Editors:
Prof. Nikos Mastorakis, Technical University of Sofia, BULGARIA
Prof. Valeri Mladenov, Technical University of Sofia, BULGARIA
Prof. Azami Zaharim, Universiti Kebangsaan, MALAYSIA
Prof. Cornelia Aida Bulucea, University of Craiova, ROMANIA

Recent Advances and Applications of Electrical Engineering

Proceedings of the 9th WSEAS International Conference on Applications of Electrical Engineering (AEE '10)

Supported by
Universiti Kebangsaan
Malaysia

Penang, Malaysia, March 23-25, 2010

Recent Advances in Electrical Engineering
A Series of Reference Books and Textbooks

ISBN: 978-960-474-171-7
ISSN: 1790-2769

Published by WSEAS Press
www.wseas.org

Recent Advances and Applications of Electrical Engineering

RECENT ADVANCES and APPLICATIONS of ELECTRICAL ENGINEERING

Proceedings of the 9th WSEAS International Conference on APPLICATIONS of ELECTRICAL ENGINEERING (AEE '10)

Penang, Malaysia, March 23-25, 2010
Supported by Universiti Kebangsaan Malaysia

Recent Advances in Electrical Engineering
A Series of Reference Books and Textbooks

Published by WSEAS Press
www.wseas.org

ISSN: 1790-2769
ISBN: 978-960-474-171-7

RECENT ADVANCES and APPLICATIONS of ELECTRICAL ENGINEERING

Proceedings of the 9th WSEAS International Conference on APPLICATIONS of ELECTRICAL ENGINEERING (AEE '10)

Penang, Malaysia, March 23-25, 2010
Supported by Universiti Kebangsaan Malaysia

Recent Advances in Electrical Engineering
A Series of Reference Books and Textbooks

Published by WSEAS Press
www.wseas.org

Copyright © 2010, by WSEAS Press

All the copyright of the present book belongs to the World Scientific and Engineering Academy and Society Press. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Editor of World Scientific and Engineering Academy and Society Press.

All papers of the present volume were peer reviewed by two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: http://www.worldses.org/review/index.html

ISSN: 1790-2769
ISBN: 978-960-474-171-7

World Scientific and Engineering Academy and Society

RECENT ADVANCES and APPLICATIONS of ELECTRICAL ENGINEERING

Proceedings of the 9th WSEAS International Conference on APPLICATIONS of ELECTRICAL ENGINEERING (AEE '10)

Penang, Malaysia, March 23-25, 2010
Supported by Universiti Kebangsaan Malaysia

Editors:
Prof. Nikos Mastorakis, Technical University of Sofia, BULGARIA
Prof. Valeri Mladenov, Technical University of Sofia, BULGARIA
Prof. Azami Zaharim, Universiti Kebangsaan, MALAYSIA
Prof. Cornelia Aida Bulucea, University of Craiova, ROMANIA

International Program Committee Members:
John Tsitsiklis, USA
Irwin W. Sandberg, USA
Lotfi A. Zadeh, USA
Viola Vogel, SWITZERLAND
Dimitris Bertsekas, USA
Lena Valavani, USA
Leonid G. Kazovsky, USA
Leon O. Chua, USA
Brian A. Barsky, USA
K. R. Rao, USA
Bimal K. Bose, USA
Joseph Sifakis, FRANCE
Paul E. Dimotakis, USA
Sidney Burrus, USA
Biswa Nath Datta, USA
George Giannakis, USA
Nikolaos Bourbakis, USA
Nikos E. Mastorakis, BULGARIA
Yorgo Istefanopulos, TURKEY
George E Andrews, USA
Stuart S. Antman, USA
Soren H. Morup, DENMARK
Robert A. Kosinski, POLAND
Ivan L'Heureux, CANADA
Alexander G. Ramm, USA
Steven Collicott, USA
Wilfried B. Kraetzig, GERMANY
Panos Pardalos, USA
Ronald Yager, USA
Stamatios Kartalopoulos, USA
Kleanthis Psarris, USA
Borje Forssell, NORWAY
Metin Demiralp, TURKEY
Constantin Udriste, ROMANIA
Amauri Caballero, USA
Geir Oien, NORWAY
George Vachtsevanos, USA
Spyros Tragoudas, USA
Olga Martin, ROMANIA
Demetrios Kazakos, USA
Gamal Elnagar, USA
Periklis Papadopoulos, USA

