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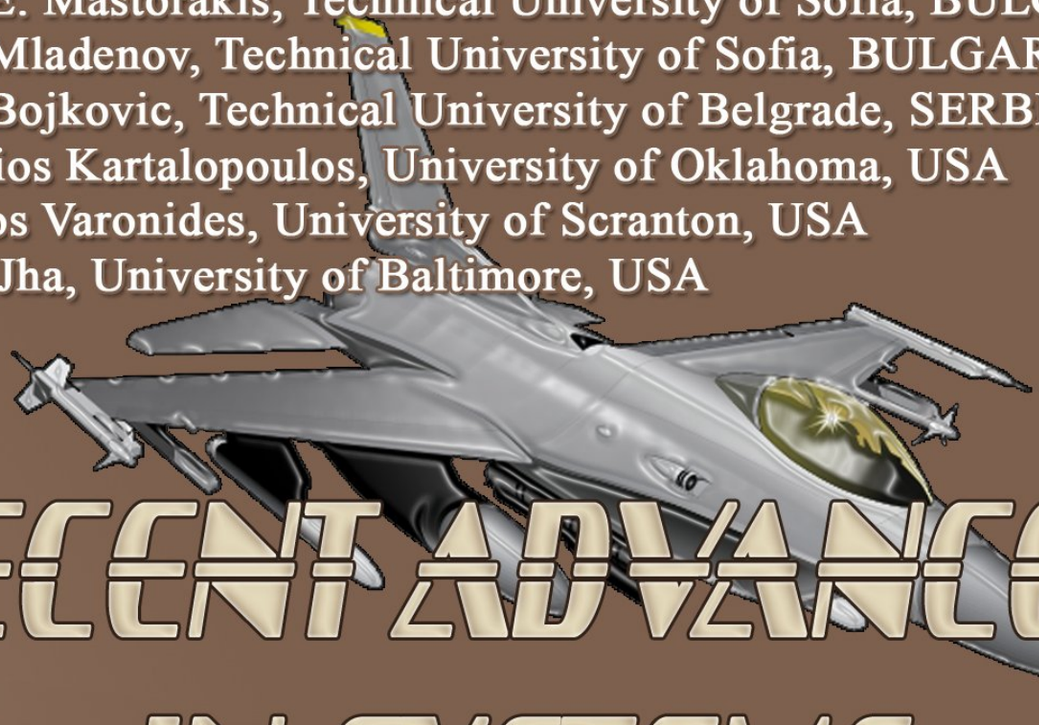

RECENT ADVANCES IN SYSTEMS

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

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Preface

This year the 13th WSEAS International Conference on SYSTEMS was held in Rodos, Greece, in July 22-24, 2009. The Conference remains faithful to its original idea of providing a platform to discuss systems theory, dynamical systems, control systems, control engineering, soft computing, simulation, modelling, robotics, artificial intelligence, fuzzy systems, neural networks 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
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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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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
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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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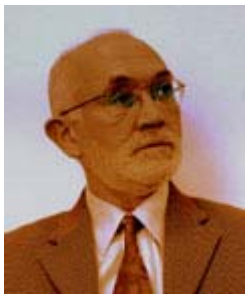
Abstract: Despite the tremendous strides witnessed in the Control and Estimation of lumped parameter systems , whether linear or nonlinear, the issue of stability and performance robustness under simultaneous structured and unstructured uncertainty still remains largely unresolved. When fault tolerance, 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 (CO2 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

Assisted Movement of Visually Impaired in Outdoor Environments – Work Directions and New Results



