



**Editors:**

Prof. Nikos E. Mastorakis, Technical University of Sofia, BULGARIA

Prof. Metin Demiralp, Istanbul Technical University, TURKEY

Prof. Valeri Mladenov, Technical University of Sofia, BULGARIA

Prof. Zoran Bojkovic, Technical University of Belgrade, SERBIA



**RECENT ADVANCES IN APPLIED INFORMATICS AND COMMUNICATIONS**

# RECENT ADVANCES IN APPLIED INFORMATICS AND COMMUNICATIONS

Proceedings of the 9th WSEAS International Conference  
on APPLIED INFORMATICS AND COMMUNICATIONS (AIC'09)

Moscow, Russia, August 20-22, 2009

**INFO**

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

ISBN: 978-960-474-107-6  
ISSN: 1790-5109

Published by WSEAS Press  
[www.wseas.org](http://www.wseas.org)





# **Recent Advances in Applied Informatics and Communications**

**Proceedings of the 9th WSEAS International Conference on  
APPLIED INFORMATICS AND COMMUNICATIONS (AIC '09)**

**Moscow, Russia  
August 20-22, 2009**

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

Published by WSEAS Press  
[www.wseas.org](http://www.wseas.org)

ISSN: 1790-5109  
ISBN: 978-960-474-107-6

# Recent Advances in Applied Informatics and Communications

**Proceedings of the 9th WSEAS International Conference on  
APPLIED INFORMATICS AND COMMUNICATIONS (AIC '09)**

**Moscow, Russia  
August 20-22, 2009**

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

Published by WSEAS Press  
[www.wseas.org](http://www.wseas.org)

Copyright © 2009, 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: 1790-5109  
ISBN: 978-960-474-107-6



World Scientific and Engineering Academy and Society

# **Recent Advances in Applied Informatics and Communications**

**Proceedings of the 9th WSEAS International Conference on  
APPLIED INFORMATICS AND COMMUNICATIONS (AIC '09)**

**Moscow, Russia  
August 20-22, 2009**

**Editors:**

Prof. Nikos E. Mastorakis, Technical University of Sofia, BULGARIA

Prof. Metin Demiralp, Istanbul Technical University, TURKEY

Prof. Valeri Mladenov, Technical University of Sofia, BULGARIA

Prof. Zoran Bojkovic, Technical University of Belgrade, SERBIA

**International Program Committee Members:**

Antonio Alves, BRAZIL

Nowshad Amin, MALAYSIA

Horia Andrei, ROMANIA

A. Andreatos, GREECE

E. Antonidakis, GREECE

Rafic Bachnak, UNITED STATES

Nikos Bardis, GREECE

Dimitri Bertsekas, USA

Luigino Benetazzo, ITALY

Krishnamurthy Bhat, INDIA

Yuval Bistriz, ISRAEL

Razvan Bologa ROMANIA

Taxiarchis Botsis, NORWAY

El ouahidi Bouabid, MOROCCO

Hamida Bougherira, ALGERIA

Comes Calin-Adrian, ROMANIA

Leon Chua, USA

Massimiliano Caramia, ITALY

George Carutasu, ROMANIA:

