Institute for Environment, Engineering, Economics and Applied Mathematics

Editors: Narsingh Deo, Metin Demiralp, Milan Stork, Eva Milkova, Hidetoshi Wakamatsu, Kiyoyuki Tchizawa

APPLIED COMPUTER SCIENCE

International Conference on Applied Computer Science (ACS)

Malta, September 15-17, 2010

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Keynote Lecture 1

Finding Communities in Web-like Complex Networks

Professor Narsingh Deo,
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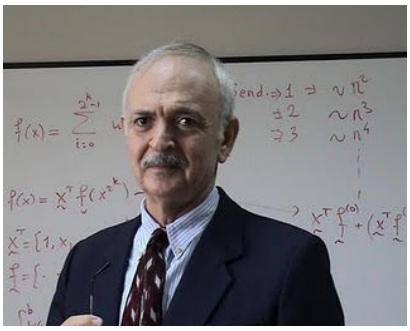
Abstract: Complex Networks such as the Internet, the World Wide Web (WWW), as well as various social and biological networks, are viewed as large, dynamic, random graphs, with properties significantly different from those of the classical Erdos-Renyi random graphs. One such property inherent to these web-like complex networks is the existence of communities. Mining for and identifying Web-based communities, for example, has an enormous potential for application. Therefore, communities have recently been explored in several disciplines—graph theory, physics, statistics, sociology, biology, and linguistics. A community may informally be defined as a locally-dense subgraph, of a significant size, in a much larger globally-sparse graph. An optimal extraction of communities has been shown to be NP-complete. We must, therefore, devise approximate algorithms. In this talk we will present a quick overview of the community-discovery algorithms and present new heuristic for community identification. That is, a new heuristic for identifying the community structure around a given set of seed vertices, using only their neighborhood information. Since identifying communities can be an extremely compute-intensive task, parallel computation has a critical role in the solution. We will discuss both sequential and parallel heuristics.

Brief Biography of the Speaker:
Professor Narsingh Deo is known for his work in computational graph theory, combinatorial computing, and parallel algorithms. He holds the Charles N. Millican Eminent Scholar's Chair in Computer Science (since 1986) and is the Director of the Center for Parallel Computation at University of Central Florida, Orlando. Prior to this, he was a Professor of Computer Science at Washington State University (1977- 86), and the department chair. Before that he was a Professor of Electrical Engineering and Computer Science at the IIT, Kanpur (1971-77), and a Member of Technical Staff at Jet Propulsion Laboratory (1966-71). He received a Ph.D. from Northwestern University and an MS from CalTech. He has held Visiting Professorships at several institutions--including at the University of Illinois, Urbana; University of Nebraska, Lincoln; Indian Institute of Science, Bangalore; and IBM's T. J. Watson Research Center; ETH, Zurich; University of Sao Paulo, Brazil, Oak Ridge National Lab., Australian National University, Chuo University, Tokyo.
A Fellow of the IEEE, a Fellow of the ACM, a Fellow of the AAAS, and a Fellow of ICA (Institute of Combinatorics and its Applications), Dr. Deo has authored four textbooks on graph theory, discrete optimization, and combinatorial computing. He has published over 200 refereed research papers, and holds a number of patents in computer hardware. Among his numerous awards and honors are NASA's Apollo Achievement Award (1969) and Florida's Governor's Award for Outstanding Contribution to High Tech Research (1989), and several research and teaching awards from University of Central Florida. He has served as an editor/guest editor/ member of the editorial board for various journals--including the IEEE Trans. on Circuits & Systems, the Journal for Parallel and Distributed Computing; theJournal of Supercomputing, and the VLSI Design Journal. He is currently the president of the Forum for Interdisciplinary Mathematics.

Keynote Lecture 2

New Generation HDMR Based Multiway Array Decomposers: Enhanced Multivariance Products Representation (EMPR)



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Abstract: High Dimensional Model Representation (HDMR) was proposed by Sobol in the last decade of twentieth century and the research groups of Rabitz, and Demiralp, contributed to its development a lot beside some other scientists especially from India. It is developed to express a multivariate function in terms of components with ascending multivariance such that the first component is just a constant followed by univariate components each of which depends on a different independent variable, and the each coming group of components have increasing variance like bivariance, trivariance and so on. This works on multiway arrays also and the efficiency of the HDMR truncations at certain level of multivariance completely depends on how univariate the array under consideration is. There have been many attempts to increase the univariance and therefore truncation efficiency. During these efforts many descendants of HDMR have been developed. These will be given as much as the duration of the talk permits. Quite recently a new point of view has been brought to the scene to open new horizons for function or array decompositions by Demiralp group. The new method is not exactly an HDMR but its an extended form. It brings the concept of support functions which are in fact given univariate functions. The choice of these supports is a very important issue and can dramatically affect the truncation approximation. What we are going to present in this talk is based on cartesian geometry, hyperprismatic grids and regions at this moment. The purpose is get maximum contributions in at most univariate terms. This speech focuses on the issues roughly mentioned above in details as much as possible and tries to make comments and remarks on the possible pitfalls and misunderstandings. The talk sufficiently addresses to the related works emphasizing on the findings of the author's and his group on this topics.
Acknowledgment: Author is grateful to Turkish Academy of Sciences for its support.

