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Recent Researches in Communications and Computers

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- **Proceedings of the 16th WSEAS International Conference on Communications**
- **Proceedings of the 16th WSEAS International Conference on Computers**

(Part of CSCC '12)

Kos Island, Greece, July 14-17, 2012

ISBN: 978-1-61804-109-8

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www.wseas.org

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All papers of the present volume were peer reviewed by no less that two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: http://www.worldses.org/review/index.html

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World Scientific and Engineering Academy and Society

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Preface

This year the 16th WSEAS International Conference on Communications (part of CSCC '12) and the 16th WSEAS International Conference on Computers (part of CSCC '12) were held in Kos Island, Greece, July 14-17, 2012. The conferences provided a platform to discuss microwave theory and techniques, electromagnetic compatibility problems, applied electromagnetics, optical fiber systems, computer networks, network reliability, military communications, computer vision, programming languages, quantum computing, fault tolerance, artificial intelligence, microelectronics, mobile computing, software engineering, security, web-based education etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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Keynote Lecture 1

Energy, Environment and Importance of Power Electronics

Professor Bimal K. Bose
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Abstract: Power electronics technology has gained significant maturity after several decades of dynamic evolution of power semiconductor devices, converters, PWM techniques, electrical machines, motor drives, advanced control, and computer simulation techniques. With the maturing trend of the technology, 21st century will find tremendous emphasis on power electronics applications in every corner of industrial, residential, commercial, transportation, aerospace , military and electric utility systems. There will be increasing emphasis on application-oriented R&D in modularization, modeling, analysis, simulation, design, and experimental evaluations. Power electronics has now established as a major discipline in electrical engineering, and is gradually tending to merge as a high tech frontier technology with power engineering. In the 21st century, we expect to see the tremendous impact of power electronics not only in global industrialization and efficient energy systems, but also in energy conservation, renewable energy systems, and electric/hybrid vehicles. The resulting impact in mitigating climate change problems due to man-made environmental problems is expected to be considerable. There are ambitious predictions that renewable energy alone with adequate energy storage can supply all the energy needs of the world, and 90% of the automobiles will be electric by the end of the century. It appears that the role of power electronics in our society will tend to be as important and versatile as computers and information technology today. In fact, there is trend of merger of power electronics with computers, information technology and power engineering in the future “Smart Grid” to emerge as a complex interdisciplinary technology. The presentation will begin with the discussion of global energy scenario, climate change problems due to burning of fossil fuels, and the consequences and remedial measures of global warming problems. The importance of power electronics relating to energy saving, renewable energy systems (wind, photovoltaic and fuel cells), bulk energy storage and electric/hybrid vehicles will be discussed in detail. The fuel cell and battery EVs will be compared, and the concept of Smart Grid will be discussed. Several example applications on HVDC wind park, FACT system, DTC drive system, axial flux PM machine EV drive, fuzzy control of wind generation system and neural network based feedback signal estimation will be discussed before coming to conclusion and future scenario of the technology.

Brief Biography of the Speaker: Bimal K. Bose held the Condra Chair of Excellence (Endowed Chair Professor) in Power Electronics at the University of Tennessee, Knoxville since 1987, where he was responsible for teaching and research program in power electronics and motor drives. Concurrently, he was Distinguished Scientist (1989-2000) and Chief Scientist (1987-1989) of EPRI (Electric Power Research Institute)-Power Electronics Applications Center for promoting power electronics in USA. Prior to this, he was a Research Engineer in the GE Corporate Research and Development (now GE Global Research Center), Schenectady, NY for 11 years (1976-1987), an Associate Professor of Electrical Engineering, Rensselaer Polytechnic Institute, Troy, NY for five years (1971-1976), and a faculty member of Bengal Engineering and Science University for 11 years (1960-1971). He is specialized in power electronics and motor drives, specially including power converters, ac drives, PWM techniques, digital control, electric/hybrid vehicle drives, renewable energy systems, A-I applications, and has made many pioneering research contributions in these areas. He has been a power electronics consultant in large number of industries. He authored/edited 7 books in power electronics, holds 21 U.S. Patents for his inventions, and large number of research publications. He has given advanced tutorials, keynote addresses and invited seminars extensively throughout the world. He is a recipient of IEEE Power Electronics Society Newell Award (2005), IEEE Millennium Medal (2000), IEEE Meritorious Achievement Award (1997), IEEE Lamme Medal (1996), IEEE IAS Outstanding Achievement Award (1993), IEEE IES Mittelmann Award (1994), IEEE Region 3 Outstanding Engineer Award (1994), GE Silver Patent Medal (1986), Calcutta University Mouat Gold Medal (1970), IEEE Fellow (1989) and Life Fellow (1996), and many other awards for his research accomplishments. The IEEE Industrial Electronics Society Magazine published a special issue (June 2009) “Honoring Dr. Bimal Bose and Celebrating His Contributions in Power Electronics” with his photo on the cover page. He received B.E. degree in 1956, M.S. degree in 1960 and Ph.D. degree in 1966.

Keynote Lecture 2

Current Video Coding Standards: H.264/AVC, Dirac, AVS China and VC-1

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Barun Technologies, Corp.
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Abstract: Video coding standards: H.264/AVC, DIRAC, AVS China and VC-1 are presented. These are the latest standards and are adopted by ITU-T/ISO-IEC, BBC, China standards organization and SMPTE respectively. Besides presenting these standards, research potential and as well projects (both at UG and grad levels) are emphasized. These are available by accessing the database for research and projects in [18]. Web/ftp sites for accessing standards documents, software, test sequences, conformance bit streams, industry activities etc are provided.