Costin Cepisca, ROMANIA

Shang-Kuan Chen, TAIWAN

Cheng-chuan Chen, TAIWAN

Chin-Tun Chuang, TAIWAN

Daniel Cristian Cismaru, ROMANIA

Spiros Courellis, UNITED STATES

Krzysztof Cyran, POLAND

Masumeh Damrudi, IRAN

Carlo Dell'Aquila, ITALY

Beixing Deng, CHINA

Radu Dobrescu, ROMANIA

Bojan Dolsa, SLOVENIA

Petr Ekel, BRAZIL

Darie Eleonora, ROMANIA

Abeer El-korany, EGYPT

Monica Enache, ROMANIA

Sorin Enache, ROMANIA

Wen-Pinn Fang, TAIWAN

Hassan Farsi, IRAN

Adrian Filipescu, ROMANIA

Maria I. Garcia Planas, SPAIN

Ioannis Gonos, GREECE

Eladio Gutierrez, SPAIN

Daphne Halkias, GREECE

Mohamed Hamada, JAPAN

Florin Hartescu, ROMANIA

Andrei Horvat-Marc, ROMANIA

Chen-Chien Hsu, TAIWAN

Ya-Hsin Hsueh, TAIWAN

Tauqeer Hussain, PAKISTAN

Fumiaki Imado, JAPAN

Konstantinos Ioannou, GREECE

Adrian Ionescu, UNITED STATES

Shahram Javadi, IRAN

Ming-Jer Jeng, TAIWAN

Tadeusz Kaczorek, POLAND

Devinder Kaur, UNITED STATES

Stamatios Kartalopoulos, USA

Mila Kazic, MONTENEGRO

Nikos Koutsoupias, GREECE

Deniss Kumlander, ESTONIA

Aouni A. Lakis, CANADA

Athina Lazakidou, GREECE

Keon Myung Lee, KOREA

Stanca Liana-Maria, ROMANIA

Seongan Lim, KOREA

Jiann-Horng Lin, TAIWAN

Fernando Lorenzo-Garcia, SPAIN

Ming-chih Lu, TAIWAN

Xia Mao, CHINA

Castor Marino, SPAIN

Zuzana Martinakova, SLOVAKIA

George Mavrommatis, GREECE

Baritz Mihaela, ROMANIA

Sanda Florentina Mihalache, ROMANIA

Sallehuddin Mohamed Haris, MALAYSIA

Maria Morandi Cecchi, ITALY

Abdelaziz Mourad, ALGERIA

Hosseini, Shahram, IRAN

Marina Novak, SLOVENIA

Mirko Novak, CZECH REPUBLIC

Vicenzo Niola, ITALY

Manuela Panoiu, ROMANIA

Kostas Passadis, GREECE

Camelia M. Pinte, ROMANIA

Sebastiano Pizzutilo, ITALY

Ioannis Pountourakis, GREECE

Nicolae Pop, ROMANIA

Dan Popescu, ROMANIA

Dorin Popescu, ROMANIA

Nicolae Popoviciu, ROMANIA

Martin Poup, CZECH REPUBLIC

Ioannis Prousalidis, GREECE

Mircea Preda, ROMANIA

Valeriu Prepelictua, ROMANIA

Ricardo Quiros, SPAIN

Dobrescu Radu, ROMANIA

Mohammadreza Rafiei, IRAN

Victor Manuel Rivas Santos, SPAIN

Buchmann Robert Andrei, ROMANIA

Marcos Rodrigues, UNITED KINGDOM

Leszek Rutkowski, POLAND  
Saeed-Reza Sabbagh-Yazdi, IRAN  
Hiroshi Sakaki, JAPAN  
Abdel Sebak, CANADA  
Takao Shimomura ,JAPAN  
Vairis Shtrauss, LATVIA  
Vladislav Skorpil CZECH REPUBLIC  
Wanrudee Skulpakdee, THAILAND  
Giandomenico Spezzano, ITALY  
Ioannis Stathopoulos, GREECE  
George Stavrakakis, GREECE  
Milan Stork, CZECH REPUBLIC  
Yumi Takizawa, JAPAN  
Horatiu Teodorescu, ROMANIA  
Chen Tianzhou, CHINA  
Chen Tonglong, CHINA  
Fragkiskos Topalis, GREECE  
Carlos Torre-ferrero, SPAIN  
Maria Trenas, SPAIN  
Dimos Triantis, GREECE  
Constantin Udriste, ROMANIA  
Filippos Vallianatos, GREECE  
Ioannis Vardiambassis, GREECE  
Argyrios Varonides, USA  
Anastassios Venetsanopoulos, USA  
Vladimir Vasek CZECH REPUBLIC  
Ti-ho Wang, TAIWAN  
Ming-Shi Wang, TAIWAN  
Wei-yen Wang ,TAIWAN  
Fuli Wu, CHINA  
Chikatoshi Yamada, JAPAN  
Zheng Yan, FINLAND  
Byumi Youssef, EGYPT  
Lotfi A. Zadeh, USA  
Stelios Zimeras, GREECE



**Preface**

This year the 9th IASME / WSEAS International Conference on APPLIED INFORMATICS AND COMMUNICATIONS (AIC '09) was held in Moscow, Russia, in August 20-22, 2009. The Conference remains faithful to its original idea of providing a platform to discuss system architecture, performance analysis and prediction, system interconnects, information theory, operating systems, software engineering, microcomputers, cad design for microwave systems, antennas and radars, reflectors and lens antennas 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](http://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

<b>Plenary Lecture 1: Qualitative Judgment Dynamics for Trust Management in Pervasive Computing Environments</b>	14
<i>Denis Trcek</i>	
<b>Plenary Lecture 2: Intrusion and Countermeasures in Secure Advanced Optical Networks</b>	15
<i>Stamatios Kartalopoulos</i>	
<b>Plenary Lecture 3: Network Infrastructure Security</b>	16
<i>Angus Wong</i>	
<b>Plenary Lecture 4: Maximum Entropy Method and Underdetermined Systems Applied to Computer Network Topology and Routing</b>	17
<i>Milan Tuba</i>	
<b>Scientific Data Formats</b>	19
<i>Juliana Georgieva, Veska Gancheva, Mariana Goranova</i>	
<b>Processing and Managing Scientific Data in SOA Environment</b>	25
<i>Bogdan Shishedjiev, Mariana Goranova, Juliana Georgieva, Veska Gancheva</i>	
<b>Security System for Mobile Users</b>	31
<i>Edgar Alejandro Andrade Gonzalez, Mario Reyes Ayala, Jose Alfredo Tirado Mendez</i>	
<b>Qualitative Trust Dynamics Algebra for Trust Management in Pervasive Computing Environments</b>	34
<i>Denis Trcek</i>	
<b>Study of Relationship Between ICT and Economic Growth</b>	40
<i>Omid Khodaveyrdi, Arezoo Mohandessi, Hossien Nemati</i>	
<b>Large-Storage Mobile Phones: New Devices Offering a New Application Domain</b>	45
<i>Angus K. Y. Wong</i>	
<b>Improving Performance of Multicast Routing in Ad Hoc Wireless Networks</b>	50
<i>Su-Kit Tang, Dongyang Long</i>	
<b>Congestion Model for Cascading Failures in Complex Networks</b>	56
<i>Chun Yin Au, Fan Yan, Kai Hau Yeung</i>	
<b>Balancing Throughput and Delay Performance by Effective Shortest Path Routing</b>	59
<i>Nagi-Ki Fong, Fan Yan, Kai-Hau Yeung</i>	
<b>Slicing of UML State Machines</b>	63
<i>Kevin Lano</i>	
<b>Information Model for The Enhancement of Human Intelligence, for the Period 2009 – 2020</b>	70
<i>Viducic V. , Simundic S. , Viducic Lj. , Boras D.</i>	
<b>Determining the Refractivity Earths Surface Distribution Using Data From a Satellite Control Station</b>	74
<i>Francisco Varela, Su Don Ling</i>	

