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RECENT ADVANCES IN ENGINEERING EDUCATION

Proceedings of the 6th WSEAS International Conference
on ENGINEERING EDUCATION (EE '09)

Rodos (Rhodes) Island, Greece, July 22-24, 2009

Mathematics and Computers in Science Engineering
A Series of Reference Books and Textbooks

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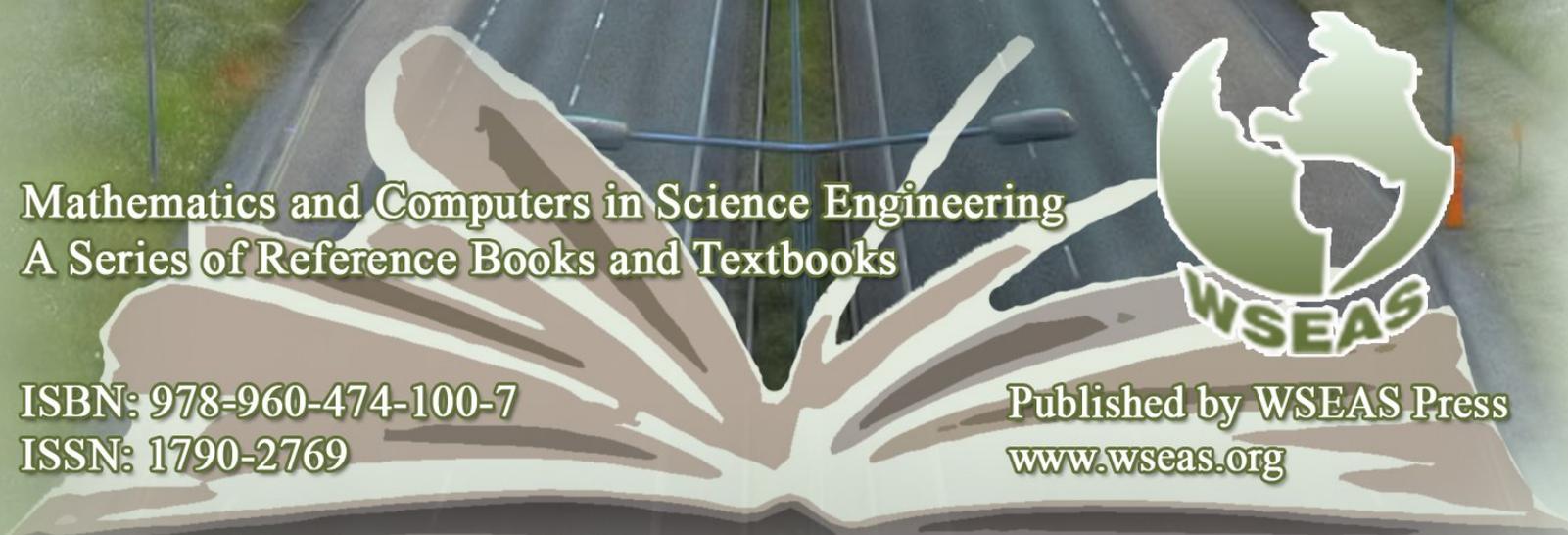ENGLISH LANGUAGE FACULTY OF ENGINEERING
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Preface

This year the 6th WSEAS International Conference on ENGINEERING EDUCATION (EE '09) was held in Rodos, Greece, in July 22-24, 2009. The Conference remains faithful to its original idea of providing a platform to discuss the basic science in engineering education, continuing education & its delivery, engineering education reforms, international recognition of qualifications, studies in engineering and the needs of the production and market etc. with participants from all over the world, both from academia and from industry.

Its 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 this conference are published in this Book that will be indexed by ISI. Please, check it: www.worldses.org/indexes as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

A Conference such as this 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

Embedded Systems Design – Scientific Challenges and Work Directions

Professor Joseph Sifakis
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Abstract: The development of a satisfactory Embedded Systems Design Science provides a timely challenge and opportunity for reinvigorating Computer Science. Embedded systems are components integrating software and hardware jointly and specifically designed to provide given functionalities, which are often critical. They are used in many applications areas including transport, consumer electronics and electrical appliances, energy distribution, manufacturing systems, etc. Embedded systems design requires techniques taking into account extra-functional requirements regarding optimal use of resources such as time, memory and energy while ensuring autonomy, reactivity and robustness. Jointly taking into account these requirements raises a grand scientific and technical challenge: extending Computer Science with paradigms and methods from Control Theory and Electrical Engineering. Computer Science is based on discrete computation models not encompassing physical time and resources which are by their nature very different from analytic models used by other engineering disciplines.

