protocol (SIP). This solution is easy to implement and its cost is relatively low. Our solution takes into account the IP multimedia subssytem (IMS) service architecture specification proposed by the third generation partnership project (3GPP) providing ubiquitous characteristics for mobile users. In this way, our proposal becomes as a tool to allow an easy transition from 2.5 to 3rdgeneration networks. [C1505]

"Experimental evaluation of an array GPR for landmine detection"

This paper presents an experimental evaluation procedure for a landmine detection GPR with a single transmit antenna and a receive antenna array. The procedure includes calibration of the ultra-wideband array, estimation of its footprint and cross-range resolution for different size of the aperture, checking the capability to image landmines buried within the array aperture. For the evaluation, the authors developed an imaging algorithm combining a synthetic aperture focusing in the mechanical scan direction with a focusing of the array in the cross-scan direction. [C1506]

"Performance analysis of RADARSAT-2 multi-channel MODEX modes"

It has been recognized that a two-aperture approach to ground moving target indication is sub-optimum and that target parameter estimation is often compromised by clutter interference or poor signal-to-clutter ratios. This paper investigates the Ground Moving Target Indication (GMTI) performance of several virtual channel concepts proposed for the RADARSAT-2 moving object detection experiment (MODEX). These are capable of increasing the spatial diversity of RADARSAT-2 by exploiting its very flexible antenna programming capabilities and allowing the two-channel SAR system to operate like a three or four channel radar. A high fidelity space-based radar moving target indication simulator (SBRMTISIM) is used to generate virtual channel raw GMTI data for analysis. Moving targets are detected using a combination of the Factored Space-Time Adaptive Processing (Factored STAP) and the cell-averaging constant false alarm rate (CA-CFAR) detector. The detection performance of virtual multi-channel MODEX modes are analyzed and compared with those of the standard two-channel MODEX mode and a true three or four channel space-based radar system. [C1507]

"Use of the ground penetrating radar methods for paleontology on example of the mammoth fauna investigation"

In the paper, methods of ground penetrating radar (GPR) are investigated with the purpose of wild animal remains detection, in particular, borders of the mammoth valley and character of the bone fragments. Object of researches are radar methods and GPR systems, a method of detection of the mammoths burial zones, algorithms of processing and representation of the paleontologic data. GPR researches in total amount of 12,000 meters of the GPR profiles are carried out by Radar R&D on terrain "Lugovskoe" (25 kms from Khanty-Mansiysk). As a result of investigations, the congestion zone of the bone remain of mammoths are found out. From the results of experimental researches, the GPR method is practically approved for monitoring of subsurface media with the purpose of revealing the zones interesting for paleontology. The technique of GPR researches is fulfilled and its efficiency is appreciated. [C1508]

"Channel De-allocation for Packets in Integrated Voice/Data Wireless Communication Networks"

In this paper, a new de-allocation scheme which the de-allocation channels can be used by both voice calls and packet calls is proposed. To research the possible neglect effect on voice calls for the de-allocated channels can be allocated to the new packets, a threshold of a new packet call can obtain a de-allocation channel or not is proposed and studied. The simulation results show that the new scheme can achieve excellent performance and it is really necessary to let the new packets use the de-allocated channels, when the threshold thetas=2/3 of our scheme in this paper, the blocking probability of voice calls and the mean packet transmission time have nearly no degradation, while the blocking probability of packet calls is decreased evidently and the mean channel utilization is improved significantly. [C1509]

"High Speed Downlink Packet Access Principles"

Data services are expected to have significant growth over the next few years and will likelly become the dominant source of 3G traffic. High speed downlink access (HSDPA) provides large enhancements over wideband code division multiple access (WCDMA) for the downlink. HSDPA was standardized as part of third generartion partnership project (3GPP) Relase 5 and Relase 6. The HSDPA peak date rate avaible in the terminals is initally 1.8 Mbps, and it is increasing to 3.6 and 7.2 Mbps with potentially beyond 10 Mbps. HSDPA has been designed to increase downlink packet data throughput by means of fast physical layer retransmission and transmission combining as well fast link adaptation controlled by the Node B -i.e. base transmission station (BTS). The paper covers HSDPA principles for WCDMA -the key new feature included in Relase 5 and enhanced further in Relase 6 specification. [C1510]

"Research on Multi-Service Terminal Adapter Based IP Technology"

Take advantage of ample modern existing telecom network resources to rural areas may achieve it's information society gradually. This includes the establishment of integrated rural information service platform, modern remote education center and electronic administration management platform for rural areas. The geographical and economic constraints must be overcome for structuring the rural service support system, in order to provide technical support, information products and information services to modern rural information service system. It is important that development an access platform based IP technology, which supports multi-service access in order to implement a variety of types of mobile terminal equipment adapter access and to reduce restrictions on mobile terminal equipment. [C1511]

"Ridgelet transform with application in ground penetrating radar processing"

Ridgelet is the new development of wavelet dealing with line singularities in signals. In goundpenetrating radar (GPR) signal, the direct wave is a strong noise which has line singularity. In time-space domain, the useful information in GPR signal is badly polluted by strong direct wave so that the underground targets can not be recognized correctly. Ridgelet overcomes the disadvantages of wavelets in dealing with high dimensions that it can effectively represent singularities along lines or hyperplanes. Concerning the characteristics of GPR signals, the ridgelet transform is employed to remove the background noise and separate the direct wave. The simulation results for real GPR signals demonstrate its effectiveness. [C1512]