<b>A Strategy-Oriented Operation Module for Recommender Systems in E-Commerce</b>	78
<i>Hsaio-Fan Wang, Cheng-Ting Wu</i>	
<b>Implementation of 3D Gesture Recognition System Based on Neural Network</b>	84
<i>Yang-Keun Ahn, Min-Wook Kim, Young-Choong Park, Kwang-Soon Choi, Woo-Chool Park, Hae-Moon Seo, Kwang-Mo Jung</i>	
<b>Optimum Design of Balanced Saw Filters Using Evolutionary Multi-Objective Optimization</b>	88
<i>Kiyoharu Tagawa</i>	
<b>Artificial Neural Networks in Bias Dependant Noise Modeling of MESFETs</b>	94
<i>Zlatica Marinkovic, Olivera Pronic - Rancic, Vera Markovic</i>	
<b>A Solution for Decreasing the Response Time of Knowledge Based Systems</b>	100
<i>Vasile Mazilescu, Costel Nistor, Daniela Sarpe</i>	
<b>Just-In-Time Business Intelligence and Real-Time Decisioning</b>	106
<i>Zeljko Panian</i>	
<b>Self-Adjustment Strategy for Models used in Autonomic Transactional Systems</b>	112
<i>D. F. Garcia, P. Valledor, J. Entrialgo, R. Medrano, F. Gonzalez-Bulnes</i>	
<b>Task Scheduling in Distributed Environment Using Genetic Algorithm</b>	118
<i>Mehdi Sadeghzadeh</i>	
<b>Second-Level NIST Randomness Tests on Pseudo Random Generator Based on Non-Linear Dynamic Chaotic System</b>	123
<i>A. Citavicius, A. Jonavicius</i>	
<b>Maximum Entropy Method and Underdetermined Systems Applied to Computer Network Topology and Routing</b>	127
<i>Milan Tuba</i>	
<b>Proposal and Evaluation of a Recommendation Technique that Considers the Context of Product Purchases</b>	133
<i>Tsuyoshi Takayama, Tetsuo Ikeda, Hiroshi Oguma, Ryosuke Miura, Yoshitoshi Murata, Nobuyoshi Sato</i>	
<b>A Social Networking Application for Psycho-Therapy Support</b>	139
<i>Robert Buchmann, Liana Stanca, Ioana Pop</i>	
<b>An Approach to Test Determination for Programmable Logic Arrays</b>	145
<i>Ljubomir Cvetkovic, Milan Tuba</i>	
<b>Enhancing Customer Relationship Management Using Enterprise Information Integration with Topic Maps</b>	151
<i>Jenny Muller, Arnim Bleier, Benjamin Bock, Manfred Kirchgorg, Lutz Maicher</i>	
<b>Disentangling the Relations Between Safety and Security</b>	156
<i>Pietre-Cambaceses Ludovic, Chaudet Claude</i>	
<b>GPS Atmospheric Monitor</b>	162
<i>Omar Calzada-Murguia, Mario Reyes-Ayala, Edgar Alejandro Andrade-Gonzalez, Jose Alfredo Tirado-Mendez</i>	