We summarize some current trends in embedded systems design and point out some of their characteristics, such as the chasm between analytical and computational models, and the gap between safety critical and best-effort engineering practices. We call for a coherent scientific foundation for embedded systems design, and we discuss a few key demands on such a foundation: the need for encompassing several manifestations of heterogeneity, and the need for design paradigms ensuring constructivity and adaptivity.

We discuss main aspects of this challenge and associated research directions for different areas such as modeling, programming, compilers, operating systems and networks.

Brief Biography of the Speaker: Joseph Sifakis is a CNRS researcher and the founder of Verimag laboratory (http://www-verimag.imag.fr/), in Grenoble, France. He holds the INRIA-Schneider endowed industrial chair since September 1st 2008. He studied Electrical Engineering at the Technical University of Athens and Computer Science at the University of Grenoble. Verimag is a leading research laboratory in the area of critical embedded systems. It developed the underlying theory and technology for the SCADE tool, used by Airbus for the design and validation of its critical real-time systems, and is becoming a de facto standard for aeronautics. Verimag has a lasting and strategic collaboration with ST Microelectronics, France Telecom R&D, and Airbus, through which numerous results on validation and testing have been transferred. Joseph Sifakis is recognized for his pioneering work on both theoretical and practical aspects of Concurrent Systems Specification and Verification. He contributed to emergence of the area of model-checking, currently the most widely-used method for the verification of industrial applications. His current research activities include component-based design, modeling, and analysis of real-time systems with focus on correct-by-construction techniques (http://www-verimag.imag.fr/~sifakis/). Joseph Sifakis has broad experience with industry, notably though joint projects with partners such as Astrium, the European Space Agency, France Telecom, ST Microelectronics and he has also been active for many years in consulting. Joseph Sifakis is the Scientific Coordinator of the European Network of Excellence ARTIST2 on Embedded Systems Design. (http://www.artist-embedded.org/). This network gathers 35 of the best European teams in the area, and aims to produce innovative results for cost-effective design of dependable embedded systems. It will also promote innovative methods safe and secure systems, notably through cooperation with key European industrial partners such as Thales, Airbus, Ericsson, Philips, and ST Microelectronics. Joseph Sifakis is the director of the CARNOT Institute "Intelligent Software and Systems" in Grenoble (http://www.carnot-lsi.com/). Joseph Sifakis is a member of the editorial board of several journals, co-founder of the International Conference on Computer Aided Verification (CAV) and a member of the Steering Committee of the EMSOFT (Embedded Software) conference. He is a member of Academia Europea (http://www.acadeuro.org/) and a member of the French National Academy of Engineering (http://www.academie-technologies.fr/).

Joseph Sifakis has received with Ed Clarke and Allen Emerson for their contribution to Model Checking, the Turing Award for 2007 (http://awards.acm.org/homepage.cfm?srt=all&awd=140). He is also the recipient of the CNRS Silver Medal in 2001.

Keynote Lecture 2

Quantum Cryptography and Chaos Functions: The Ultimate for Network Security

Professor Stamatios Kartalopoulos
Williams Professor in Telecommunications Networking
The University of Oklahoma
USA
Email: Kartalopoulos@ou.edu

Abstract: As the sophistication of intruders' increases, so does the incidents of information integrity breaches and network attacks. In response, very complex cryptographic processes have started being employed, such as chaos theory and quantum theory, in an effort to create the "holy grail" of cryptographic systems and network security.
Quantum theory defines the non-classical qubit, which is the superposition of quantum states having no classical analog. In addition, it is based on the "no cloning" or "no copying" theorem and on Heisenberg's uncertainty. Both, the qubit and the no-cloning theorem, along with the quanto-mechanical properties of photons, have been applied to a new breed of cryptography and secure optical communication networks known as quantum cryptography and quantum networks, respectively.
Chaos is based on the particular behavior of certain non-linear functions, which for a minute change of parameters produce a very large and unstable output, known as the "chaotic regime". However, this chaos is reproducible, which also makes it attractive to secure communications.
In this talk we explain quantum cryptographic protocols as well as chaos and chaotic processes with simple examples. We then describe how chaos functions are used in quantum cryptography in order to increase efficiency and speed of the quantum key establishment.

