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COMPUTING and COMPUTATIONAL TECHNIQUES in SCIENCES

Selected Papers from the WSEAS Conferences in Spain, September 2008

Santander, Cantabria, Spain, September 23-25, 2008

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Preface

This book contains selected papers from the WSEAS Conferences in Santander, Cantabria, Spain, September 23-25, 2008. These conferences aim to disseminate the latest research and applications in Web-based Education, Power System Planning and Management, Simulation via Computational Linear Algebra techniques, Fuzzy Systems, Evolutionary computation and other relevant topics and applications.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from **http://www.wseas.org/reports**. Your feedback encourages the society to go ahead as you can see in **http://www.worldses.org/feedback.htm**

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: **www.worldses.org/indexes**

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

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Plenary Lecture I

Fuzzy Control of Electrical Drives

Professor Constantin Volosencu
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Abstract: The paper presents a short survey of some topics related to speed control of electrical drives based on fuzzy PI controllers. In the beginning the conventional control systems of the main three motors mostly used in practice: DC motors, induction motors and permanent magnet synchronous motors are taken in discussion, emphasizing the way of their PI liner controller design. The paper presents how the fuzzy PI speed controllers may be developed for all three motors. A stability analysis of the fuzzy control of DC control system, based on circle criterion is presented. Modeling and simulation Simulink diagrams with transient characteristics for different functioning regimes are presented. A comparison of the quality criteria for fuzzy control systems and linear control systems is discussed. Some ways of implementation of the fuzzy speed controllers based on interpolation and neural networks is presented.

Brief Biography of the Speaker: Prof. Constantin Volosencu graduated in 1981 the Faculty of Electrotechnics, "Traian Vuia" Polytechnic Institute of Timisoara, Romania, as an engineer in automatics and computers and he is doctor in control systems from 2000 at "Politehnica" University of Timisoara. In present he is professor at "Politehnica" University of Timisoara, Faculty of Automatics and Computers, Department of Automatics and Applied Informatics. His interest is in linear control systems, fuzzy control, neural networks, control of electrical drives, modeling, simulation, identification and sensor networks. He is author of 9 books, of more then 100 published papers, he was manager of 30 national an international research projects. Constantin Volosencu worked from 1981 to 1990 at "Electrotimis" Enterprise Timisoara, in the field of control systems for industrial machines, where he developed control equipments for a large scale of machineries, which are the objects of 27 patents.

Plenary Lecture II

Artificial Social Systems for Workflow Chart

Associate Professor Calin I. Ciufudean
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Abstract: We focus on the control of the performance characteristics of workflows modelled with stochastic Petri nets (SPN's). This goal is achieved using a new model for Artificial Social Systems (ASS's) behaviours, and by introducing equivalent transfer functions for SPN's.

ASS's exist in practically every multi-agent system, and play a major role in the performance and effectiveness chart of the agents. This is the reason why we introduce a suggestive model for ASS's. To model complex systems, such as flexible manufacturing ones, a class of Petri nets is adopted, and briefly introduced.

This class allows representing the flow of physical resources and control information data of the ASS's components. In the analysis of SPN we use simulations in respect to timing parameters in a generalized semi-Markov process (GSMP). By using existing results on perturbation analysis (e.g., delays in supply with raw materials, equipment failure, etc.), and by extending them to new physical interpretations we address unbiased sensitivity estimators correlated with practical solutions in order to attenuate the perturbations.

The novelty of the approach is that the construction of large Markov chains is not required. Using a structural decomposition, the construction system is divided into cells. We can simplify the structure of the SPN using the presented approach, which is useful when we deal with complex Petri nets, and we need to simplify these structures (e.g. graphs) in order to analyze them properly. For each cell a Markov model was derived and the probability was determined of at least N_i working machines in cell i, for i = 1,2,..,n and j , where j=1, ..., m, working material handling system (MHS) at time t, where N_i and j satisfy the system production capacity requirements. An example illustrates this approach. The results reported here form the basis of several enhancements, such as conducting performance studies of complex systems with multiple part types.

Brief Biography of the Speaker:

- Honor Member of the Romanian Society of Electrical & Control Engineering - Member of the Romanian Technical Experts Corp.
- Technical Expert of the Romanian Ministry of Justice.
- President of the Romanian Society of Electrical & Control Engineering, Suceava Branch.
- Academic Positions: Assoc. Professor, Dept. of Automatics and Computers, Faculty of Electrical Engineering and Computer Science, "Stefan cel Mare" University of Suceava, Romania.
- Fields of Scientific Activities: Discrete Event Systems, Complex Measurement Systems, Reliability and Diagnosis of Control Systems, Environmental Management.
- He published 6 books and over 120 scientific papers in conference proceedings and journals

Plenary Lecture III

Opposition-Based Computation

Assistant Prof. Shahryar Rahnamayan
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Abstract: Footprints of the opposition concept can be observed in many areas around us. But it has sometimes been known by different names. Opposite particles in physics, complement of an event in probability, absolute or relative complement in set theory, and theses and antitheses in dialectic just are some examples to mention. But for the first time, recently, Opposition-Based Learning (OBL) was proposed and then the opposition-based approaches have been introduced in different artificial intelligence areas. All of them have tried to enhance searching or leaning process by utilizing the opposition concept. Opposition-based evolutionary algorithms, opposition-based neural networks, and also opposition-based reinforcement learning are some efforts in this direction. The main idea behind OBL is the simultaneous consideration of a candidate and its corresponding opposite candidate in order to achieve a better approximation for the current solution. This lecture will introduce Opposition-Based Computation (OBC) in general and also its possible variant applications in soft computing techniques.