"3D template based automatic landmine detection from GPR data"

In this paper, we present a 3D template based landmine automatic detection from GPR data. A 3D template is chosen and a 3D fuzzy template is designed. The choice of the 3D template is decided based on smooth changing position of the maximum amplitude at every C-scan as well as the threshold of its background average intensity. The 3D fuzzy template is extracted from 3D template crisp data. GPR similarity for both the 3D

template as well as its fuzzy template is examined by crisp similarity measure and fuzzy similarity measure respectively. The cross correlation is applied as a similarity measure in crisp case while a fuzzy similarity measure, based on similarity of a measured data to a fuzzy rule, is applied in the fuzzy template case. Results of similarity applying both methods for automatic landmine detection are presented. The results show the promise of 3D fuzzy template and the fuzzy similarity measure in differentiating a landmine from other objects. [C1513]

"An Open Source Architecture for Low-Latency Video Streaming on PDAs"

This paper presents a open-source system for low- latency video streaming on PDAs, specifically addressing mobile video surveillance requirements. The system is based on H.264 and suitably modified to obtain the best trade-off between image quality and video fluidity, working also at very limited bandwidths. Moreover, the used controls allow to keep the number of lost frames very low. A large set of experiments and comparisons have been carried out and the achieved results demonstrate the efficacy and efficiency of our system. [C1514]

"Advanced Multicast and Broadcast Content Distribution in Mobile Cellular Networks"

Recently 3GPP (Third Generation Partnership Project) has standardised MBMS (Multimedia Broadcast Multicast Services) enabling broadcast and multicast transmissions over GPRS (General Packet Radio Service) and UMTS (Universal Mobile Telecommunications System). Hence it makes an efficient usage of radio resources possible. 3GPP and 3GPP2 introduced the specification of IMS (IP Multimedia Subsystem) and MMD (Multimedia Domain), receptively, which both are responsible for resource, admission and charging control. It allows for cost efficient and flexible provision of enriched multimedia services over IP networks. Up to now the controlling IMS and MBMS are separated subsystems sharing no common interfaces. This paper introduces both systems and depicts ongoing standardisation activities regarding their interworking. Finally, it proposes a service provision architecture and describes required signalling flows which enable the provision of multicast streaming using the MBMS specifications not only as access bearer technology. Thus, we present a step towards the evolution of IMS enabling it with multicast and broadcast capabilities. [C1515]

"A Wide Band Coherent Ice Penetrating Radar Receiver and Related EMC Considerations"

We have accomplished a prototype of wide band Coherent ice penetrating radar system which can be used for polar ice depth measurement. The radar uses pulse compression and Coherent integration techniques and works in the VHF band. Using different transmit power, the system can operate in both surface-based and airborne applications. A dual-channel receiver is introduced for better performance on different layer' s return signals. Related EMC considerations are also given. [C1516]

"A Back-projection algorithm to stepped-frequency synthetic aperture through-the-wall radar imaging"

Back-projection imaging algorithm is widely used in through-the-wall and GPR imaging because of the high image quality and being compensated easily. In this paper, the author introduce the back-projection algorithm to the stepped-frequency through-the-wall radar and put forward the time-minimization method to eliminate the wall's effects, such as refraction, changing in speed and attenuation. Proof of concept is provided using real data collected in a laboratory environment. The results show that the BP algorithm can outputs a high quality image and the time-minimization method can eliminate the wall's effect very well. [C1517]

"Subaperture wiener filter construction for time-varying RFI suppression in UWB SAR"

Ultra-WideBand synthetic aperture radar (UWB SAR), operating in the very high frequency/ultra-high frequency bands, has foliage and ground penetrating capability to detect targets hidden in forest or under the ground. The existing services such as television, radio and communications, referred to as radio frequency interference (RFI), degrade the quality of focused UWB SAR image. The Wiener filter has been found to have superior suppression performance and be more computationally efficient than other RFI suppression methods but its construction needs additional recorded RFI data, which increases the radar system complexity. In this paper, a subaperture Wiener filter (SWF) construction method is proposed, which does not require additional recorded RFI data and can deal with the time-varying RFI. The proposed SWF has been proved efficient by real UWB SAR data. [C1518]

"Technology roadmap process to compare commercial broadband technologies available to SME and SOHO owners in South Arica"

A technology roadmap process is proposed to determine the stakeholders in the broadband Internet arena as

well as their possible impact on future broadband adoption in Southern Africa. The current status for available broadband technologies is accessed and then compared to the technology specification as provided by standards authorities or technology providers. New broadband technologies, currently in advanced pilot projects, are identified and their possible impact on current broadband technologies is discussed. The importance of standards in the roll out of new technologies is assessed and recommendations regarding commercial broadband technologies available to SME and SOHO in South Africa are made. [C1519]

"An antenna array for the detection of objects buried in various soil media"