Brief Biography of the Speaker:
Professor Metin Demiralp was born in Turkey on 4 May 1948. His education from elementary school to university was entirely in Turkey. He got his BS, MS, and PhD from the same institution, ?Istanbul Technical University. He was originally chemical engineer, however, through theoretical chemistry, applied mathematics, and computational science years he was mostly working on methodology for computational sciences and he is continuing to do so. He has a group (Group for Science and Methods of Computing) in Informatics Institute of ?Istanbul Technical University (he is the founder of this institute). He collaborated with the Prof. Herschel A. Rabitz's group at Princeton University (NJ, USA) at summer and winter semester breaks during the period 1985–2003 after his 14 months long postdoctoral visit to the same group in 1979–1980. Metin Demiralp has more than 80 papers in well known and prestigious scientific journals, and, more than 130 contributions to the proceedings of various international conferences. He has given many invited talks in various prestigious scientific meetings and academic institutions. He has a good scientific reputation in his country and he is the full member of Turkish Academy of Sciences since 1994. He is also a member of European Mathematical Society and the chief–editor of WSEAS Transactions on Mathematics currently. He has also two important awards of turkish scientific establishments.
The important recent foci in research areas of Metin Demiralp can be roughly listed as follows: Fluctuation Free Matrix Representations, High Dimensional Model Representations, Space Extension Methods, Data Processing via Multivariate Analytical Tools, Multivariate Numerical Integration via New Efficient approaches, Matrix Decompositions, Quantum Optimal Control.

Plenary Lecture 1

State Space Energy Approach And Nonlinearly Coupled Systems

Prof. Milan Stork
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Abstract: In the proposed lecture a physically motivated signal-system-theoretic approach, based on a generalization of the well known Tellegen's principle of electrical circuits will be presented. The most important feature of Tellegen's approach is the fact that the energy conservation principle holds without any regard to physical nature of constituent network elements. This is the key idea of the proposed approach to problems of dissipativity and chaos. The lecture is motivated by some fundamental questions arising in theoretical analysis of linear and nonlinear state space energy exchange between two causal systems under a coupling nonlinearity, including a possibility of appearing chaotic dynamics. Knowledge of principles of nonlinear dynamics and synthesis of non-chaotic and chaotic attractors is found to be very important also for other potential applications, such as biomedical engineering, e.g. cardiovascular system modelling, encryption by secure communication, modeling of nonlinear phenomena in power networks, etc. This provides a strong motivation for the current research on exploiting some new chaotic attractors and their implementations.
An analog electronic circuit was designed and built to confirm typical behavior of a class of nonlinearly coupled non-chaotic and chaotic oscillators. It was explained theoretically, as well as demonstrated by computer simulation combined with laboratory experiments that some typical chaotic phenomena can appear as a consequence of irregular energy exchange between two coupled systems. In our experiments, the system consists of a 2-nd order nonlinear antidissipative subsystem nonlinearly coupled with a linear oscillator with dissipation. The part of experiment concern also synchronization of coupled non-chaotic and chaotic oscillators.

Brief Biography of the Speaker:
Milan Stork received the M.Sc. degree in electrical engineering from the Technical University of Plzen, Czech Republic at the department of Applied electronics in 1974 and Ph.D. degree in automatic control systems at the Czech Technical University in Prague in 1985. In 1997, he became as Associate Professor and in 2007 full professor at the Department of Applied Electronics and Telecommunication, faculty of electrical engineering on University of West Bohemia in Plzen, Czech Republic. He has numerous journal and conference publications. He is member of editorial board magazine "Physician and Technology". His research interest includes analog/digital linear and nonlinear systems, control systems, signal processing and biomedical engineering, especially cardiopulmonary stress tests systems.

Plenary Lecture 2

Breadth First Search Tree and x-y Shortest Paths Tree

Prof. Eva Milkova
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Abstract: The Breadth-First-Search algorithm, together with the Depth-First-Search algorithm, belongs among the most frequently used searching algorithms. The spanning trees created during the algorithms have special and interesting properties. Using them we can obtain important statements allowing us to formulate various other algorithms. At the conference I will formulate a new concept, x-y Shortest Paths Tree, i.e. a tree that contains all the shortest paths from the vertex x to the vertex y in the given undirected graph, and an algorithm using the x-y Shortest Paths Tree to determine all the shortest paths between the two given vertices.

Brief Biography of the Speaker:
Eva Milkova finished her studies of numerical mathematics at Charles University in Prague, Faculty of Mathematics and Physics in 1978. Gradually received the following titles - master degree RNDr., doctoral degree Ph.D., associate professorship and at present she is professor at the University of Hradec Kralove, Faculty of Management and Informatics, Department of Informatics and Quantitative Methods. Eva Milkova has taken part at several study visits at the universities in EU countries and at a lot of international conferences. Her publication activity includes more than 30 contributions at international conferences and journals and more than 80 contributions at Czech and Slovak conferences and journals. The survey of her publications is on http://lide.uhk.cz/fim/ucitel/milkoev1/.
She has been invited as an invited speaker to several conferences as well and she has been in several scientific program committees of international conferences. In summer 2007 she was chair of the ICTMT8 (the 8th International Conference on Technology in Mathematics Teaching – www.ICTMT8.org) at the University of Hradec Kralove. She is a member of editorial board of international journals and guest editor of several special issues in international journals. She is a member of two scientific counsels for doctoral studies and a supervisor of considerable number of doctoral students. Her scientific interests include Graph Theory, Graph Algorithms, ICT in education.