Brief Biography of the Speaker: Dr. Shahryar Rahnamayan received his B.Sc. and M.S. degrees both with honors in software engineering from Shahid Beheshti University, Iran. In 2007, he received his Ph.D. degree in the field of evolutionary computation from University of Waterloo (UW), Canada. The opposition-based differential evolution (ODE) was proposed in his PhD thesis. Since August 2007, he has been a chief research manager at OMISA Inc. (Omni-Modality Intelligent Segmentation Assistant); a company which develops innovative software for medical image segmantation. Before joining to faculty of engineering and applied science, University of Ontario Institute of Technology (UOIT), Canada, as a faculty member, he was a postdoctoral fellow at Simon Fraser University (SFU), Canada. His research includes evolutionary algorithms, image processing, and opposition-based computation. Dr. Shahryar was awarded the Ontario Graduate Scholarship (OGS), President's Graduate Scholarship (PGS), NSERC's Japan Society for the Promotion of Science (JSPS) Fellowship, NSERC's Industrial R&D Fellowship (IRDF), NSERC's Visiting Fellowship in Canadian Government Laboratories (VF), and the Canadian Institute of Health Research (CIHR) Fellowship for two times.

Plenary Lecture IV

Classification Methods for Bibliomining

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Abstract: Advances in information technology are having an important impact on library systems. Large collections of heterogeneous data, from ancient manuscripts to sounds, videos and spatial data are now available in electronic format. Digital libraries are capturing human knowledge and distributing it over the web. The increasing volume of data in today digital repositories and library data warehouses has determined a wide use of computer-based sophisticated analysis techniques. Special operation of data mining can be performed in order to answer questions of librarians and researchers in information science. In 2003, S. Nicholson and J. Stanton introduced a new term – bibliomining - for data mining library systems. Therefore bibliomining is a large umbrella incorporating all data mining methods based on mathematics, statistics, operational research, machine learning, evolutionary computing, visualization techniques, and including traditional methods of analysing groups of bibliographic references as authorship, publications, and literature, specific to bibliometrics. Librarians and researchers in information science are mining library data warehouses and other library data collections in order to discover patterns and to understand library users' behaviour, their information and services needs, but also in order to evaluate and predict the effectiveness of library services, to discover trends in queries and to identify hot topics. Classification of items based on their characteristics (features, attributes, properties) in pre-defined categories is one of the most important bibliomining tasks. Classification is defined as the ordering of items in pre-defined groups (categories) or classes, based on their similarity. The classification process consists in assigning one of k labels (or classes) to each of n items derived from a specific problem. Classification predicts categorical labels. Analysis goal is to find a classification, a model or profile for each class that optimizes a combinatorial function consisting of assignment costs, based on the individual choice of label made for each item, and separation costs - based on the pair of choices made for two related items. In machine learning classification is defined as supervised learning. Classification, as a bibliomining technique, can be used for finding hidden patterns in data by deciding to what pre-defined class to assign a record of the data set, and also in prediction, to predict group membership for data instances. This lecture describes the most important classification methods (traditional approaches as classification trees, discriminant analysis, generalized linear models, modern statistical machine learning algorithms, support vector machine, belief networks, Gaussian processes, neural network, evolutionary algorithms, swarm intelligence, boosting and ensemble) and their use in mining library data collections. Research questions regarding pre-processing operations, attribute relevance and classifiers' performance will also be discussed with emphasis on the specificity of the library items to be classified.

Brief Biography of the Speaker: Ioana Moisil received the M.Sc. in Mathematics at the University of Bucharest, in 1971, the scientific grade in Statistical, Epidemiological and Operation Research Methods Applied in Public Health and Medicine at the Universite Libre de Bruxelles, in Belgium, in 1991 and the Ph.D. in Mathematics at the Romanian Academy in 1997. Work places: the National Institute for Research & Development in Informatics - I.C.I

(1971-1986), Carol Davila Faculty of Medicine Bucharest – department of Biophysics, CCSSDM Center of the Ministry of Health. At present she is a full-time Professor and a Senior Researcher at the Department of Computer Science and Automatic Control – Faculty of Engineering at the "Lucian Blaga" University of Sibiu. She is the author/co-author of fourteen books and over 150 scientific papers. Her scientific interests include intelligent systems, healthcare telematics, web technologies, data-mining, e-learning, modelling and simulation, uncertainty management, human-computer interaction. Professor Moisil participated in several EU funded projects as project manager for the national partner (Telenurse ID ENTITY, MGT, PROPRACTITION, PRO-ACCESS), in Tempus projects and in national funded projects as research manager and software development coordinator (INFOSOC – eUNIV, AMTRANS – eCASTOR, INFOSOC - e-Scribe, INFOSOC – DANTE, e-EDU-Quality, eTransMobility, CNCSIS 2007-code 33, Studies on multivariate interpolation, polinomial classifiers and applications, CNCSIS 2007 – cod 1502, Aspects concerning the psycho-cognitive abilities of artificial intelligent agents and applications in ITC based education). Ioana Moisil is a member of EARLI (European Association for Research in Learning and Instruction), she is Romanian representative in the IMIA SIG and EFMI WG5 Nursing Informatics, honorary member of the Bohemian Medical Association J.E.Purkyne of Bio-engineering and Medical Informatics, member of the ISCB – International Society for Clinical Biostatistics – Romanian National Group, of the Romanian Association of Engineers, member of the IITM- International Institute of Tele-Medicine and of the Romanian Society of Mathematics Sciences. She is vice-president of the Romanian Medical Informatics Society; vice-president of the HIT Foundation for Health Informatics and Telematics and a member of RoCHI-ACM. Professor Moisil is taking part in several international peer-review committees and conferences scientific boards.