In this paper the ground penetrating radar is modified such that the effect of the ground bounce and the antenna coupling is minimized. This is done through the use of two transmitter antennas instead of one. The will totally reduce the antenna coupling effects, but the ground bounce is to some extent dependant of the surface roughness of the ground. In this research the ground has been assumed to have a planar surface. The effect of the dielectric constant of the ground on the system is also studied. [C1520]

"Application of a dielectric lens for focusing of a GPR"

It will be investigated whether the resolution of ground penetrating radar (GPR) can be improved using a dielectric lens for focusing the transmitted waves. For the design of the entire GPR system a 3D field simulation will be used. The theoretical results will be compared with measurement results of a real GPR system which has been set up according to the design considerations which are presented in this contribution. [C1521]

"Detection of buried metal structures using ground penetration radar techniques: A numerical study"

This paper investigates the resonance characteristics of metal structures based on numerical analyses. The complex natural resonances (CNR) are calculated using the FDTD method. Although CNRs are intrinsic to a metal structure, it is found that many factors affect their extraction from the scattered signals. We investigate some of these factors and point out useful guidelines that may be employed in the characterization of buried metal. [C1522]

"FDTd modeling of scattering from distant buried objects"

The purpose of this work is to study the propagation of the lateral wave over long distances in the earth and see what the scattering signal is at the radar system. This study is done through simulations with the finite difference time domain (FDTD) method [K.S. Yee, 1966; A. Taflove, 1995]. [C1523]

"Investigation into detection of malignant tumor using Singularity Expansion Method (SEM)"

In this work, we would like to explore the use of SEM to detect cancerous growth in breast tissue. An SEM approach requires aspect independent poles to be extracted first and then uses this information to determine, for example, the E-pulse for discrimination. [C1524]

"Evaluation of the Multicast Mode of MBMS"

Multicasting is an efficient way for delivering rich multimedia applications to large user groups as it allows the transmission of packets to multiple destinations using fewer network resources. Content and service providers are increasingly interested in supporting multicast communications over wireless networks and in particular over universal mobile telecommunications system (UMTS). To this direction, the third Generation Partnership Project (3 GPP) is currently standardizing the multimedia broadcast/multicast service (MBMS) framework of UMTS. In this paper, we present an overview of the MBMS multicast mode of UMTS. We analytically present the multicast mode of the MBMS and analyze its performance in terms of packet delivery cost under various network topologies, cell environments and multicast users' distributions. Furthermore, for the evaluation of the scheme, we consider different transport channels for the transmission of the data over the UTRAN interfaces and propose a cost based scheme for the efficient radio bearer selection that minimizes the packet delivery cost. [C1525]

"Discovering Feasible Protocol Stack Combinations in Beyond 3G Systems: Information Model, Search Algorithms and Performance"

Beyond 3G wireless systems will be vested with dynamic reconfiguration capabilities capable of adapting their protocol stacks during runtime to optimize spectrum utilization and, thus, better meet the ever-changing service demands. For protocol stack reconfiguration to become a practical capability, a language for modeling, expressing and circulating data essential to reconfigurable protocol stacks is necessary. We present a generic

object-oriented information model for describing the feasible combinctions of protocol layers into protocol stacks. The model supports the derivation of an associated ontology specified in standard W3C semantic languages (OWL). We introduce a novel algorithm for discovering all the feasible protocol layer combinations that render valid protocol stacks, thus facilitating the selection of suitable ones. We assess the performance of a prototypical implementation of our algorithm used to discover feasible protocol stack combinations for the GPRS, UMTS and IMS access standards. Finally, we present our conclusions and provide directions for future work. [C1526]

"Towards Seamless Mobility Support with Cross-Layer Triggering"

This paper presents mechanisms for collecting and processing cross-layer information from mobile devices and networks. That information is further used to feed the handover decisions as a part of the seamless mobility support. This paper presents a mechanism called Trigger Management, developed within the EU's Ambient Network project, for collecting and processing cross-layer trigger information. The trigger management system is bound to the VERHO vertical handover controller system, enabling the handover decisions based on several input parameters. [C1527]

"Ultrawideband hybrid EBG/ferrite ground plane for low-profile array antennas"

Ultrawideband and low-profile antennas are considered a most critical component in the development of low-band systems such as airborne foliage penetrating radar and EW applications. For these applications it is clear that an ultrawideband and low-profile ground plane needs to be developed and implemented to achieve the desired specifications and enhanced performance. In this paper a novel ultrawideband and low-profile hybrid EBG/ferrite ground plane is presented. The hybrid ground plane design offers ultrawideband operation beginning in the 100s of MHz with the presented design version offering an operational bandwidth exceeding 22:1 starting at 170 MHz. The use of this ground plane will allow for the practical and effective implementation of the new highly sophisticated and ultrawideband antenna systems developed at Raytheon. [C1528]

"Design and implementation of a golay-based GPR system for improved subsurface imaging"

A bench-top prototype GPR using Golay codes has been designed and implemented. The preliminary experimental results show a reasonable good improvement in terms of SNR. This work is still in progress. Improvements related to some of the other components and subsystems are underway. In particular, we are experimenting with innovative antenna designs having minimum influence on the transmitted waveform, and improved image processing algorithms. [C1529]

