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Recent Advances & Applications of Computer Engineering

Proceedings of the 9th WSEAS International Conference on Applications of Computer Engineering (ACE '10)

Penang, Malaysia, March 23-25, 2010

Supported by Universiti Kebangsaan Malaysia

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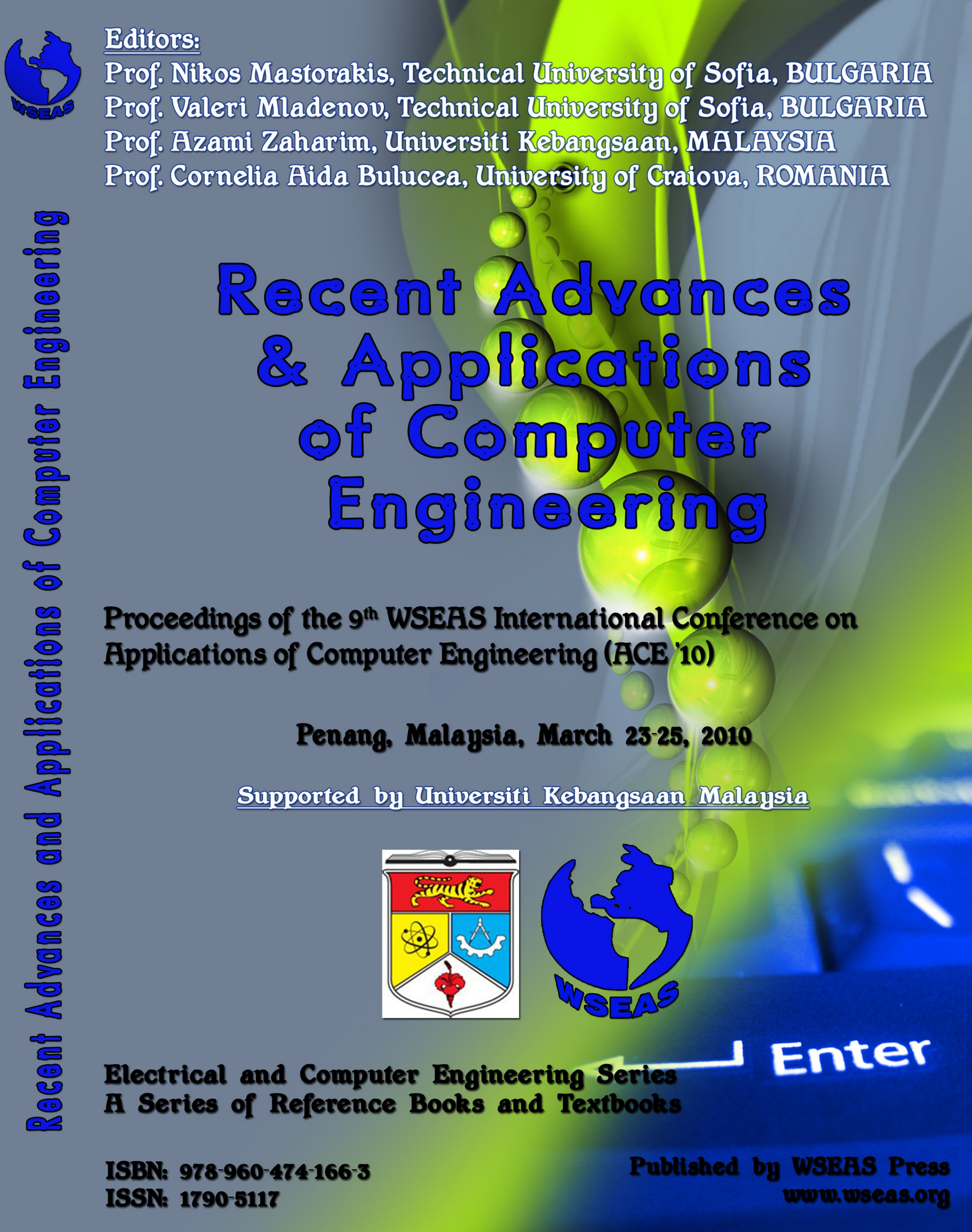

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Preface

This year the 9th WSEAS International Conference on APPLICATIONS of COMPUTER ENGINEERING (ACE '10) was held in Penang, Malaysia, March 23-25, 2010. The conference remains faithful to its original idea of providing a platform to discuss hardware systems, software engineering, computational intelligence, communications, computer networks, computer applications in biomedicine, nuclear physics, environmental science and development, geoscience, plasma and fusion, astrophysics, optics, naval and marine engineering, acoustics and music, remote sensing, chemistry and chemical engineering 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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Plenary Lecture 1

Intelligent Human Interaction based on Mental Cloning

Professor Hamido Fujita
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Abstract: This plenary Lecture; is to high light on the importance of human nature collective behavior on intelligent interaction between man and machine. We have investigated on different disciplinary, (philosophical, physiological, cultural, physiognomy, and technical) views that collectively reflect the behavioral reasoning of human emotional feature interaction with machines (i.e., computer), this is essential to have mutual effective engagement between human and machine based on observing and examining the user from different views reflecting the emotional behavior of the user. The system will be sensitive to emotion related attributes that through integrated conceptual views, representing these attributes, we can be able grasp the emotional transition state of user engagement with the system. Emotion recognition is one of the most important components of emotional intelligence and it has a direct effect on our ability to make optimal decisions (along with the ability to utilize emotions to make decisions), any attempt by computer scientists to model human interaction should, at least in part, be founded on an accurate identification of affective states. It is suggested that by ignoring the emotional component intrinsic to human decision-making, we have been missing valuable information that could potentially lead to inadequate interactive models.