Plenary Lecture V

Modeling Pedestrian Dynamics in Evacuation Processes

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and

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Abstract: In the paper the mathematical model of the evacuation processes from a chosen types of rooms in buildings, based on the Langevin equations, is presented. This process is an example of a collective dynamics of a set of self driven particles. In the equations additional term - social force - describing the interactions of the pedestrian with obstacles and other pedestrians, is included. As a result of numerical simulations the trajectories of each pedestrian in the room are found and the time of evacuation is calculated as a function of the desired velocity of pedestrians, which can be treated as the measure of the level of panic. Evacuation process can have laminar or turbulent character, depending on the geometry of the room and the number of persons present in it..

Brief Biography of the Speaker:
Prof. Robert Kosinski obtained a title of professor of physics in 1999.

He works at:
- The Faculty of Physics, Warsaw University of Technology (since 1972), where he is a Head of the Physics of Complex Systems Division
- The Central Institute for Labor Protection – National Research Institute (since 1995), in Safety Engineering Department

He performed scientific investigations in some foreign universities:
- 1982 – 1985 Wuppertal University, Germany, (Humboldt scholarship)
- 1990 Institute of Theoretical Physics, Zurych University of Technology (Switzerland)
- 1992 Centre of Nonlinear Studies, University of Johannesburg (Rep. Of South Africa)

His scientific activity concerns:
- theory of magnetism,
- investigations of nonlinear dynamical systems
- theory of artificial neural network,
- application of neural network in safety engineering,
- physics of complex systems, in particular mathematical modeling and numerical simulations of complex systems of different kind.

He is an author of
- 70 publications in the most known physical journals (as Physical Review, International Journal of Modern Physics)
- the book on Artificial Neural Network
- the academic textbook on Statistical Physics and Quantum Mechanics

He is a member of a number of scientific societies (e.g. Polish Physical Society, Societas Humboldtiana Polonorum)

Plenary Lecture VI

Change Point in Time Series Data

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Abstract: In building a statistical model for time series data the primary concern is to know whether all the observations can be represented by one particular model or whether the parameters in the model change at some known or unknown time point, called the change point. Subsequently, change points are defined as the points in data where two adjacent segments of the time series are connected. However, there are real-world applications in which only the position of the change is required and not the fitting functions. A change point can occur as a change in mean; change in variance or covariance or both; change in parameter; change in the structural model; or change in the trend in the model at certain known or unknown time point. Time series change point can be classified into two main categories; those which infer in a change when the statistics exceed a control limit; and those which directly estimate the time of change. In each category, the time point is a main factor, where the construction of the statistics and estimation are based on whether the time of occurrence is not known or not. Practically in most cases the time of change is unknown. From the simulation, it can be conclude that the larger the difference of the parameter estimates before and after the given change point, the higher will be the probability of the detection of the change point, the models that do not include a regular differencing operator, tends to be slightly higher in the probability of detection than the others, similar results occur for seasonal and non-seasonal models but the detection for the change point will be slightly lower for the seasonal models, and the procedure does not perform well when the point of change is at the beginning or at the end of the series.

Brief Biography of the Speaker: Azami Zaharim worked first 13 years as a lecturer in the Universiti Teknologi MARA (University of MARA Technology - UiTM) before joining the Universiti Kebangsaan Malaysia (National University of Malaysia - UKM) in the year 2003. He is Associate Professor at the Faculty of Engineering and Built Environment UKM, and is currently Coordinator for the Unit Fundamental Engineering Studies. He obtained his BSc(Statistics and Computing) with Honours from North London University, UK in 1988 and PhD (Statistics) in 1996 from University of Newcastle Upon Tyne, UK. He specialize in statistics, public opinion, engineering education and renewable energy resources.

He has until now published over 80 research papers in Journals and conferences, conducted more than 15 public opinion consultancies and delivered 3 keynotes/invited speeches at national and international meetings. He is currently the head of Renewable Energy Resources and Social Impact Research Group under the Solar Energy Research Institute (SERI). In the year 2007, he headed the Engineering Mathematics Research Group. At the same time, he is currently active involve in outcome based education (OBE) approach at the national level and the chairman of the Engineering Education Research Group since 2005. He is also involved actively in the research for the future of engineering education in Malaysia 2006 under the Ministry of Higher Education of Malaysia.

Plenary Lecture VII

System Dynamics Models for Business Process Optimization: An Application to Supply Chain Management

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Abstract: In today's global market, managing the entire supply chain becomes a key factor for the successful business. World-class organizations now realize that non-integrated manufacturing processes, non-integrated distribution processes and poor relationships with suppliers and customers are inadequate for their success. They realize the impact of an organization's plan on the other areas of the supply chain. The impact of an organization's plan on the whole supply chain is unpredictable before its execution. That's why system dynamics models are constructed in order to prognosticate and visualize the behavior of of the system and to improve its performance.

The use of System Dynamics Modelling in Supply Chain Management has only recently re-emerged after a lengthy slack period. Current research on System Dynamics Modelling in supply chain management focuses on inventory decision and policy development, time compression, demand amplification, supply chain design, and international supply chain management.