"Calculation of Available Bandwidth for UMTS-HSDPA/HSUPA Users"

The article discusses an analytical method of determining average bandwidth offered to a user in UMTS applying HSDPA (high speed downlink packet access) and HSUPA (high speed uplink packet access) technologies. The application of HSDPA/HSUPA increases the transmission speed between the base station and the end-user's terminal in UMTS networks. This has, in turn, made it possible for cellular systems operators to offer new services that require greater data flow both in the uplink direction and downlink direction such as, e.g., broadband Internet access. [C1530]

"Differential evolution approach to the grid-based localization and mapping problem"

A new solution to the Simultaneous Localization and Modelling problem is presented. It is based on the stochastic search of solutions in the state space to the global localization problem by means of a differential evolution algorithm. A non linear evolutive filter, called Evolutive Localization Filter (ELF), searches stochastically along the state space for the best robot pose estimate. The proposed SLAM algorithm operates in two steps: in the first step the ELF filter is used at a local level to re-localize the robot based on the robot odometry, the laser scan at a given position and a local map where only a low number of the last scans have been integrated. In a second step the aligned laser measures together with the corrected robot poses are use to detect when the robot is revisiting a previously crossed area. Once a cycle is detected, the Evolutive Localization Filter is used again to re-estimate the robot poses in order to integrate the sensor measures in the global map of the environment. The algorithm has been tested in different environments to demonstrate the effectiveness, robustness and computational efficiency of the proposed approach. [C1531]

"Accurate posterior probability estimates for channel equalization using gaussian processes for classification"

In this paper we propose to use Gaussian processes for classification (GPC) for solving the channel equalization problem. GPC provides not only accurate decisions as other nonlinear machine learning tools do, i.e. support

vector machines or neural networks, but it also assigns posterior probabilities to each one of its output. This is a significant advantage of GPC with respect to other machine learning tools for channel equalization, because the channel decoder benefits from its soft outputs to provide significantly better error correcting capabilities for the entire communication system. As, for previous schemes, the channel decoder had to rely on the hard decisions given by the equalizer, because the output of these methods cannot be transformed into posterior probabilities. We show that the GCP equalizer is able to estimate posterior probabilities accurately in a variety of real digital communications channel. [C1532]

"The UMTS business case in emerging markets economic considerations of network upgrade"

With universal mobile telecommunications system (UMTS) technology reaching maturity stage, current third generation (3G) mobile network deployment increasingly spreads to developing, "follower" markets; at the same time, technical feasibility issues are gradually replaced by economic considerations. We introduce a technology migration model explaining end-user market behaviour, and propose a modular, structured business modeling approach to simulate the economic impacts of an operator's go/no-go decision regarding new technology network roll-out. Our model is illustrated by applying it to a realistic case based on an emering-market incumbent operator. [C1533]

"Teaching protocol exchanges over cellular air interfaces"

The evolutionary path taken by cellular standards to the current and future standards is incomplete without fully understanding the older standards. The comprehension of the GSM standard, specifically the procedures for protocols exchange over the air interface will help students understand radio resource allocation procedures in GPRS and UMTS, and will ultimately assist future communication engineers to be able to design and solve problems related to these cellular standards. In this paper we describe the novel architecture of our teaching software, developed and programmed in Java. We present all the user interfaces and show how it can be used to assist in teaching, by presenting how the mobile station and the GSM/GPRS network exchange data frames over the air interface with their associated protocols. Finally the uniqueness of this teaching tool was proved from the stand point of our modular architecture. [C1534]

"Ultra wide band antenna for a multimode cellular phone"

This paper presents the design of the antenna system of the first multimode cellular-WiFi phone which operated as both a GSM cellular phone for wide area coverage and a WiFi (IEEE 802.11a,b) local area network phone providing broadband data connection and phone call services via voice over IP (VOIP). [C1535]

"An equivalent model of loaded traveling-wave antennas in simulating GPR system performance with FDTD"

First Page of the Article [C1536]

"On the feasibility of using GPR technology for the UXO detection and discrimination in the volcanic soil of Hawaii"

In this paper we describe the recent results from an ongoing project at the University of Hawaii to use advanced GPR technology for the detection and discrimination of UXO in the high iron content volcanic soil of Hawaii. To help determine a suitable frequency range for detecting targets at two feet depth from the surface, a soil characterization effort has been implemented. Both the dielectric and magnetic properties of the earth soil are being measured using a unique shunt capacitance terminating a transmission line method and a recently fabricated TEM cell. Both the reflection and transmission S-parameters are being measured to determine both the complex permittivity and permeability of the soil. Furthermore, a TLS-Prony method together with FDTD 3D simulations of typical detection environments are being used to extract the complex natural resonance frequencies (CNR) of targets from the late arrival signals associated with the scattering mechanisms from these targets. A UXO testbed has been development to help experimentally validate simulation results and provide data to check and improve the accuracy of the detection/discrimination algorithm. Results from this study including dielectric and magnetic characterization of the volcanic soils, and CNR of typical UXO targets encountered in Hawaii will be presented. [C1537]

"Increasing data-bandwidth to instruction-set extensions through register clustering"