Brief Biography of the Speaker: Stamatios V. Kartalopoulos, PhD, is currently the Williams Professor in Telecommunications Networking at the University of Oklahoma. His research emphasis is on optical communication networks (FSO, long haul and FTTH), optical technology including optical metamaterials, and optical communications security including quantum cryptography and key distribution. Prior to this, he was with Bell Laboratories where he defined, led and managed research and development teams in the areas of DWDM networks, SONET/SDH and ATM, Cross-connects, Switching, Transmission and Access systems. He has received the President's Award and many awards of Excellence.
He holds nineteen patents in communications networks, and has published more than hundred fifty scientific papers, nine reference textbooks important in advanced fiber optic communications and security, and has also contributed several chapters to other books.
He has been an IEEE and a Lucent Technologies Distinguished Lecturer and has lectured at international Universities, at NASA and conferences. He has been keynote speaker of major international conferences, has moderated executive forums, has been a panelist of interdisciplinary panels, and has organized symposia, workshops and sessions at major international communications conferences.
Dr Kartalopoulos is an IEEE Fellow, chair and founder of the IEEE ComSoc Communications & Information Security Technical Committee, member at large of IEEE New Technologies Directions Committee, and has served editor-in-chief of IEEE Press, chair of ComSoc Emerging Technologies and of SPCE Technical Committees, Area-editor of IEEE Communications Magazine/Optical Communications, member of IEEE PSPB, and VP of IEEE Computational Intelligence Society.

Keynote Lecture 3

Content-Adaptive Efficient Resource Allocation for Packet-Based Video Transmission

Professor Aggelos K. Katsaggelos
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Northwestern University
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Abstract: Supporting video communication over lossy channels such as wireless networks and the Internet is a challenging task due to the stringent quality of service (QoS) required by video applications and the many channel impairments. Two important QoS characteristics for video are the degree of signal distortion and the transmission delay. Another important consideration is the cost associated with transmission, for example, the energy consumption in the wireless channel case and the cost for differentiated services in the Internet (with DiffServ) case.
In this presentation we consider the joint adaptation of the source coding parameters, such as the quantization step-size and prediction mode, along with the physical layer resources, such as the transmission rate and power. Our goal is to provide acceptable QoS while taking into account system constraints such as the energy utilization. We discuss a general framework that allows a number of "resource/distortion" optimal formulations for balancing the requirements of different applications. We conclude the presentation with some of the grand opportunities and challenges in designing and developing video communication systems.

