

NORTH ATLANTIC UNIVERSITY UNION

**Editors: Valeri Mladenov, Kleanthis Psarris, Nikos Mastorakis,
Amauri Caballero, George Vachtsevanos**

Advances in Communications, Computers, Systems, Circuits and Devices

- ◆ **European Conference of Systems (ECS '10)**
- ◆ **European Conference of Circuits Technology and Devices (ECCTD '10)**
- ◆ **European Conference of Communications (ECCOM '10)**
- ◆ **European Conference of Computer Science (ECCS '10)**

Puerto De La Cruz, Tenerife, November 30 - December 2, 2010

PRINT VERSION ISSN

ISSN: 1792-6637

ISSN: 1792-667X

ISSN: 1792-6696

ISSN: 1792-670X

ELECTRONIC VERSION ISSN

ISSN: 1792-6742

ISSN: 1792-6785

ISSN: 1792-6807

ISSN: 1792-6815

ISBN: 978-960-474-250-9



ADVANCES in COMMUNICATIONS, COMPUTERS, SYSTEMS, CIRCUITS and DEVICES

**European Conference of Systems (ECS '10)
European Conference of Circuits Technology and Devices
(ECCTD '10)
European Conference of Communications (ECCOM '10)
European Conference of Computer Science (ECCS '10)**

**Puerto De La Cruz, Tenerife
November 30-December 2, 2010**

ADVANCES in COMMUNICATIONS, COMPUTERS, SYSTEMS, CIRCUITS and DEVICES

European Conference of Systems (ECS '10)
**European Conference of Circuits Technology and Devices
(ECCTD '10)**
European Conference of Communications (ECCOM '10)
European Conference of Computer Science (ECCS '10)

Puerto De La Cruz, Tenerife, November 30-December 2, 2010

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>

PRINT VERSION:

ISSN: 1792-6637
ISSN: 1792-667X
ISSN: 1792-6696
ISSN: 1792-670X
ISBN: 978-960-474-250-9

ELECTRONIC VERSION:

ISSN: 1792-6742
ISSN: 1792-6785
ISSN: 1792-6807
ISSN: 1792-6815



North Atlantic University Union

ADVANCES in COMMUNICATIONS, COMPUTERS, SYSTEMS, CIRCUITS and DEVICES

**European Conference of Systems (ECS '10)
European Conference of Circuits Technology and Devices
(ECCTD '10)
European Conference of Communications (ECCOM '10)
European Conference of Computer Science (ECCS '10)**

**Puerto De La Cruz, Tenerife
November 30-December 2, 2010**

Editors:

Prof. Valeri Mladenov, Technical University of Sofia, BULGARIA
Prof. Kleanthis Psarris, University of Texas at San Antonio, TX, USA
Prof. Nikos Mastorakis, Technical University of Sofia, BULGARIA
Prof. Amauri Caballero, Florida International University, Miami, FL, USA
Prof. George Vachtsevanos, Georgia Institute of Technology, Atlanta, GA, USA

International Program Committee Members:

Ronald Yager, USA
Amauri Caballero, USA
George Vachtsevanos, USA
Robert Finkel, USA
Demetrios Kazakos, USA
Theodore Trafalis, USA
Takis Kasparis, USA
Zhiqiang Gao, USA
Yan Wu, USA
Spyros Tragoudas, USA
Arkady Kholodenko, USA
Gregory Baker, USA
Galigeekere Dattatreya, USA
Caroline Sweezy, USA
Asad Salem, USA
Dian Zhou, USA
Metin Demiralp, TURKEY
Olga Martin, ROMANIA
Panos Pardalos, USA
Constantin Udriste, ROMANIA
Kleanthis Psarris, USA
Andrew D. Jones, USA
Valeri Mladenov, BULGARIA
Neri F., ITALY
Chen S. Y., P. R. CHINA
Shyi-Ming Chen, R. O. C.
Yen K., USA
Rong-Jyue Fang, TAIWAN
Argyrios Varonides, USA
Nikolai Kobasko, USA
Xu Anping, P. R. CHINA
Zhu H., JAPAN