Brief Biography of the Speaker: K. R. Rao received the Ph. D. degree in electrical engineering from The University of New Mexico, Albuquerque in 1966. He received B.S. E.E from the college of engineering, Guindy, India in 1952.Since 1966, he has been with the University of Texas at Arlington where he is currently a professor of electrical engineering. He, along with two other researchers, introduced the Discrete Cosine Transform (DCT) in 1975 which has since become very popular in digital signal processing. DCT, INTDCT and MDCT (modified DCT) have been adopted in several international video/image/audio coding standards such as JPEG/MPEG/H.26X series and also by SMPTE (VC-1)and by AVS China.He is the co-author of the books “Orthogonal Transforms for Digital Signal Processing” (Springer-Verlag, 1975), Also recorded for the blind in Braille by the Royal National Institute for the blind. “Fast Transforms: Analyses and Applications”(Academic Press, 1982), “Discrete Cosine Transform-Algorithms, Advantages, Applications” (Academic Press, 1990). He has edited a benchmark volume, “Discrete Transforms and Their Applications” (Van Nostrand Reinhold, 1985). He has co edited a benchmark volume, “Teleconferencing” (Van Nostrand Reinhold, 1985). He is co-author of the books, “Techniques and standards for Image/Video/Audio Coding” (Prentice Hall) 1996 “Packet video communications over ATM networks(Prentice Hall) 2000 and “Multimedia communication systems” (Prentice Hall) 2002. He has co edited a handbook “The transform and data compression handbook,” (CRC Press, 2001). Digital video image quality and perceptual coding, (with H.R. Wu)(Taylor and Francis 2006). Introduction to multimedia communications: applications, middleware, networking, (with Z.S. Bojkovic and D.A. Milovanovic), Wiley, (2006). He has also published a book, “Discrete cosine and sine transforms”, with V. Britanak and P. Yip (Elsevier 2007). Wireless Multimedia Communications (publisher: Taylor and Francis) Nov. 2008. “Fast Fourier Transform: algorithms and Applications”, with D. Kim and J.J. Hwang (publisher: Springer) 2010. (Also e-book). Also into Chinese by China Machine Press. Also Asian edition by Springer India. Also into Korean by A-Jin publishing company. Some of his books have been translated into Japanese, Chinese, Korean and Russian and also published as Asian (paperback)editions(also as e-books). He has been an external examiner for graduate students from universities in Australia, Canada, Hong Kong, India, Malaysia, Singapore, Thailand, Taiwan and USA. He was a visiting professor in several Universities -3 weeks to 7 and 1/2 months- (Australia, Japan, Korea, Singapore and Thailand). He has conducted workshops/tutorials on video/audio coding/standards worldwide. He has supervised several students at the Masters (77) and Doctoral (31) levels. He has published extensively in refereed journals and has been a consultant to industry, research institutes, law firms and academia. He has reviewed 23 book manuscripts for book publishers. He is a Fellow of the IEEE (Member # 03911617). He is a member of the Academy of Distinguished Scholars, UTA. He was invited to be a panelist for the 2011 NSF Graduate Research Fellowship Program (GRFP), with service on the following panel: PANEL NAME: Electrical Engineering Panel MEETING DATES: Friday Feb 11, 2011 to Sunday Feb 13, 2011 Do Nyeon Kim received the Ph.D. degree in electrical and electronic engineering from Yonsei University in Seoul, South Korea in 2004. From 1989 to 2003, he was with the Electronics and Telecommunications Research Institute (ETRI), South Korea, where he was a senior researcher. From 2005 to 2010, he was with the University of Texas at Arlington where he was a visiting scholar of electrical engineering. Since 2010, he has been with Barun Technologies, Corp., South Korea, where he is currently a senior engineer. He has published "Fast Fourier Transform - Algorithms and Applications (with K.R. Rao and J.J. Hwang, Springer, 2010).

Keynote Lecture 3

Program Analysis beyond Closed-form Expressions for Maximum Parallelization

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Abstract: Program analysis techniques and accurate data dependence testing enable a compiler to perform safe automatic code optimization and parallelization. It has been shown that factors, such as loop variants and nonlinear expressions, limit program analysis, dependence testing, and parallelization. The NLVI-Test and the PLATO library have been introduced as a new tool to enable exact data dependence testing on nonlinear expressions. Apart from this work, analyses that utilize the Chains of Recurrences formalism have been shown to improve a dependence test's ability to analyze expressions. In this work we present techniques for applying the NLVI-Test ideas in conjunction with Chains of Recurrences analysis, to couple the benefits of both. In addition, we develop a "Parallelization Index" which describes the upper bound of the total parallelization obtainable in a compiler infrastructure. We perform an experimental evaluation of our techniques on several scientific benchmarks. Our experiments show that our techniques result in higher numbers of total parallel loops discovered, and moreover, that we consistently expose a majority of the obtainable parallelism.

Brief Biography of the Speaker: Kleanthis Psarris is a Professor of Computer and Information Science and the Dean of the School of Natural and Behavioral Sciences at City University of New York - Brooklyn College. He received his B.S. degree in Mathematics from the National University of Athens, Greece in 1984. He received his M.S. degree in Computer Science in 1987, his M.Eng. degree in Electrical Engineering in 1989 and his Ph.D. degree in Computer Science in 1991, all from Stevens Institute of Technology in Hoboken, New Jersey. His research interests are in the areas of Parallel and Distributed Systems, Programming Languages and Compilers, and High Performance Computing. He has designed and implemented state of the art program analysis and compiler optimization techniques and he developed compiler tools to increase program parallelization and improve execution performance on advanced computer architectures. He has published extensively in top journals and conferences in the field and his research has been funded by the National Science Foundation and the Department of Defense. He is an Editor of the Parallel Computing journal. He has served on the Program Committees of several international conferences including the ACM International Conference on Supercomputing (ICS) in 1995, 2000, 2006 and 2008, the IEEE International Conference on High Performance Computing and Communications (HPCC) in 2008, 2009 and 2010, and the ACM Symposium on Applied Computing (SAC) in 2003, 2004, 2005 and 2006.

Keynote Lecture 4

Folding and Unfolding Related Issues, Especially Decompositions, in Data Processing

Professor Metin Demiralp
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Abstract: Many branches in science and engineering deal with data composed of huge number of elements. Neuroscience, signal processing and similar issues are amongst these types of applications where each data vector contains hundreds of thousands or millions of elements. These types of data vectors can be partitioned to sets having rather small number of elements at the expense of dimensionality increase. Thus certain arrays having more than two indices appear after this partitioning. Their processing is generally based on the expressing of those arrays in terms of rather simple arrays which can be processed more easily. This is somehow decomposition of the arrays to rather simple arrays. This issue is one of the core topics of multilinear algebra. There have been many attempts to get efficient decomposition methods by using folding and unfolding operations.
The general tendency is to use the tensor concept to consider the multilinear algebraic entities. However, a multiindex entity need not be adjacently considered to a tensor even though a tensor can be characterized by a multiindex array depending on the coordinate system in which the considered tensor is represented. We prefer to use the folded arrays to this end. Folded arrays (folarrs) and especially their specific forms, folded vectors (folvecs) and folded matrices (folmats) are very harmonious to the conceptual structure of the ordinary linear algebra. Thus the decomposition of folmats becomes the basic issue.
One way is the use of spectral representation for the decompositions of the folmats. To this end the eigenvalue problems of the folmats should be brought to the scene. On the other hand a complete analogy to the singular value decomposition of ordinary matrices is possible for the singular value decompositions of the folmats. What we need is to consider a folmat as a transforming agent from a specific type folmat to another type folmat even though type conservation is possible.
Spectral decomposition, singular value decomposition, reductive array decomposition, high dimensional model representation, enhanced multivariance product representation will be the main foci for folmat decompositions in the presentation.