Preface

This year the 9th WSEAS International Conference on APPLICATIONS of ELECTRICAL ENGINEERING (AEE '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

Table of Contents

Plenary Lecture 1: Fuzzy Dynamic Modeling for Walking Modular Robot Control 13
Luige Vladareanu

Plenary Lecture 2: Developments and Applications of Adaptive Cerebellar Model Articulation Controllers 15
Chih-Min Lin

Sensitivity of Compact Fluorescent Lamps During Voltage Sags 17
Hussain Shareef, Azah Mohamed, Khodijah Mohamed, Nazri Marzuki

A Reliable Fuzzy Logic Approach for Measurement Data Validation through Line Susceptance Estimation 24
K. N. Bhanuprakash, A. D. Kulkarni, B. R. Lakshmikantha, K. Thanushkodi, Hari Kumar Naidu

Impedance Hygrometer based on Natural Organic Material 35
Kh. S. Karimov, T. A. Qasuria, Zubair Ahmad

The Placement of FACTS Devices in Modern Electrical Network Using Bees Algorithm 40
R. Mohamad Idris, A. Khairuddin, M. W. Mustafa

A New Detection Technique for Distance Protection During Power Swings 46
Ahmad Farid Bin Abidin, Azah Mohamed, Hussain Shareef

Effects of Non-Ideal Elements on Auxiliary Resonant Commuted Pole Multi-Level Converter Design to Achieve Design Guideline 51
Zhaleh Hashemi

An Improved Indirect Maximum Power Point Tracking Method for Standalone Photovoltaic Systems 56
Tamer T. N. Khatib, A. Mohamed, N. Amim, K. Sopian

Slotless Permanent Magnet Synchronous Generator (S-PMSG) for Low Power Wind Applications 63
Corneliu Salisteanu, Iulian Udroiu, Otilia Nedelcu, Diana Enescu

Mitigation of Different Type Voltage Sags in Low Voltage Distribution Systems Using Dynamic Voltage Restorer 67
Rosli Omar

Risk Assessment of Line Overload in a Practical Power System Considering Different Types of Severity Functions 74
Marayati Marsadek, Azah Mohamed, Zulkifi Mohd. Norpiah

Application of Power Modular Current Sources to Test High Breaking Capacity Fuses 80
Adrian Plesca, Emilian Furnica

The Line-Lightning Performance and Mitigation Studies of Shielded Steel-Structure Distribution Lines 86
Asnawi Mohd Busrah, Malik Mohamad

The Effect of DVR Location for Enhancing Voltage Sag 92
Rohanim Ibrahim, Ahmed M. A. Haidar, M. Zahim, Herbert Iu

A Comparative Study on Performance of metaheuristics Optimization Methods for Optimal Var Sizing and Allocation 99
Reza Keypour, Hosein Sharifzadeh

Probabilistic Voltage Stability Constrained Optimal Power Flow Considering Wind Farms 105
Reza Keypour, Ali Akbar Rashidi

Genetic Algorithm Optimization of Multiwavelet-based Audio Watermarking 111
Prayoth Kumsawat, Kitti Attakitmongcol, Arthit Srikaew

A Proposed System for Edge Mammogram Image 117
Yessi Jusman, Nor Ashidi Mat Isa, Rahmadi Kurnia

Analysis, Simulation and Implementation of Space Vector Pulse Width Modulation Inverter 124
E. Hendawi, F. Khater, A. Shaltout

ECG Signal Monitoring using One-Class Support Vector Machine 132
Soo-Min Woo, Hye-Jin Lee, Bub-Joo Kang, Sang-Woo Ban

Mobile Qibla and Prayer Time Finder using External GPS and Digital Compass 138
M. Z. Ibrahim, M. Z. Norashikin

Design and Experimental Tests of a Pick and Place Robot: Theoretical and Experimental Approaches 144
Hasan Ghorabi, Yaser Maddahi, Seyyed Mohammad Hosseini Monsef, Ali Maddahi