Plenary Lecture 3

Aerobic Bioprocess: Modelling and Control

Prof. Mihai Caramihai
Professor of Computer Science
POLITEHNICA University of Bucharest
m.caramihai@yahoo.com

Abstract: In this overview, the most important and recent issues regarding the modeling and the control of the aerobic bioprocess are discussed: (a) modeling and control role; (b) instruments and techniques for bioprocess variables determination and monitoring; (c) the mathematical modeling (unstructured global models; structured models; segregated models; metabolic modeling); (d) bioprocess control techniques (model based, adaptive or artificial intelligence control); (e) case study: control of the fed-batch bioprocess of alcoholoxidase formation with the yeast Hansenula polymorpha.

Brief Biography of the Speaker:
Mihai Caramihai is Professor of Computer Science at POLITEHNICA University of Bucharest (where he has been since 1989) and Expert with the European Commission / National Agency for Community Programmes in the Field of Education and Vocational Training (Romania). Professor Caramihai is the author of more than 17 scientific books and 180 technical papers and is involved both in research and project management activities and he holds one patent deriving from his research. He is a member of 4 Royal Societies and more than 20 Professional Societies.

Plenary Lecture 4

Computational Study of Molecular Mechanisms of Caffeine Actions

Professor Valery Poltev
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Abstract: Caffeine (CAF) is one of the most widely and regularly consumed biologically active substances. It acts as a stimulant of the nervous system. This is the reason for consumption by the most humans of various CAF-containing drugs and beverages. The structure of the caffeine molecule is relatively simple. CAF is a purine derivative, 1,3,7-trimethylxantine (1,3,7-trimethyl-2,6-dioxopurine). Besides its principal and rapid actions on nervous system CAF has an effect on various other biological processes, including those related to functioning of DNA and some enzymes. In spite of the simplicity of molecular structure and the importance of biological effects of CAF, detailed atomic level mechanisms are unknown for both the main and lateral effects of CAF and related compounds. We use computer simulation approach to the study of CAF activity by searching for its possible complexes with biopolymer fragments. Molecular mechanics is the principal method for the calculations of the energy of interactions between CAF and the biopolymer fragments. More exact and having more physical basis quantum mechanics methods are possible for considerations of CAF interactions with rather small molecules only. The energy minimization enables us to suggest the most favorable configurations of the complexes; the use of Monte Carlo sampling provides us with the most populated by CAF regions of the biopolymer surface and with mean energy and structure characteristics of the complexes. Earlier we considered molecular mechanisms of CAF interactions with DNA fragments in relation to its "lateral" action on genetic processes. Computer simulation enables us to explain CAF influence on DNA repair and DNA-drug interactions. Recently we started computational study of the main CAF action [3]. The principal CAF target at physiologically important concentrations refers to adenosine receptors. It is a common opinion that CAF is a competitive antagonist of adenosine. At the first step to molecular level elucidation of CAF action, we have found a set of the minima of the interaction energy between CAF and the fragments of human A1 adenosine receptor. It appears that the deepest minima refer to H-bond formation of CAF with amino acid residues involved in interactions with adenosine, its agonists and antagonists. The results suggest that the formation of CAF-receptor H-bonded complexes enforced by a close packing of CAF and the receptor fragments is the reason of CAF actions on nervous system. CAF can block the atomic groups of the adenosine repressors responsible for the interactions with adenosine, not necessary by the formation of H bonds with them, but simply hide these groups from the interactions with adenosine. The computer simulation will help us to answer the next question: "Why such rather small molecule as CAF with restricted set of centers of sufficiently strong interactions can compete with larger molecules capable to form potentially more stable complexes?"

Brief Biography of the Speaker:
Dr. Poltev received his Ph.D. in 1984 in Physics and Mathematics from Lomonosov Moscow State University, Moscow. He has the following experience. He was: 1997 - Present Research professor, Titular C, Department of Physics and Mathematics, Autonomous University of Puebla, Puebla, Mexico. 1991 - Present Principal Research Scientist, Institute of Theoretical and Experimental Biophysics, Russian Academy of Sciences Pushchino, Moscow Region, Russia. 1984 - 1991 Leading Research Scientist, Institute of Biological Physics, USSR Academy of Science, Pushchino, Moscow Region, USSR. 1980 - 1984 Senior Research Scientist, Institute of Biological Physics, USSR Academy of Science, Pushchino, Moscow Region, USSR . 1966 - 1980 Junior Research Scientist, Institute of Biological Physics, USSR Academy of Science, Pushchino, Moscow Region, USSR . 1963 - 1966 Predoctoral training, Department of Physics, Lomonosov's Moscow State University, Moscow, USSR
Prof. Polteve has published more than 100 papers in reviewed journals (including review papers, book chapters and invited contributions). Recent publications are in Int. J. Quant. Chem., Theor. Chem. Acc., Chem.Phys.Lett., J.Mol.Struct. THEOCHEM, J.Biomol.Struct.Dyn., J.Biophys., Biophysics (Moscow),

His RESEARCH INTERESTS are: The study of fine structure, interactions, and conformations of nucleic acids; atomic level mechanisms of genetic processes. Development of computational methods for the study of the structure and biological functions of biopolymers. The application of computational methods to the investigations of molecular mechanisms of pharmacological actions of biologically active substances; directed search of new drugs. He has also about 20 INVITED LECTURES at Universities and Research Centers in USA, France, Italy, China, Czecho-Slovakia, Poland, Mexico.