Table of Contents

<u>Keynote Lecture 1: Cognitive Engineering & Religious Emotions: A Mathematical Equivalence of Dynamics and Teleology</u>	12
<i>Leonid Perlovsky</i>	
<u>Computer Science in the Orthodontic Treatment of Adult Patients</u>	15
<i>Alexandru S. Ogorescu, Cosmin Sinescu, Emilia A. Ogorescu, Meda Negrutiu, Roxana Rominu, Elisabeta Bratu</i>	
<u>Investigations of Different Types of Welding in Dental Technology</u>	19
<i>Daniela Maria Pop, Dorin Dodenciu, Cosmin Sinescu, Meda Lavinia Negrutiu, Florin Ionel Topala, Emanuela Lidia Petrescu, Roxana Otilia Rominu, Adelina Elena Stoia, Mihai Rominu</i>	
<u>Floating Simulators Based on Current Follower Transconductance Amplifiers (CFTAs)</u>	23
<i>Norbert Herencsar, Jaroslav Koton, Kamil Vrba, Abhirup Lahiri</i>	
<u>Parallel Genome Sequence Searching on SupercomputerBlueGene/P</u>	27
<i>Plamenka Borovska, Ognian Nakov, Veska Gancheva, Ivailo Georgiev</i>	
<u>Image Denoising by Exploring the Context Information in the Wavelet Domain</u>	32
<i>Ajay Kumar Mandava, Emma E. Regentova, Markus Berli</i>	
<u>Classifiers Design and Implementation for Material Recognition on a Heterogeneous Computer Cluster</u>	37
<i>Plamenka Borovska, Desislava Ivanova</i>	
<u>Gridclass^{TK} - Toolkit for Grid Learning Classifier Systems</u>	43
<i>Manuel Filipe Santos, Wesley Mathew, Henrique Santos</i>	
<u>A New Routing Protocol for UWB MANET</u>	48
<i>Y. Jazyah, M. D. Hope</i>	
<u>Temperature Effects on Satellite Power Systems Performance</u>	57
<i>M. Bekhti, M. N. Sweeting</i>	
<u>Establishment of the Conceptual Solution in Mobile Robot Guidance</u>	63
<i>Paul Ciprian Patic, Lucia Pascale, Luminita Duta</i>	
<u>Hiding Image in Image Using Iterated Function System (IFS)</u>	68
<i>Loay E. George, Suad K. Ahmad</i>	
<u>Analytical Dispersion Compensation Technique to Transmit Optical Millimeter-Waves over Long Fiber Links</u>	75
<i>Abdosllam M. Abobaker, Daw A. Asderah, Elghanai M. Rhoma</i>	
<u>Mathematical Models and the Control of Homopolar and Homo-Heteropolar Reactive Synchronous Machines with Stator Excitation</u>	78
<i>Sorin Ioan Deaconu, Lucian Nicolae Tutelea, Gabriel Nicolae Popa, Tihomir Latinovici</i>	

<u>A Qualitative Comprehension of Nanophotonics</u>	84
<i>E. A. Anagnostakis</i>	
<u>Current-Mode Tunable and Adjustable Filter with Digitally Adjustable Current Amplifier and Transconductance Amplifiers</u>	101
<i>Jan Jerabek, Kamil Vrba</i>	
<u>Translation-Invariant Two-Dimensional Discrete Wavelet Transform on Graphics Processing Units</u>	105
<i>Dietmar Wippig, Bernd Klauer</i>	
<u>Minimal Configuration Versatile Precision Full-Wave Rectifier Using Current Conveyors</u>	111
<i>Jaroslav Koton, Norbert Herencsar, Kamil Vrba</i>	
<u>ARS: Web Page Recommendation System for Anonymous Users Based on Web Usage Mining</u>	115
<i>Yahya AlMurtadha, MD. Nasir Bin Sulaiman, Norwati Mustapha, Nur Izura Udzir, Zaiton Muda</i>	
<u>Simulation of Alternative Measurement System for EMI Filters Worst-Case Identification</u>	121
<i>J. Drinovsky, Z. Kejik, V. Ruzek, J. Zachar</i>	
<u>Reusable Software Components Framework</u>	126
<i>Anas Bassam Al-Badareen, Mohd Hasan Selamat, Marzanah A. Jabar, Jamilah Din, Sherzod Turaev</i>	
<u>Software Quality Evaluation through Maintenance Processes</u>	131
<i>Anas Bassam AL-Badareen, Zaiton Muda, Marzanah A. Jabar, Jamilah Din, Sherzod Turaev</i>	
<u>Automatic Pixel Selection Criteria for Image Registration</u>	135
<i>Paula M. Tristan, Ruben S. Wainschenker, Jorge H. Doorn</i>	
<u>Communication as a Basic for Future Artillery Fire Support Control System</u>	140
<i>Martin Blaha</i>	
<u>Urban Noise Permanent Monitoring and Pattern Recognition</u>	143
<i>Luis Pastor Sanchez Fernandez, Arturo Rojo Ruiz, Jose de Jesus Medel Juarez</i>	
<u>XML Schema Language Specifications for Conditional Knowledge</u>	149
<i>Nicolae Tandareanu, Mihaela Colhon, Cristina Zamfir</i>	
<u>A Java Template to Interrogate Knowledge Bases by Client-Server Technology</u>	155
<i>Nicolae Tandareanu</i>	
<u>Search Algorithm to Find Optimum Strategies to Shape Political Action with Subjective Assessment</u>	162
<i>J. Rodrigo, M.D. Lopez, S. Lantaron, R. Caro</i>	
<u>Theoretical and Experimental Study on Cryogenic Freezing of Berries</u>	171
<i>Damian Valeriu, Iosifescu C. Cristian, Coman Gelu, Dragan Marcel, Constantin O. Emilia</i>	
<u>A Standard Cell Based Synchronous Dual-Bit Adder with Embedded Carry Look-Ahead</u>	175
<i>Padmanabhan Balasubramanian, Krishnamachar Prasad, Nikos E. Mastorakis</i>	
<u>Special Hardware Concatenations for the Design of a High Dynamic Range ADC</u>	183
<i>Miguel Santiago Villafuerte Ramirez, Luis Pastor Sanchez Fernandez, Alfonso Gutierrez Aldana</i>	