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Abstract: There are approximately 45 million blind individuals world-wide according to the World Health Report. Vision loss limits their access to the educational opportunities, social events, public transportation and leads to a higher rate of unemployment than that of individuals with no functional limitations (58% and 18% respectively, according to the American Foundation for the Blind (AFB)). Many efforts have been invested in the last years, based on ingenious devices and information technology, to help people to overcome these barriers and to integrate them in the social and productive life.
In this talk, research efforts are presented to develop electronic travel aids (ETA) that increase the visual impaired people's independence in their working and living environment. These devices, based on sensor technology and signal processing, are capable to improve the mobility of blind users (in terms of safety and speed), in unknown or dynamically changing environment. In particular, an integrated environment that improves the mobility of blind persons in to a limited area is presented. The proposed solution includes wearable equipment, placed on the subject, who guides the blind user to navigate autonomous with obstacles avoidance and stationary, monitoring equipment, which supervises the motion in order to avoid some unexpected events. The 3D obstacles detection system, included in the wearable equipment is bio-inspired, i.e. the system detects obstacles in a similar way as a subject with normal sight is looking for obstacles in front of him. The monitoring equipment, based on a GPS and a GSM/GPRS communication system, is capable to track the movement of a group of visually impaired, each of them moving on a specified pathway, in order to reach the desired target. The man-machine interface exploits the remarkable abilities of the human hearing system in identifying sound source positions in 3D space. The proposed solution relies on the Acoustic Virtual Reality (AVR) concept, which can be considered as a substitute for the lost sight of blind and visually impaired individuals. According to the AVR concept, the presence of obstacles in the surrounding environment and the path to the target will be signalized to the subject by burst of sounds, whose virtual source position suggests the position of the real obstacles and the direction of movement, respectively.

Brief Biography of the Speaker: Prof. Virgil TIPONUT received the M.Sc. in 1968, in Electrical Engineering/Computer Science, and the Ph.D. degree in Electronic Engineering and Telecommunications, in 1981, both at the POLITEHNICA University of Timisoara, Romania. Since graduation he is with POLITEHNICA University of Timisoara and curently he is a professor at Electronic and Telecommunication Faculty, responsable for teaching in embedded systems, smart transducers and neural networks.
His research interests include bioinspired systems, with application in mobile and rehabilitation robotics and some closed related areas: smart transducers, neural networks and fuzzy logic, biomedical engineering, embedded systems. He has published more than 100 papers in national and international Journals and Conference Proceedings, authored 10 books and 10 text books, and holds 21 patents. He conducted more than 25 research and development projects, grants and contracts in the field of embedded systems, robotics and smart transducers.
Prof. Tiponut has been involved in setting up national and international conferences as a reviewer and/or member of organizing committee or board of sections. He was a visiting professor at universities from USA, Germany, Ireland and Schotland.
He is a member of the IEEE Society (CAS, EMB, RA), WSEAS Society, member of the Society of Electronic Engineers from Romania and corresponding member of the Academy of Technical Science from Romania

He is a Fellow if IEEE (1994) and a Fellow of SAE (2005) and has served in many leadership positions in both of these professional societies. Presently he serves on the AdCom of IEEE Power Electronics Society, and Board of

Governors of IEEE Vehicular Technology Society. We was the founding chairman of the IEEE Vehicle Power and Propulsion Conference Steering Committee.
Ehsani is a registered Professional Engineer in the State of Texas.

Plenary Lecture 2

Artificial Social Systems for Control Charts of Workflows

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Abstract: We focus on the control of the performance characteristics of workflows modeled with stochastic Petri nets (SPN's). This goal is achieved by introducing a new model for Artificial Social Systems (ASS's) behaviours. We also propose new equivalent transfer functions for SPN's. ASS's exist in practically every multi-agent system, and play a major role in the performance and effectiveness of the agents. This is the reason why we introduce a more suggestive model for ASS's. In order to model these systems, a class of Petri nets is adopted and briefly introduced in the paper. This class allows representing the flow of physical resources and control information data of the ASS's components. In the analysis of SPN we use simulations in respect to timing parameters in a generalized semi-Markov process (GSMP's). By using existing results on perturbation analysis (e.g., delays in supply with raw materials, failure of equipments, etc.) and by extending them to new physical interpretations, we analyse unbiased sensitivity estimators correlated with practical solutions in order to attenuate the perturbations. A few examples will emphasize these new approaches.

Brief Biography of the Speaker: *

Honor Member of the Romanian Society of Electrical & Control Engineering - Member of the Romanian Technical Experts Corp.

*Technical Expert of the Romanian Ministry of Justice.