Computer simulations are widely used to analyse supply chain dynamics. It is too complex to manage an entire inventory by mathematical analysis because more than two echelons are involved and the inventory management is usually carried out with the aid of computer simulation (Ballou, 1992).
Computer simulations can be divided into the static and dynamics models. The primary difference between them is the way in which they treat timerelated events. Static simulations do not pay enough attention to time-period interplay but the dynamic simulationsevaluate system performance across time (Bowersox, Closs, & Helferich, 1986).

Simulation permits the evaluation of operating performance prior to the execution of a plan. In the practical application of this concept, the development of the simulation model for the supply chain management has become a necessity.

There are different types of computer software for simulations like Dynamo, iThink/Stella, PowerSim, Vensim, AnyLogic, Berkely Madonna, etc. It is possible to perform good system dynamics work with all the above mentioned programs, however in our case we use Berkely MAdonna, developed by Robert Macey and George Oster of the University of California at Berkely under the sponsorship of NSF and NIH.

Brief Biography of the Speaker: He earned his degree in mechanical engineering at the University of Genoa and he completed his master thesis in Genoa Mass Transportation Company developing an automatic system integrating ANN (Artificial Neural Networks) and simulation with the ERP (Enterprise Resource Planning) for supporting purchasing activities. He had consulting experience in modeling applied to environmental management for the new Bosch plant facility TDI Common Rail Technology in construction near Bari. During his service in the Navy as officer, he was involved in the development of WSS&S (Weapon System Simulation & Service) Project. He

completed is PhD in Mechanical Engineering in 2001 defending his Doctoral thesis on "Advances in Industrial Plant Management" by applying Artificial iontelligence and Distributed Simulation to several Industrial Cases. Since 1998 is active in Distributed Simulation by moving US DoD HLA (High Level Architecture) Paradigm from Military to Industrial application. In 2000 he succesfully led a research group first demonstrating practical application of HLA in not dedicated network involving a 8 International University Group. He is currently involved, as reseacher, in the DIP of Genoa University, working on advanced modeling projects for Simulation/ERP integration and DSS/maintenance planning applied to industrial case studies (Contracting & Engineering and Retail companies). He is active in developing projects involving simulation with special attention to Distributed Discrete Event and Agent Based Continuous Simulation (SwarmSimulation Agents). He is teaching Modelling & Simulation, VV&A, Distributed Simulation (HLA), Projecty management in Master Courses Worldwide and he is teaching Industrial Plants Design in University of Genoa Masters' Courses. He is member of SCS, IASTED, ACM, ANIMP, AICE, MIMOS and Liophant Simulation Club. He is Associated Professor in Mechanical Engineering and Logistics.

Plenary Lecture VIII

Game-Based Learning in Higher Education and Lifelong Learning: Bridging the Gap between Theory and Practice

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Abstract: Game-based learning virtual environments are tailored for diversified university and lifelong student groups preparing them to enter national, European and global environments. They foster collaboration at various levels between university and industry providing knowledge and innovation exchange. In learning processes support collaboration among teachers/educators and learners at the international level. Representing a real life phenomenon – complex and dynamic systems in which the variables for manipulation illustrate variables in real life situations. Learners are offered to learn in an authentic environment of imitating concrete activities which they will face in their professional life. Learning about complex phenomena and systems is more meaningful in collaboration because knowledge is distributed among learners and the cognition is socially shared. Currently there are many initiatives at European and global level aiming at agreements for arranging new learning environments which will offer learning linking theory and practice, university and industry. Paper provide framework for new solutions at institutional level facing challenges of game-based learning in virtual environments.

Brief Biography of the Speaker: Andreja Istenic Starcic holds a B. Sc. in sociology of culture (1998) and Ph.D. in education (2002) University of Ljubljana, Slovenia. She received habilitation for assistant professor in didactics and educational technology and habilitation for research in management. Her research interests include social impacts of information and communication technology, information communication systems for professional development, knowledge management, educational technology, computer supported collaborative learning, web based communities, game-based learning, sustainable development.

She has been acting as a member of research groups:

• Research in education (2000-2002), University of Ljubljana, Faculty of Arts and Humanities;
• Management and informatisation of education and employability (2004-2004), University of Primorska, Faculty of Management;

• E-construction engineering (2006-), University of Ljubljana, Faculty of Civil and Geodetic engineering, Institute of construction, earthquake engineering and computing.

She has been developing educational technologies for all levels of education and adult education since 1993. She is devoted to teacher education and professional development and had developed the first e-learning courses for university teachers and adult educators in Slovenia. Present research projects are: Intensive e-learning introduction for rising educational level and suppress regional discordance in Slovenia, I3CON – Industrialised, Integrated, Intelligent Construction, Virtual International Business Management Learning Environment for Hospitality and Destination management.

Dr. Istenic Starcic has published several referred journal and conference papers, workbooks and monographs. Her publication also including invited state-of-the-art chapters in international scientific monographs. She is in editorial board of international journal IJET http://online-journals.org/i-jet/about. Dr. Starcic is a convenor in The European Educational Research Association EERA Didactic section http://www.eera.ac.uk/web/eng/all/home/index.html

She was giving courses at Belfast Queens University Northern Ireland, Luleå University of technology Sweden, and University of Turku Finland.