Webcam-based Mobile Robot Path Planning using Voronoi Diagrams and Image Processing 151
Shahed Shojaeipour, Sallehuddin Mohamed Haris, Elham Gholami, Ali Shojaeipour

Research Regarding the Design of a New Transport Pipe Flow Control System 157
Olimpiu Stoicuta, Marin Silviu Nan, Gabriel Dimirache, Nicolae Buda, Dan Liviu Dandea

Fuzzy Dynamic Modeling for Walking Modular Robot Control 163
Luige Vladareanu, Gabriela Tont, Ion Ion, Lucian M. Velea, Alexandru Gal, Octavian Melinte

Modeling Mott Transition in a Disordered System by Sinc Wavelets and the Minimal Sensitivity Principle 171
Armando Barranon

SEM-EDAX and Optical Microscopy Investigations of Sparked-In Spots on AES Analyzed Steel 175
Florina Violeta Anghelina, Ion V. Popescu, Vasile Bratu, Elena Stoian

Hierarchical Bayesian Reliability Analysis of Complex Dynamical Systems 181
Gabriela Tont, Luige Vladareanu, Mihai Stelian Munteanu, Dan George Tont

The Study of a Curved Strip Dipole Antenna Parameters on EBG Reflector Plane for RFID Applications 187
N. Fhafhiem, P. Krachodnok

The Shaped Coverage Area Antenna for Indoor WLAN Access Points 193
A. Bumrungsuk, P. Krachodnok

Optimal Power Flow Based on Linear Adapted Genetic Algorithm 199
Abdullah M. Abusorrah, Abdel-Fattah Attia, Yusuf A. Al-Turki

A Quality Measure of Professional Training Processes Based on the Directional Malmquist - Luenberger Productivity Index 204
Ovidiu Ilie Sandru, Ioana Maria Diana Sandru

Grasping Objects with Mobile Robots 210
Ovidiu Ilie Sandru, Luige Vladareanu, Alexandra Sandru

Classifying Student's Faces for Teaching Assistant System 216
B. S. Nor Surayahani, B. S. Lee, A. Ida Laila, M. Masnani

Neural Network Modeling based on Biological and Electrical Behaviors 221
Yumi Takizawa, Atsushi Fukasawa

Experimental Researches and Statistical Analysis of the Corrosion Behavior of Rolled and Heat Treated 2xxx Al Alloys 225
Ileana Nicoleta Popescu, Vasile Bratu, Maria Cristiana Enescu

Optimization of Flicker Noise in Eng Application 239
Parisa Vejdani, Shahin Ashtiani, Mahmoud Kamarei

Authors Index 243

Plenary Lecture 1

Fuzzy Dynamic Modeling for Walking Modular Robot Control

Professor Luige Vladareanu
Romanian Academy, Institute of Solid Mechanics
Bucharest, ROMANIA
E-mail: luigiv@imsar.bu.edu.ro

Abstract: The paper presents new concepts and approaches of multi-stage fuzzy method of walking modular robots using resolved acceleration control. Several compliant control methods were analyzed in order to obtain high performances in robot trajectory control, which generates position and force parameters for multi-stage fuzzy control, some of which include a dynamic model in loop control: control with the settled acceleration (Luh, Walker and Paul 1980), operational space method (Khatib 1980;1987), impedance control (Kazerooni, Houpt and Sheridan 1986), and some of which not include dynamic model: hybrid control (Railbert and Craig) and rigidity control (Salisbury 1980). Stability analysis and experimental implementation are presented, which demonstrate not only that by using dynamic models is achieved a more accurate control, but also that using a inadequate dynamic model can lead to a unstable control of the force in some cases. For real-time control of robot stability the mathematical modeling of the center of gravity position was realized, in order to allow control of the walking robot when moving on terrains with complicated configuration, and relations for robot position coordinates of the center of gravity were established which are necessary. Modified control by resolved acceleration or operational space method is stable because the inertia matrix is also included canceling the destabilizing effects of the inverse Jacobian. The control system architecture by dynamic models through fuzzy multi-stage method is presented where control method through resolved acceleration had been chosen as compliant control method. The results of the rules base analysis are presented, in which the loop reaction for force is dependant on the values of inference from fuzzy control of component P together with a set of membership functions for inputs and outputs. Choosing a universe of discreet discourse allows the using of PLC system from control system architecture of the HFPC modular walking robots, in order to generate fuzzy output variables in a reduced processing time. The studies presented have demonstrated the possibility of implementing force control by resolved acceleration where dynamics and kinematics stability are simultaneously achieved in rigid environments. The obtained results lead to a smooth transition, in walking robots movement, without discontinuities, from controlling in position to controlling in force and position. Furthermore, we achieve a fast response of control loop maintaining robot stability in the process of stepping on uneven ground.