These concepts are the basis of what we called mental cloning. A concept introduced by me through a project. This project is to establish a system as a virtual world to re-create a Miyzawa Kenji virtual world (famous Japanese writer dead on 1930) based on cognitive model of his personality and inner thinking). However, the Kenji system is currently be modified and adapted into a health care system, that this plenary lecture is trying to introduce.

The objective is to have users (i.e., patients) who are attending a hospital (or they can do it from their home using computer link), to do all transaction of 1st level diagnosis before going to the actual health examination. In this level, based on mental cloning of medical doctors in that hospital, and based on their previous case studies, and experiences to examine patients the system would practice this diagnosis on patient as if the actual doctor are doing. All doctor cases studies have been collected and categorized into the system according to levels and type. The solutions or induced scenarios by the virtual doctors to the patients have been abstracted to distinguishing its central part (primary) from surrounding (secondary) parts. It first finds the solution of the central part, and then refines the solution by considering the secondary related parts. Medical doctors' knowledge has been classified according to categories. The system is been divided into our related parts.

The 1st part is to create a hologram (or virtual 3D face on a display) that produce emotional character of a certain human defined personality, we use in this experiment actual employed medical doctor, the system will produce generated animated face emotionally talk and act as the medical doctor themselves, and who are currently working in the hospital. These animated characters reflecting the main interface the patient would look through and through it the virtual medical doctor would establish the best engagement to extract the current status of the subject patient. This part is working with part 4 of the system. Together part 1 and part 4 represent the mental cloning of the medical doctor.

The 2nd part reflects the interaction of user (patient) emotional engagement states, by observing the user mental transition states (i.e., trace), that been recorded and analyzed by Active Appearance model system through a camera. A high resolution camera would collect images from the user (along with voice as in part 3). These frame streams of video are analyzed though what is called as active appearance model, so the system would collect user mental engagement with the doctor and accordingly, can estimate the user appearance state.

The 3rd part is related to the voice reasoning, to produce with emotion a voice reflecting the context in hand, and to recognize it as it heard from the observed user. Also, this part would produce the output voice of the virtual medical doctor to speak emotionally the generated (in part 4) scenarios.

Through Part 2 and Part 3 information is collected by the system (virtual doctor), to create a cognitive model of the subject patient. Such that to create the problem space that the system would use to navigate to the best match and accordingly the best scenario to use for diagnosis. When a user talk, the face emotional states, along with emotional states and the words are recognized by the system as information through it the system would find the best scenarios and corresponding cognitive model to use for interacting with the subject user.

The 4th part is to produce the synthesis of the scenario that make the user and system been actively engaged. This would be based on creating a cognitive interaction between the human subject and the system based on transition analysis.
This lecture is to bring into the audience the needs for such way of metaphoric thinking to bring user emotional status view to be part of the design views that to be integrated with other parts of the system.

Brief Biography of the Speaker:
Dr. Hamido Fujita, is a professor at Iwate Prefectural University(IPU), Iwate, Japan.
He is the director of Intelligent Software Laboratory.
He took his Ph.D from Tohoku University, Sendai, Japan on 1988.
He worked at Tohoku University as visiting Professor on late eighties, and then joined University of Tokyo, RCAST as Associate Professor, on 1990_1993, and then he moved to Canada, as visiting Professor at the University of Montreal, IRO, till 1997.
He then moved to Japan to become a committee member to establish Iwate Prefectural University on 1997. Then after he joined Iwate Prefectural University (IPU), Faculty of Software and Information Science, as professor and head of Information System Division. He is directing at IPU two laboratories, Intelligent Software Laboratory and Cognitive Systems Laboratory. He was a committee of Establishing Graduate School of Software Science, of IPU.
He has directed and led many project sponsored by the Ministry of Science, Education and Culture of Japan, and others from International sponsors and Japanese company sponsors project on new software methodologies.
Also, he is the founder of SOMET organization.
He published many books and journal papers, and participated as speaker in many conferences worldwide. Also, he gave invited talks at many universities in EU, and North America. He has supervised Ph.D students jointly with University of Laval, University Technology, Syndey(UTS), He is also Professor at the University of Laval, Quebec, Canada supervising Graduate Studies students, he was a visiting Professor CRI at the University of Paris_1, Sorbonne, 2003~2004, working with Prof. Colette Rolland. He worked as opponent for Stockholm University, Sweden co-supervised students with Prof. Love Ekenberg He also worked with UTS, CCS group led by Prof. Ernest Edmonds and co-supervised Ph.D students. He published books in IOS press. He guest edited several special issues on International Journal of Knowledge based systems, Elsevier. Also, he has editor role in this journal since 2008. Also, he a guest edited Transaction of Internet Research,
He is currently heading a cognitive Miyzaza Kenji project in Intelligent HCI, and a project related to Mental Cloning as an intelligent user interface between human user and computers, supported by MEXT (Ministry of Education, Culture, Sports, Science and Technology), and SCOPE project on Virtual Doctor Systems, supported by Ministry of Internal Affairs, and Communications of Japan.

Plenary Lecture 2

A Fully Automated Water Management System for Large Rice Paddies

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Kanagawa University, Japan
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Abstract: An automatic water management system for large-scale paddy fields has been developed. The purposes of that are to supply the paddy fields with water or drain water from that automatically, to decrease water consumption, and to have a good harvest. To accomplish the above purpose, developed system has five functions, (1) prediction of paddy growth stages, (2) water level control corresponding to growth stages, (3) estimation of mean water level, (4) prediction of water consumption, and (5) optimal water allocation for minimizing of damage. In this paper, we especially give a detail description of functions (3). For (3), we construct estimation model based on Kalman-filter theory, and give an estimation result.

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.