*President of the Romanian Society of Electrical & Control Engineering, Suceava Branch.

*Academic Positions: Assoc. Professor, Dept. of Automatics and Computers, Faculty of Electrical Engineering and Computer Science, "Stefan cel Mare" University of Suceava, Romania.

* Fields of Scientific Activities: Discrete Event Systems, Complex Measurement Systems, Reliability and Diagnosis of Control Systems, Environmental Management.

* He published 6 books and over 120 scientific papers in conference proceedings and journals.

Plenary Lecture 3

Forest Fire Detection and Prevention with Unmanned Systems

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Abstract: This presentation addresses a significant problem facing many countries in Europe, the U.S. and elsewhere: fires during the summer months are ravaging forests, resulting in loss of life and endangering the balance of sensitive ecosystems. It is essential that forest fires be detected as early as possible and their spread ascertained in order to minimize their catastrophic impact.
Civil authorities are attempting to prevent the extent of forest fires via observation ports, satellite data, citizen input and other available means. Recent advances in unmanned system technologies, communications and computing are promising to bring to the front such emerging technologies in order to assist in the forest fire prevention challenge.
We introduce towards this goal an integrated architecture consisting of a swarm of unmanned aerial vehicles (UAVs) equipped with infrared and optical sensing devices, communications and computing to detect forest fire pressure (smoke plumes, small fires), communicate the information to a control command and control port, and even provide information about possible human intruders initiating forest fires.
The command and control station employs all available information from multiple sources to access the accuracy of the data and transmit pertinent information to appropriate fire fighting personnel. We will discuss current prototype programs in several countries that are exploring UAVs and related technologies for forest fire prevention.

Brief Biography of the Speaker: George Vachtsevanos is a Professor Emeritus of Electrical and Computer Engineering at the Georgia Institute of Technology. He was awarded a B.E.E. degree from the City College of New York in 1962, a M.E.E. degree from New York University in 1963 and the Ph.D. degree in Electrical Engineering from the City University of New York in 1970. He directs the Intelligent Control Systems laboratory at Georgia Tech where faculty and students are conducting research in intelligent control, neurotechnology and cardiotechnology, fault diagnosis and prognosis of large-scale dynamical systems and control technologies for Unmanned Aerial Vehicles. His work is funded by government agencies and industry. He has published over 240 technical papers and is a senior member of IEEE. Dr. Vachtsevanos was awarded the IEEE Control Systems Magazine Outstanding Paper Award for the years 2002-2003 (with L. Wills and B. Heck). He was also awarded the 2002-2003 Georgia Tech School of Electrical and Computer Engineering Distinguished Professor Award and the 2003-2004 Georgia Institute of Technology Outstanding Interdisciplinary Activities Award.

Plenary Lecture 4

Multimedia Traffic Analysis in the Framework of New Generation Networks

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Abstract: Multimedia traffic management is analyzed,tackig into account some categories of this type of traffic.The emphasis is on video traffic management techniques including a video rate control and buffering for constant bit rate(CBR)and available bit rate(ABR).The second part deals with connection admission control(CAC),i.e.,CAC based on peak rate allocation,CAC based on rate envelope multiplexing,as well as CAC based on rate sharing.Next part of this work covers resource allocation as the key factor in achieving a certain QoS level for a connection requesting a certain amount of bandwidth.As for bandwidth allocation,efficiency will be performed,too.Congestion control for multicast communication , together with multimedia traffic modeling conclude this work.

Brief Biography of the Speaker: Prof. Dr. Zoran S. Bojkovic is a professor of electrical engineering at the University of Belgrade, Serbia. Together with Prof. K.R.Rao, from the University of Texas at Arlington,USA, he is the co-author of the international books: " Wireless Multimedia Communications "(CRC Press, 2008) ," Introduction to Multimedia Communications" (Wiley, 2006), "Multimedia Communication Systems" (Prentice- Hall, 2002), and " Packet Video Communications over ATM Networks" (Prentice- Hall, 2000). Also, he is the first author of the international monography " Advanced Topics in Digital Image Processing" (Editura Politechnica, Romania, 1997). He has published in international peer-reviewed journals and particpated in many scientific and research projects in industry, institutes and academia. He has conducted seminars,special sessions, tutorials,keynote and plenary lectures, on video/audio coding, standards, multimedia communications and networking, worldwide. He is Senior Member IEEE, EURASIP and WSEAS member.Also, he is Serbian Scientific Society member.