Brief Biography of the Speaker: Metin Demiralp was born in Turkiye (Turkey) on 4 May 1948. His education from elementary school to university was entirely in Turkey. He got his BS, MS degrees and PhD from the same institution, ÿIstanbul 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 ÿIstanbul 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 month long postdoctoral visit to the same group in 1979–1980. He was also (and still is) in collaboration with a neuroscience group at the Psychology Department in the University of Michigan at Ann Arbour in last three years (with certain publications in journals and proceedings).
Metin Demiralp has more than 90 papers in well known and prestigious scientific journals, and, more than 200 contributions to the proceedings of various international conferences. He gave many invited talks in various prestigious scientific meetings and academic institutions. He has a good scientific reputation in his country and he is one of the principal members of Turkish Academy of Sciences since 1994. He is also a member of European Mathematical Society. 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: Probabilistic Evolution Method in Explicit ODE Solutions and in Quantum and Liouville Mechanics, Fluctuation Expansions in Matrix Representations, High Dimensional Model Representations, Space Extension Methods, Data Processing via Multivariate Analytical Tools, Multivariate Numerical Integration via New Efficient Approaches, Matrix Decompositions, Multiway Array Decompositions, Enhanced Multivariate Product Representations, Quantum Optimal Control.

Keynote Lecture 5

Human Control Strategies for Multi-Robot Teams

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Abstract: Expanding human span of control over teams of robots presents an obstacle to the wider deployment of robots for practical tasks in a variety of areas. One difficulty is that many different types of human interactions may be necessary to maintain and control a robot team. We have developed a characterization of human-robot tasks, and appropriate human robot interaction models, based on complexity of control that helps explicate the forms of control likely to be needed and the demands they pose to human operators. In this paper we use research from two of these areas to illustrate our taxonomy and its utility in characterizing and improving human-robot interaction.

Brief Biography of the Speaker: Katia Sycara is a Professor in Robotics in the School of Computer Science at Carnegie Mellon University and holds the Sixth Century Chair in Computing at the University of Aberdeen, UK. She is the Director of the Laboratory for Advance Agents and Robot Technology & Semantic Technologies. She holds a B.S in Applied Mathematics from Brown University, M.S. in Electrical Engineering from the University of Wisconsin & PhD in Computer Science from Georgia Institute of Technology. She holds an Honorary Doctorate from the University of the Aegean (2004). Dr. Sycara is a Fellow of the Association for Advancement of Artificial Intelligence (AAAI), Fellow of the Institute of Electrical & Electronic Engineers (IEEE), & the recipient of the 2002 ACM/SIGART Agents Research Award. She has served as member of the Scientific Advisory Board of France Telecom, panel evaluation for Siemens, Sandia Labs and others. Dr. Sycara has given numerous invited talks, & has authored or co-authored more than 400 technical papers dealing with Multi-Agent and Multi-Robot Systems, Game Theory, Agents Supporting Human Teams, Human-Agent Interaction, Negotiation, Web Services, Machine Learning & the application of these techniques to crisis action planning, scheduling, manufacturing & e-commerce. Her students have won multiple best paper awards (AAMAS, 2005, 2006, ACHI 2008, BRIMS, 2004, 2005). Her robot team has won various awards in the Robocup Rescue competitions. Dr. Sycara has led successful multimillion dollar research effort funded by DARPA, DDR&E, NASA, AFOSR, ONR, ARO, AFRL, NSF & industry. She is a founding member & served as member of the Board of Directors of the International Foundation of Multiagent Systems (IFMAS). She is a founding member of the Semantic Web Science Association, & serves as the US co-chair of the US-Europe Semantic Web Services Initiative. She has founded the journal “Autonomous Agents & Multiagent Systems” and served as Editor in Chief (1998-2008); she is on the Editorial Board of six additional journals.

Plenary Lecture 1

Performance Analysis of SSC/SC Combiner at Two Time Instants in The Presence of Fading

Dr. Dragana Krstic
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Abstract: The performance analysis of diversity schemes in wireless communications typically involves the assumption of a variation of an instantaneous value of the received signal, i.e. fading of signal envelope, due to the multipath propagation. Fading is one of the main causes of the receiver performance degradation. Diversity combining technique which consists of receiving redundantly the same information-bearing signal over two or more fading channels, then combining these multiple replicas at the receiver in order to increase the overall received signal-to-noise ratio (SNR) is commonly used. Diversity technique is certainly one of the most frequently used methods for combating the deleterious effect of channel fading.

Since the selection combining (SC) and switch and stay combining (SSC) do not require signal cophasing and fading envelope estimation, they are very often implemented in practice. The SC is combining technique where the strongest signal is chosen among L branches of diversity system. In the case of dual branch SSC, the first branch stay selected as long as its instantaneous signal-to-noise ratio (SNR) is greater than predetermined switching threshold, even if the instantaneous SNR in the second branch maybe has a larger value at that time. The consideration of SSC systems in the literature has been restricted to low-complexity mobile units where the number of diversity antennas is typically limited to two.

The Rayleigh fading is a simple channel model frequently used to model multipath fading with no direct line-of-sight (LOS) path exists between the transmitter and receiver antennas. It also applies to the propagation of reflected and refracted paths through the troposphere and ionosphere and to ship-to-ship radio links.

Considering Nakagami-m 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.

Slow fading can be caused by events such as shadowing, where a large obstruction such as a hill or large building obscures the main signal path between the transmitter and the receiver. The amplitude change caused by shadowing is often modeled using a log-normal distribution with a standard deviation according to the log-distance path loss model.