Plenary Lecture 5

Knowledge management strategy for Small and Medium Enterprises

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Abstract: The paper focuses on the importance of knowledge management in the knowledge-driven economy, and its role for SMEs. It considers the importance of linking knowledge management strategy with the corporate strategy in order to gain maximum benefits. The important factors for knowledge management implementation are considered as well. A special focus is given on the need to undertake knowledge audit as an initial step for any knowledge management initiative, as well as a tool for monitoring knowledge management implementation and results. Here, some knowledge audit approaches suitable for SMEs are presented and the tools which could be used for measuring knowledge assets and flows.

Brief Biography of the Speaker:
Dr. Elissaveta Gourova is currently Associate Professor at the Department of Software Engineering at the Faculty of Mathematics and Informatics of Sofia University. She works since 2006 as a guest lecturer on Project management at New Bulgarian University, and on Knowledge Management at Technical University-Sofia. After graduation in Computer engineering in 1989, she received a professional qualification on 'Public administration and European integration' from the Institute for post-graduate studies at the University for National and World Economy in Bulgaria. She holds a PhD degree from the Technical University – Sofia. She has professional experience as research fellow and project manager at the Centre for Information Society Technologies of Sofia University, where she took part at coordination and expert level in 6 FP7 projects, 3 FP6 projects, etc. Presently, Dr. Gourova is National Contact Point for FP7 program People. In the time 2000-2003 she was research fellow at the Institute for prospective technological studies (IPTS) - Seville, Spain. She has experience as a Head of Department 'Information Society and Technologies' at the Ministry of Transport and Communications. Dr. Gourova took part at expert level in the area of new technologies in the work of some international organizations, such as the Council of Europe, the Information Society Forum at the European Commission. Her primary research is cross-disciplinary focused on Knowledge management, ICT impact, and digital divide. Her research interests further focus on e-skills, mobility and career of researchers. She has more than 60 publications, some of which are at ECKM and WSEAS conferences.

Plenary Lecture 6

Political machinery: sophisticated software to assist governance

Dr. Saurabh Kwatra
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Abstract: Rules by which societies govern themselves are called institutions. Institutions can be political, economic, social, but generally they are a complex combination of these. Universities and academies of higher education frequently offer courseware on 'Political Engineering'; the title has an interdisciplinary flavor, suggesting some kind of engineering applied to political science. When you proceed from heading to subject, you find tools of economic theory, game theory, social-choice theory and formal logic used in ample. There is everything but engineering! This lecture is the first bold attempt to apply genuine methodologies in mechanical engineering design to Governance. Hence I define this created subject as 'Genuine Political Engineering'. The paper revolves around the solution to a complex problem: comparing the size of a road roller required resurfacing a road most efficiently with the number of elected representatives required ruling a population (in a country or state) most effectively. The solution emerges in the shape of a sophisticated software that I call "political machinery'. This research is aimed to compel a sizeable percentage of conventional political pundits and exponents of sustainable living to conclude that governance can be bettered by employing machine designers to assist parliamentarians-turned-policy makers. Perhaps, the phrase, political machinery, wants to live up to its technically oriented name.

Brief Biography of the Speaker:
Dr. Saurabh Kwatra is currently the Director of interdisciplinary projects at Revolutionary Designs Organization based in New Delhi. After graduation in mechanical engineering, Saurabh received an Advanced Certificate in Computer Aided Design/Computer Aided Manufacturing from Department of Mechanical Engineering, Indian Institute of Technology (IIT) Delhi in 2002 and an Advanced Certificate in Industrial Design from Hero Global Designs (of Hero-Honda Group) with specialization in Pro/E software in 2003. He also holds a doctorate in Industrial Design from Suffield University & College.
In 2002-03 he was a trainer of engineering design at Hero Global Designs, the R & D center of Hero Motors Limited, the largest manufacturers of two-wheeled automobiles in the world. As an invited faculty to Instrument Design & Development Center, IIT Delhi, Saurabh also gave several freelance talks there to the students of M.Des at IIT Delhi. Since 2007, he has chaired conferences, presided over workshops & has been an invited speaker or a sponsored delegate, worldwide. The list is : UN 7th Global Forum on Reinventing Government, UN Headquarters Vienna, 2007; Kennedy School of Government, Harvard University, 2008 Frontiers of Innovation Conference (as Member of Global Innovators Network); Shanghai Business School, International Conference on Industrial Globalization and Technology, 2007 (as speaker) ; Indian Institute of Advanced Study, Presidential House, Shimla, India, Summer School on Methodologies in Political Sciences, 2007 (as speaker); Workshop on Industrial Design about East Lake in Wuhan, China as part of Icocrada World Design Congress 2009 Beijing (as Director); International Association of Societies of Design Research, IASDR Conference 2009, Korea (as Conference Chair and Academic Reviewer); WSEAS Conferences at Morgan State University, Baltimore, 2009 (as an invited dinner speaker over the ticketed banquet & as an invited luncheon speaker), New England Complex Systems Institute (NECSI) Boston, International Conference on Complex Systems, 2007 (as a session speaker); Harvard University, Kennedy School of Government, Conservation Finance Forum 'webinar' conference (as a participant in Q & A section).
His primary research is cross-disciplinary; it lies at the intersection of conceptual stage of engineering design & the theory of classical dynamics. Some of his recent publications are - Polity by Design; an engineering approach, a working paper on American Political Science Association: APSA's website : Governance by design; an engineering approach, WSEAS conferences, 2009, Prague : Preventing another identical/similar/verisimilar 9/11 by taking 2nd (Heavenly) opinion from satellites, WSEAS conferences, Morgan State University, 2009: Interlinked Signage on hilly terrains, WSEAS conferences, Harvard University, 2010: Recollecting Memoirs of the laws of Physics; a desperate