Plenary Lecture 5

A New Class of Chaotic Systems with Memristor-Like Elements

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Abstract: We have learned at school that there are three fundamental two-terminal elements used for electrical circuits building: resistors, capacitors and inductors. These are known as passive elements, capable of dissipating or storing energy - but not, as active elements are, of generating it. The behavior of each of these elements is described by a simple linear relationship between two of the four basic physical state variables describing a circuit: current, voltage, charge and magnetic flux.
As the electrical engineer Leon Chua pointed out in 1971, for the sake of the logical completeness of circuit theory, a fourth passive element should in fact be added to the list. He named this hypothetical element, linking flux and charge, the memristor.
The point is that such an element always appears instantanously as a nonlinear resistor. However, in fact it represents a new passive element, which may relate some state variable to flux without storing a magnetic field. This contrasts strongly with behavior of an inductor, for which a magnetic field stores all the energy (originating in the potential across its terminals), later releasing it (as an electromotive force) within the circuit.
It is just the inability to duplicate the properties of the memistor with a combination of the other three (classic) passive circuits elements, what makes the existence question of the memristor fundamental.
There are six independent permutations of two objects from the bank of four passive circuit elements above. Obviously, six binary relations might be constructed to connect pairs of the four fundamental circuit variables (current i; voltage v; charge q; magnetic flux φ). Five of them are well known. Two arise from the definitions of two of the physical state variables concerned: charge and magnetic flux are the time integrals of current and voltage ($dq = i\,dt$ and $d\varphi = v\,dt$), respectively.
The other three relations lead to the axiomaticaly given constituent properties of three classic passive circuit elements: resistance R, is the rate of change of voltage with current; capacitance C, is the rate of change of charge with voltage; and similarly inductance L, is that of flux with current.
The sixth relation leads to a fourth basic circuit element, which had been missing, and has now been found: the memristor, with memristance M, defined as the rate of change of flux with charge.
Whether physically realized or not, since memristance was first proposed the memristor has been successfully used as a conceptual tool for analyzing signals, and for successful modelling, for instance, nonlinear semiconductor devices. Beyond its fundamental interest, the excitement lies in the fact that now - almost 40 years later, Strukov et al. present both a simple physical model system in which a “generalized resistance” called memristance should arise and could markedly extend how we can make electronic circuits work. Even so, the concept has not been widely adopted, possibly because in normal microscale chips the memristance is negligible. But everything changes on the nanoscale, because the size of memristance effects increases as the inverse square of device size. That could make memristors useful for ultra-dense, non-volatile memory devices. For memristor memory devices to become reality, and to be readily scaled downwards, the efficient and reliable design and fabrication of electrode contacts, interconnects and the active region of the memristor must be assured.
But even to consider an alternative to the transistor is anathema to many device engineers, and the memristor concept will have a steep slope to climb towards acceptance. Some will undoubtedly trivialize the realization of this ubiquitous nanoscale concept, whereas others will embrace it only after the demonstration of a well-functioning, large-scale array of these densely packed devices. When that happens, the race towards smaller devices will proceed at full steam.
In all these instances, a deeper understanding of the memristor’s dynamic nature, as well as the non-linear energy dissipation effects is necessary. It is often the simple ideas that stand the test of time.
Recall that essentially the memristor acts as a nonlinear resistor the dissipation power of which depends on the history of one of the circuit state variables, e.g. the voltage across it. Its name, a contraction of “memory resistor”, reflects just that property.