Plenary Lecture IX

Challenges for Wireless Sensor Networks Deployment

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Abstract: In the recent years extensive research has opened challenging issues for wireless sensor networks (WSNs) deployment. Many of ad hoc networks are sensor networks designed to collect data and revert to a centre unit connected to the Internet or monitored. WSNs are formed by a large number of resource-constrained and inexpensive nodes, which has an impact on protocol design and network scalability. Sensor networks have enabled a range of applications where the objective is to observe an environment and collect information about the observed phenomena or events. This has lead to the emergence of a new generation sensor networks called sensor actuator networks. Sensors gather information about the physical world, while actuators make decisions and perform actions that affect the environment. To enable next-generation sensor actuator systems, new customizable architectures are needed. The collected information and sensor nodes must be localized in space to identify the location of an event. This positioning is accomplished using localization systems. They not only locate events, but can also be used as the base for routing, density control, tracing and a number of other protocols. Due to their key role in WSNs, localization systems can be a target of an attack. In order to be fully autonomous and self-capable, it is essential for the nodes to be aware of their environment, and will not be able to configure itself to respond to internal/external events.

The first part of this lecture deals with sensor actuator networks and localization systems. We continue with self configurability, situation awareness, and information detection system. The next part treats the problem of wireless sensor network for distributed detection. Model proposal for wireless sensor network concludes the presentation.

Brief Biography of the Speakers:

Zoran S. Bojkovic received the Diploma in electrical engineering and the M.S. and Ph.D. degree all from the Faculty of electrical engineering, University of Belgrade, Serbia. He is a professor of Electrical Engineering at the University of Belgrade.

He is the co-author of the books "Introduction to Multimedia Communications Applications" (Wiley, 2006), "Multimedia Communications Systems" (Prentice-Hall 2002) and "Packet Video Communications over ATM Networks" (Prentice-Hall, 2000), all with prof. K. R. Rao from the University of Texas at Arlington, USA. He has published in international peer-reviewed journals and participated in many scientific and industrial internacional projects.
Prof. Bojkovic is Editor-in-chief for the WSEAS Transactions on Communications and WSEAS Transaction Science and Applications. He is IEEE Senior Member and EURASIP member.

Bojan M. Bakmaz received B.Sc. and M.Sc. degrees in telecommunication traffic from the Faculty of Traffic and Transport Engineering, University of Belgrade, Serbia in 2004 and 2007, respectively.

He is a Ph.D candidate on the same faculty. He is a teaching assistant at the Department of Telecommunication Traffic and Networks. Bojan Bakmaz is the author of one monograph and coauthor of 10 papers in International Journals and the Proceedings of the International Conferences. Also he participates in several projects in the domain of telecommunication traffic and networks. His research interest also includes the field of multimedia wireless networks: convergence, DSP, QoS and security.

Plenary Lecture X

Sustainability Issues for Electric Transportation Systems

Professor Cornelia Aida Bulucea
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Abstract: The Universe Powers let us discover a part of their laws. We can not change the Nature laws but we must know and respect them. The human engineering actions and the living nature can not anymore be separated because the future survival of the society is strongly depending on physical, environmental and human resources. Scientists and public authorities around the world are realizing that human actions have to be responsable regarding not only the social and economic matters, but also the environment issues. The environmental problems are mainly consequences from a too strong belief in traditional engineering and economic growth as the solution. The first human intelligence step against ignorance would be to understand that the real world processes involving energy and matter need to be linked both to the engineering design and operation, and to the environment issues. For the moment, our correct activities must be referred into the frame of Sustainable Development that is encompassing three general areas, concerning the economical development, the environmental issues and the social protection problems. On a broader front, an utmost human world priority should be the improvement of public transportation systems. The merit of an electric transportation system is based not only on technical performance, safety, energy efficiency, economic acceptance but also on sustainability and exergy efficiency. This study emphasizes a number of sustainability-based concepts, such achieved energy, embodied energy and exergy, related as tools in order to describe, analyse and optimize the energy conversion in the electric transportation systems. Costs should reflect value and value is not associated with energy but with exergy and sustainability. Hence, the main aim of this investigation is to assess the sustainability of modern electric transportation systems, based both on electrical engineering analysis and on further alternative knowledge. An Electric Railway System should be considered a component of the Sustainable Development architecture if it meets certain criteria: a strong train operation safety, a high reliability of the electric supply and an increased exergy efficiency of the transportation system. In the paper only the urban railway vehicles with electric motors at wheels, operating in traction and electric brake regimes are taken into account. This study aimed at examining an underground railway train viewed as a system where different energy forms occur, so that the successive energy conversion chain is emphasized and the energy and exergy efficiencies, respectively, are compared. The exergy dynamic approach in that case study assessed interesting results concerning the electric trains sustainability in traction and electric brake regimes, emphasizing the negative effects of exergy destruction and the corresponding longterm environmental impact.

Brief Biography of the Speaker: Cornelia Aida Bulucea is currently an Associate Professor in Electrotechnics, Electrical Machines and Environment Electrical Equipments in the Faculty of Engineering in Electromechanics and Environment, University of Craiova, Romania. She is graduate from the Faculty of Electrical Engineering Craiova and she received the Ph.D degree from Bucharest Polytechnic Institute. In Publishing House she is author of four books in electrical engineering area. Research work is focused on improved solutions for electrical networks on basis of new electric equipments and environmental impact of energy and electric transportation systems. She has extensive experience in both experimental and theoretical research work, certified by over 40 journal and conference research papers and 11 research projects from industry. She has held in the Association for Environment Protection OLTENIA and she is a regular invited keynote lecture for environmental engineering symposia organized by

Chamber of Commerce OLTENIA. Due to WSEAS recognition as high scientific Forum she partcipated in three WSEAS International Conferences, presenting papers and chairing sessions. She is very proud of her two papers published in WSEAS TRANSACTIONS on ENVIRONMENT and DEVELOPMENT August 2007 and March 2008, respectively.