Brief Biography of the Speaker: Aggelos K. Katsaggelos received the Diploma degree in electrical and mechanical engineering from the Aristotelian University of Thessaloniki, Greece, in 1979 and the M.S. and Ph.D. degrees both in electrical engineering from the Georgia Institute of Technology, in 1981 and 1985, respectively. In 1985 he joined the Department of Electrical Engineering and Computer Science at Northwestern University, where he is currently professor. He is also the Director of the Motorola Center for Seamless Communications and a member of the Academic Affiliate Staff, Department of Medicine, at Evanston Hospital.
Dr. Katsaggelos is a member of the Publication Board of the IEEE Proceedings, the IEEE Technical Committees on Visual Signal Processing and Communications, and Multimedia Signal Processing, the Editorial Board of Academic Press, Marcel Dekker: Signal Processing Series, Applied Signal Processing, and Computer Journal. He has served as editor-in-chief of the IEEE Signal Processing Magazine (1997-2002), a member of the Publication Boards of the IEEE Signal Processing Society, the IEEE TAB Magazine Committee, an Associate editor for the IEEE Transactions on Signal Processing (1990-1992), an area editor for the journal Graphical Models and Image Processing (1992-1995), a member of the Steering Committees of the IEEE Transactions on Image Processing (1992-1997) and the IEEE Transactions on Medical Imaging (1990-1999), a member of the IEEE Technical Committee on Image and Multi-Dimensional Signal Processing (1992-1998), and a member of the Board of Governors of the IEEE Signal Processing Society (1999-2001). He is the editor of Digital Image Restoration (Springer-Verlag 1991), coauthor of Rate-Distortion Based Video Compression (Kluwer 1997), co-editor of Recovery Techniques for Image and Video Compression and Transmission, (Kluwer 1998), and co-author of Super-Resolution for Images and Video, (Morgan and Claypool, 2007), and co-author of Joint Source-Channel Video Transmission (Morgan and Claypool 2007). He was the holder of the Ameritech Chair of Information Technology (1997-2003), and he is the co-inventor of twelve international patents, a Fellow of the IEEE (1998) and SPIE (2009), and the recipient of the IEEE Third Millennium Medal (2000), the IEEE Signal Processing Society Meritorious Service Award (2001), an IEEE Signal Processing Society Best Paper Award (2001), an IEEE ICME Best Paper Award (2006), and an IEEE ICIP Paper Award (2007). He was a Distinguished Lecturer of the IEEE Signal Processing Society for 2007-2008.

Keynote Lecture 4

Computer Aided-Visual Perception : Challenges and Perspectives

Professor Nikos Paragios
Ecole Centrale de Paris / INRIA Saclay, Ile-de-France
France
E-mail: nikos.paragios@ecp.fr

Abstract: Computer aided human perception aims at developing intelligent algorithms towards understanding visual cues coming from images, video, or other means of gathering visual information. Such a process often consists of three stages, initially the problem of perception is parameterized through a mathematical model where the estimation of its parameters will lead to visual understanding. Then, the model is associated with the available observations through the definition of an objective function and last, this function is optimized using computational methods. The main challenges that one has to address in this context is the curses of dimensionality, non-linearity, non-convexity and modularity. In simple words, even the simplest possible perception problem could involve too many parameters where the association between the data and them is not straightforward and is done through non-convex functions. In this talk, we will present a generic mathematical framework that exploits recent advances in discrete optimization to address computational visual perception. Numerous image processing, computer-aided diagnosis and computer vision applications will be considered to demonstrate the potentials of this method.

Brief Biography of the Speaker: Nikos Paragios (http://vision.mas.ecp.fr) obtained his B.Sc. (highest honors, valedictorian) and M.Sc. (highest honors) in Computer Science from the University of Crete (Greece) [1994,1996] , his Ph.D. in electrical and computer engineering from I.N.R.I.A. [2000] and his D.Sc. (Habilitation a Diriger de Recherches) from the University of Nice/Sophia Antipolis (France) [2005)]. He is professor of applied mathematics at the Ecole Centrale de Paris - one of most exclusive engineering schools "Grande Ecoles" - leading the Medical Imaging and Computer Vision Group. He is also affiliated with INRIA Saclay Ile-de-France, the French Research Institute in Informatics and Control heading the GALEN group. Prior to that he was professor/(2004-2005) at the Ecole Nationale de Ponts et Chaussees, affiliated with Siemens Corporate Research (Princeton, NJ, 1999-2004) as a project manager, senior research scientist and research scientist. In 2002 he was an adjunct professor at Rutgers University and in 2004 at New York University. N. Paragios was a visiting professor at Yale University in 2007.

Professor Paragios has co-edited four books, published more than hundred papers (DBLP server) in the most prestigious journals and conferences of medical imaging and computer vision, gave more that hundred invited lectures, and has twelve US issued patents and more than twenty pending. His work has approx 3,500 citations in googlescholar and approx 2,000 in scopus, and and his H-number according to scholar is 28 and 24 according to scopus. He is a Senior member of IEEE, associate editor for the IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), area editor for the Computer Vision and Image Understanding Journal (CVIU) and member of the Editorial Board of the International Journal of Computer Vision (IJCV), the Medical Image Analysis Journal (MedIA) and the Journal of Mathematical Imaging and Vision (JMIV). Professor Paragios is one of the program chairs of the 11th European Conference in Computer Vision (ECCV'10, Heraklion, Crete). In 2008 N. Paragios was the laureate of one of Greece's highest honor for young academics and scientists of nationality or descent (world-wide), the Bodossaki Foundation Prize in the field of applied sciences. In 2006, he was named one of the top 35 innovators in science and technology under the age of 35 from the MIT's Technology Review magazine. He and his collaborators were the recipients of numerous scientific rewards, like for example the Francois Erbsmann prize for the IPMI'07 conference. His research interests are in the areas of computer vision, medical image analysis and human-computer interaction.