It is easy to deduce that memristance can simply be seen as a “charge-dependent resistance”. It means that nonzero current implies instantanously varying charge. However, if no current is applied, the memristance is constant, and consequently memristor reduces to a static circuit element – ordinary linear resistor. On the other hand, it implies that if the memristance increases rapidly, current and power consumption will quickly stop. This is the essence of the memory effect.
At this point it seems to be evident that the memristance is a special case of a significantly more general property, occurring in a class of nonlinear dynamical systems, including e.g. chaos generating systems. From this point of view a ”generalized memristor” can be seen as an abstract power dissipation element, (or a subsystem), of a nonlinear system the dissipation rate of which depends on the history of some system state variables.
Let us now make a further substantial step. It has been mentioned that the most recognizable signature of the memristor is that when a sinusoidal voltage is applied to the device, the current – voltage plot takes the form of a Lissajous curve. A typical example can be formed by combining two orthogonal harmonic signals i.e. harmonic oscillations that are perpendicular to each other. It is obviously easy to generate them by a second order linear dynamical system.
In this lecture instead of harmonic oscillations a relatively broad class of chaotic oscillations generated by a new class of finite dimensional causal system representations with memristor-like nonlinear dissipation subsystems will be investigated.

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

Plenary Lecture 6

Mathematical Models for Eddy Current Testing

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Abstract: Eddy current method is one of nondestructive testing methods based on the law of electromagnetic induction. The basic principle of eddy current method can be described as follows. Consider a coil carrying an alternating current which is located in the vicinity of a conducting medium to be tested. A varying magnetic field (called the primary field) is generated by the current passing through the coil. This field induces eddy currents which, in turn, generate a varying magnetic field (called the secondary field). The variation of the output signal of the coil representing the sum of the primary and secondary fields can be used to draw conclusions about the properties of the tested medium. In particular, it can be used to detect flaws (for example, cracks or non-metallic inclusions) in the medium.
The talk is devoted to the analysis of mathematical models for eddy current testing. Media with constant properties in planar and cylindrical geometry as well as non-homogeneous conducting media with flaws and without flaws will be discussed.

Brief Biography of the Speaker: Andrei Kolyshkin received his undergraduate degree in Applied Mathematics in 1976 at the Riga Technical University. In 1981 he received a Ph.D in differential equations and mathematical physics at the University of St. Petersburg. Andrei Kolyshkin is currently a full professor at the Department of Engineering Mathematics at the Riga Technical University. His current research interests include investigation of stability problems in fluid mechanics with applications to open-channel flows and transient flows in hydraulic systems and mathematical models for eddy current testing. He is the co-author of three monographs published by Academic Press and CRM. Andrei Kolyshkin has participated in more than 30 international conferences and has published more than 50 papers in refereed journals since 1990. As a visiting professor and visiting researcher he spent a few years at the University of Ottawa and Hong Kong University of Science and Technology.

Plenary Lecture 7

Temperature Control of Electrical Resistance Furnace based on a Real Time Identification Method using Adaptive Filters

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Abstract: In this paper is presented a possibility of control of the electrical resistance furnace temperature. It is been considered that this process can be very well approximate taking into consideration that the heating process model is of a delayed time constant system of first order.
To determine the values of the process parameters of the analogical system function of the process, she was approximate with a digital system function of the process of which parameters can be determined in an adaptive manner. Based on these values, the values of the process parameters of the analogical system can be computed, also in an adaptive manner.
The process controller parameters are computed based on the values of the process parameters of the analogical system and according to some criteria. The criteria, which can be used in choosing the delayed time controllers, are criteria based on stability limits method, criteria based on identification result and experimental criteria determined with process in functioning.
From the earlier presented here result that the temperature control process is realized using adaptive filter in identification scope.
Because the temperature measured process is very disturbed by noise it was used an adaptive filter ALMS (Average Least Mean Squares) in scope of noise cancellation.
Finally are presented the advantages of the proposed temperature control method comparative to other.

Brief Biography of the Speaker: Caius Panoiu was born in 1965, graduate the Electrical Engineering Faculty, Polytechnic University of Timisoara in 1989. He receives his PhD degree in Electrical Engineering in 1999 and is currently Assistant Professor at the Electrical Engineering and Industrial Informatics Department of Engineering Faculty of Hunedoara, Polytechnic University of Timisoara, Romania. His research interests focus on signal processing, modelling and simulating systems, and data acquisition systems.
He has until now published over 80 research papers in Journals and conferences and participated in 8 research projects, from which 2 as director.