attempt to redesign transportation systems, paper accepted for presentation at ‘International Journal of Arts & Sciences (IJAS) Conference for Academic Disciplines’ scheduled at Harvard University in May 2010. His ongoing projects are ‘design and installation of 3-dimensional luminous signage in Shimla city’ – a project funded by the Himachal Pradesh Government, India & ‘design of a geared smooth and non-drip teapot’ – a project funded by venture capitalist based in New Delhi. He is a Member: Satellite Educator Ambassador, Satellite Educators Association, in partnership with NOAA, NASA & others & amongst the ‘Friends of the Network Science Center’, Network Science Center, US Academy at West Point, NY.

Plenary Lecture 7

Computer Aided Evaluation of Heat Exchangers

Professor Gheorghe Bacanu
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Abstract: In the speech is presented a generalized method to determine the performance of different types of heat exchanger starting from the behaviour of different Elementary Heat Exchanger (EHE), as part of an assembly. Algorithms, with computer aided analyse and application in the specific case of heat pipe heat exchanger (HPHE) is presented, also. The EHE (the Heat Pipe in the case of HPHE) has a self performance depending on the different operating conditions. Inside the heat exchanger, usually, we have a combination of the EHE in a parallel, a series or a mixed arrangement. The performance (behaviour) of each EHE depend, essentially, on the position inside the exchanger, taking in account that the temperatures of both fluids are variable in the longer of the exchanger. Finally, the overall performance of the exchanger is a sum of the performance of the total number of EHE. The algorithm to predict the performance oh HPHE is based on the knowledge of the behaviour of EHE in very different conditions (behaviour obtained by laboratory tests) and on the use of a specific software, which is presented more detailed in the lecture.

Brief Biography of the Speaker:

• Engineer License degree obtained in 1974, at Faculty of Energetics, University “Politehnica" of Bucharest, ROMANIA;
• Master degree in “Gestion de PME-PMI” (SMEs management) obtained in 2001 at Faculte d'Administration et Echange, Universite Paris XII, Val de Marne, FRANCE ;
• From 1980 Professor (Department of Thermodynamics and Fluids Mechanics), University Transilvania of Brasov (teaching Thermodynamics, Renewable Sources of Energy, Energy Management, Heat and Mass Transfer Processes);
• PhD obtained in 1991 with the thesis "Optimization of Heat Pipe Heat Exchangers", (in Romanian);
• Participations at International Heat Pipe Conferences: Grenoble (France), Beijing (China), Tokyo (Japan), Albuquerque (U.S.A) and at different WSEAS Conferences (HTE’07, HTE’08, URES ‘08).

Plenary Lecture 8

The Overview of SC Macrodiversity System Second Order Statistics Operating over Shadowed Fading Channels

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Abstract: Wireless channels are simultaneously affected by short-term fading and long-term fading (shadowing). While short-term fading is mitigated through the use of diversity techniques typically at the single base station (micro-diversity), use of such microdiversity approaches alone will not be sufficient to mitigate the overall channel degradation when shadowing is also concurrently present. Since both short- and long-term fading coexist in wireless systems, we must simultaneously take their influence into account. Macrodiversity is used to alleviate the effects of shadowing, where multiple signals are received at widely located base stations, ensuring that different long-term fading is experienced by these signals. The simultaneous use of multiple base stations and the processing of signals from these base stations will provide the frame work for both macro and micro-diversity techniques to improve the performance in shadowed fading channels. At the macro-level, SC is basically a fast response handoff mechanism that instantaneously or, with minimal delay chooses the best base station to serve mobile based on the signal power received. The level crossing rate (LCR) and the average fading duration (AFD) are second-order statistical quantities, which complement the static probabilistic description of the fading signal (the first-order statistics), and have found several applications in the modelling and design of practical systems and designing of wireless communication systems.
The second order statistics of SC (Selection Combining) macrodiversity operating over the Gamma shadowed fading channels are derived. The macrodiversity system of SC type consists of two microdiversity systems and selection is based on their output signal power values. Each microdiversity system is of SC type with arbitrary number of branches in the presence of various types of short time fading. The short-term signal variation is described by several distributions such as Hoyt, Rayleigh, Rice, Nakagami-m, α-μ and Weibull. This range of short-time fading distribution includes all important fading phenomenons. Considering Nakagami-m and Hoyt distribution multipath scattering with relatively large delay-time spreads, with different clusters of reflected waves are described. In that way good fits to collected data in indoor and outdoor mobile-radio environments are provided. Also the consideration of propagation paths, consisting of one strong direct line-of sight (LoS) signal, and many randomly reflected, usually weaker signals is included trought the Ricean distribution. The non-linearity fading effects are included trought consideration of Weibull and α-μ fading distributions. Since base stations at the macrodiversity level are widely located, due to sufficient spacing between antennas, long-term fading is moddeled with joint distribution of two statistically independent Gamma distributions.

