MODELING THE QUANTIZATION EFFECTS IN DIGITAL FILTERS VIA SPICE-FAMILY PROGRAMS

Dalibor BIOLEK, Viera BIOLKOVÁ, Zdeněk KOLKA

Abstract: The paper describes an unusual approach of employing the SPICE-family circuit simulation programs in a simple analysis of digital filters, including the quantization effects. For explanation and demonstration, the evaluation version of OrCad PSpice v.15.7 is used which is available free on the Internet.

Keywords: Digital filter, quantization, OrCad, PSpice, modeling, analysis.

INTEROPERABILITY IN INFORMATION SYSTEMS

Ladislav BUŘITA

Abstract: In the introduction, the meaning of the term "interoperability" is analyzed. The requirements and recommendations for achieving the information systems (IS) interoperability are quoted from the European Interoperability Framework and the recommendation of the US Office of Electronic Government. Predominantly, the aspects of accessibility, multilingualism, security, privacy, subsidiarity, the use of open standards, the assessment of the benefits of open source software, and the use of multilateral solutions are highlighted. It is recommended to use the business-centric methodology, and move to standard mechanisms. To achieve the information systems interoperability, it is necessary to apply the architectural approaches, particularly the implementation of NATO Architecture Framework in the military environment. When constructing an interoperable IS, it is suitable to use metadata, and the model-driven and service-oriented architecture. The current research in IS interoperability is oriented to the semantic WEB, ontologies, information modeling, and knowledge bases.

Keywords: interoperability, information system, European interoperability framework, architecture, metadata, ontology.

NEW FILTERS FOR DISCRETE WAVELET TRANSFORM IN THE JPEG2000 STANDARD

Marcel HARAKAĽ, Ľubomír DEDERA, Július BARÁTH

Abstract: This article presents an application of the discrete wavelet transform in image compression with the JPEG2000 standard. The article also presents properties and some aspects of realization of the discrete wavelet transform as the base transform method in the JPEG2000 standard. Properties of the discrete wavelet transform are derived from results of experimental verification of filters used by the discrete wavelet transform.

Keywords: discrete wavelet transform, image compression, JPEG2000, FIR filter.

ACCURATE SIMULATION OF SWITCHED SYSTEMS USING VHDL-AMS

Zdeněk KOLKA, Dalibor BIOLEK, Viera BIOLKOVÁ

Abstract: The paper deals with behavioral modeling of switched systems with discontinuities. The purpose of such models is to obtain the first-order effects to verify analytic calculations or to increase simulation speed. Traditional algorithms for the time-domain analysis implemented in Spice-class simulators are based on the assumption of smoothness and continuity. Abrupt changes of system parameters or even discontinuity during switching cause numerical errors. The VHDL-AMS language brings radically different approach in comparison with Spice [1]. The system of differential algebraic equations can be formulated explicitly and can be structurally modified during simulation. The basic principles will be demonstrated on the model of boost converter with accelerated finding of steady-state solution.

Keywords: Computer simulation, switched systems, behavioral modeling, VHDL-AMS.

SOFTWARE EVOLUTION FROM A META-LEVEL COMPILER PERSPECTIVE

Ján KOLLÁR, Jaroslav PORUBÄN, Peter VÁCLAVÍK,
Jana BANDÁKOVÁ, Michal FORGÁČ

Abstract: From the viewpoint of adaptability, we classify software systems as being nonreflexive, introspective and adaptive. Multiple metalevel concepts are essential demand for a systematic language approach, to build up adaptable software systems dynamically, i.e. to evolve them. Paper presents the software evolution from a computer language perspective. Using this approach the system can be evolved not just through source code changes but even the language itself is evolving through the compiler adaptation defined on meta-levels.

Keywords: Adaptive compiler, program transformation, software evolution, system reflection, metaprogramming.

GENERAL-PURPOSE COMPUTING ON GRAPHICS PROCESSING UNITS: NEW TRENDS FOR COMPUTATIONAL ACCELERATION

Miroslav LÍŠKA, Miloš OČKAY

Abstract: GPGPU is a promising trend of using parallel, computational power of GPU for general-purpose computing. We are presenting a simple comparison of CPU and GPU methods and rules, which are computing results. We are showing possibilities how to use GPU for general-purpose computing. Short list of applications is also included.

Keywords: GPU, GPGPU, General-purpose computing, Parallel computing, Compute unified device architecture, Close to metal.