Plenary Lecture 8

Workspace Evaluation for Analysis and Synthesis of Manipulator

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Abstract: Manipulator workspace is illustrated by discussing its basic characteristics as fundamental for design and operation of mechanical systems in manipulation applications. Algorithms are explained for numerical evaluation of the workspace of serial and parallel manipulators. Formulations are discussed also for design purposes. Design problem for manipulators is formulated by using workspace characteristics. Experimental procedures for workspace determination are outlined both for model validations and performance evaluation.

Brief Biography of the Speaker: Marco Ceccarelli was born in Rome in 1958. He received the mechanical engineer degree cum laude in 1982 at the University "La Sapienza" of Rome. At the same University he received a Ph.D. degree in Applied Mechanics in 1988. In 1987 he was visiting scholar at Stanford University, U.S.A., and in 1990 he received a CNR-NATO annual grant as visiting professor at the Technical University of Valencia, Spain. Since 1990 he teaches courses on Mechanics of Machinery and Mechanisms, and Mechanics of Robots at the School of Engineering at the University of Cassino. Since 1996 he is Director of LARM, the Laboratory of Robotics and Mechatronics of DiMSAT, the Department of Mechanics, Structures, Environment and Territory at the University of Cassino. Since 2001 he has been appointed Full Professor of Mechanics of Machinery and Mechanisms at the University of Cassino. From 2003 to 2005 he has been Vice Director of DiMSAT.
He is member of ASME (The American Society of Mechanical Engineers), AEIM (Spanish Society of Mechanical Engineers), SIRI (Italian Association of Robotics and Automation), IEEE (the Institute of Electrical and Electronics Engineers), FeIbIM (Iberoamerican Federation for Mechanical Engineering), AISI (Italian Society for the History of Engineering), GMA (Italian Group for Mechanics of Machinery).
From 1998 to 2004 he has been Chairman of the Permanent Commission for History of Machine and Mechanism Science of IFToMM, the International Federation for the Promotion of Machine and Mechanism Science, and currently he is still a member. He is also member of the IFToMM Technical Committee for Robotics. He has been member of IFToMM TC for Computational Kinematics. He is Chairman of the Commission for Mechatronics of FeIbIM, Federacion Iberoamericana de Ingenieria Mecanica. He is Coordinator of the Scientific Committee for RAAD, International Workshops on Robotics in Alpe-Adria-Danube Region. He is Chairman of the Scientific Committee of MUSME, IFToMM-FeIbIM International Conference on Mechatronics and Multibody Systems. He is member of scientific Committees for several conferences, like RAAD, Romansy, CK, and many others; he is associate editor for the journal Transactions of CSME (the Canadian Society of Mechanical Engineers), Journal Mechanics Based Design of Structures and Machines, International Journal of Mechanics and Control, Chinese Journal of Mechanical Design, and Journal Advanced Robotic Systems; he has served as associated editor for Mechanism and Machine Theory; he has served as reviewer for several international conferences and journals; he has served as reviewer for national and international projects for Italian and foreign agencies. He has given invited lectures and short courses in many countries at conference events, celebration events, or within regular courses. He has carried out consulting activity for companies and in industrial plants on problems regarding with Automation and Robotics. He has been Scientific Editor for the Proceedings of HMM 2000, HMM 2004 and HMM2008, International Symposium on History of Machines and Mechanisms. He has been Chairman for HMM 2000 and 2004 that have been held in Cassino; he has been Co-Chairman for MUSME in 2002 in Mexico City, in 2005 in Uberlandia, Brazil and in 2008 in San Juan, Argentina. He has been Chairman for RAAD Workshops held in Cassino in 1997 and 2003. He has been Chairman for CK2005, IFToMM International Workshop on Computational Kinematics that has been held in Cassino in 2005. He is Scientific Editor of a Book Series on History of Mechanism and Machine Science published by Springer. He has edited 'Distinguished Figures in MMS – Part 1' published by Springer in the above-mentioned book series. He has coauthored the book 'A short Illustrated History of Machines' published at Technical University in Madrid in 2008. He has written the book 'Fundamentals of Mechanics of Robotic Manipulation' published by Kluwer/Springer in 2004.
In November 2003 he has received the Degree of Doctor Honoris Causa from UNI, National University of Lima, Peru, as recognizing his academic and scientific career, and his support to the activity of UNI in Mechatronic Engineering. He has been indicated as Coordinator of the Commission for Research of GMA, Italian National Group for Mechanics