Brief Biography of the Speaker:
Luige Vladareanu received his M.Sc. degree in electronics from the Polytechnic Institute Bucharest, in 1977. From 1984, scientific researcher of the Institute of Physics and Material Technology, from 1990, team leader of data acquisition systems and real time control systems of the Institute of Solid Mechanics, from 1991, President General Manager of Engineering and Technology Industrial VTC company. In 1998 he received Ph.D. degree in electronics field from the Institute of Solid Mechanics of Romanian Academy. From 2003, Ministry of Education and Research, executive Department for Financing Superior Education and of Scientific University Research - High Level Expert Consulting for MEC/CNCSIS project, from 2003-2005, member of Engineering Science Committee of Romanian National Research Council, from 2005, Scientific Researcher Gr.I (Professor) of Romanian Academy. His scientific work is focused on real time control in solid mechanics applied in robot trajectory control, hybrid position – force control, multi-microprocessor systems for robot control, acquisition and processing of experimental physical data, experimental methods and signal processing, nano-micro manipulators, semi-active control of mechanical system vibrations, semi-active control of magnetorheological dissipaters systems, complex industrial automations with programmable logical controllers in distributed and decentralized structure. He has published 4 books, over 20 book chapters, 11 edited books, over 200 papers in journals, proceedings and conferences in the areas. Director and coordinator of 7 grants of national research – development programs in the last 5 years, 15 invention patents, developing 17 advanced work methods resulting from applicative research activities and more then 60 research projects. In 1985 the Central Institute of Physics Bucharest awarded his research team a prise for the first Romanian industrial painting robot. He is the winner of the two Prize and Gold of Excellence in Research 2000, SIR 2000, of the Romanian Government and the Agency for Science, Technology and Innovation. 3 International Invention and Innovation Competition Awards and Gold of World's Exhibition of Inventions, Geneva 2007 and 2008, and other 7 International Invention Awards and Gold of the Brussels, Croatia, Bucharest International Exhibition. He received "Traian Vuia" (2006) award of the Romanian Academy, Romania's highest scientific research forum, for a group of scientific papers published in the real time control in the solid mechanics. He is a member of the International Institute

of Acoustics and Vibration (IIAV), Auburn University, USA (2006), ABI/s Research Board of Advisors, American Biographical Institute (2006), World Scientific and Engineering Academy Society, WSEAS (2005), International Association for Modelling and Simulation Techniques in Enterprises-AMSE, France (2004), National Research Council from Romania(2003-2005), etc. He was an organizer of several international conferences such as the General Chair of four WSEAS International Conferences (http://www.wseas.org/conferences/2008/romania/amta/index.html) and is serving on various other conferences and academic societies.

Plenary Lecture 2

Developments and Applications of Adaptive Cerebellar Model Articulation Controllers

Professor Chih-Min Lin
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 servomotor control, biped robot and computer-aided diagnostic of breast nodules are demonstrated.

Brief Biography of the Speaker:
Prof. Chih-Min Lin is currently a Professor of Electrical Engineering, Yuan Ze University, Taiwan. He also serves as the Editor-in-Chief of WSEAS Trans. Systems and Control and Associate Editor of IEEE Trans. Systems, Man, and Cybernetics, Part B; Asian Journal of Control; and International Journal of Fuzzy Systems.. He is now the Chair of IEEE Computational Intelligence Society, Taipei Chapter, and Board of Government of IEEE Taipei Section. His research interests include fuzzy systems, neural network, cerebellar model articulation controller, and intelligent control systems. He is an IEEE Fellow and IET Fellow. He has published 93 journal papers and 134 conference papers.