The conflicting requirements of performance and flexibility in today 's embedded system market are forcing system designers to use more and more of the so called configurable or customizable processor cores. Such processors tend to meet the demanding performance constraints by accommodating application specific

instruction set extensions (ISEs) which have, naturally, become a vital component of current processor customization flows. One major bottleneck in maximizing ISE performance is the limitation on the data-bandwidth between the general purpose register (GPR) file and the ISEs. For improved performance, it is desirable to have a large data-bandwidth from the GPRs to ISEs. However, the tight area constraints of modern embedded processors often restrict the GPR I/O of ISEs to save port area of the register files. This paper presents a novel approach to increase the GPR I/O of ISEs without significantly increasing the size of the GPR files. This is achieved by applying the concept of register clustering, common in many VLIW architectures, to single-issue processors with high performance ISEs. Such clustering often causes extra register moves in compiled code. This work also presents an algorithm to minimize such register moves. The benchmark results presented in this paper show that our solution can significantly reduce the area overhead of many-port GPR files without sacrificing the performance improvements through ISEs. [C1538]

"Multi-objective optimization for peer-to-peer multipoint video conferencing using layered video"

We present a multi-objective approach and corresponding formulations for the optimal operation of a peer-to-peer multipoint video conferencing system. The system aims end-points with low bandwidth connections (i.e., single full-quality video in and out) and makes use of layered video to achieve that each participant can view any other participant's video at anytime. This may cause some of the peers receive lower quality video. Moreover, since the peers may have to forward the video they receive, this may cause larger delays for the peers that receive the video after it is forwarded by several peers. Objective formulations to determine the number of lower quality video receiving peers and the delay experienced by the peers are derived. A multi-objective optimization approach for minimizing both simultaneously is described. An extension that allows multiple video requests from the participants with sufficient bandwidth is proposed. Formulations to minimize the number of lower quality video receivers while maximizing the number of additional video requests are presented. A multi-objective optimization technique assigning importance weights to each of these objectives and its sensitivity to changes in the weights are shown. The use of multi-objective optimization techniques within a system is demonstrated through example scenarios. The effects of our optimization approach on the percentage of base quality receiving peers are examined through simulations. [C1539]

"Distributed Tuplespace and Location Management-an Integrated Perspective using Bluetooth"

Location based or "context aware" computing is becoming increasingly recognized as a vital part of a mobile computing environment. As a consequence, the need for location-management middleware is widely recognized and actively researched. Location management is frequently offered to the application through an API where the location is given in the form of coordinates. It is the opinion of the authors that a localization API should offer localized data (e.g. direction to the nearest pharmacy) directly through a transparent and integrated API. Our proposed middleware for location and context management is built on top of Mobispace. Mobispace is a distributed tuplespace made for J2me units where replication between local replicas takes place with a central server (over GPRS) or with other mobile units (using Bluetooth). Since a Bluetooth connection indicates physical proximity to another node, a set of stationary nodes may distribute locality information over Bluetooth connections, and this information may be retrieved through the ordinary tuplespace API [C1540]

"Resource Sharing and Discovery on Top of IMS"

First Page of the Article [C1541]

"Simulative Considerations for Future 4G Hierarchical Mobility Management in All-IP Networks"

The convergence of future fixed and wireless networking more and more requires solutions for transporting realtime application data to IP enabled mobile devices and mobile networks. Even if the general Mobile IPv6 protocol performs sufficient in macro environments with non-realtime requirements, seamless mobility demands some more enhanced protocol procedures in between the mobile client and the involved network entities. Limiting the effect of handovers has the potential to considerably improve handover performance in terms of latency and packet loss. This contribution is going to present simulative studies on the performance of a future 4G Hierarchical Mobility Management approach. The demonstrated simulation scenarios comprises 3 independent access domains, twelve access routers, and up to 72 mobile clients that communicate in accordance with the popular IEEE 802.11 wireless LAN standard, as one of the possible wireless access networks in a future All-IP network infrastructure. [C1542]

"Distributed Data Storage with Strong Offline Access Support"

In this paper, we propose a distributed data storage framework that supports unrestricted offline access. The system does not explicitly distinguish between connected and disconnected states. Its design is based on a

lock-free distributed framework that avoids update conflicts through file versioning. The feasibility of this framework is confirmed by a proof-of- concept implementation. We also demonstrate that the proposed lock-free replica synchronization algorithm scales well. A future work will include also direct support for non-versioned files. [C1543]

"Media-Push Technology in Multimedia Mobile Environment"

First Page of the Article [C1544]

"Evaluating Video Streaming Over GPRS/UMTS Networks: A Practical Case"

In this paper, we focus on analyzing video streaming service performance on real networks. We propose a non intrusive methodology based on mobile devices as clients, instead of using them as modems. Our objective is to provide a more realistic test environment using actual mobile devices in real conditions of network load and radio propagation while taking into account the intrinsic mobility of mobile subscribers. This solution allows us to follow the end to end performance even when handover between different access technologies is performed. Using this methodology we carry out a study of video streaming behavior over GPRS and UMTS networks. Outstanding results related with delays, jitter, lost packets and sequence errors have been obtained. Also other conclusions about video quality, such as PSNR, have been achieved. Moreover, we analyze the impact of mobility issues such as handover or cell reselection. [C1545]