<b>An Upgraded Petri Net Model, Simulation and Analysis of An 8x8 Sub-Image for JPEG Image Compression</b>	167
<i>Perica Strbac, Milan Tuba</i>	
<b>A Fully-Automated Computer-Assisted Language Learning Courseware for Beginner-Level Korean Language Learners</b>	173
<i>Su-Jin Cho, Seongsoo Lee</i>	
<b>Design and Construction WDM Type Triplex Optical Receiver Module Using System Multimode Polymeric PLC Hybrid Integration Technology</b>	178
<i>Vitezslav Jerabek, Ivan Huttel, Vaclav Prajzler, Karel Busek</i>	
<b>A Tool for Comparing Resource-Constrained Project Scheduling Problem Algorithms</b>	182
<i>Alexandru-Liviu Olteanu</i>	
<b>High-Performance Multi-Pattern Matching Structure in Hardware Network Firewall</b>	187
<i>Wang Jie, Ji Zhen-Zhou, Hu Ming-Zeng</i>	
<b>Approach to Solving DCSP Using BDI</b>	192
<i>Jose Miguel Rubio, Broderick Crawford, Jimena Ahumada</i>	
<b>Simulations and Experiment of Applicator System for Regional Induction Heating 2.45 GHZ</b>	198
<i>Chumpon Patummakasorn, Chanchai Thongsopa</i>	
<b>New Parallel Prefix Algorithms</b>	204
<i>Yen-Chun Lin, Li-Ling Hung</i>	
<b>IPTV Concepts Related to Kosovo's Telecommunication Network</b>	210
<i>Shkelzen Cakaj, Vehbi Sheholli, Hysen Gashi</i>	
<b>An Energy and Trust-Aware Routing Protocol for Large Wireless Sensor Networks</b>	216
<i>Theodore Zahariadis, Helen C. Leligou, Stamatis Voliotis, Sotiris Maniatis, Panagiotis Trakadas, Panagiotis Karkazis</i>	
<b>Ultrasonic Radar and its Applications</b>	225
<i>Mansoor-Ul-Hassan Siddique</i>	
<b>Wireless Multimedia Communication Toward Mobile Telemedicine</b>	232
<i>Chin-Feng Lin, Hsin-Wang Lee</i>	
<b>Micro-Grids: Practical Applications of Grid Technology to Small Distributed Collaborations</b>	238
<i>Jason Lee</i>	
<b>A New Watermark Approach for Protection of Databases</b>	243
<i>Hazem M. El-Bakry, Nikos Mastorakis</i>	
<b>Business Process Modeling Languages for Information System Development</b>	249
<i>Hazem M. El-Bakry, Nikos Mastorakis</i>	
<b>Lightweight Mix Columns Implementation for AES</b>	253
<i>Eslam Gamal Ahmed, Eman Shaaban, Mohamed Hashem</i>	
<b>Usability Evaluation of Selected Web Portals</b>	259
<i>Miloslav Hub, Michal Zatloukal</i>	

<b>Improving the ETL Process of Higher Education Information System Data Warehouse</b> <i>Igor Mekterovic, Ljiljana Brkic, Mirta Baranovic</i>	265
<b>MANET Routing Protocols Vs. Mobility Models: Performance Analysis and Comparison</b> <i>Valentina Timcenko, Mirjana Stojanovic, Slavica Bostjancic Rakas</i>	271
<b>Improving Performance and Reliability of Adaptive Fault Tolerance Structure in Distributed Real Time Systems</b> <i>Negar Mosharraf, Mohammad Reza Khayyambashi</i>	277
<b>Numerical Investigation Oo Noncircular PCFT Beam's Divergence in Turbulent Media</b> <i>M. Khatiri , F.D.Kashani , B. Ghafary</i>	283
<b>Remote Evaluation of Mobile Context-Aware Systems Using Data-Gathering Agents</b> <i>Angel Palacio-Gonzalez, Fernando Mantilla-Gomez</i>	288
<b>Disulfide Bonding Pattern Prediction Using Support Vector Machine with Parameters Tuned by Multiple Trajectory Search</b> <i>Hsuan-Hung Lin, Lin-Yu Tseng</i>	293
<b>Integrated Electronic Prescribing Systems: Pharmacists' Perceptions of Impact on Work Performance and Patient Safety</b> <i>Bahlol Rahimi, Vivian Vimarlund, Rahman Mokhtari, Toomas Timpka</i>	299
<b>Fast Information Processing over Business Networks</b> <i>Hazem M. El-Bakry, Nikos Mastorakis</i>	305
<b>Personal Identification Through Biometric Technology</b> <i>Hazem M. El-Bakry, Nikos Mastorakis</i>	325
<b>Application of Adaptive Genetic Algorithm in Mining Industry</b> <i>G. Besiashvili, O. Rcheulishvili</i>	341
<b>A Fuzzy Based Aircraft Collision Avoidance System</b> <i>Irfan Younas, Zaheed Ahmed, Syed Tauseef Mohyud-Din</i>	344
<b>Scalability of Real-Time Online Applications in Edutain @ grid</b> <i>S. Gorlatch, F. Glinka, A. Ploss, T. Fahringer, R. Prodan, V. Nae, M. Surr ridge, S. Middleton, C. Anthes, A. Arragon, A. Lipaj, C. Rawlings</i>	351
<b>Distributed Application for Traffic Control Using Intelligent Agents</b> <i>Florin Leon, Mihai Horia Zaharia, Cristea Pal, Stefan Adrian Boronea, Tudor Didilescu</i>	357
<b>An Accessibility Framework Based on Wiimote</b> <i>Fernando Mantilla-Gomez, Angel Palacio-Gonzalez</i>	363
<b>Vehicle Speed and Volume Measurement using V2I Communication</b> <i>Quoc Chuyen Doan, Tahar Berradia, Joseph Mouzna</i>	366
<b>Modular Networks for Active E-learning</b> <i>Hazem M. El-Bakry, Nikos Mastorakis</i>	373
<b>User Interface for Internet Applications</b> <i>Hazem M. El-Bakry, Nikos Mastorakis</i>	383