<u>Microwave Image Reject Mixer Modeling</u>	189
<i>Miroslav Kasal, Petr Vagner</i>	
<u>Object's Motion Parameters Determination Using Stereovision</u>	193
<i>A. Zak</i>	
<u>Ontology-Driven Question Answering System with Semantic Web Services Support</u>	199
<i>Borut Gorenjak, Marko Ferme, Milan Ojstersek</i>	
<u>Model of Parts of Active Network Element</u>	203
<i>V. Skorpil, P. Zednicek</i>	
<u>TextProc – A Natural Language Processing Framework</u>	208
<i>Janez Brezovnik, Milan Ojstersek</i>	
<u>Research on the Particular Subclass of a Class Coloured Petri Nets</u>	213
<i>Mihaita Dragan</i>	
<u>The Preliminary Processing of Visional and Thermal Images in Thermo-Optical Set for Reconnaissance of Coastal Zone</u>	219
<i>B. Zak</i>	
<u>Self Referenced Multi-Agent Model, their Information States and Arrangements</u>	226
<i>Snezana Cerepnalkovska Dukovska, Biljana Percinkova</i>	
<u>Finnish National Broadband Action Plan and its Current Implementation</u>	230
<i>Matti Koivisto</i>	
<u>Sequence Matching with Subsequence Analysis</u>	234
<i>Marko Ferme, Milan Ojstersek</i>	
<u>Collaborative Distance Teaching of Electronics in Synchronous and Asynchronous Environments Using Free Software</u>	239
<i>Luis Rogerio Gomes de Almeida, Jose Antonio Siqueira Dias</i>	
<u>Recognition of Digital Modulations Based on Mathematical Classifier</u>	245
<i>A. Kubankova, J. Prinosil, D. Kubanek</i>	
<u>Towards 3D Object Recognition for Universal Goods in Logistic</u>	250
<i>Bernd Scholz-Reiter, Hendrik Thamer, Claudio Uriarte</i>	
<u>Order Reduction for a Realtime Engine Model Using Flat and Nonlinear Galerkin Methods</u>	255
<i>Georg Fuchs, Alois Steindl, Stefan Jakubek</i>	
<u>Memristor Modeling based on its Constitutive Relation</u>	261
<i>Viera Biolkova, Zdenek Kolka, Zdenek Biolek, Dalibor Biolek</i>	
<u>A Novel Distance Measure for Data Vectors with Nominal Feature Values</u>	265
<i>Humar Kahramanli</i>	
<u>Optimized Implementation of FMT Modulation on DSP</u>	268
<i>Ondrej Krajsa, Pavel Silhavy, Martin Koutny, Petr Sysel</i>	