Keynote Lecture 5

Control and Estimation Theory: Current Trends, New Challenges, & Directions for the Future

Professor Lena Valavani

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Laboratory for Information and Decision Systems
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Abstract: Despite the tremendous strides witnessed in the Control and Estimation of lumped parameter systems , whether linear or nonlinear, the issue of stability and performance robustness under simultaneous structured and unstructured uncertainty still remains largely unresolved. When fault tolerance, autonomy and reactivity are added to the requirements, this presents an additional challenge. 'Closed form' solutions are in most cases not possible and computational methods (optimization based, search, etc.) do not provide the necessary guarantees.

The challenges become even greater in the case of distributed systems and networks, such as large industrial/manufacturing plants, environmental applications (CO_2 sequestration), communications networks, traffic networks (aeronautical, highway), space networks (satellite constellations), biomedical applications(CNS studies) which, by their nature, require control and estimation in a distributed setting. Requirements and specifications can also be widely variable between safety critical and socially/economically significant systems.

It becomes increasingly evident that control, communications and computation need to be synergistically combined through a 'universal formalism' and novel paradigms that combine logical operations (symbolic reasoning and decision making) with analytical constructs (mathematical algorithms)and continuous quantities(throughput, subsystem interconnections), in order to handle heterogeneity, asynchronicity , real time functionality, properties that typically characterize distributed systems/networks.

We focus on some representative examples to elucidate key issues that arise in modeling, algorithm design, computation, in order to ensure robustness , fault tolerance, autonomy and even reactivity of distributed systems/networks, that point to the need for total synergy of Control, Communications , and Computation/Computer Science- to meet today's and future challenges.

Brief Biography of the Speaker: Lena Valavani holds her B.S. in Physics, from Barnard College, Columbia University, and the M.S., M.Phil. and Ph.D degrees in Engineering and Applied Science from Yale University. After postdoctoral positions at Yale and MIT's Laboratory for Information and Decision Systems, she joined the Department of Aeronautics and Astronautics, MIT, where she was Boeing Associate Professor. She also served as Chief Scientist, Systems Engineering, U.S. D U.S. Department of Transportation for four years. She is currently president of Hellenic Space Systems , S .A.

Dr. Valavani served as Associate Editor of IEEE Transactions of Automatic Control, Automatica , AIAA Journal of Guidance, Navigation and Control, and the International Journal on Robust and Nonlinear Control. She was elected to the Board of Directors, AIAA, N.E., and served as General Secretary. She also was for a long time a member of the steering committee of the International Physicians for the Prevention of Nuclear War, GBPSR, (1985 Nobel Peace Prize).

Her research interests are in modeling for, and the analysis and synthesis of control systems, estimation and identification, with emphasis on robustness to structured and unstructured uncertainty, fault tolerance and reconfiguration, currently in distributed systems and networks . Her research in the U.S. was supported by NASA, NSF, AFOSR,ONR ,and by private industry , resulting in innovative designs of prototype systems currently in operation in the U.S; in Europe by ESA and EC. She has supervised 27 Ph.D and 29 M.S theses at MIT , and 22 M.S. theses at NTUA and UoA.

Dr. Valavani was consultant to Lincoln Laboratory, C.S.Draper Laboratory , and Bell Helicopter while in the U.S. She received the Best Research Paper Award (1991) from the International Gas Turbine Institute and holds three U.S. Patents in the area of controlling unsteady aerodynamic processes in compressors. She is an Associate Fellow of AIAA.