Brief Biography of the Speaker:
Dragana S. Krstic was born in Pirot, Serbia. She received the BSc, MSc and PhD degrees in electrical engineering from Faculty of Electronic Engineering, Department of Telecommunications, University of Nis, Serbia, in 1990, 1998 and 2006, respectively. Her field of interest includes telecommunications theory, optical communication systems, wireless communication systems, satellite communication systems etc. She works at the Faculty of Electronic Engineering in Nis since 1990. She participated in more Projects which are supported by Serbian Ministry of Science. She has written or co-authored more then 100 papers, published to International/National Conferences and Journals. She has also reviewed more articles in IEEE Journals, ETRI journal and other journals. She is a member of technical program committees and international scientific committees of several scientific conferences.

Plenary Lecture 9

Better living arrangement supported by communication technique from the viewpoints of beneficiaries

Prof. Hidetoshi Wakamatsu, Ph.D.
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Abstract: For the rapid shift of our society to the longevity and little birth rate, we discuss the possible contribution of communication environment based on information technology to the better living arrangement of the elderly, the handicapped, the sick, the healthy and so on. The information systems based on the same principle combined with a newly developed button type simple computer for definite inevitable functions are introduced as a unified system. It was particularly designed not only for everyday life convenience but also for sudden illness threatened to life for the lonely living persons. The unified system works on the basis of its safety, reliability and flexibility, reflecting limits and vulnerability of past technical achievements in wellness and well-being. We emphasize the importance of wide area networks, considering its easy replacement and convenience for public benefits, including favorable economics and easy-to-handle equipment, as systems boasting both high-tech and multiple functions in a single apparatus do not necessarily lead to widespread use. Hereby, the active use of the Internet environment is also mentioned for the wide provision of convenience on public benefits. Various appropriate systems as variations on the basis of same principle are presented for the help of guidance, health care, nursing and medical affairs, physical exercise, amusement, rehabilitation, social participation and so on. The proposals on policies aimed at hardware development, software improvement and system management, which can help better use of these networks with technical viewpoints and equipment derived from our trials with comprehensive engineering issues related to developing and practical utilization of basic functions. In addition, beneficiaries themselves cover effective activity and communications in remote islands and/or depopulated area, where sufficient resource of welfare staff might not be provided including the definite intercommunication of persons at a distance. Although our argument and views cover some, not all, pertinent aspects, we try to illustrate and advocate the roles and possibilities that we can play in wellness and well-being. Thus, we provide appropriate means of communication not only for everyday life support of beneficiaries with closely related persons such as family members, but also for substantial support of welfare staff such as helper, caretaker, nurse, health nurse and physician. Consequently, the basic posture of proposed system relating to current information technology leads us to the intended build-up of new future welfare culture.

Brief Biography of the Speaker:
Professor Hidetoshi Wakamatsu born on 15.Nov.1946, received his B.E. and M.E. degrees from Yokohama National University in 1970 and 1972, respectively. He received his Dr. of Eng. degree in 1984 from the University of Tokyo. Academic Positions: He was a research Associate at the Institute for Medical and Dental Engineering from 1972-1986, Tokyo Medical and Dental University. From 1973-1974 he was a Visiting Research Associate, Institute for Biocybernetics, Faculty of Medicine, University of Erlangen-Nuernberg, Germany. From 1986-1988 he was an Associate Professor at Ashikaga Institute of Technology, Associate professor 1988-1991, Professor 1991-1992 at Fukui University and Professor, Faculty of Medicine in 1992, Professor, Graduate School of Health Care Sciences in 2001, Tokyo Medical and Dental University. In 1994 a visiting professor, Oregon State University and so on. From 2006 a general chair of Asia Pacific Conference on Control and Measurement.
Scientific Activities
1. Automatic precise control system of temperature for clinical brain hypothermia
2. Biochemical dynamics in the damaged area of brain tissue and in the clinical treatment.
3. Haptic operation of virtual visco-elasto-plastic material by virtual tools and its application to medicine
4. Life support system based on simple principle and method using the Internet.

Plenary Lecture 10

Intelligent online learning systems

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Abstract: With the use of intelligent online systems we can bring benefits, such as releasing teachers from their routine tasks, to participants of study process and face students with the possibility to learn more systematically and probably quicker. In this lecture the short overview of some projects in connection with intelligently adapting online learning systems will be given. Methods, approaches and techniques to solve various types of emerging tasks will be discussed. A developing implementation under the open source environment will be shortly presented.

Brief Biography of the Speaker:
D. Baziukaite recieved her master degree in Mathematics (Numerical analysis and systems) from Klaipeda University and doctoral degree in Informatics from Vytautas Magnus University (Kaunas) and Institute of Mathematics and Informatics (Vilnius). Currently, she is assoc. professor in the Department of Computer Science, Klaipeda University and the Executive of Net-Based learning group at Information Technology Center, Klaipeda University, conducting the work flow and activity related to distance and e-learning, participating in formation of policy according new developments establishing and supporting flexible study forms. Her research is focused on adaptivity, intelligence, and decision making processes in virtual learning environments, machine learning algorithms and various applications, data mining.