"Architecture Concept of a Wireless Body Area Sensor Network for Health Monitoring of Elderly People"

First Page of the Article [C1546]

"Proposed Techniques to Dimension a Push-To-Talk over Cellular Server"

First Page of the Article [C1547]

"Dual Polarized UHF/VHF Honeycomb Stacked-Patch Feed Array for a Large-Aperture Space-borne Radar Antenna"

As penetration depth through vegetation and ground becomes more important in active remote sensing applications, there is a shift toward using lower frequencies. To facilitate imaging of ground water, soil moisture and composition, and penetrating through forest canopies, a dual-band synthetic aperture radar (SAR) has been proposed to operate at VHF and UHF frequencies. To accommodate weekly repeat observations from LEO, a swath of roughly 350 Km is needed, requiring a 30-m long antenna aperture from the SAR design point of view. The beams of the UHF and the VHF antennas must coincide in the cross-track direction, resulting in antenna widths of 3m and 11m, respectively. A stacked, linearly dual-polarized patch array feeding a 30 meter diameter parabolic reflector is proposed for this application, which synthesizes near-rectangular effective apertures on the reflector. Using a mesh reflector technology, the mass of such an antenna configuration is about ten times smaller than a corresponding phased-array antenna. A scaled-frequency version of the feed array was initially designed, built, and tested. It was also integrated with a scaled reflector antenna to verify the performance of the overall system. The actual frequency version was then designed, built, and tested. The design of the dual-band stacked array and the power dividers will be discussed, the fabrication process explained, and the approaches used for optimizing the performance characteristics will be presented. The measurement results for return loss on both transmit and receive, isolation, and radiation pattern will be presented and shown to be in good agreement with the simulated results. [C1548]

"Tork: A Variable-Hop Overlay for Heterogeneous Networks"

We present a new variable-hop peer-to-peer overlay that combines active stabilization and opportunistic maintenance to provide overlay nodes with a large range of hop-count versus peer bandwidth capabilities. Because of the variable-hop design, Tork is suitable for use in large-scale heterogeneous peer-to-peer networks where peers have a range of bandwidth capacities. For high-bandwidth peers Tork has O(I)-hop performance, and for low-bandwidth, most likely mobile peers, Tork has multi-hop performance. We further show that mapping overlay messaging to multi-destination routing in the underlay reduces Tork message overhead by up to 35% [C1549]

"Enabling rapid and cost-effective creation of massive pervasive games in very unstable environments"

Pervasive gaming is a new form of multimedia entertainment that extends the traditional computer gaming experience out into the real world. Through a combination of personal devices, positioning systems and other sensors, combined with wireless networking, a pervasive game can respond to player's movements and context and enable them to communicate with a game engine and other players. We review our recent deployment examples of pervasive games in order to explain their distinctive characteristics as wireless ad-hoc networking applications. We then identify the network support challenges of scaling pervasive games to include potentially mass numbers of players across extremely heterogeneous and unreliable networks. We propose a P2P overlay capable of storing large amount of game related data, which is the key to combating the loss of coverage and potential dishonesty of players. The proposed protocol decreases the deployment costs of the gaming infrastructure by self organization and utilizing storage space of users' devices. We demonstrate scalability and increased availability of data offered by the proposed protocol in simulation based evaluation [C1550]

"Overview of rate adaptation algorithms based on MIMO technology in WiMAX networks"

Wireless communication technology has been evolving over the years. From the 2.5G era where the general packet radio service (GPRS) offered very low data rates of 171.2 Kbps to the 3.5G era where the high-speed downlink packet access (HSDPA) offered data rates of 10.8 Mbps, the increased data rates can support the delivery of richer mobile multimedia contents to end-users. With the growing demand in data throughput, the IEEE 802.16e promises to deliver high data rates over large areas to a large number of users in the near future. This exciting technology can rapidly provide broadband access to locations in the world's rural areas where broadband is currently unavailable, as well as competing for urban market share. In this paper, we will investigate the research issues in devising rate adaptation algorithms at the WiMAX PHY and MAC layers. We will propose a framework in which the PHY layer metrics can be passed into the MAC layer under practical simulation environment [C1551]

"Performance Evaluation of IEEE 802.11b, IEEE 802.11g and GPRS/EDGE Based on Query Retrieval Time"

In this article, two popular database connection types of mobile devices, which are Windows Authentication over IP (internet protocol) and IIS (internet information services) [1], are used and IEEE 802.11 standards, namely IEEE 802.11b and IEEE 802.11g, and GPRS/EDGE technology are evaluated with respect to query retrieval time of different number of attributes and records. In both concepts, it is obvious that a successful connection can be established, but some differences occur on query results retrieval time as the database grows. Experimental results pointed out that while using IIS connection method IEEE 802.11b has less query retrieval time than IEEE 802.11g and GPRS/EDGE, in contrast to this, IEEE 802.11g is obviously time superior than IEEE 802.11b and GPRS/EDGE while using IP connection method. [C1552]

"Methods for Seamless Vertical Handoff between UMTS and WLAN"