Plenary Lecture 1

Gogu Constantinescu, Son of Craiova - Romania's Exponent

Professor Gheorghe Manolea
University of Craiova
Centre of Innovation and Technological Transfer CITT
E-mail: ghmanolea@gmail.com

Abstract: The paper presents, shortly, Gogu Constantinescu, his life and his achievements. A model of engineer educated in schools of Craiova and Bucharest, and based on an exceptional mathematical knowledge, he has set the theoretical basis of reinforced concrete buildings and of transmission of mechanical power to distance through oscillations which propagate in continuous environments (liquid or solid) due to their elasticity.

At 45, he was already famous. The British magazine "The Graphycs", in its issue of January 26th, 1926, mentions him among the 17 most well-known world scientists between 1900-1925, together with Einstein, Lord Kelvin, Marconi and others.

His recognition is also proven by the number of Patents of invention he has obtained:
• in England – 114 patents of invention
• in the USA – 45 patents
• in France – 18 patents
• in Romania – 5 patents

The most prolific field of his technical and scientific activity is the sonicity.
The first application in sonicity was the sonic machine gun.
Gogu Constantinescu won a contest launched by the British Admiralty, and, in august 1916, there were performed the first tests with an airplane equipped with something new that would become the Constantinesco Fire Control Gear or "C.C. Gear" for short.
By the end of the WWI, over 50,000 American and British airplanes were equipped with such systems. As an appreciation of his results, the British government built for Gogu Constantinescu in West Drayton, in 1918, a very large laboratory for researches and practical applications in sonicity, laboratory called "the Sonic Plants".

In 1961 he was awarded the doctor honoris causa Diploma by the Polytechnic Institute of Bucharest (the former National School of Bridges and Roads, where he had graduated his academic studies).

Conclusion
Gogu Constantinescu's activity can be a model in the contemporary engineering education as it is based on theory and practical application.

Brief Biography of the Speaker:
Name: Gheorghe Manolea
Date and place of birth: 9 March 1948, Deleni, Mehedinti, Romania
Marital Status: Married
University Studies: Technical University Of Petrosani, 1970
Dissertation: A Contribution to Intrinsic Safety protection of the Automation and Telemechanic Elements in Explosive Atmosphere, 1981, Petrosani
Affiliation: University of Craiova, Romania, Faculty of Engineering in Electromechanics and Environment
Didactic Rank: University professor teaching:- Electromechanical Drives, Basics of the creative research
Other functions:
Scientific secretary of the Professors Board of the Electromechanical Faculty 1990-1992
The head of the Electromechanical department since 1992
The head of the Innovation Center and Technological Transfer of Romania since 1992

Plenary Lecture 2

Constructing Knowledge in Graph Theory and Combinatorial Optimization

Associate Professor Eva Milkova
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Abstract: Graph Theory and Combinatorial Optimization are powerful tools for teachers allowing them to develop logical thinking of students, increasing their imagination and meeting them familiar with solving various practical problems. The paper offers some ideas how to make the education of these branches of applied mathematics and computer science attractive for students. The approach used for teaching and learning these subjects can serve as an inspiration for education of other subjects as well.
The areas described in detail will be:

-Puzzles as a useful motivation
-Teaching in contexts
-Demonstration and visualization of the particular issue
-Intensification of students' self-preparation

Brief Biography of the Speaker: She was born in 1954 in Nymburk, Czech Republic. In 1978 finished her studies of numerical mathematics at Charles University in Prague, Faculty of Mathematics and Physics. Gradually received the following titles - master degree RNDr., doctoral degree Ph.D. and associate professorship.
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 (Faculty of Philosophy, UP Olomouc and Faculty of Education, UHK Hradec Kralove). Her scientific interests include Graph Theory, Graph Algorithms, ICT in education.