Plenary Lecture 11

4-dim duck solution in a trading economic model

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Abstract: In a previous paper H.Nishino, H.Miki and the author have constructed 2-dimensional duck solutions in Goodwin's economic model modifying the effective function. In another one, we got 4-dimensional ducks in a trading economic model using two symmetric Goodwin's models. These results lead us a new point of view to analyze the stability for the ducks. In the R^{2+2} slow-fast system with an invariant manifold, we first assume that this manifold describing limit cycle has a duck solution in a projected R^{2} space. If there exists pseudo singular node point near the invariant manifold, the system has a duck solution with a relatively stable region in R^{4}. This fact gives a global behavior in R^{4}, because it satisfies the condition including the invariant manifold at around the pseudo singular point. In other words, we can observe a center manifold for the slow-fast system in R^{4}.

Brief Biography of the Speaker:
Prof. Kiyoyuki Tchizawa received his Ph.D. in 1985 from Administration Engineering (Applied Maths) KEIO University. He is now As.Professor in the Tokyo City University (Musashi Institute of Technology),also Prof. Kiyoyuki Tchizawa is a Member of Mathematical Society of Japan, member of the Societe Mathematique de France, and member of the International Federation Nonlinear Analists. He is author of many papers.

Plenary Lecture 12

Parametric control in continua based on the new numerical approach

Professor Ivan Kazachkov
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lso Affiliated Professor of the Royal Institute of Technology, Stockholm.
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Abstract: Parametric control of the processes in continua is of interest both for the development of the theory, as well as for the practical applications in diverse technical and technological processes and systems. For example, parametric excitation of oscillations at the interfaces in continua may intensify various technological and technical processes (heat and mass transfer, mixing of different liquid components, decreasing viscosity and conductivity of media, improving a quality for crystallizating metal and many others). Then, the excitation of parameters' oscillations is used for disintegration of the jet and film flows in the processes like spray-coating, metal spraying, granulation of materials, and so on. The opposite task is a suppression of the oscillations in a problem of stabilization of the unstable boundaries, or regimes and processes. What is more, parametric control in a number of highly effective intensive thermal, electromechanical and electrochemical processes makes possible to run even the unstable modes, which are impossible to have without proper control.

Brief Biography of the Speaker:
Ivan Kazachkov is a Mechanical Engineer who had earned his PhD (Candidate of Physical and Mathematical Sciences, 1981) and MSc (1976) from the Kyiv National Taras Shevchenko University and got his Full Doctorship (1991) in Engineering Sciences from the Institute of Physics of the Latvian Academy of Sciences in Riga. Recently during 5 years he was teaching and doing research at the National Technical Univeristy of Ukraine "KPI". He is also an affiliated professor at the Royal Institute of Technology in Stockholm, where he has been teaching numerical methods and doing research in modeling of multiphase systems as visiting professor (1999-2004 permanently and afterwards part-time). Since 2009 he is Head of Department of Applied Mathematics and Informatics at the Nizhyn State University named after M. Gogol. The research activities of prof. Kazachkov include Parametric Control in Continua, Multiphase Flows, Controlled Film Flow Decay, and Granulation of Metals for Special Metallurgy, Modeling and Simulation. He has over 200 publications in scientific journals and conferences, participates in European research programs and committees. A number of PhD students are doing research under his supervision.

Plenary Lecture 13

Admission-Discharge-Transfer Gateway Interface: A Health Level 7 Application for Hospital Information Systems

Professor Dr. Coskun Atay
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Abstract: This paper presents a software application called Admission-Discharge-Transfer (ADT) Gateway Interface. This interface uses the Health Level 7 (HL7) standard to bridge the hospital computer systems for maintaining hospital bed occupancy. ADT Gateway Interface is a Microsoft VB.NET application that utilizes the Microsoft Windows TCP/IP socket to communicate with the Hospital Information System (HIS) ADT System. Received messages are processed using a custom Microsoft Windows DLL called HL7Messaging DLL and information presented inside these messages are put into a Microsoft SQL Server 2005 database. Hospital computer systems reach to this SQL Server 2005 database to examine the bed occupancy in the hospital. Furthermore, states and errors of this ADT Gateway Interface are recorded. This helps design engineers in measuring performance and observing failures and recoveries. This may require detailed log information from this application. In this study, a robust logging viewer design methodology is used to improve reliability and consistency of the overall integrated system.

Brief Biography of the Speaker:
Dr. Coskun Atay received his BSc degree (1983) from Industrial Engineering Department of M. E. Technical University. Then he received his Masters (1986) and Ph.D. (1992) degrees both in Computer Science from Florida Institute of Technology, and City University of New York, USA under a Ministry of Education scholarship. During his doctoral study, he taught courses on C, UNIX, Computer Architecture and Microcomputers at Brooklyn College of CUNY. His doctoral thesis was on parallelization of Constraint Logic Programming. At Periphonics Corporation on facsimile imaging system, at Information Builders on migration of Focus database to 64-bit architectures, at Royalblue Technologies on Nasdaq electronic trading systems, at Citibank on ATM software release migration, and at UBS Investment Bank on global SWIFT interface project, as Software Engineer and Project Manager for 12 years from1992 to 2004. He is a professor at Izmir University of Economics, Software Engineering Department since 2004. He is member of IEEE and Turkish Scientific and Technical Research Organization overseeing government sponsored research projects.