<b>Some Simple Algorithms for Some Odd Graceful Labeling Graphs</b>	399
<i>M. Ibrahim Moussa</i>	
<b>Design of Sensor Signal Processing Algorithm and Its SoC Architecture for Bio-Sensor Systems and Intelligent Robots</b>	405
<i>Young-Ju Jang, Jongsung Kim, Seongsoo Lee, Seok Lee, Youngtae Byun</i>	
<b>Coexistence Goals of VoIP and TCP Traffic in Mobile WiMAX Networks: Performance of Flat Architecture</b>	409
<i>Zoran Bojkovic, Dragorad Milovanovic</i>	
<b>Digital Phase-Locked Loop and its Realization</b>	415
<i>Tsai-Sheng Kao, Sheng-Chih Chen, Yuan-Chang Chang, Sheng-Yun Hou, Chang-Jung Juan</i>	
<b>Performance Evaluation of Routing Strategies in MANETs</b>	421
<i>Muhammad Shabbir</i>	
<b>Luminance-Chrominance Gain Equalizer based on Bernstein Polynomials</b>	427
<i>V. Chutchavong, O. Sangaroon, C. Benjangkaprasert, K. Janchitrapongvej</i>	
<b>An Application of Probabilistic Risk Assessment to Information Security Audit</b>	436
<i>Naoki Satoh, Hiromitsu Kumamoto</i>	
<b>The Problem of Margin Calculation and its Reduction via the p-Median Problem Model</b>	444
<i>Boris Goldengorin, Dmitry Krushinsky, Viktor Kuz'menko</i>	
<b>Performance Comparison of RBF Networks and MLPs for Classification</b>	450
<i>Hyontai Sug</i>	
<b>Active Low Pass Filter Using Multielectrode RC Distributed Circuit</b>	455
<i>V. Pirajnanchai, C. Benjangkaprasert, K. Janchitrapongvej</i>	
<b>A Hyperheuristic Approach to Select Enumeration Strategies in Constraint Programming</b>	460
<i>Broderick Crawford, Mauricio Montecinos, Carlos Castro, Eric Monfroy</i>	
<b>An Ant-based Solver for Subset Problems</b>	466
<i>Broderick Crawford, Carlos Castro, Eric Monfroy</i>	
<b>Semantics Based on Eye-Tracking Data</b>	471
<i>Robert Andrei Buchmann, Alin Mihaila, Radu Meza</i>	
<b>The ParMetaOpt Experience: Performance of Parallel Metaheuristics on Scheduling Optimization</b>	475
<i>Plamenka Borovska, George Yanchev</i>	
<b>A Study on the Electronic Market for the Successful Launching of a Business</b>	480
<i>Dan-Andrei Sitar-Taut, Liana-Maria Stanca, Robert Buchmann, Ramona Lacurezeanu</i>	
<b>Impact of Grafting a 2-opt Algorithm Based Local Searcher into the Genetic Algorithm</b>	485
<i>Milan Djordjevic, Milan Tuba, Bojan Djordjevic</i>	
<b>Nursing Information Architecture for Situated Decision Support in Intensive Care Units</b>	491
<i>M. F. Santos, F. Portela, M. Vilas-Boas, J. Machado, A. Abelha, J. Neves, A. Silva, F. Rua, M. Salazar, C. Quintas, A. F. Cabral</i>	
<b>Authors index</b>	497

## Plenary Lecture 1

### Qualitative Judgment Dynamics for Trust Management in Pervasive Computing Environments



#### Associate Professor Denis Trcek

Laboratory of e-media  
Faculty of computer and information science  
University of Ljubljana  
Trzaska cesta 25, 1000 Ljubljana  
SLOVENIA  
Email: [denis.trcek@fri.uni-lj.si](mailto:denis.trcek@fri.uni-lj.si)

**Abstract:** Trust management is turning out to be essential for further and wider acceptance of contemporary IT solutions. In IT world it was first addressed some ten years ago when the suggested approaches were actually tackling security and not trust directly. Later, more advanced methodologies emerged that were based on Bayesian statistics. These were followed by Dempster-Shafer theory of evidence and its derivative, subjective logic (algebra). In addition, some attempts were made that were based on game theory.

However, trust is a manifestation of reasoning and judgment processes. It has to be treated in line with this fact and has to be adequately supported from technological point of view. Therefore, on the basis of our experiments, a new methodology called qualitative judgment dynamics (QJD) has been developed, which addresses the core of trust phenomenon. It complements existing methodologies and, together with the appropriate conceptual model, enables technological solutions for trust management in pervasive computing environments.