3G cellular networks and 802.11 wireless LANs have complementary advantages to each communication systems. Interworking between UMTS and WLAN can be used to pursue two advantages of both high speed access network and a broad cell coverage. How to reduce handoff latency between UMTS and WLAN is a so important issue, so in this paper we investigate the handoff latency and separate handoff delay into several parts in both upward handoff (from WLAN to UMTS) and downward handoff (from UMTS to WLAN). In order to reduce the handoff delay, we use cross-layer information between layer 2 and layer 3. [C1553]

"Verifying Behavior of L4 Microkernel based Mobile Phone"

The embedded mobile phone based on L4 microkernel are known to be difficult to predict their behavioral correctness since L4 microkernel communicates with various components for their execution. That means its correctness is not easy to guarantee by using traditional design and testing methods. In this paper, we propose a formal approach to prove the correctness of L4 based mobile platforms. [C1554]

"Multihoming in Nested Mobile Networks with Route Optimization"

With the development of wireless technologies, devices (laptop, PDA, etc.) become easily mobile. When they are moving together, they can form a mobile network. NEMO basic support was standardized to provide network mobility. As it does not define any solution for route optimization, it suffers from triangular routing. Optimized NEMO (ONEMO) is one of the proposed solution to solve this problem. In this paper, we study ONEMO in nested and multihomed mobile router (MR) configurations. One mechanism to select the best default router using policies is proposed. Information is needed to define policies in nested configurations: the nested level, and the connectivity provided by the root-MR. We propose to optimize an option of the router advertisement (RA) message to forward that information to the other MRs in the nested tree [C1555]

"Adaptive Data Scheduling for Mobile Broadcast Carousel Services"

Several mobile operators have now started "broadcast-like" services, which are based on the channel delivery model, known from classical broadcast services like radio and TV. Examples are goal notification for football fans (one club = one channel), news channels and mobile television in general. In order to efficiently support mobile broadcast services 3GPP has standardized multimedia broadcast multicast services (MBMS) for UMTS and GPRS in Release 6. The delivery of multicast/broadcast channels over capacity limited radio links requires intelligent scheduling mechanisms that make best use of the resources. The scheduler has to determine what content should be sent at which time in order to satisfy as many clients as possible. This work focuses on carousel based content delivery, which means periodical retransmission of each content. The paper investigates the performance and computational complexity of different scheduling algorithms applied for mobile multicast. The algorithms then are enhanced to fulfil the identified requirements of MBMS which are mainly adaptation to new contents, adaptation to network congestion and adaptation to the clients' demands. The simulation results are compared to conclude with recommendations for scheduling of mobile broadcast carousel services. [C1556]

"Ultra-Low Cost GSM Phones Enabled by Baseband-Radios with Integrated Power-Management"

A system on chip, providing all functions needed for a GSM/GPRS mobile phone, is presented. Because of the high integration level, one can build up ultra-low cost and ultra-small size mobile phones. [C1557]

"An Intelligent Assistant for Context-Aware Adaptation of Personal Communications"

Personal communications are facing many challenges created by mobility and convergence in today's communication networks. People often find themselves interacting with their devices in attention-constrained environments and deal with a bewildering variety of communication services, devices and access technologies. Although context awareness seems to be the best answer to these challenges, most of the already developed context-aware solutions did not make their way to the consumer market because they focused on context provisioning (acquisition and modeling) and fell short from proposing concrete architectures for context-based adaptation of user communications. In this paper, we discuss the basic requirements for communication adaptation and we define the main characteristics of a communication session. Then, we propose INCA (intelligent network-based communication assistant) by describing its architecture and its behavior according to a previously defined reference scenario. [C1558]

"A Heuristic Technique for Solving Dual-Homing Assignment Problem of 2.5G Cellular Networks"

2.5 cellular network topology involves grouping of NodeBs into Radio Network Controllers (RNCs), RNCs into serving GPRS support nodes (SGSNs), and RNCs into mobile switching centres (MSCs), so as to minimize the total cost of operation (TCO) including equipment cost, cable cost, installation cost, cost of call setup and handoff cost. The problem has been traditionally solved under single-homing consideration with an objective to reduce the TCO over a certain period of time. However, a single homing solution may not be effective with a group of subscribers having a specific diurnal pattern of their inter-SGSN mobility. In this scenario dual-homing of RNCs may be one of the approaches to reduce the TCO. In this paper, we have addressed the problem by making RNCs dual-homed. The problem is formulated as a combinatorial optimization problem and solved using a heuristic technique. The performance of the heuristic technique is compared with an exhaustive search technique for small size problems and it is found that the proposed technique is capable of finding a good quality solutions [C1559]

"One-Pass Authentication and Key Agreement Procedure in IP Multimedia Subsystem for UMTS"

In IP Multimedia Subsystem (IMS) of UMTS, both packet-switch domain and IMS authentications are necessary for the IMS subscriber, so-called the two-pass authentication. However, the IMS authentication is carried out by IMS authentication and key agreement (IMS AKA). Since IMS AKA is based on 3GPP AKA that is used to Packet-switch domain authentication, almost all of the operations are the same. It is inefficient that almost all involved steps in the two-pass authentication are duplicated. Hence, Lin et al.'s proposed the one-pass authentication to increase efficiency of the IMS authentication. Unfortunately, in addition to some security problems, the one-pass authentication procedure only has unilateral authentication without capabilities of mutual authentication and key agreement. Therefore, this paper proposes an one-pass AKA procedure, which not only avoids the lacks of the one-pass authentication procedure but also does not lose the efficiency. [C1560]