The probability density functions of the SSC/SC combiner output signal at two time instants in the presence of Rayleigh, Nakagami-m and log-normal fading are determined in closed form. The probability density function of the SSC/SC combiner output signal at two time instants is important when the decision is based on multiple samples. The outage probability is numerically calculated using PDF. The graphically shown results emphasize better performances of the SSC/SC combiner apropos classical SSC and SC combiners at one time instant.

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 about 140 papers, published to International/National Conferences and Journals. She has also reviewed more articles in IEEE Transactions on Communications; IEEE Communications Letters; ETRI journal; C&EE Journal; Electronics and Electrical Engineering (Elektronika ir Elektrotechnika) and other journals. She is the reviewer of the papers for many conferences and the member of technical program committees and international scientific committees of several scientific conferences.

Plenary Lecture 2

Parallel WAN Switch Based on Neural Network

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Abstract: The article deals with a WAN switch design based on a Feed-forward neural network, specifically for the Feed-forward Back-propagation algorithm. The designed switch is fully parallel, uses a neural network for switch management and also for traffic engineering. The switch uses an advanced packet dropping mechanism. The article describes the switch design (network processor design) and compares the developed switch with other "conventional" architectures. The subject of comparison is the architectures and performance.

Brief Biography of the Speaker: Vladislav Skorpil, PhD. attended the Brno University of Technology, Faculty of Electrical Engineering, Department of Telecommunications. He graduated from this university in 1980. From 1985 to 1989 he was a doctoral student in the same Department. From 1980 to 1982 he worked as a designer for the telecommunication design office. He again entered the Department of Telecommunications of BUT in 1982 as a university teacher and he has been working in this department since that time, now he has been a vice-head of this department and Assoc.Prof. (from 2004). He takes a keen interest in modern telecommunication systems. He has taught in courses on transmission systems from analogue through all categories of digital up to special applications. He is the author of about 105 international scientific papers and some manuals. He has complemented his theoretical knowledge by co-operation with a lot of firms and institutions. He has co-operated on telecommunication projects such as digital transmission and switching systems, telecommunication broadband networks, ISDN, ATM, data networks LAN and MAN, on structured cabling design, neural networks, wavelet transform, Quality of Service QoS, data bit rate compression, etc. He is a member of international organisations IEEE and WSEAS.

Plenary Lecture 3

Resilient Communication and Sensor Networks with Intrusion Detection

Professor Demetrios Kazakos
Texas Southern University
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Abstract: The development of secure and dependable communication and sensor networks is a major objective for both civilian and military systems. There are two types of threat that are considered in this proposal: The first type is the cyberthreat, based on cyberattacks and software based approaches. One of the thrusts of this effort is to advance the use of statistical methodology to model cyberattacks by viewing them as abrupt changes in traffic patterns. Such approaches have been effective, but there is a need to advance the state of the art, making them more sophisticated and flexible to respond to changing cyberthreat forms. In this talk we discuss the use and advances of the novel approach of using statistical tools of decentralized fastest change detection as a building tool of a theoretical and practically implementable intrusion detection system.This research has been conducted at Texas Southern University during the past 3-4 years.

Brief Biography of the Speaker: Dr. Demetrios Kazakos received his Diploma in Electrical and Mechanical Engineering from the National Polytechnic University of Greece. He then started graduate his graduate studies in the United States. He received a Master of Arts degree in Electrical Engineering from Princeton University and a Doctor of Philosophy degree from the University of Southern California, specializing in Statistical Communication Theory. In 1980, he joined the Electrical Engineering Department of the University of Virginia,where he stayed until 1993. In 1992, he was elevated to the grade of Fellow of IEEE, for his research in two areas: Enhanced Algorithms for Multiuser Multiaccess Networks and Statistical Pattern Recognition. In 2009, he was elevated to the grade of IEEE Life Fellow. In 1993 he accepted the position of Head of the Electrical and Computer Engineering of the University of Southwestern Louisiana. At the same time he has always been a very active participant in IEEE conference organizing and editorial activities. He was Editor of the IEEE Transactions on Communications for 5 years, Technical Program Chair for two major IEEE Conferences, and member of the Technical Program Committee for several IEEE and other conferences. In 1983 he started a new company named HITEC, INC, which undertook several Research and Development projects in Information Technology, funded by the U.S. Department of Defense and the European Community. In 2001, he undertook the position of Professor and Chair of the Electrical Engineering and Computer Science Department at the University of Toledo. In 2004, he moved to the University of Idaho, as Professor and Chair of the Electrical and Computer Engineering Department. From 2006 to 2008, he was Dean of the College of Science and Technology at Texas Southern University. From September 2009 to September 2011, he was at the National Science Foundation in the position of Program Director responsible for the Program: "Centers of Research Excellence in Science and Technology". Overall, he has published about 165 refereed journal papers, book chapters and conference proceeding papers, as well as two books.

Plenary Lecture 4

Impact of Nonlinearities on Fiber Optic Communications

Professor Mário F. S. Ferreira
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Abstract: Nonlinear effects in optical fibers impose different limitations on the communications link, and an understanding of such effects is almost a prerequisite for actual lightwave-system designers. On the other hand, they offer a variety of possibilities for all-optical signal processing, amplification and regeneration. Using conventional optical fibers for these applications, a length of several kilometres is usually required due to their relatively small nonlinear parameter ( ). Such long fibers pose some practical limitations, concerned namely with the size and stability of the system. The required fiber length is reduced to about 1km using highly nonlinear silica fibers with a smaller effective mode area, and hence, a larger nonlinear parameter ( ). A further reduction in fiber length by one order of magnitude has been achieved in recent years using nanowires and microstructured optical fibers with an extremely small effective mode area and significantly enhanced nonlinear characteristics. Another main advance was the production of highly nonlinear fibers using materials with a nonlinear refractive index higher than that of the silica glass, namely lead silicate, tellurite, bismuth glasses and chalcogenide glasses. Using such fibers, the required fiber length for nonlinear processing can be dramatically reduced to the order of centimetres.
In this lecture we review the effects – both detrimental and potentially beneficial – of optical nonlinearities both in conventional and in highly nonlinear fiber systems. Such lecture will be based on my book “Nonlinear Effects in Optical Fibers”, recently published by John Wiley & Sons, with the sponsorship of the Optical Society of America.