#### **Brief Biography of the Speaker:**

- PhD in the field of communications security, received in 1995 from University of Ljubljana, Slovenia / EU.
- Associate Professor of computer and information science, gives courses on e-business at Faculty of Computer and Information Sciences, University of Ljubljana, and courses on computer communications and IS security at the University of Primorska.
- Almost 20 years involved in computer communications, IT and IS, computer communications, security, e-business.
- Author of scientific monograph *Managing IS Security and Privacy*, published by renowned publisher Springer in 2006.
- Invited speaker at PKI Invitational Workshop, organized by US Security Information Program Management Office, NIST and MITRE Corp., September 1995, Washington D.C.
- Involved in EU projects (also as a national coordinator) COST 225, COST 330, COST 263, NetLINK CEE.
- Establishment of the first IP connection and its management in 1991. One of the key persons that contributed to establishment of the Slovene Academic Research Network ARNES.
- Project leader for user security policy for internet banking services of the biggest Slovene bank NLB, project leader for IS implementation for the Slovene National Gallery, consultant for security architecture of a nationwide project of smart-card based health care information infrastructure (the first nation-wide implemented project of that kind in the world).
- 100+ items in bibliography (including journals with SCI JCR impact factor / WoS).
- 30 published communications (scientific conferences like IEEE, IFIP, Internet Society, US National Information Systems Security Conference...).
- Contributor to 3 scientific books, published by Springer Verlag, John Willey and Idea Group Publishers Inc., author of 2 university textbooks.
- Inventor of a crypto-protocol for hash functions based authentication and key exchange (patent granted in 2005).
- Editorial board member of *International Journal of Computers and Applications*, ACTA Press, 2004 - 2005.
- Member of program committees of IASTED Software Engineering 05, 06 and 07, *Complex Systems in e-Business / CSeB 04 & 05*, *Workshop on Applications of Wireless Communications - WAWC04* (scientific conferences).
- Regular reviewer for high ranking scientific journals published by Elsevier, IEEE, etc.

## Plenary Lecture 2

### Intrusion and Countermeasures in Secure Advanced Optical Networks



#### Professor Stamatios Kartalopoulos

University of Oklahoma,  
USA

Email: [kartalopoulos@ou.edu](mailto:kartalopoulos@ou.edu)

**Abstract:** Optical networks are considered to be intrusion-resistant by virtue of the fiber medium. The common belief is that the optical fiber is difficult to tap, as compared to copper wire and to wireless media. In fact, this is a simplistic view because stripping a cable and tapping a fiber with tools that are commercially available is a relatively simple task to the sophisticated intruder. Moreover, because the fiber link is many kilometers long, the fiber cannot be guarded; this presents a tremendous opportunity and flexibility to the intruder to select the point of intrusion unnoticed. Therefore, it is important that the network is sophisticated enough to monitor and detect intrusions, differentiate from possible component failure and degradation, and upon detection of fiber attacks, it executes automatic countermeasures, outsmarting the intruder. In this talk, we describe automatic intrusion detection methods and countermeasure strategies in modern optical networks.

**Brief Biography of the Speaker:** Stamatios V. Kartalopoulos, PhD, is currently the Williams Professor in Telecommunications Networking with the University of Oklahoma. His research emphasis is on optical communication networks (long haul, FSO, and FTTH), optical technology including signal performance sensors, optical metamaterials, as well as chaotic processes, optical network security, including quantum networks and chaotic quantum cryptography. Prior to this, he was with Bell Laboratories where he defined, led and managed research and development teams in the areas of DWDM networks, SONET/SDH and ATM, Cross-connects, Switching, Transmission and Access systems. He has received the President's Award and many awards of Excellence.

Dr Kartalopoulos holds nineteen patents related to communications networks and technology, and he has published more than hundred fifty scientific papers, nine reference textbooks, and has also contributed chapters to other books. He has been an IEEE and a Lucent Technologies Distinguished Lecturer and has lectured at international Universities, at NASA and conferences,. He has been keynote speaker of major international conferences, has moderated executive forums, has been a panelist of interdisciplinary panels, and has organized symposia, workshops and sessions at major international communications conferences.

Dr Kartalopoulos is an IEEE Fellow, chair and founder of the IEEE ComSoc Communications & Information Security Technical Committee, member at large of IEEE New Technologies Directions Committee, and he has served as editor-in-chief of IEEE Press, chair of ComSoc Emerging Technologies and of SPCE Technical Committees, Area-editor of IEEE Communications Magazine/Optical Communications, member of IEEE PSPB, and VP of IEEE Computational Intelligence Society.

## Plenary Lecture 3

### Network Infrastructure Security



#### Associate Professor Angus Wong

Macao Polytechnic Institute

Macao

E-mail: [kywong@ipm.edu.mo](mailto:kywong@ipm.edu.mo)

**Abstract:** Unlike network information security which is concerned with data confidentiality and integrity by using techniques like cryptograph, network infrastructure security is concerned with the protection of the network infrastructure itself, that is, to focus on how to detect and prevent routers or other network devices from being attacked or compromised.

Since the Internet, in the beginning, was assumed to work in a trustworthy environment, it was designed without much concern of security. As a result, the infrastructure is vulnerable to a variety of security threats and attacks, such as packet spoofing, routing table poisoning and routing loops.

One of the reasons of why network infrastructure security is important and has drawn much concern in recent years is that attacks to the infrastructure would affect a large portion of the Internet and create a large amount of service disruption. Since our daily operations highly depend on the availability and reliability of the Internet, the security of its infrastructure has become a high priority issue.