Plenary Lecture XI

Switching Transient Phenomena in Power Systems at the 400 KV High Voltage Unloaded Line

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Abstract: In this paper, there are evaluated the transient phenomena in power systems at the 400 kV high voltage operations, which appear at the unloaded line switching. In point of news, the paper presents the modelling and simulation of an unloaded three-phase line switching effect in Power System, using PSCAD Program and MathCAD Program. There were obtained the transient recovery voltages (TRV), the overcurrents (OC) in the 400 kV network and the electrical field (EF), according with the overvoltages (OV) at 400 kV. After that, a comparatively analyse of results is made. The paper presents the electrical field values, according to modelled and simulated disturbances. The simulation was performed using the EMTDC/PSCAD software package, in order to obtain the electromagnetic disturbances in the transmission line and in the busbars. The proposed simulation is applied for an unload transmission line connected between KEPEZ and YATAGAN in 380 kV Turkish National Power Transmission Systems. Also, in the paper are presented modelling, simulations, measurements and experiments performed for determination of switching overvoltages at the 400 kV unloaded lines switching in a Romanian Network (Tintareni-Sibiu). After that, a comparative analysis of results regarding switching overvoltages determined through modelling and experiments is made and conclusions about admissible limits recommended by the CIGRE and IEEE international norms are established.

Brief Biography of the Speaker: Petre Tusaliu is full professor at University of Craiova, Romania and President of the "High Voltages Engineering, Environment & Life" Scientific Professional Association. He is doctor in "switching transient phenomena". His Research activity is in area: high voltages engineering, transient phenomena, power systems, electromagnetic compatibility. He is author and joint author of over 150 works of their area, has 7 invention and innovation patents, 9 works for Education and 4 books published. He is Editor al "CHALLENGES IN POWER, HIGH VOLTAGES and MACHINES", published by WSEAS Press, Venice, Italy, November, 2007. He was CIGRE member (5 years) and their Curriculum vitae and activity have been included in "The International Directory of Distinguished Leadership, 1997", edited by "American Biographical Institute". Also, he have received the title "Man of the Year-1997", awarded by "American Biographical Institute-North Carolina-USA". He was specialising in Germany and, in last years, he has effectuated three International scientific research grants, in co-operation at the NATO Scientific Research Programmes in the European Universities. He has participated as member of many "Steering Committee", "Editorial Board", "Chairperson" and "Papers Reviewer" of the numerous International Conferences. He was plenary speaker at "the eighth IASTED International Conference on POWER AND ENERGY SYSTEMS, June 23-25, 2008, Corfu, Greece".

Plenary Lecture XII

Influence of Segmentation to Efficiency of Joint Channel Coding and Cryptography

Professor Natasa Zivic
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Abstract: Newly researches show that cooperation between the elements of the receiver improves the accuracy of the received information. Such cooperation is especially important in noisy environments, as wireless, mobile and satellite communications. Examples of cooperate work of elements of receiver are:

1. iterative decoding with feedback used inside of the channel decoder for Turbo codes in order to decrease the error rate
2. the feedback information about the decoded bits from the channel decoder to the demodulator used to improve the equalization and synchronization of the demodulator
3. the feedback information from the source decoder to the channel decoder used to improve the channel decoding (so-called source channel decoding).

Joint Channel Coding and Cryptography represents the combination of cryptography and convolutional channel coding. SISO channel decoder and decryptor exchange output information with each other, enabling correction of the output results. This cooperation introduces feedback from decryptor to the SISO decoder for sending information which helps correction of results.

The algorithm of Joint Channel Coding and Cryptography is based on the use of L-values (reliability values) which are output of the SISO channel decoder and input to the decryptor. L-values show the probability of wrong decoded bits of the received information. Therefore absolute L-values are ordered per their greatness, for correction of bits with the lowest absolute L-values which have the highest probability of being wrong decoded. Joint Channel Coding and Cryptography uses feedback for improving of decoding results using the information previously corrected by the lowest absolute L-values. Efficiency of the feedback, depending on the lengths of information which have to be corrected, is the subject of this lecture.

Brief Biography of the Speaker: Dr Natasa Zivic was born on 6th of January, 1975 in Belgrade, Serbia (Yugoslavia). She graduated from the Faculty of Electrical Engineering (Electronics, Telecommunication and Automatics) of the Belgrade University in 1999. at the Telecommunication Department (Access Networks). After the Post diploma studies at the same Faculty (Telecommunications Division) she defended her Magister Thesis (Acoustics) in 2002.

From October 2004. she was scientific assistant on the University of Siegen in Germany at the Institute for Data Communications Systems as a DAAD and University of Siegen Scholarship holder. In 2007. she defended her Doctoral Thesis on the same University. The main course of her work in Siegen is Coding and Cryptography. From 2000. till 2004. she was working at the Public Enterprise of PTT ``Serbia``, Belgrade as the senior engineer. Currently she is employed as an Assistant Professor at the University of Siegen.

She published about 30 articles at international Conferences and Journals and two monographs.

Plenary Lecture XIII

Image Denoising: From Multiresolution Frameworks to Variational frameworks

Professor Sergio Amat
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Abstract: In order to reduce the noise that perturb an image we can find two general approaches: Multiresolution frameworks and Variational frameworks.

In the linear case, both frameworks are related. But this is not the best situation in practice.

Our goal in this lecture is to review some nonlinear techniques in both framewors and their relations.