of Machinery for the period 2002-2006. He has been elected Secretary-General of IFToMM for the term 2004-2007. He has been elected President of IFToMM for the term 2008-2011.
His research interests cover aspects of Theory of Machines and Mechanisms (TMM) and Mechanics of Robots. Specific subjects of his interest are Analysis and Design of Workspace and Manipulation; Mechanical Design of Manipulators, Legged Robots, and Grippers; Mechanics of Grasp; History of TMM; and Mechanism Design. He is author or co-author of more than four hundreds papers, which have been presented at Conferences or published in national and international journals.

Plenary Lecture 9

Generation of Electrical Energy with Variable Speed in Microhydro and Eolian Power Plant

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Abstract: The mini hydroelectric power plant are built to use the flow of the small rivers .
The main disadvantage of these systems is the reduced capacity to store a high quantity of water which should ensure the long term running of the hydroelectric plants during the droughty periods of time.
In the periods with low flow capacities the steady speed functioning cannot be achieved and a big quality of energy is lost.
This paper presents a mini hydroelectric plant with turbine (T) (without the classical devices of regulate the turbine) which runs with a variable flow capacity of water. The system uses an asynchronous generator which is coupled to the electric network through a static frequency converter (SFC). The frequency converter can be coupled to the network or it can run in autonomous regime, the voltage and the frequency at its output are very strictly regulated.
This way it can be produced electric energy at low and high flow capacities (higher then the rated flow capacity), the gain is obvious.
The figure no.1 presents the principle scheme of the system. In the figure, B represents the breakwater, CPT – the inlet of the feeding pipe, Q – the flow capacity of the water, VBP – by-pass valve, Δh – the drop, VAT – turbine access valve.
The paper proposes a computer simulation and experimental results of the system presented.
Similary such a wind power plant functioning with variable speed can be analyzed.

Brief Biography of the Speaker: Sorin Deaconu was born in 1965, graduate the Electrotechnical Faculty, "Polytechnica" University of Timisoara in 1989. He receives his PhD degree in Electrical Engineering in 1998 and is currently Assistant Professor at the Electrical Engineering and Industrial Informatics Department of Engineering Faculty of Hunedoara, "Polytechnica" University of Timisoara, Romania. His research interests focus on improvement of performances for classical and special electrical machines, generation of electrical energy with variable speed in microhydro and eolian power plant, improvement of performances for electrical variable speed drives, modern electrical traction systems, static performance converters.
He has until now published over 130 research papers in Journals and conferences and participate to 12 research projects.

Plenary Lecture 10

The Study of an Optimal Earth Observing System Employing Dive and Ascent Satellites

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Abstract: DAS (Dive and Ascent Satellite) has the ability to change its altitude in the orbital plane. The authors have noticed the characteristics of DAS, and have been studying the optimal (minimum fuel) control of DAS for the purpose of earth observation. In this paper, we propose some constellations of DAS which can observe a wide area of the earth in association with the optimal orbital control of DAS. In the study, the normal orbit of DAS is assumed to be a 400km altitude circular one. As the observable window of one DAS is very limited, we first studied the orbital inclination change of DAS, which was proved to require too much fuel. Next, we studied the extension of the time to reach the observation point. The result also showed that too much fuel is required for changing the reaching time. One of the most important advantages of DAS is that it can observe more precisely by lowering its altitude, however, quick observation is most important, it can enlarge the observable window by increasing the altitude. Following to the concept, some constellations of DAS are studied and proposed. The future work is to construct an optimal constellation with DASes which can observe anywhere on the earth in a short time with minimum fuel consumption.