Plenary Lecture 3

Engineering Education: Future Trends and Advances

Professor Marc A. Rosen
Faculty of Engineering and Applied Science
University of Ontario Institute of Technology
Oshawa, Canada,
President of Engineering Institute of Canada
E-mail: M.Rosen@uoit.ca

Abstract: Engineering developments and innovations are being brought forward at an increasingly rapid rate, thereby forcing engineering educators to adapt to new realities. A reasoned response to such pressures is essential, because engineering education, and more broadly the engineering profession, advances best if
-challenges are identified early and well managed,
-opportunities are sought and where possible exploited beneficially, and
-speculation is made on future trends, based on logical assessments and reasoned arguments.
In this presentation, the views of the presenter are described, based on his experiences as an engineering educator, administrator and practitioner, on future trends in engineering education, and on many related challenges and opportunities. This topic is of great importance because the advancement of engineering education is strongly influenced by its challenges and opportunities, as well as by future trends. The objective of the presentation is to improve engineering education by increasing awareness of these topics among engineering educators and others, and promoting active consideration and debate of potential actions in response to these issues.

Brief Biography of the Speaker:
Dr. Marc A. Rosen is a Professor of Mechanical Engineering at the University of Ontario Institute of Technology in Oshawa, Canada, where he served as founding Dean of the Faculty of Engineering and Applied Science from 2002 to 2008. Dr. Rosen became President of the Engineering Institute of Canada in 2008. He was President of the Canadian Society for Mechanical Engineering from 2002 to 2004, and is a registered Professional Engineer in Ontario.
With over 60 research grants and contracts and 500 technical publications, Dr. Rosen is an active teacher and researcher in thermodynamics, energy technology (including cogeneration, district energy, thermal storage and renewable energy), and the environmental impact of energy and industrial systems. Much of his research has been carried out for industry.
Dr. Rosen has worked for such organizations as Imatra Power Company in Finland, Argonne National Laboratory near Chicago, and the Institute for Hydrogen Systems near Toronto. He was also a professor in the Department of Mechanical, Aerospace and Industrial Engineering at Ryerson University in Toronto, Canada for 16 years. While there, Dr. Rosen served as department Chair and Director of the School of Aerospace Engineering.
Dr. Rosen has received numerous awards and honours, including an Award of Excellence in Research and Technology Development from the Ontario Ministry of Environment and Energy, the Engineering Institute of Canada's Smith Medal for achievement in the development of Canada, and the Canadian Society for Mechanical Engineering's Angus Medal for outstanding contributions to the management and practice of mechanical engineering. He is a Fellow of the Engineering Institute of Canada, the Canadian Academy of Engineering, the Canadian Society for Mechanical Engineering, the American Society of Mechanical Engineers and the International Energy Foundation.

Plenary Lecture 4

Engineering Employability Skills required by Employers in Asia

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Abstract: Employers nowadays place main concern on and give emphasis to employability skills in potential engineers which caused a significant increase in unemployment among engineering graduates in Malaysia. There are several discussions and studies on "What types of skills and abilities are needed in the workplace?" How the government and higher education overcomes this rising phenomenon? This study attempts to look into engineering employability skills that have been required for their new engineers by other countries in Asia such as Malaysia, Japan, Singapore and Hong Kong. This paper will put forward a list comprised of the skills needed by these four countries, and compare the existing similarities and differences of these enlisted skills. Information was gathered from articles, journals, papers and reports. The findings indicate that these countries have published reports on the necessary frameworks of employability skills to prepare engineering graduates for the employment today and in the future. Overall, the studies suggest that the engineering graduates should acquire and demonstrate a set of generic skills such as communication skills, problem solving and interpersonal skills.

Brief Biography of the Speaker: A Azami Zaharim worked first 15 years as a lecturer in the Universiti Teknologi MARA (University of MARA Technology - UiTM) before joining the Universiti Kebangsaan Malaysia (National University of Malaysia - UKM) in the year 2003. He is Associate Professor at the Faculty of Engineering and Built Environment UKM, and is currently the head for centre engineering education research. He obtained his BSc(Statistics and Computing) with Honours from North London University, UK in 1988 and PhD (Statistics) in 1996 from University of Newcastle Upon Tyne, UK. He specialize in statistics, public opinion, engineering education and renewable energy resources.

He has until now published over 100 research papers in Journals and conferences, conducted more than 15 public opinion consultancies and delivered 3 keynotes/invited speeches at national and international meetings. He is currently the head of Renewable Energy Resources and Social Impact Research Group under the Solar Energy Research Institute (SERI). In the year 2007, he headed the Engineering Mathematics Research Group.

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