Brief Biography of the Speaker:

1. Sergio Amat Plata, Elda (Alicante) (Spain), 23-3-73.
2. MS and BS in Mathematics from Universitat de Val`encia in 1996. PhD in Mathematics from Universitat de Val`encia in 2001.
3. PhD Visiting: Paris VI 1998-1999, Marseille 1998-1999.
4. Post-doctoral and Visiting Faculty positions: EGIM, LATP IMT, Technopole de Chateau-Gombert Marseille (France) 2002-2003-2004-2005, U.Castilla La Mancha (Spain) 2003-2005-2006.
5. Head of the Department of Applied Mathematics and Statistics (U.P. Cartagena) (Spain).
6. More than 70 papers with referee process.
7. More than 50 communications in congress.
8. 10 PhD students.
9. 1 Post-Doc student.
10. He has participated in 2 regional, 3 national and 2 European projects.
11. He is member of the executive board of SEMA (Spanish Society of Applied Mathematics).
12. Head of the research group: Differential Equations and Numerical Analysis.
13. Participation in the organization of several congress.
14. Associated Editor of Journal of The Franklin Instituted.
15. Associated Editor of Applied Mathematics and Computation.
16. Associated Editor of Journal of Mathematical Sciences: Advances and Applications.
17. Associated Editor of WSEAS.
18. Referee and reviewer of several journals.
19. Coordinator of several PhD programs.
20. Coordinator of the department's publications and conferences.
21. His research interests include:
    - Nonlinear Reconstructions.
    - Multiresolution and wavelets algorithms.
    - Iterative schemes for nonlinear equations.
    - Numerical approximation of conservation laws.

Plenary Lecture XIV

Enhancement and Restoration

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Abstract: Persons that suffer from diseases such as throat cancer require that their larynx and vocal cords be extracted by a surgical operation, and then require rehabilitation in order to be able to reintegrate to their individual, social, familiar and work activities. To accomplish this, different methods have been used, such as: The esophageal speech, the use of tracheoesophagical prosthetics and the Artificial Larynx Transducer (ALT), also known as "electronic larynx".

The ALT, which has the form of a handheld device, introduces an excitation in the vocal track by applying a vibration against the external walls of the neck. This excitation is then modulated by the movement of the oral cavity to produce the speech sound. This transducer is attached to the speaker's neck, and in some cases in the speaker's cheeks. The ALT is very easy using even for new patients, although the voice produced by these transducers is unnatural and with low quality, besides that it is distorted by the ALT produced background noise. The Esophageal speech is produced through the compression of the contained air in the vocal tract with the tongue. This air is swallowed and as passing through the esophageal-pharynx segment produces a vibration of the esophageal upper muscle, bringing about the speech. The generated sound is similar to a burp, the tone is commonly very low and the timbre generally harsh. In ALT as well as in esophageal speech, the voiced segments are the most affected part of speech.
Several approaches have been proposed to improve the quality and intelligibility of ALT produced, as well as esophageal speech signals. Some of them reduce the ALT produced background noise by using cepstral root subtraction or adaptive filtering. However the speech quality produced by these approaches is still poor. Another approach intended to improve the speech quality estimating the frequency band from 4 KHz to 8 KHz using the frequency band from 300Hz to 4 KHz. Although this approach may be an attractive alternative, it must be still improved. A promising approach is based on speech conversion techniques which carry out a spectral conversion using vector quantization methods. A similar approach based on a pattern recognition approach, has also been proposed, in which, firstly the voiced segments are detected and identified. Then the voiced segments are replaced by their equivalent voiced segments of normal speech while the unvoiced segments are kept without change. Finally the voiced, unvoiced and silence segments are concatenated together to produce the restored speech. These approaches perform fairly well although still present some problems because the spectral conversion reduce a continuous spectral space into a discrete code book, which may produce a distortion that still must be reduced. This speech presents a review of alaryngeal speech enhancement systems, providing also evaluation results to show the improvement in the quality and intelligibility of produced speech.

Brief Biography of the Speaker: Hector Perez-Meana received his M.S: Degree on Electrical Engineering from the Electro-Communications University of Tokyo Japan in 1986 and his Ph. D. degree in Electrical Engineering from the Tokyo Institute of Technology, Tokyo, Japan, in 1989. From March 1989 to September 1991, he was a visiting researcher at Fujitsu Laboratories Ltd, Kawasaki, Japan. From September 1991 to February 1997 he was with the Electrical Engineering Department of the Metropolitan University of Mexico City where he was a Professor. In February 1997, he joined the Graduate Studies and Research Section of The Mechanical and Electrical Engineering School, Culhuacan Campus, of the National Polytechnic Institute of Mexico, where he is now The Dean. In 1991 he received the IEICE excellent Paper Award, and in 2000 the IPN Research Award and the IPN Research Diploma. In 1998 he was Co-Chair of the ISITA'98, and in 2009 he will be the General Chair of The IEEE Midwest Symposium on Circuit and Systems (MWSCAS). Prof. Perez-Meana has published more that 100 papers and two books. He also

has directed 15 PhD theses and more than 30 Master theses. He is a Senior member of the IEEE, member of The IEICE, The Mexican Researcher System and The Mexican Academy of Science. His principal research interests are adaptive systems, image processing, pattern recognition watermarking and related fields

Plenary Lecture XV

Signal Processing Education Challenge: A Speaker Verification R&D Undergraduate Team

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Abstract: In order to develop the area of signal processing technology in Argentina, R+D projects have to be carried out at universities. In that way, they can train new SP doctors to start the job. But for that purpose doctorate candidates are a must, as well as proper funding for the graduate school.