Brief Biography of the Speaker: Mário F. S. Ferreira was born in Ovar, Portugal. He graduated in Physics from the University of Porto, Portugal, and he received the Ph.D. degree in Physics in 1992 from the University of Aveiro, Portugal, where he is now a Professor at the Physics Department.
Between 1990 and 1991 he was at the University of Essex, UK, performing experimental work on external cavity semiconductor lasers and nonlinear optical fiber amplifiers. His research interests have been concerned with the modeling and characterization of multi-section semiconductor lasers for coherent systems, quantum well lasers, optical fiber amplifiers and lasers, soliton propagation, polarization and nonlinear effects in optical fibers. He is actually the leader of the Optics and Optoelectronics Group of the I3N – Institute of Nanostructures, Nanomodelling and Nanofabrication. He has written about 300 scientific journal and conference publications, a book with the title: “Optics and Photonics” (Lidel, 2003, in Portuguese) and another with the title: “Nonlinear Effects in Optical Fibers” (Wiley & OSA, May 2011).

Plenary Lecture 5

Innovations in Nanotechnology and Neurotechnology for Human Enhancement

Professor Jeanann Boyce
Computer Science at Montgomery College
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Abstract: This presentation is an examination of key innovations in Nanomedicine that will enhance human capacities. Recent developments in neuro-manufacturing for human enhancement, particularly bioprinting, will be discussed and an active interaction with the audience will occur. Finally, the presentation will consider future needs and developments on a continuum of human-machine interfaces.

Brief Biography of the Speaker: DR. JEANANN S. BOYCE has extensive experience as an educator and trainer in Education and Computer Systems over the past thirty years. She received her undergraduate degree from Douglass College of Rutgers University and her master's and doctorate in computer-based information systems for career education from the University of Massachusetts, Amherst. Her wide teaching background spans business, computer, and management courses from the undergraduate through doctoral levels. She is currently Professor of Computer Science and Business and coordinator of the Computer Science and Applications programs, Montgomery College, Takoma Park Campus, of Maryland. She specializes in teaching artificial intelligence programming and systems and intelligent agents. In addition, she is one of the lead faculty involved on the 11-school Advanced Technology Centers Cyberwatch grant for the National Science Foundation since the inception of the program.
Dr. Boyce is recognized as a leader in vocational, career, and technical education training. She is an active professional who has written many articles and presents regularly at national and international technical education conferences. She has maintained a currency in technology through continuous consulting and writes on neurotechnology and ethics. In addition, she serves as a research and dissertation advisor at Morgan State University. She is certified in a Capability Maturity Management and Configuration Management from the Software Engineering Institute of Carnegie Mellon University and is an evaluator for the American Council on Education. Her current research interests include systems process improvement and the optimization of virtual and classroom learning environments.

Plenary Lecture 6

Fast Information Retrieval for Textual and Geometrical Applications

Professor Vaclav Skala
Center of Computer Graphics and Visualization
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Faculty of Applied Sciences
University of West Bohemia
&
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Abstract: Today, datasets are becoming extremely large. One of the main problems is a retrieval of an item from the dataset for the given key. Of course, the index-sequential and other data techniques can be used. Nevertheless the computational complexity is high as the search in the index table is at least of O(lgN) complexity. One well known technique is hashing where a query for an item is made with O(1) expected complexity if the hash function is so called perfect hash function (PFH). The problem is that PFH is generally very expensive to construct especially for large data sets. In today's applications it is necessary to process textual data and geometrical data as well. It should be noted that the longest word has 189 819 characters (the largest protein - titin), the longest word used in printed text has been 1 909 characters. The geometrical data has to usually handle 105-109 points in E3. It seems to that the requirements for textual and geometrical hash functions will be quite different.
We will present a unifying approach to hashing in general including methodology how the hash function is to be constructed. This approach leads to very short clusters and therefore to significant speed up as well. The approach has been extensively tested for textual and geometrical large data sets.

Brief Biography of the Speaker: Prof. Vaclav Skala is a Full professor of Computer Science at the University of West Bohemia, Plzen and VSB-Technical University Ostrava, Czech Republic. He received his ING.(equivalent of MSc.) degree in 1975 from the Institute of Technology in Plzen and CSc. (equivalent of Ph.D.) degree from the Czech Technical University in Prague in 1981. In 1996 he became a full professor in Computer Science. In 1997 the Center of Computer Graphics and Visualization (CCGV) was formally established and since then he is the Head of the CCGV in Plzen (http://Graphics.zcu.cz).
Prof.Vaclav Skala is an associate editor of The Visual Computer (Springer), Computers and Graphics (Elsevier), member of the Editorial Board fo Machine Graphics and Vision (Polish Academy of Sciences) and the Editor in Chief of the Journal of WSCG. He is a member of international program committees of prestigious conferences and workshops. He is a member of ACM SIGGRAPH, IEEE and Eurographics Association.
Prof.Vaclav Skala has published over 200 research papers at conferences and research journals. His current research interests are computer graphics and visualization, mathematics, especially geometrical algebra, algorithms and data structures.
Details can be found at http://www.VaclavSkala.eu.

Plenary Lecture 7

Knowledge Creation Capacity in Designing New Products for Industry as Extension of Constructing University Theoretical Knowledge

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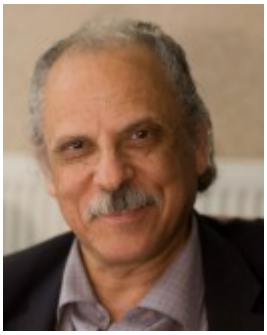
Abstract: This talk reports on knowledge creation in industry sponsored engineering student projects and global collaborative approaches supported by technological advancements. It covers pedagogical issues related to these developments. It focuses on the incorporation of students with different social, cultural, and academic backgrounds into an industrial project situation where their combined contribution is required to achieve the final goal. Thus, it aims to develop clear sense of the requirements of a graduate in the industry where he/she will be involved in multifaceted team led projects. This teaching approach requires students to construct knowledge by engaging collaboratively with industry sponsored projects. It is hypothesized that this teaching method is more effective than traditional didactic approaches in developing innovative thinking, knowledge creation capacity, and professional skills. It meets the emerging needs of industry to develop managers, designers, and engineers into more accomplished practitioners in the global economy.