INFORMATION RETRIEVAL BY ART NEURAL NETWORKS

Igor MOKRIŠ, Roman KRAKOVSKÝ

Abstract: The paper deals with the ART neural networks with unsupervised learning based on adaptive resonance theory ART for processing of text documents in nature language. The paper is focused on the ART neural network description, principle of adaptive resonance and its separate phases in t he learning process. Next, the paper continues with utilization of ART neural networks in the text documents processing with respect to the clustering of document by sequence of keywords. On the end the paper introduces description of an algorithm for automatic generation of ontological construction by means of the projective ART neural network PART based on the association of keywords which is performed by Bayesian network.

Keywords: ART neural networks, clustering of text documents, association of keywords and documents, Bayesian network, ontology construction.

ANALYSIS OF MOBILE RADIO CHANNEL PREDICTION METHODS

Vladimír PŠENÁK, Vladimir WIESER

Abstract: The effective handling of the radio resources is important to keep declared quality of service (QoS). A basic hybrid link adaptation algorithm updates technical link parameters according to the delayed feedback information from receiver. The fast power adaptation if essential for the third generation of mobile radio network UMTS, because active users are sharing the same carrier frequency (WCDMA). A prediction of future channel state can be used to eliminate feedback delay and power control command transport delay; therefore the link adaptation becomes more efficient. We have analyzed and simulated prediction methods used for prediction of the mobile radio channel state in this article. Implementation of proposed methods into the hybrid link adaptation algorithm should increase the efficiency of data transmission among user equipment and base stations (uplink).

Keywords: hybrid link adaptation, mobile radio channel, prediction methods.

DRM BASED ON THE ROBUST DIGITAL WATERMARKING

Radovan RIDZOŇ, Dušan LEVICKÝ

Abstract: The geometrical attacks are still open problem for many digital watermarking algorithms used in present time. Most of geometrical attacks can be described by using affine transforms. This article deals with digital watermarking in images robust against the affine transformations. The new approach to improve robustness against geometrical attacks is presented. The discrete fourier transform and log-polar mapping is used for watermark embedding and for watermark detection. Some attacks against the embedded watermarks are performed and the results are given.

Keywords: digital watermarking, geometrical attacks, discrete fourier transform, log-polar mapping

THE APPLICATION OF MORPHOLOGICAL FILTERS IN SUBBAND CODING

Jozef ŠTULRAJTER, Milan LEHOTSKÝ, Marcel HARAKAĽ

Abstract: Subband coding system using morphological filters in analyzing and synthesizing filter banks is described in this paper a standard method of morphological decomposition is realized by decomposition of the input image to the subimages created by objects of certain size. Perfect reconstruction is reached by adding all subimages. The purpose is to design system BAF/BSF using the bank of morphological systems with perfect reconstruction of the image.

Keywords: morphological filters, morphological transformation, subband coding, filter banks, morphological operations.

NETWORK ACCESS CONTROL TECHNOLOGIES FOR SECURING INTERNAL NETWORKS

Július BARÁTH, Ľubomír DEDERA, Marcel HARAKAĽ

Abstract: Today, networks must face the threat of their systems being compromised by misuse or malicious access. The paper presented examines the role of Network Access Control (NAC) and compares approaches that can help to:

- reduce the risk of security incidents and increase compliance with security policies by enforcing IT security policies as a prerequisite for network access,
- dramatically reduce the number and severity of security events and aid in regulatory compliance.

Adding Network Access Control (NAC) to an existing network is a dramatic and significant change to the physical network. When NAC is in place, the network is no longer a neutral substrate for moving packets around as quickly as possible. Instead, it becomes a security barrier which can authenticate users, evaluate the security of end-point systems, and apply access control focused on the user and his/her security status. A NAC-enabled network is no longer a utility, like power and water, but must be tailored to fit organizationally into networking, security, and desktop management teams to be effective **Chyba! Nenalezen zdroj odkazů.**.

Keywords: Network Access Control, network security, Network Admission Control.

QUALITY OF SERVICES IN THE IP NETWORKS FOR MULTIMEDIA COMMUNICATIONS

Milan GOTTSTEIN

Abstract: Nowadays, a question about convergence voice and data networks is still more relevant. The best solution for convergent networks is platform based on TCP/IP protocol. These types of nets weren't projected for multimedia transfers in the real time; therefore we need a consistent solution of quality of services. This contribution indicates a possibility, how to solve QoS in IP networks, moreover, shows results and influence of some precautions towards QoS, according an original simulation model.

Keywords: Quality of service – QoS, Voice over IP – VoIP, IP networks, Simulation of QoS in IP networks.