Brief Biography of the Speaker:
March 1945 Born in Tokyo, Japan
March 1968 BS, March 1970 MS, March 1973 Ph.D Graduate course of Aeronautics, University of Tokyo
April 1973 - Engineer Central Research Laboratory, Mitsubishi Electric Corporation
April 1977 - Senior Engineer, 1984- Chief Engineer, 1991- Department Manager
April 1994 - Professor, Department of Mechanical Systems Engineering, Shinshu University
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1994, 1996, 2000.:NAL(Current JAXA), Japan
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Guest Lecturer
1991-1993, 1995, 1998. CSIST, Taiwan, 1998, KAIST Korea, 2002, Kiev Univ. of Tec, Ukraine, 2000, 2008, Silesian Univ. of Tec, Poland, etc.
Reviewer and Contributor of J. of Guid, Cont. and Dyn, Automatica, IEEE Journals etc. as well as Domestic journals, Korean and Iranian journals.
Founding Editor of Information Technology Econometrics and Management
Achievements include many patents for satellites, bombs, missiles, antennae etc.
Fields of Study and Research:
Guidance and Control in Aerospace Fields
Nonlinear Optimal Control and Dynamic Games
Covariance Analysis of Nonlinear Systems
Robotics

Plenary Lecture 11

The Finite Difference Method Applied for the Simulation of the Heat Exchangers Dynamics

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Abstract: The heat exchangers that transfer energy from combustion gas to steam are an important part of the power circuits of thermal power stations. Their inertia is often decisive for the design of the steam temperature control system. In this paper, the analysis and the simulation of the dynamics of steam superheaters is discussed. There are many types of the steam superheaters applied in the industry. Here, the steam superheater of the counterflow heating surface arrangement is presented as an example. The fire gas is the product of combustion of brown coal in a drum-boiler. The heated medium is the saturated steam, generated by the steam generator. To simulate the steam superheater on the computer, the heat exchanger and the associated piping are described by the set of partial differential equations.The equations are then solved numerically by modified finite difference method. In the paper, the discussion of the simulation method and both qualitative and quantitative simulation results are presented.

Brief Biography of the Speaker:
Born 1941 in Brno, Czech Republic.
Ing. (MSc) in Electrical Engineering at the Technical University Brno in 1963.
CSc (PhD) in Technical Cybernetics at the Technical University Brno in 1968.
DrSc in Technical Cybernetics at the Czech Technical University in Prague in 1986.
Professor at VSB-Technical University of Ostrava since 1990.
1964 -1966 VZKG Ostrava Steel Works, research worker.
1967 -1971 VSB-Institute of Mining and Metallurgy Ostrava, project leader.
1971 -1986 Research Institute of Metallurgy Dobra, head of department.
1987 -1990 Vitkovice Steel Works, Ostrava, head of department.
1990 -1994 VSB-Technical University Ostrava, head of department.
1995 - VSB-Technical University Ostrava, professor.
4 books, 204 papers.

Plenary Lecture 12

Port Terminal Automation

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Abstract: This article presents the definition of a model for application of mobile technology in Ports. The work has been developed in the context of the use of mobile devices for automation of the processes of loading and logistics of highway transportation from the port to the importer. The term mobile technology is employed to define equipment, communication means and software engineering that permit to extend the computing support beyond the existing infra-structure limits.

Brief Biography of the Speaker: Eduardo Mario Dias was born in 1951, graduated in Electrical Engineer in 1974 at the Escola Politecnica of the University of Sao Paulo. At the same University he received the Master and PhD in 1976 and 1978, respectively. He has been full professor since 1994.
Professor of Escola Politecnica of the University of Sao Paulo since 1975. He is active in theDepartmente Council and he is vice head of the Electrical Energy and Automation Engineering Department of the Escola Politecnica of the University of Sao Paulo. He has coordinated contracts with a lot of public companies and has developed researches with companies that promote researches. He is currently the coordinator of the Technical Comitee of ITS (Intelligent Transport System) of the AEA (Brazilian Assossiation of Automotive Engineering).

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