Editors: Ford Lumban Gaol, Jiri Strouhal

Recent Researches in Computational Intelligence and Information Security

- Proceedings of the 10th WSEAS International Conference on Computational Intelligence, Man-Machine Systems and Cybernetics (CIMMACS '11)

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Preface

This year the 10th WSEAS International Conference on Computational Intelligence, Man-Machine Systems and Cybernetics (CIMMACS '11) and the 10th WSEAS International Conference on Information Security and Privacy (ISP '11) were held in Jakarta, Island of Java, Indonesia. The conferences provided a platform to discuss neural networks, fuzzy systems, modeling and control, signal processing, threat and attacks to information, standards of information security, infrastructure etc. with participants from all over the world, both from academia and from industry.

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

The accepted papers of these conferences are published in this Book that will be 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.

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

The Editors

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Plenary Lecture 1

Computer-Aided Adaptive Camouflage

Professor Jiri F. Urbanek
Department of Civil Protection
Faculty of Economics and Management
University of Defence
Kounicova 65, 662 10 Brno
CZECH REPUBLIC
E-mails: jiri.urbanek@unob.cz

Abstract: The article deals with results of a Project - acronym ADAPTIV which is Czech Defence Research Project. This Project solve adaptive camouflage by the Computer - Aided Mimicry (CAM) as Project terminal solution. Perceptive interface between recipient and camouflaged object is visualized by means of textile modular screens. Screen/s special light semi-permeability enables front/ back projection with nearly identical light parameters. Information permeability, towards illusion creation, is sure controlled by the camouflage provider by means sophisticated and mastered illusion with perfect scenarios. ADAPTIV/s financial possibilities and COTS principle have asked special definition of feasibility conditions, especially recipient/s space position. All participants of camouflage Use Case have pregnant scenario roles as the technologic system components, domains, actors, agents and art mediators. Project conclusions will be introduced especially in military and security environments in live PowerPoint presentation at the Conference CIMMACS '11.

Brief Biography of the Speaker: Univ. Prof. Jiri F. Urbanek, Ph.D., born 1949 in Pelhrimov, Czech Republic was graduated 1972 at Brno University of Technology, Faculty of Mechanical Engineering. 14 years he operated in Czech industrial and mining enterprises, including technical help for mining rescue services. Parallel he was graduated Ph.D. with thesis Mathematical Methods in Industrial Processes. Then he gave the lectures on technological, managerial and military universities in the branches Automation, Management, Logistics and Non-conventional Technologies. On Brno University of Technology, he first habilitated in branch Mechanical Technology and later second in branch Management and Battle Employment of Ground Forces at Vyskov Military University.
Now, he gives professor's lectures at University of Defence, Faculty of Economics and Management in Brno, Czech Republic. His research branches are Safety, Civil Protection, Interoperability, Security Management, Crisis Scenarios and Civil Emergency Planning. He is European Commission expert for Security Research and for the Development of Small and Middle Enterprises. He solves many national and international research and development projects. Now he is in the solution of EC 7FP Security Research project CAST. He is author of 245 articles, 6 books and 7 patents. 8 papers was published via WSEAS.

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Plenary Lecture 2

Developments and Applications of Adaptive Cerebellar Model Articulation Controllers

Professor Chih-Min Lin
Chair Professor of Electrical Engineering Department
Yuan Ze University, Taiwan
E-mail: cml@saturn.yzu.edu.tw

Abstract: Based on biological prototype of human brain and improved understanding of the functionality of the neurons and the pattern of their interconnections in the brain, a theoretical model used to explain the information-processing characteristics of the cerebellum was developed independently by Marr (1969) and Albus (1971). Cerebellar model articulation controller (CMAC) was first proposed by Albus in 1974. CMAC is a learning structure that imitates the organization and functionality of the cerebellum of the human brain. That model revealed the structure and functionality of the various cells and fibers in the cerebellum. The core of CMAC is an associative memory which has the ability to approach complex nonlinear functions. CMAC takes advantage of the input-redundancy by using distributed storage and can learn nonlinear functions extremely quickly due to the on-line adjustment of its system parameters. CMAC is classified as a non-fully connected perceptron-like associative memory network with overlapping receptive-fields. It has good generalization capability and fast learning property and is suitable for a lot of applications. This speech introduces several CMAC-based adaptive learning systems; these systems combine the advantages of CMAC identification, adaptive learning and control techniques. In these systems, the on-line parameter training methodologies, using the gradient descent method and the Lyapunov stability theorem, are proposed to increase the learning capability. Moreover, the applications of these systems in nonlinear systems control, biped robot control, signal processing, and computer-aided diagnostic of breast nodules are demonstrated.