Brief Biography of the Speaker: Prof. Les Mark Sztandera is Professor of Computer Information Systems at Philadelphia University , Philadelphia , PA 19144. His research interests include fuzzy sets and systems, artificial neural networks, genetic algorithms, and knowledge management. Currently, Prof. Sztandera is involved in multidisciplinary industry sponsored research projects as part of the new curriculum that draws on Philadelphia University rich history in innovation and design, and long tradition of excellence in teaching and researching integrated product development. The curriculum meets the emerging needs of industry to develop managers, industrial designers, and engineers into more accomplished practitioners in the global product development processes. Prof. Sztandera draws on his experience in the development and delivery of innovative curricula to facilitate crafting of cross disciplinary projects. His cross-disciplinary work to encourage the inclusion of knowledge management principles and competences in undergraduate education led to the NSF grant award through the Division of Undergraduate Education in 1996. Complementary with his teaching effort, Prof. Sztandera has been involved in a variety of research activities. His research was funded, among others, by DoD, DoC, NSF, state Supercomputer Centers, and American Heart Association. He has delivered papers, seminars, and workshops, and published widely on soft computing issues.

Plenary Lecture 8

Machine Learning in Biomedical Informatics



Professor Abdel-Badeeh M. Salem
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Abstract: Biomedical informatics is a multidisciplinary field of research, at the intersection of medical sciences, biology sciences, biochemistry neurosciences, cognitive sciences and informatics. Machine learning offers potentially powerful tools and intelligent techniques that can help in solving many medical and biological problems. The variety of machine learning algorithms enable the design of a robust techniques and new methodologies for managing, representing, accumulating, understanding ,discovering ,and updating knowledge in biological/medical databases. This paper explores the applications of machine learning in medical and biological domains. Current research topics and promising application areas are discussed as well.

Brief Biography of the Speaker: Prof. Dr. Abdel-Badeeh M Salem is a Professor of Computer Science since 1989 at Faculty of Computer and Information Sciences, Ain Shams University, Cairo-Egypt. He is a professor emeritus since October 2007. He was a Director of Scientific Computing Center at Ain Shams University (1984-1990). His research includes intelligent computing, expert systems, biomedical informatics, and intelligent e-learning technologies. He has published around 250 papers in refereed journals and conference proceedings in these areas. He has been involved in more than 300 conferences and workshops as an Int. Program Committee , organizer and Session Chair. He is author and co-author of 15 Books in English and Arabic Languages.

He was one of the founders of the following events, First Egyptian Workshop on Expert Systems 1987, Int. Cairo Conference on Artificial Intelligence Applications in 1992 and Int. Conf. on Intelligent Computing and Information Systems 2002, and one of the main sustainers of annual Int. Romanian Internet Learning Workshop Project (RILW), 1997.

In addition he was Secretary of Egyptian Computer Society (1984-1990), Member of National Committee in Informatics – Academy of Scientific Research and Technology (1992-200), Member of Egyptian Committee in the Inter-Governmental Informatics Program, IIP-UNISCO, Paris (1988-1990) and Coordinator of the Annual International Conference for Statistics, Scientific Computing, and Social and Demographic Research (1983-1990). In addition he was a partner of a MEDCAMPUS Projects on Methodologies and Technologies for Distance Education in Mediterranean (1993-1995). In addition He is a Member of the Editorial Board of 15 international and national Journals in the following countries: Canada; Italy, Romania, Japan, Turkey, UK and Egypt. Also, He is member of many Int. Scientific Societies and associations in USA, UK, Switzerland, Austria, Canada and Egypt.

Plenary Lecture 9

Digital Music Libraries: From Deregulation to Reconstruction

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Abstract: During the last decades, music recordings and productions worldwide have created a vast collection of music resources, which lie interspersed in different media on earth. Several years ago, it would imagine impossible to organize suitably and make accessible to any interested user all this huge volume of music data.
However, the advent of the Internet, the small (in size) digital music files compared to broadband distribution speeds, the disks of enormous capacity and the development of computer music have led the scientists and the industry in parallel to focus their efforts in organizing great music collections, which are accessible from the Web.
The Digital Music Libraries, whether registered as taxable entities or not, have offered their users new ways of interaction with music repositories and music stores online. The same time, the more and more frequent bypass of DRM policies has created a culture of violation for the respect of intellectual property rights and the distinction between legal and illegal has blurred.
Apart from the legal matters evoked, a more profound economic effect is burdening the music industry which is highly deregulated and unprotected. Is there a viable solution to the upcoming breakdown?

Brief Biography of the Speaker: Dr. Politis received his BS, MSc and PhD from the Aristotle University of Thessaloniki. He has also received a Grad. Dip. in Computing from the Royal Melbourne Institute of Technology as a scholar funded by the Australian Government.
He teaches at the Dept. of Informatics of the Aristotle University of Thessaloniki, while for several years he served as a Scientific Collaborator of the Center of International and European Economic Law in Thessaloniki.
His research interests focus on Computer Music, Legal Databases and Human Computer Interaction. The lecture to be presented is a culmination of his involvement to the editing of the books Socioeconomic and Legal Implications of Electronic Intrusion and E-Publishing and Digital Libraries: Legal and Organizational Issues, both published by IGI.

Plenary Lecture 10

Multimedia Application – Effective Support of Education

Professor Eva Milková
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Abstract: Logical thinking is an important foundational skill. It should be enhanced at all levels of studies. Mathematics is one of the leading subjects that develop this skill. Graph theory together with combinatorial optimization, the very interesting and practical part of applied mathematics, is a powerful tool for teachers allowing them to develop logical thinking in students, increase their imagination and make them familiar with solutions to various practical problems.
Multimedia applications have substantially influenced education. They give teachers an excellent chance to demonstrate and visualize the subject matter more clearly and comprehensibly, as well as also enabling them to prepare study material for students which optimizes their study habits. Since nineties we have prepared with our students various multimedia applications dealing with objects appropriate to subject matter.
This lecture focuses on ideas how to make teaching and learning of graph theory and combinatorial optimization more understandable and attractive using multimedia applications. The presented approach used for teaching and learning these important branches of mathematics and computer science can serve as an inspiration for instruction in other subjects as well.