"Detecting Curved Underground Tunnels using Partial Radon Transforms"

The Radon transform (RT) is known to be effective in detecting lines in noisy images, but it is not capable of

detecting curves unless the curve parametrization is given. In this paper, partial Radon transforms (PRT) are investigated as a tool to detect curved features such as underground tunnels in ground penetrating radar (GPR) images. The algorithm applies the Radon transform to small batches of the total image and updates the tunnel position parameters as new batches are used. Missing data, as well as finding the ends of tunnels can be handled with the proposed algorithm. Performance analysis is given for various signal-to-noise ratios (SNR) and batch sizes. The effect of the curvature level on the performance is also analyzed. [C1561]

"WiMP-SCTP: Multi-Path Transmission Using Stream Control Transmission Protocol (SCTP) in Wireless Networks"

In this paper, WiMP-SCTP, which allows a host to improve its transmission goodput in wireless networks using multi-path transmission of stream control transmission protocol, is proposed. Along with a transmission mode switching scheme, two transmission modes of WiMP-SCTP, i.e., the "Data-duplicating Mode" and the "Data-striping Mode", are designed to enhance transmission goodputs for different wireless link status. The issue of path selection scenarios are investigated and the possible solution for the path selection is also discussed in this paper. [C1562]

"4G Self-Configurable System Based on Nueral Networks"

This work present the study on two types of neuronal networks for a fourth generation (4G) self-configurable wireless communications system. Simulations were made in MATLAB to study the behavior of two types of neuronal networks, back propagation network (BPN) and radial basis function (RBF) trained to discriminate signals taken from three systems of wireless communication of second (2G) and third generation (3G). When the results are observed it seems that designed network BPN, generates a smaller error of recognition in addition of which it contains a smaller number of neurons than network RBF, this reduces the system time response in addition of which it allows a saving in the memory use [C1563]

"SIP-Based Handoff in 4G Mobile Networks"

It is commonly held that 4G mobile systems were founded on the Internet joined with diverse access technologies. Future network architecture is regarded as various overlapping wireless access segments. To efficiently support seamless mobility is the most critical challenge to integrate various wireless networks in future heterogeneous networking environment. The characteristics of the lower layer protocols are understandably invisible to SIP which provides mobility in the application layer. Hence, SIP is a promising nominee for managing mobility in heterogeneous networks. However, the performance of SIP-based mobility management is downgraded resulting from adopting TCP/UDP for signaling. In this paper, a soft handoff method, namely Bi-CoA, is proposed to shorten the service interruption time when the mobile node frequently handovers between WLAN and UMTS. The simulation results show that the solution proposed in this paper can efficiently support vertical handoff in future heterogeneous wireless networks. [C1564]

"Algorithmic Approaches for Vertical Handoff in Heterogeneous Wireless Environment"

The increasing need of ubiquitous wireless connectivity is pushing towards the emergence of hybrid wireless technologies and networks merging the advantages of the different wireless standards. In correspondence to the new hybrid environment, new handoff (HO) algorithms are needed for maximizing the efficiency of the HO decision-making process and guaranteeing the best possible connectivity and service quality. Apart of considering pure connectivity parameters for HO, in the future it is also important to take in account user preferences. In this paper we propose two vertical HO (VHO) decision-making schemes, based on fuzzy logics and neural networks. The mechanism for interworking among the different wireless technologies is taken for granted. We will show that multi-parametic HO decision-making turns out to be a useful and necessary step in the development of hybrid wireless environments. [C1565]

"DVB-H-UMTS Integration at Radio Access Level"

The provision of one-to-many multimedia services to mobile users over scarce wireless resources has to be performed in a cost-efficient way. In addition to various systems optimized for this type of service, such as DVB-H, UMTS was recently enhanced for support of multimedia broadcast and multicast services (MBMS) over the existing infrastructure. Since MBMS provision will reduce the UMTS capacity for its essential point-to-point services, the integration of UMTS and DVB-H may be beneficial. In this paper, we address the integration of DVB-H at the UMTS radio access level. We present an interworking architecture and discuss necessary modifications to UMTS. [C1566]

"Increasing System Capacity in GERAN by Means of TRX Power Reduction"

In this paper we propose an efficient and simple method to improve system capacity in GSM/GPRS/EDGE radio systems. It exploits the power shaping concept and the parameter "TRX power reduction" already present in the standard and does not require major modifications to operators specific radio resource management algorithms. Power-shaping means assigning in advance (static allocation) a maximum power level to each channel before dynamically performing channel allocation. This is done by exploiting a set of suitably reused power profiles that partially organize the inter-cell interference in the available channels and make it partially predictable. This technique, thanks to the possibility of tightening the reuse factor, permits to increase the system capacity for both voice and data services if compared to most common reuse schemes or to the widely used concentric cells schemes. This is shown in the results where an interesting gain is achieved by power shaping with power reduction with respect to the other schemes. [C1567]

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с использованием специализированного программного модуля (ПИО ТУСУР)