How do you start the movement, when there is not such a graduate school, no candidates and the companies don't do research? How do you get the funding if you don't have the project or the people to do it? This is the challenge I faced, as head of the Electrical Engineering Department in a small University in Argentina. My talk will address the problem, and the way I could overcome it. It will describe an undergraduate team dealing with Speaker Verification (SV) research. It will explain how it is possible to insert such a subject in the EE curricula, how to encourage senior student to do R+D, how to contribute with teams in other countries, how to help build a new platform for SV and how to design a strategy to get funding and political support.

Brief Biography of the Speaker: She received her Electrical Engineering degree in 1987 from the University ITBA (Buenos Aires Institute of Technology), Argentina. She achieved a Masters degree in Speech Processing from the "Universidad Politecnica de Madrid", Spain, where she is currently finishing her Ph.D thesis on Speaker Verification.
Since 1988 she has been holding academic positions in Argentina, until she became tenured faculty in the rank of the Full Professor in 2004. Since 2007 she is the Electrical Engineering Department Chair at ITBA.

Her research area is primarily signal processing, as well as electromagnetic compatibility. In recent years she started research groups in different areas, such as speaker verification, acoustics, DSP application and EMC.

She is the author of more than 20 papers, mostly in the area of signal processing education, published in reviewed journals or presented at international conferences such as IEEE ICASSP, IEEE ISCAS, IASTED and WSEAS. She is a technical reviewer for the IEEE Transactions on Circuits and Systems and IEEE ICASSP Proceedings. She is an active senior member of the IEEE. She is the founder of the IEEE Signal Processing Society (SPS) Argentina Chapter, from which she currently Chair, she is the IEEE SPS Education Technical Committee Chair and a IEEE SPS Lensing Oversight Committee Member.

Plenary Lecture XVI

Multi-Channel Convolution for Room Acoustics Auralization

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Abstract: The application of multi-channel convolution algorithms for room acoustics auralisation is actually considered the most suitable technique for correctly reproducing the sound characteristics of a room. The initial simple convolution from a dry signal with a mono impulse response moved to a binaural convolution and therefore to a more complex system. On the other hand, the new technology has allowed the definition of a new set of physical parameters that could be able to correctly describe the sound characteristics of the room. During this lecture, the results of a world-wide campaign of acoustic measurement of impulse responses in different special theatres and auditoria are presented. Moreover, after an overview on the most common techniques utilised for 3D auralization, an innovative procedure of measuring and reproducing spatial sound characteristics is presented. The application of this new technique in virtual 3D sound reconstruction is presented. Furthermore, the methodology is compared with other techniques of 3D sound reproduction. The possibility to enhance the spatial reproduction of sound quality in real spaces and the comprehensibility of spatial parameters is finally considered and presented in different cases.

Plenary Lecture XVII

Content Aware Image Processing

Associate Professor Raimondo Schettini

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Abstract: The great diffusion of digital cameras and the widespread use of the internet have produced a mass of digital images depicting a huge variety of subjects, generally acquired by non-professional photographers using unknown imaging systems under unknown lighting conditions. The quality of these real-world photos can be considerably improved by digital image processing .In this lecture we describe our approach for content-aware image processing and enhancement. According to our approach, the overall quality of a digital photo is improved by modular, fully automatic, image enhancement procedures driven by the image class and content. Single processing modules can be considered as autonomous elements that are suitably combined to improve the overall quality according to image and defect categories.

Brief Biography of the Speaker: Raimondo Schettini is an Associate Professor at the University of Milano-Bicocca, Italy. He is Vice–Director of the Department of Informatics, Systems and Communication, and head of Imaging and Vision Lab. He has lead several research projects and published more than 200 papers on image processing, analysis and reproduction, and on image content-based indexing and retrieval. Associated Editor of the Pattern Recognition Journal, he was Chairman of several International Conferences related to color imaging.

Special Session I

High Frequency Circuits and Systems

within the
8th WSEAS International Conference on
SIMULATION, MODELLING and OPTIMIZATION
(SMO '08)

Organized by

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Topics:

- Modelling of semiconductor technologies
- DC and large signal modelling of semiconductor power devices
- Design and modelling of microwave power amplifiers
- Linearisation
- Transmitter modelling
- Up-down converters
- Passive and waveguide 2D and 3D geometrical models

Brief Biography of the Organizers:

José M. Zamanillo was born in Madrid, Spain in 1963. He received B.Sc and Ph.D. degrees in physics from the University of Cantabria, in 1988 and 1996, respectively. Since 1988 he has been devoted to education and research at the University of Cantabria where he is a Professor in the areas of radiofrequency, microwaves and Communication Systems. He has been engaged in various European and Spanish R&D projects, mainly in the fields of microwaves, device modelling, propagation, and television. Presently, his research interests include linear and nonlinear modelling of GaAs MESFETs, HEMTs, and HBTs. Since 2004 up to January 2008, he has been the director of the summer courses of the University of Cantabria, in Laredo, Spain. Actually, he manages the "Aula de Imagen y Sonido" of the University of Cantabria.

Pablo Luis López Espí was born in Madrid, Spain in 1972. He received B.Sc from the University of Alcala and M. Sc degrees from the University of Cantabria, in 1996 and 1998, respectively. Since 1998 he has been devoted to education and research at the University of Alcala where he is a Professor in the areas of electromagnetics, microwaves and optical systems. He has been engaged in various European and Spanish R&D projects, especially in application of optical and optimization techniques to water pollution measurement.

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