<u>Using Data Mining Technology to Design a Quality Control System for Manufacturing Industry</u>	272
<i>R. S. Chen, Y. C. Chen, C. C. Chen</i>	
<u>Availability Study of FSO Systems in Europe</u>	277
<i>Zdenek Kolka, Viera Biolkova, Dalibor Biolek</i>	
<u>Virtual and Virtualization Technologies in Computer Networks Education</u>	281
<i>Agata Bodnarova, Martin Hatas, Kamila Olsevicova, Vladimir Sobeslav, Jaroslav Stefan</i>	
<u>Design Patterns in Mobile Architectures</u>	286
<i>Tomas Chlouba</i>	
<u>Software Architecture Components of an Abstract Framework for Assessment in E-Learning</u>	290
<i>Milen Y. Petrov, Vladimir A. Vlaykov</i>	
<u>Modeling the Infrastructure of Autonomous Logistic Control Systems</u>	295
<i>Bernd Scholz-Reiter, Steffen Sowade, Daniel Rippel</i>	
<u>Early Recognition of Smoke in Digital Video</u>	301
<i>Julia Ahlen, Stefan Seipel</i>	
<u>BPMN Mobilisation</u>	307
<i>Tomas Kozel</i>	
<u>High-Voltage and High-Amperage Current Pulse Generator for Experimental Magnetic Therapy</u>	311
<i>Pavel Hanak, Kamil Vrba</i>	
<u>Amalgam and Composite Resin Interface Investigation by Optical Coherence Tomography</u>	316
<i>Marius Enescu, Cosmin Sinescu, Meda Negrutiu, Radu Negru, Liviu Marsavina, Florin Topala, Roxana Rominu, Emanuela Petrescu, Adrian Bradu, George Dobre, Mihai Rominu, Adrian Podoleanu</i>	
<u>Technological Aspects, Numerical Simulation and Noninvasive Imagistic Approach on Resin Bonded Fixed Partial Prosthesis</u>	323
<i>Andra Soicu, Cosmin Sinescu, Meda Negrutiu, Florin Topala, Roxana Rominu, Emanuela Petrescu, Mihai Rominu, Adrian Podoleanu</i>	
<u>Multi-Criterion Decision Making in Distributed Systems by Quantum Evolutionary Algorithms</u>	328
<i>Jerzy M. Balicki, Honorata T. Balicka, Jan Masiejczyk, Artur Zacniewski</i>	
<u>Voice Activity Detection under the Highly Fluctuant Recording Conditions of Call Centres</u>	334
<i>Ivan Mica, Hicham Atassi, Jiri Prinosil, Petr Novak</i>	
<u>Tensile Bond Strength of Acrylic Resin Teeth to Denture Base Repair Resin</u>	337
<i>Adelina Elena Stoia, Cosmin Sinescu, Meda Negrutiu, Marius Enescu, Roxana Rominu, Mircea Pielmusi, Anca Tudor, Mihai Rominu</i>	
<u>Analytical Method for L3 Handover Latency Evaluation</u>	342
<i>Michal Skorepa, Richard Klugl</i>	

<u>Atomic Force Microscopy and Scanning Electronic Microscopy Investigations of Conditioned IPS Empress E.max Ceramic Core</u>	348
---	-----

Emanuela Lidia Petrescu, Meda Lavinia Negrutiu, Cosmin Sinescu, Roxana Rominu, Florin Topala, Pop Daniela Maria, Mihai Rominu

<u>Authors Index</u>	352
-----------------------------	-----

Keynote Lecture 1

Cognitive Engineering & Religious Emotions: A Mathematical Equivalence of Dynamics and Teleology