This seminar covers comprehensive topics of network infrastructure security -- from lower to higher layer, and from basic concept of network infrastructure security to the research solution to future network device design.

**Brief Biography of the Speaker:** Angus Wong obtained his BSc and PhD degrees from City University of Hong Kong, and is currently an associate professor at Macao Polytechnic Institute. Dr. Wong is active in research activities, and has served as a reviewer and a technical program committee member in various journals and conferences. He has successfully obtained grants from universities and governments, and published tens of technical papers.

Dr Wong is devoted to teaching. In the past, he has taught 11 different courses, range from the first year to forth years, and developed five new network related courses to keep students abreast of cutting-edge network technologies. He has devoted his time and energy in establishing a quality Internet systems laboratory environment for student use. Students' learning has proven to be enhanced significantly through their hand-on experience on networking devices. Dr. Wong was awarded for his teaching contributions and received the Best Teacher Awards in 2005 and 2007.

## Plenary Lecture 4

### Maximum Entropy Method and Underdetermined Systems Applied to Computer Network Topology and Routing



**Professor Milan Tuba**  
Megatrend University Belgrade  
Faculty of Computer Science  
Serbia  
E-mail: [tuba@ieee.org](mailto:tuba@ieee.org)

**Abstract:** The maximum entropy method (MEM) is a relatively new technique for solving underdetermined systems. It has been successfully applied in many different areas. All methods for solving underdetermined systems introduce some additional, artificial constraints. The advantage of the maximum entropy method is that it uses the most natural additional constraint: one that does not introduce any new, arbitrary and unwarranted information. One important property of entropy maximization is that it favors uniform distribution.

Network design and analysis almost always involve underdetermined systems, especially when routing policy has to be determined. The number of possible routings grows with the factorial of the number of the nodes in the network and the number of possible topologies is exponential in the number of links. The number of constraints is typically polynomial in the number of nodes in the network. That makes the network design problem a good candidate for the maximum entropy method application. It is intuitively clear that an optimal network should not have overloaded or underutilized links. The hope is that the maximum entropy constraint will give a starting topology and routing with smoothly distributed traffic that would lead to the solution that is closer to the optimal. The problem is computationally feasible and with proper identification and selection of certain parameters the method gives reasonable topology and routing.

It is possible to apply MEM if we start our analysis with totally interconnected network of  $n$  nodes. Some lines will be dropped later in the process of improving utilization or reducing the cost. To apply the maximum entropy method we have to decide what will be the variables of the system. Some combination of required traffic values can be used for that if we remember that for MEM application we do not need to start with probabilities, but an arbitrary set of numbers which can be normalized. Additional parameters are introduced which allow the control of optimization process.

Philosophical discussions about the real meaning of the maximum entropy method are interesting, but since the method was successfully applied in many areas, for any new area the most important criterion is not how well can we explain the relation between the MEM and that area, but how useful are the results we get by applying the method.

**Brief Biography of the Speaker:** Milan Tuba received B. S. in Mathematics, M. S. in Mathematics, M. S. in Computer Science, M. Ph. in Computer Science, Ph. D. in Computer Science from University of Belgrade and New York University. From 1983 to 1987 he was a graduate student and teaching and research assistant at Vanderbilt University in Nashville and Courant Institute of Mathematical Sciences, New York University. From 1987 to 1993. he was Assistant Professor of Electrical Engineering at Cooper Union Graduate School of Engineering, New York. During that time he was the founder and director of Microprocessor Lab and VLSI Lab, leader of scientific projects and supervisor of many theses. From 1994 he was Associate professor of Computer Science and Director of Computer Center at University of Belgrade, Faculty of Mathematics, and from 2004 also Professor of Computer Science and Dean of the College of Computer Science, Megatrend University Belgrade. He was teaching about 20 graduate and undergraduate courses, from VLSI Design and Computer Architecture to Computer Networks, Image Processing, Calculus and Queuing Theory. His research interest include mathematical, queuing theory and algorithmic optimizations applied in computer networks, image processing and combinatorial problems. He is the author of more than 60 scientific papers and a monograph. He was coeditor or member of the board of editors of number of scientific journals and conferences. Member ACM 1983, IEEE 1984, AMS 1995, New York Academy of Sciences 1987.