Brief Biography of the Speaker: Professor Eva Milková graduated from the Charles University in Prague, Faculty of Mathematics and Physics, Czech Republic in 1978. Gradually received the following titles - master degree RNDr., doctoral degree Ph.D., associate professorship (docent) and professor.
She is a full professor at the University of Hradec Králové, Faculty of Science, and Department of Informatics. Her scientific interests include Graph Theory, Combinatorial Optimization and ICT in Education. She is a member of scientific counsels for doctoral studies and a supervisor of considerable number of doctoral students.
Her publication activity includes more than hundred contributions at international conferences and journals. She is a member of scientific program committees of prestigious international conferences and she is a member of editorial board of several international journals. Details can be found on http://lide.uhk.cz/milkoev1/

Plenary Lecture 11

Towards Petaflop Computing – An example application on Jet Noise Simulation

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Abstract: Due to processing speeds and memory limitations of existing supercomputers, many current simulations cannot faithfully simulate important realistic phenomena. Thus these simulations are not accurate enough to allow design and optimization of important devices. In order to simulate realistic situations very fine grids (e.g. on the order of tens of billions of points) are sometimes needed, requiring petascale computing systems. However, running existing codes on bigger computers is not the answer. Fresh designs are needed as well as implementation strategies that take advantage of the main characteristics of petascale architectures. For example, algorithms that take advantage of multi-level parallelism and, within a node of such an architecture, address the "memory wall" aspect of multicore architectures where the cost of arithmetic operations is much smaller than memory references. One example of a problem that can benefit petaflop computing is jet noise simulation. Jet noise is an important issue due to increased commercial air-traffic, penalty fees for noisier aircraft, and future stringent noise regulations as well as military operational requirements. Simulations of realistic conditions requires tens of billions of grid points. Examples of large-scale simulations for this problem will be given and scalability studies will be shown for up to 91,125 cores.

Brief Biography of the Speaker: Dr. Lyrintzis joined ERAU in January of 2012 as a Distinguished Professor and chair of the Department of Aerospace Engineering. He was Purdue (1994-2011) after serving seven years on the faculties of University of Minnesota (1989-94), Cornell (1988-89) and Syracuse University (1987-88). At Purdue he was School of Aeronautics and Astronautics Associate Head for graduate programs and the Director of Purdue's Computational Science and Engineering (CS&E) interdisciplinary program. Dr. Lyrintzis' primary research interests are in the area of fluid dynamics with emphasis on numerical methods and applications in aero-acoustics. His research endeavors are currently supported by NSF, NASA, the US Navy, and the US Department of Education. He has co-authored about 60 journal papers and more than 100 conference papers. He has advised or co-advised 15 Ph.D. and 17 M.S. students. Dr. Lyrintzis teaches courses in fluid mechanics, aerodynamics, and aero-acoustics. In the Fall of 2002, while at Purdue Dr. Lyrintzis received the School's Teaching Award. Further, Dr. Lyrintzis has received Purdue's College of Engineering Leadership Award and the School's CT Sun Research Award. Dr. Lyrintzis is a Purdue University Faculty Scholar, a registered Professional Engineer, an AIAA Associate Fellow, an ASME Fellow, and a Boeing Welliver Fellow. He has been a member of the AIAA Aero-acoustics Technical Committee (vice-chair '05-07, chair '07-09), the AHS Acoustics Committee, and the ASME Coordinating Group for CFD. He has co-organized the 10th AIAA/CEAS Aeroacoustics Conference and Exhibit, Manchester, UK, as well as several Sessions and Forums in AIAA, ASME and AHS Conferences and he is currently an Associate editor for the AIAA Journal and the International Journal of Aero-acoustics. Finally, Dr. Lyrintzis has participated in the development of award-winning (American Helicopter Society, Howard Hughes Award, NASA Group Achievement Award) TRAC (Tilt-Rotor Aeroacoustic Codes) system of codes from NASA Langley.

Plenary Lecture 12

Design and Implementation of River's Sectors Clustering Models

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Abstract: Clustering models are required in many ecological studies and analysis. Clustering and/or classification of sites based on wet deposit loads, of waters based on their quality, of climate regions and habitats are few examples. Design a good clustering model in ecology should take into account several aspects: data analysis, choice of variable to be use in the clustering analysis, choice of classification techniques and evaluation of the classification results by an ecological point of view. Clustering and classification techniques are strongly dependent on the type of data. Techniques having good results for some types of data may have poor results for other ones.
Our main aim is to realize a model for river's sectors clustering based on biotope characteristics. The model is able to automatic provide the optimum number of classes, their components and the biotope attributes hierarchy. The influence of data standardization on the biotope attributes hierarchy was also analyzed. Our case study was the Vişeu River watershed, a second order tributary of Danube River, localized in the north part of the Romanian territory.

Brief Biography of the Speaker: Dana Simian received the diploma. in engineering from the University of Sibiu, Romania, the diploma. in Mathematics from the University Babes-Bolyai of Cluj-Napoca, Romania and the Ph.D. from Babes-Bolyai University of Cluj- Napoca, Romania. She graduated many courses in Computer Science. She has a great experience in algorithms and numerical methods for modelling and optimization, and in machine learning. She published 16 books, more than 60 articles and participated in the editorial board of more than 22 scientific publications (proceedings of international conferences).
She organized 8 special sessions within international conferences, 2 international workshops and an international conference on topics related to algorithms and computational techniques in modeling, approximation and optimization. She is member of many international scientific committees. She is reviewer of many scientific publications.

Plenary Lecture 13

On the Inversion of Adjacent Tridiagonal and Pentadiagonal Matrices

Professor N. A. Baykara
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Abstract: Pentadiagonal as well as tridiagonal matrices have a wide number of applications in various fields of science, like mechanics, image processing, mathematical chemistry, etc.. For example, in fluid mechanics which is a commonly used subject, the number of meshes necessary to obtain reasonably good results is at times expressible in millions. Powerful techniques were developed to solve such systems. In the most common of these methods, inverses of tridiagonal and pentadiagonal matrices are encountered. Numerical inverses of band matrices as well as full matrices are amongst the topics for which serious difficulties in computations arise, perhaps not from a theoretical point of view but from the point of view of the computational time required. A rather inexpensive method was suggested by Huang and McColl initially for the inversion of symmetric tridiagonal and later for the general tridiagonal matrices. It turned out to be employable for the case of strictly diagonally dominant matrices which are quite widely encountered within many applications in literature. Needless to say it is very well known that such matrices can be shown to be non-singular and hence invertable. A similar but of course slightly more complicated method was developed for the inversion of adjacent pentadiagonal matrices by Kanal and Baykara. Kanal has also developed a parallel algorithm for the suggested method. Other methods to the same end were developed by Zhao and Huang and also by Hadj and Elouafi. The method of Zhao and Huang seems to somewhat suffer from computational complexity since it is of O(N3). Recently, the mathematical structure of the method suggested by Kanal and Baykara was investigated in detail and it was also shown that it is faster than the method of Hadj and Elouafi.

