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Preface

This year the 10th WSEAS International Conference on INSTRUMENTATION, MEASUREMENT, CIRCUITS and SYSTEMS (IMCAS '11) was held in Venice, Italy, March 8-10, 2011. The conference remains faithful to its original idea of providing a platform to discuss instrumentation, real-time systems, optoelectronics, network theory and applications, automatic control and robotics, mechatronics, fuzzy systems, modeling, power systems, probabilistic reasoning, signal processing 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

Analytical Synthesis Method---A New Mathematical Design Method for the Analog Circuit Design

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Abstract: Analytical Synthesis Method (ASM) has been presented in several papers published in the IEEE Transactions on Circuits and Systems since 2003. It is one of the powerful design methods in the field of analog circuit design. It is the method using a succession of innovative algebra manipulation operations to decompose a complicated transfer function representing the relationship between the output and the input signals of a design project into many simple equations feasible by using the corresponding simple sub-circuitries. The simple sub-circuitries can be constructed by the desired configuration of the element such as the single-ended-input operational transconductance amplifiers (OTAs) and the grounded capacitors, both of which are used for absorbing and reducing the shunt parasitic capacitance and lead to have more precise output responses. In addition to this, the ASM can control the number of the terms in the complicated decomposition process such that the number of both active and passive components used in the circuit is the least compared to the previously reported ones. Then, the ASM is the only one method which can simultaneously achieve the three important criteria for the design of OTA-C circuits without trade-off. Due to the flexibility of the ASM, the simple sub-circuitries used in the circuit design can be changed and chosen according to different necessities for the target of the circuit design. For example, if the reduction of the number of the active and passive components used in the circuit is more important than the type of the element configurations like single-ended-input/differential-input OTAs and grounded/floating capacitors due to the consideration about power consumption, chip area, noise, and total parasitics..., etc., the minimum component OTA-C circuit can also be investigated and developed successfully using the ASMs. The fully flexible characteristic and the real demonstration in the literature of the ASM may make it be one of the most prospective methods in the field of analog circuit design in the near future.

Brief Biography of the Speaker: Chun-Ming Chang received the B.S.E.E. and M.S.E.E. degrees from National Cheng Kung University, Tainan, Taiwan, R. O. C. in 1975 and 1977, respectively, and the Ph.D. degree from the University of Southampton, Southampton, U.K., in 2004.
In 1979, he joined the Department of Electrical Engineering, Taipei Institute of Technology, Taipei, Taiwan, R. O. C., as a Lecturer. After one year, he transferred to the Department of Electronic Engineering, Fu Jen Catholic University, Taipei Hsien, Taiwan, R.O.C. In 1982, he joined the Department of Electrical Engineering, Chung Yuan Christian University, Chung-Li, Taiwan, R.O.C., where he became an Associate Professor and a Full Professor in 1985 and 1991, respectively. He is currently a Professor of Electrical Engineering and leader of the Electronic Circuits Group in the Department of Electrical Engineering, Chung Yuan Christian University. He is also a departmental teacher promotion committee member and a college teacher promotion committee member. He was the chairman of the Department of Electrical Engineering of Chung Yuan Christian University from 1995 to 1999. His research interests are divided into two parts: network synthesis and analog circuit design before and after 1991, respectively. The improvement for the approach technique to factorize a paramount matrix used in network synthesis and proposed by Professor I. Cederbaum let him be promoted to a Full Professor in 1991. He has published over 70 SCI papers, in which the most famous is the invention of a new analytical synthesis method for the design of analog circuits which can, for the first time, simultaneously achieve three important criteria for the design of OTA-C filters without trade-offs. Using a succession of innovative algebra manipulation operations, a complicated nth-order transfer function can be decomposed into a set of simple equations feasible using the single-ended-input OTAs and grounded capacitors. Several IEEE Transaction papers on Circuits and Systems with analytical synthesis method have been published in the literature since 2003. Recently, he was invited as the Plenary Speaker of the (i) 7th WSEAS International Conference on Instrumentation, Measurement, Circuits and Systems (IMCAS '08), Hangzhou China, April 6-8, 2008; (ii) 8th WSEAS International Conference on Electronics, Hardware, Wireless and Optical Communications (EHAC'09), University of Cambridge, UK, February 21-23, 2009; and (iii) 11th WSEAS International Conference on Mathematical and Computational Methods in Science and Engineering (MACMESE'09), Baltimore USA, November 7-

9, 2009. He was invited as a Visiting Professor by Peking University and National Taiwan University in the summer of 2008 and 2009, respectively. He is in the process of writing his professional textbook: "Analog Circuit Design---Analytical Synthesis Method". Prof. Chang is a senior member of the IEEE Circuits and Systems Society.

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Plenary Lecture 2

Artificial Neural Networks Applications for Virtual Sensors Design

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Abstract: Virtual sensors constitute a novel area of virtual instrumentation, whose principal mission is to perform indirect measurements of process important variables using historical data of the desired variable and some other variable that affects its performance. Virtual sensors are widely used because they are computer programs that can be change or updated when it is necessary. These programs can consist of a mathematical model, heuristic models or intelligent model. Virtual sensors are some times designed for working in parallel with a physical sensor in order to evaluate its performance, but they can also be used for having on-line estimation of the desired measurement. Neural networks have been one of the most used intelligent tool for designing and developing Virtual Sensors due to its accurate, its capability for identifying complex nonlinear dynamical systems, giving appropriate results in different situations, modeling and Identification capabilities and easy for implantation. This plenary will present some methodological frameworks for designing Virtual Sensors using Artificial Neural Networks. This Methodology is based upon Software Engineering, Knowledge-Based Systems and Neural Networks schemes. It includes both technical and economical feasibility for building the virtual sensors and considers important aspects concerning computational platform, data processing, virtual sensor requirements, among others. It also considers the computational nature of virtual sensors. It will be also presented some industrial examples.

Brief Biography of the Speaker: Francklin Rivas-Echeverria Systems Engineer, MSc. in Control Engineering and Applied Science Doctor. Full professor in Control Systems Department, at Universidad de Los Andes, Venezuela. He has been invited professor in the Laboratoire d'Architecture et d'Analyse des Systemes (LAAS, Toulouse-France) and some Venezuelan and international Universities. He has also been technical advisor for "Venezuelan Oil Company" (PDVSA), "Aluminum Venezuelan Company" (VENALUM), "Steel Venezuelan Company" (SIDOR), Trolleybus System in Venezuela (TROLMERIDA). He has created and is the Director of the Intelligent Systems Laboratory and is the head of the University consulting unit (UAPIT-ULA). Over 180 publications in high level conferences and journals: the main topics of his papers are: Artificial Intelligence, Intelligent Control, Automation Systems and Industrial Applications. He has applied his results to many fields: Processes Control and Supervision, Oil production, Steel production processes, among others. Also, has developed several tools for automatic control teaching. He is coauthor of two books concerning Artificial Intelligence and Nonlinear Systems.

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