## Authors Index

Abelha, A.	491	Glinka, F.	351	Maniatis, S.	216
Ahmed, E.	253	Goldengorin, B.	444	Mantilla-Gomez, F.	288, 363
Ahmed, Z.	344	Gonzalez, E. A.	31, 162	Marinkovic, Z.	94
Ahn, Y. K.	84	Gonzalez-Bulnes, F.	112	Markovic, V.	94
Ahumada, J.	192	Goranova, M.	19, 25	Mastorakis, N.	243, 249, 305,
Anthes, C.	351	Gorlatch, S.	351	Mastorakis, N.	325, 373, 383
Arragon, A.	351	Hashem, M.	253	Mazilescu, V.	100
Ayala, M.	31, 162	Hou, S.	415	Medrano, R.	112
Baranovic, M.	265	Hub, M.	259	Mekterovic, I.	265
Benjangkprasert, C.	427, 455	Hung, L. L.	204	Mendez, J. A.	31, 162
Berradia, T.	366	Huttel, I.	178	Meza, R.	471
Besiashvili, G.	341	Ibrahim Moussa, M. I.	399	Middleton, S.	351
Bleier, A.	151	Ikeda, T.	133	Mihaila, A.	471
Bock, B.	151	Janchitrapongvej, K.	427, 455	Milovanovic, D.	409
Bojkovic, Z.	409	Jang, Y.	405	Ming-Zeng, H.	187
Boras, D.	70	Jerabek, V.	178	Miura, R.	133
Boronea, S.	357	Jie, W.	187	Mohandessi, A.	40
Borovska, P.	475	Jonavicius, A.	123	Mohyud-Din, S. T.	344
Brkic, L.	265	Juan, C.	415	Mokhtari, R.	299
Buchmann, R.	139, 480	Jung, K. M.	84	Monfroy, E.	460, 466
Buchmann, R. A.	471	Kao, T. S.	415	Montecinos, M.	460
Busek, K.	178	Karkazis, P.	216	Mosharraf, N.	277
Byun, Y.	405	Kashani, F. D.	283	Mouzna, J.	366
Cabral, A. F.	491	Khatiri, M.	283	Muller, J.	151
Cakaj, S.	210	Khayyambashi, M.	277	Murata, Y.	133
Calzada-Murguia, O.	162	Khodaveyrdi, O.	40	Nae, V.	351
Castro, C.	460, 466	Kim, J.	405	Nemati, H.	40
Chang, Y. C.	415	Kim, M.	84	Neves, J.	491
Chen, S.	415	Kirchgeorg, M.	151	Nistor, C.	100
Cho, S.	173	Krushinsky, D.	444	Oguma, H.	133
Choi, K. S.	84	Kumamoto, H.	436	Olteanu, A. L.	182
Chutchavong, V.	427	Kuz'menko, V.	444	Pal, C.	357
Citavicius, A.	123	Lacurezeanu, R.	480	Palacio-Gonzalez, A.	288, 363
Claude, C.	156	Lano, K.	63	Panian, Z.	106
Crawford, B.	192, 460, 466	Lee, H.	232	Park, W. C.	84
Cvetkovic, L.	145	Lee, J.	238	Park, Y.	84
Didilescu, T.	357	Lee, S.	405	Patummakasorn, C.	198
Djordjevic, B.	485	Lee, S.	173, 405	Pirajnanchai, V.	455
Djordjevic, M.	485	Leligou, H. C.	216	Ploss, A.	351
Doan, Q.	366	Leon, F.	357	Pop, I.	139
El-Bakry, H. M.	243, 249, 305,	Lin, C. F.	232	Portela, F.	491
El-Bakry, H. M.	325, 373, 383	Lin, H.	293	Prajzler, V.	178
Entrialgo, J.	112	Lin, Y. C.	204	Prodan, R.	351
Fahringer, T.	351	Ling, S.	74	Pronic - Rancic, O.	94
Fong, N.	59	Lipaj, A.	351	Quintas, C.	491
Gancheva, V.	19, 25	Lj., W.	70	Rahimi, B.	299
Garcia, D. F.	112	Long, D.	50	Rakas, S. B.	271
Gashi, H.	210	Ludovic, P.	156	Rawlings, C.	351
Georgieva, J.	19, 25	Machado, J.	491	Rcheulishvili, O.	341
Ghafary, B.	283	Maicher, L.	151	Rua, F.	491

Rubio, J. M.	192	Stanca, L. M.	480	Viducic, V.	70
Sadeghzadeh, M.	118	Stojanovic, M.	271	Vilas-Boas, M.	491
Salazar, M.	491	Strbac, P.	167	Vimarlund, V.	299
Sangaroon, O.	427	Sug, H.	450	Voliotis, S.	216
Santos, M. F.	491	Surridge, M.	351	Wang, H.	78
Sarpe, D.	100	Tagawa, K.	88	Wong, A. K.	45
Sato, N.	133	Takayama, T.	133	Wu, C. T.	78
Satoh, N.	436	Tang, S.	50	Yan, F.	56, 59
Seo, H. M.	84	Thongsopa, C.	198	Yanchev, G.	475
Shaaban, E.	253	Timcenko, V.	271	Yeung, K. H.	56, 59
Shabbir, M.	421	Timpka, T.	299	Yin Au, C. Y.	56
Sheholli, V.	210	Trakadas, P.	216	Younas, I.	344
Shishedjiev, B.	25	Trcek, D.	34	Zaharia, M. H.	357
Siddique, M.H.	225	Tseng, L.	293	Zahariadis, T.	216
Silva, A.	491	Tuba, M.	485	Zatloukal, M.	259
Simundic, S.	70	Tuba, M.	127, 145, 167	Zhen-Zhou, J.	187
Sitar-Taut, D. A.	480	Valledor, P.	112		
Stanca, L.	139	Varela, F.	74		