Dr. Leonid Perlovsky

Visiting Scholar, Harvard University

33 Oxford St, Rm 336, Cambridge MA 02138

Principal Research Physicist and Technical Advisor

Air Force Research Laboratory 80 Scott Drive, Hanscom AFB, MA 01731-2909

AFRL: Tel. 781-377-1728; Fax 781-377-8984; Leonid.Perlovsky@hanscom.af.mil

Harvard: Tel. 617-496-1339; 617-495-7871; leonid@seas.harvard.edu

Abstract: The talk discusses a mathematical theory for cognitive engineering, which significantly improves solutions of many engineering problems and at the same time models spiritual feelings in the human brain-mind. This convergence of scientific, engineering, and religious theories indicates a possibility of signal developments. C. Jung wrote that schism between science and religion points to a psychosis of contemporary collective psyche; survival of culture demands repairing of this schism. Many outstanding scientists are trying to mend this schism. Many books are written arguing that the newest scientific discoveries in molecular biology, evolution, and cosmology do not contradict the main tenets of the world's religions. But there is no scientific theory, explaining spiritual dimension of the mind-brain. "Every one who is seriously involved in the pursuit of science becomes convinced that a spirit is manifest in the laws of the Universe." This Einsteinian statement remains outside of science. Understanding of the mind mechanisms today came close to explaining spirituality from scientific point of view. The talk tells about the knowledge instinct, driving growth of the mind, responsible for our higher mental abilities of abstract symbolic thinking, for beautiful and sublime, and for evolution of cultures. A mathematical theory is presented. This theory is a mathematical breakthrough that overcame decades of limitations in AI, pattern recognition, neural networks, and other attempts to solve complex problems by modeling the brain-mind. Solutions of engineering problems are presented that overcome previous difficulties of computational complexity, and result in orders of magnitude improvements in detection, prediction, tracking, fusion, and learning situations. This theory is extended to higher cognitive functions. It models the knowledge instinct operating on the hierarchy of the human brain-mind. At the bottom of the hierarchy are simple objects, higher up are situations, general and abstract concepts, unifying contents of lower levels. At the top are concepts unifying our entire knowledge; we perceive them as concepts of the meaning and purpose of our existence. The mathematical theory explains why these concepts are inherently vague and unconscious and our consciousness is in great doubt about their very existence. When we feel that we have understood them a bit better or our belief in their existence got a bit firmer, we feel the emotion of beautiful. In parallel with the concepts of understanding the meaning and purpose, we have concepts of behavior needed to realize the beauty in our life. When we feel that we have understood these behavioral concepts a bit better or our belief in their existence got a bit firmer, we feel the emotion of spiritually sublime. Science explains that beautiful and sublime are not final notions. It follows from Godel theory, that mechanisms of the highest aspirations of human spirit are not logically reducible to finite statements. Attempts to compute them logically exceed in complexity all elementary interactions in the Universe in its entire lifetime and therefore choices of beautiful and sublime involve more information than is available in the Universe. A possibility of these choices is called a miracle in traditional language. A computational theory of these choices goes together with a proof that science is not reducible. Laws governing our highest values would not be reduced to laws governing a leaf flying with the wind. Hamiltonian formulation of the fundamental laws of physics leads to what is commonly considered a scientific causality: particles and fields move under forces, and the next moment is a consequence of the previous one. Lagrangian formulation leads to teleological formulation: particles and fields move toward a purpose, maximum of Lagrangian function ("minimum of energy" in the parlance of the middle school physics). The Lagrangian equivalence of causality and purpose exists in physics of few particles, but it does not exist in statistical physics of complex systems. The mathematical theory of the knowledge instinct made equivalent causality and teleology for very complex systems, the human mind and culture evolve causally according to dynamic logic and evolve teleologically toward maximization of knowledge. This defines the new "arrow of time." The talk discusses brain imaging experiments conducted at Harvard Brain Imaging Lab confirming this theory. Contents of

models of beautiful and sublime are unconscious; they do not belong to our consciousness. They are "collective," outside of consciousness. Consciousness does not control them, they control our consciousness. Therefore, we feel them as a source of agency outside of ourselves. In recent discussions it is called Designer.

Brief Biography of the Speaker:

Dr. Leonid Perlovsky is Visiting Scholar at Harvard University and Principal Research Physicist and Technical Advisor at the Air Force Research Laboratory, Hanscom AFB. He leads research projects on modeling the mind (including cognitive roles of the beautiful, sublime, and music), computing with words, evolution of languages and cultures, fuzzy dynamic logic, neural networks, cognitive and bio-inspired algorithms for signal processing, prediction, detection, tracking, fusion. As Chief Scientist at Nichols Research, a \$0.5B high-tech organization, he led the corporate research in intelligent systems. He served as professor at Novosibirsk University and New York University; as a principal in commercial startups developing tools for biotechnology, text understanding, and financial predictions. His company predicted the market crash following 9/11 a week before the event. He is invited as a keynote plenary speaker and tutorial lecturer worldwide, published more than 360 papers, 11 book chapters, and 3 books, including "Neural Networks and Intellect," Oxford University Press, 2001 (currently in the 3rd printing), awarded 2 patents. Dr. Perlovsky participates in organizing conferences on Computational Intelligence, Chairs IEEE Boston Computational Intelligence Chapter; Co-Chairs IEEE TC on Neural Networks, Chairs IEEE TF on The Mind and Brain, serves on the INNS Board of Governors, where he Chairs Award Committee. He serves on the Editorial Board of five professional journals, including Editor-in-Chief for "Physics of Life Reviews" (which he founded jointly with Nobel Laureate I. Prigogine). He received National and International awards including the Best Paper Award 2001 from Zvezda, a leading Russian literary and essayistic magazine; the Gabor Award 2007, the top engineering award from International Neural Network Society; and the John McLucas Award 2007, the highest US Air Force Award for basic research.