CURRENT IP TELEPHONY SECURITY PROBLEMS

Jaroslav DOČKAL

Abstract: We often ask this question: Why invest to expensive Cisco etc. devices and not to use free software. This article is looking for an answer for this question by this way: firstly article shows results of laboratory experiments that illustrate how IP telephony is not resistant to network attacks. Secondly it describes possibilities that dispose IP telephony involved into Cisco network infrastructure.

Keywords: Security, IP telephony, attack, Snort, SIP, Call Manager.

A MICROSTRIP PHASE SHIFTER AS AN DRIVEN ELEMENT OF DYNAMIC PHASED ARRAY

Ján HARING, Norbert MAJER, Peter POLOHA, Rudolf HRONEC

Abstract: An antenna system is a system compound from simply radiators (dipoles, microstrip antennas), which together form desired radiation pattern. During form a radiation pattern of antenna system the main emphasis is on the width, contour and direction of orientation. By the assistance this way of created patterns it is possible a radiation energy of antenna system to rout into desiderative direction, the reduce interference and increase efficiency entire transmission. In practice are known several techniques which can form radiation pattern of antenna system. The article deals with by description of technique based on feeding particular elements antenna system by different phase signals.

Keywords: Interference, Smart Antenna, Beamsteering, Phase Shifter, Microstrip Line.

RADIO WAVE PROPAGATION PREDICTION ALGORITHM BASED ON ITU-R RECOMMENDATIONS SUITABLE FOR IMPLEMENTATION IN INFORMATION SYSTEM

Marek HOVANEC, Martin MARKO

Abstract: An accurate prediction of the field strength and propagation loses is necessary for proper base stations deployment and a proper frequency planning along with meeting criteria of electromagnetic compatibility. The communication system establishment time is crucial especially in military area. Therefore, it is suitable to use computer applications for radio system projection to decrease the necessary deployment time. In the article the outcomes of dissertation thesis are briefly discussed. The primary aim of dissertation is to work out a propagation prediction algorithm based on ITU recommendations suitable for implementation in C2 information system. Some results of measurements carried out in Slovak republic are discussed. Accuracy, advantages, disadvantages and usability of existing models for a practical application in military information systems are evaluated.

Keywords: radio wave propagation, prediction methods.

NETWORK ENTRY PROCEDURE IN WIMAX

Pavel MACH, Robert BESTAK

Abstract: The article analyses the newest trends in wireless networks with focus on a standard IEEE 802.16-2004 that is also known as WiMAX (fixed WiMAX). Both, point to multipoint and Mesh network topologies are considered and the main differences between them are described. Besides, a new network topology can be distinguished when introducing relay stations to the network. Thus, several new schemes of node association procedure may be specified. The article describes the standard association procedures together with the new schemes when considering relay stations.

Keywords: WiMAX, Network entry, PMP, Mesh, Relay.

PROPERTIES OF OPTICAL WAVELENGTHS 850 nm AND 1550 nm FROM VIEW OF THEIR USE FOR WIRELESS OPTICAL LINKS

Aleš PROKEŠ

Abstract: In the paper, the parameters of an optical wireless communication link which are most dependent on the optical wavelength are discussed. The paper deals with the comparison of the atmospheric attenuation at 850 nm and 1550 nm caused by scattering by the particles present in the atmosphere and with comparison of the optical receiver sensitivity in dependence on a bit rate for both wavelength. Presented calculations are demonstrated on the connection of avalanche and PIN photodiodes with a high-impedance amplifier using a MOSFET and with a transimpedance amplifier using a bipolar junction transistor. It is assumed that the silicon photodiodes work at a wavelength of 850 nm and the InGaAs photodiodes at 1550 nm.

Keywords: Atmospheric attenuation, avalanche photodiode, PIN photodiode, meteorological visibility, optical receiver sensitivity.

DEVELOPMENT OF MODERN RADIO FREQUENCY HOPPING SYSTEMS; INTEGRATION OF RADIO NETWORKS AND ELECTRONIC WARFARE OF FH SYSTEMS

Andrej LÚČ, Juraj HRABOVSKÝ, Michal HALUZA

Abstract: The contribution is oriented to a development of FH telecommunication technology in the tactical radio systems. The content of contribution is based on Electronic Warfare (EW) requirements with a focus on modern military radio stations. Weapon systems call for reconstruction of communication systems. The content of contribution treats of the creation of radio networks. In the second part the contribution describes the jamming of FH radio systems. The analysis of FH modern communication and jamming systems are in the frequency and the time domain.

Keywords: Electronic Warfare, Recognition, Jamming, Frequency Hopping System, Pseudo-Random Sequence, Correlation, System Gain.