Plenary Lecture 14

Periodic And Aperiodic Dynamics From A Resistively Coupled Nonidentical Superconducting Junction Under Dc Excitations

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Abstract: Nonidentical Josephson junctions (JJs) coupled via a high resistance Rcp is considered under the excitation of dc sources. Initially, an analytical model is constructed in terms of several first order differential equations following a nonlinear resistive-capacitive shunted junction (NRCSJ).Then, the properties at an equilibrium point is investigated and a transcritical bifurcation is observed as a result of a center manifold analysis. Both periodic and aperiodic behaviors are encountered depending on the circuit parameters. It is proven that, the coupling resistance Rcp, the excitation amplitudes Ii and internal junction parameters such as Ri and Ci play important roles in order to depict the overall dynamics.

Brief Biography of the Speaker:
Dr. Erol KURT completed his undergraduate studies at Gazi University, Department of Physical Education in 1998 and took his M. Sc. degree from the Institute of Science & Technology of the same university in 2001. He was awarded by an European Graduate College stipend during his Ph. D study at the Institute of Physics & Mathematics of Bayreuth University in Germany. He completed his Ph. D. degree in 2004 on the instabilities of rotating magnetic fluids. After his Ph.D., he worked in Turkish Atomic Energy Authority R&D Department, Fusion Division for 3 years. Beginning from the middle of 2009, he was assigned to the position of Associate Professor at Technology Faculty of Gazi University in Ankara. His main teaching and research areas include nonlinear phenomena in electrical/electronic circuits, mechanical vibrations, chaos, plasmas and magnetohydrodynamics. He has authored or co-authored various scientific papers. A detailed list of scientific activities can be followed by http://websitem.gazi.edu.tr/ekurt/AnaSayfa&Lisan=En .He is a member of Turkish Science-Research Foundation TUBAV.

Plenary Lecture 15

The Role of Environmental Indicators in Environmental Management

Prof. Davorin Kralj
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Abstract: Today, companies are facing with the process of sustainable development. We believe that only the companies which will implement interchanges of organisational renovation from the environmental viewpoint will be able to offer holistic environmental answers to the customer's needs and their preferences. For that reason it is important that company retains its ability of ongoing monitoring of organisational model of viewpoints of environmental management. High quality environmental information is indispensable for responsive and cost-effective policies. The OECD provides leadership in the development of indicators to measure countries' environmental performance and provides harmonized data on environmental progress in OECD countries. It advises on methodologies for environmental indicators and accounting systems; it issues recommendations that help countries improve their environmental information systems and produce reliable environmental data . The purpose of this contribution is to study and define the most important indicators influencing environmental management effectiveness and efficiency in enterprises, focusing on Slovenian enterprises. The focus is on environmental indicators as the result of environmental management, environmental policy and a strategic direction towards achieving environmental goals as well as constant and continuous training and awareness-raising in stakeholders, employees, customers, suppliers and wider social community.The research objective was to set or determine and prove the role and significance of environmental management indicators in an enterprise's operations. The reflection included interdisciplinary thinking which enables us to understand and manage the process of environmental management in terms of sustainable development. Based on the assumption that an enterprise respects and complies with environmental legislation, it was analitically examined what types of environmental indicators and measures contribute to a constant and continuous improvement in terms of sustainable development. Environmental indicators are powerful tools that serve many purposes, useful as tools for performance evaluation and public information. The development of indicators is a dynamic process that is constantly subject to updating and improvement.

Brief Biography of the Speaker:
Dr. Davorin Kralj completed his undergraduate studies at the University of Maribor, Faculty of Chemistry and Chemical Engineering (1987) and post-graduate study at the University of Maribor- Faculty of Organizational Sciences, in the area of Integral Quality Management (1991) and also post-graduate master' study program Management and Organization - MBA at Faculty for Economics and Business in Maribor (2008). In 2009 he holds a Ph.D. in the field of Chemistry and Chemical Engineering. In 2006 he started his second doctoral study program at the Faculty of Economics in Ljubljana. His main teaching and research areas include organizational sciences, environmental management and sustainable development. He has authored or co-authored various scientific papers and environmental patents. He has been awarded numerous certificates and awards. In 2008, have been distinguished with the silver award during the China Association of Inventions and IFIA International Federation of Inventors' Associations, the silver award during the International Jury of IENA 2008 and award of the Best Eco Inventor during the WIPO World Intellectual Property Organization.

Plenary Lecture 16

Managerial Methods to Control the Downside Risk of Derivatives

Dr. Patrick L. Leoni
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Abstract: Derivatives are at the very heart of the recent financial disasters, and the surveillance of their downside risk is of paramount importance both to practitioners and regulators. We survey and present original managerial methods to efficiently control the downside risk of derivatives portfolios. We first describe the managerial methods currently used in practice and their relative cost, and we then show that the most common methods actually aggravate this downside risk. We then argue that selecting appropriate underlyings satisfying some specific statistical and easily identifiable properties is a natural way to significantly reduce the downside risk without involving costly managerial interventions.

Brief Biography of the Speaker:
Patrick Leoni is a Professor of Finance at Euromed School of Management (Marseille, France), and at the University of Southern Denmark. He received his Ph.D. from the University of Minnesota, and he held research positions in Zurich, Venice and Dublin. Patrick Leoni's research foccuses on two distinct issues. The first issue is about beliefs and learning effects on asset pricing, in particular at macro-economic level. The second issue is about designing and pricing new classes of derivatives, with a strong emphasis on health economics. He has been involved in the last few years in projects related to HIV/AIDS economic policies, and the design of derivatives to hedge against mortality risk. He has over 20 publications in leading scholastic journals in Finance, Psychology and Mathematics, and he has received scientific awards for his research.

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