Brief Biography of the Speaker: Prof. Chih-Min Lin is currently a Chair Professor of Electrical Engineering, Yuan Ze University, Taiwan. He also serves as the Editor-in-Chief of WSEAS Trans. on Systems and Control, and Associate Editor of IEEE Trans. on Systems, Man, and Cybernetics, Part B; Asian Journal of Control; International Journal of Fuzzy Systems; Intelligent Automation and Soft Computing; and International Journal of Machine Learning and Cybernetics. He is now the Chair of IEEE Systems, Man, and Cybernetics Society, Taipei Chapter. His research interests include fuzzy systems, neural network, cerebellar model articulation controller, and intelligent control systems. He is an IEEE Fellow and IET Fellow. Till now he has published 108 journal papers and 142 conference papers.

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Plenary Lecture 3

A Technique for Diagnosing Abnormalities in Intermittent Sound Emission Mechanisms Based on Dynamic Programming Matching

Professor Teruji Sekozawa
Department of Infomation Systems Creation
Kanagawa University, Japan
E-mail: sekozawa@ie.kanagawa-u.ac.jp

Abstract: This paper proposes an acoustic diagnosis technique for detecting abnormalities in and deterioration of machines that emit intermittent sounds during operation. The effectiveness of this technique is demonstrated experimentally. Acoustic diagnosis is generally applied to continuous sounds by analyzing the power spectrum patterns of regular, periodic sounds emitted by rotating components. However, machines such as automatic teller machines (ATMs) emit intermittent, episodic sounds during operation, making it impossible to employ the same diagnosis techniques as those used for conventional, continuous sounds. The proposed technique enables intermittent acoustic abnormalities to be diagnosed. It achieves this by constructing two vector series that are polygonal chain approximations of the temporal changes in the pressure levels of the most characteristic frequencies of the acoustic emissions during normal operation (the "standard vector series") and during inspection (the "measured vector series"). The technique employs dynamic programming (DP) matching to collate and compare the two vector series at standard intervals. The technique consists of the following six steps: (1) acquisition of the temporal changes in the pressure level, as acoustic data; (2) extraction of the diagnosis regions; (3) selection of relevant features using a polynomial expansion filter; (4) polygonal chain approximation of the acoustic waveforms by vector series; (5) collation of the resulting measured vector and standard vector series by DP matching; (6) diagnosis of abnormality by vector dissimilarity. This paper provides detailed descriptions of steps 3 to 6. Steps 3 and 5 are particularly notable: in step 3, the acoustic data are approximated as vectors in a polygonal chain using a Hermite polynomial and the relevant features are extracted; in step 5, the DP collation absorbs operational asynchronicities, thereby eliminating what has been the greatest impediment to intermittent sound diagnosis. The effectiveness of this method for localizing and diagnosing abnormalities is demonstrated experimentally by applying it to acoustic data from the paper-slip transport in an actual machine.

Brief Biography of the Speaker: Teruji Sekozawa is a professor of Information Systems Creation at Kanagawa University, Japan. His area of expertise is the social information system, automotive control system, information service system. He authored or co-authored over 100 scientific papers published in reviewed journals or presented at conferences. He has over 150 patents related to system engineering. He had been researching the system development of the new social infrastructure in Hitachi Ltd. until 2004, and works in present Kanagawa University, Japan since 2005. He experienced the Chairman of Industrial system in SICE(Society of Instrument and Control Engineers) and the director of Tokyo branch in IEEJ(Institute of Electrical Engineers of Japan) as Scientific Activities. He is a senior member of IEEJ.

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