Brief Biography of the Speaker: N. A. BAYKARA was born in Istanbul,Turkey on 29th July 1948. He received a B.Sc. degree in Chemistry from Bosphorous University in 1972. He obtained his PhD from Salford University, Greater Manchester, Lancashire,U.K. in 1977 with a thesis entitled “Studies in Self Consistent Field Molecular Orbital Theory”, Between the years 1977–1981 and 1985–1990 he worked as a research scientist in the Applied Maths Department of The Scientific Research Council of Turkey. During the years 1981-1985 he did postdoctoral research in the Chemistry Department of Montreal University, Quebec, Canada. Since 1990 he is employed as a Staff member of Marmara University. He is now a Full Professor of Applied Mathematics mainly teaching Numerical Analysis courses and is involved in HDMR research and is a member of Group for Science and Methods of Computing in Informatics Institute of Istanbul Technical University. Other research interests of his for him are “Density Functional Theory” and “Fluctuationlessness Theorem and its Applications” which he is actually involved in. Most recent of his concerns is focused at efficient remainder calculations of Taylor expansion via Fluctuation–Free Integration, and Fluctuation–Free Expectation Value Dynamics.

Plenary Lecture 14

Simulation of Multiphase Porous Media Flows on High-Performance Hybrid Computing Systems

Professor Boris Chetverushkin
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Abstract: Nowadays, the rapid growth in the computer performance is mainly achieved due to the use of hybrid architectures including the multi-core CPUs and graphics accelerators. However, such architectures cause serious difficulties in their efficient employment and make new demands to the software development. One of the most promising approaches to construct the efficient applications for such systems consists in the creation of computational algorithms with a simple logical structure. This approach has been used at the development of the cross-platform unified parallel program library for modeling such large-scale processes in the underground space as given by the contaminant infiltration into the soil, oil recovery problems and so on. The library is written in C++ using the MPI and CUDA technologies. It consists of calculation, communication as well as control modules and allows computations of 2D and 3D problems with double precision, which can be realized on both the GPU and the NUMA cluster multi-core CPUs, the access to different memory types is optimized. To verify the developed parallel programs, some test calculations in the infiltration and oil recovery problems have been performed on the hybrid supercomputer with 100 TFLOPS peak performance.

Brief Biography of the Speaker: Boris Chetverushkin was born in Moscow on 26 January 1944.
Positions: Director of Keldysh Institute of Applied Mathematics Russian Academy of Sciences, Academician of RAS, Professor.
Studies: Moscow Institute of Physics and Technology (MIPT) Faculty of Applied Mathematics and Control (1966), Master of Science Graduate school at the MIPT (1969). He has received PhD in 1971, Dr.Sc. in 1981, Professor in 1988. Since 1968 he is researcher at Keldysh Institute of Applied Mathematics.
Research fields: Numerical Methods, Computational fluid dynamics, Radiation gas dynamics, Parallel computations.
More than 340 publications including 4 books.
Leader of projects of Russian Foundation for Basic Research, INTAS, ISTC and others.
Chairman of the Russian national committee on applied and industrial mathematics. Member of ECCOMAS. Member of the scientific committee of Parallel CFD conference since its foundation.
Editor-in-Chief of Russian journal Mathematicheskoe Modelirovamie (Eng. Translation: Mathematical Models and Computer Simulations). Member of editorial boards of two others scientific journals.

Plenary Lecture 15

Image Processing in Biometrics and Forensic Science

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Abstract: This lecture is a survey on biometrics and forensics, especially methods of image processing and recognition for human identification. A biometric system is a pattern recognition system that recognizes a person on the basis of a feature vector derived from a specific physiological or behavioral characteristic that the person possesses.
All biometric systems work in a similar fashion:
- The user submits a sample that is an identifiable, unprocessed image or recording of the physiological or behavioral biometric via an acquisition device.
- This image and/or biometric is processed to extract information about distinctive features.
Biometric systems have four main components: sensor, feature extraction, biometric database, matching-score and decision-making modules.
The processes of forensic computing can be divided into three main areas:
- Image Capture - The Imaging process is fundamental to any computer investigation.
- Image Processing - The processing software to extract features of the target image.
- Investigation.
Distinctions between biometrics and forensic are based on the fact that biometrics methods are implemented on live subjects. Techniques designed for person identification in biometrics can be utilized for forensic purposes.
Personal attributes used in a biometric identification system can be physiological, such as facial features, fingerprints, iris, retinal scans, hand and finger geometry; or behavioral, the traits idiosyncratic of the individual, such as voice print, gait, signature, and keystroking.
In this paper a recognition methods are presented for recognizing a person on the basis of a feature vector derived from a biometrics templates/images.

Brief Biography of the Speaker: Prof. Ryszard S. Choraś is currently Full Professor in the Institute of Telecommunications of the University of Technology & Life Sciences, Bydgoszcz, Poland. His research experience covers image processing and analysis, image coding, feature extraction and computer vision.
At present, he is working in the field of image retrieval and indexing, mainly in low- and high-level features extraction and knowledge extraction in CBIR systems. He is the author of Computer Vision. Methods of Image Interpretation and Identification (2005) and more than 163 articles in journals and conference proceedings.
He is the member of the Polish Cybernetical Society, Polish Neural Networks Society, IASTED, and the Polish Image Processing Association. Professor Choras is a member of the editorial boards of Machine Vision and Graphics, International Journal of Biometrics (IJBM), International Journal of Biology and Biomedical Engineering, Recent Patents On Signal Processing (Bentham Open). He is the editor-in-chief of WSEAS Transaction on Signal Processing Journal, Image Processing and Communications, An International Journal and associate editor-in-chief Computer Science Journals (CSC Journals) Image Processing (IJIP). He has served on numerous conference committees, e.g., as Visualization, Imaging, and Image Processing (VIIP) , IASTED International Conference on Signal Processing, Pattern Recognition and Applications (SPPRA) and International Conference on Computer Vision and Graphics, ICINCO\ICATE Conference.