

*EDITORS: N. Mastorakis, S. Kartalopoulos, D. Simian  
A. Varonides, V. Mladenov, Z. Bojkovic, E. Antonidakis*

# **COMPUTER SCIENCE and TECHNOLOGY**

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

## **VOLUME 4 of the Proceedings of the 11<sup>th</sup> WSEAS International Multiconference CSCC (CIRCUITS, SYSTEMS, COMMUNICATIONS, COMPUTERS)**

*(Proceedings of the 11th WSEAS International Conference on COMPUTERS)*

*Agios Nikolaos, Crete Island, Greece, July 23-28, 2007*



**Electrical and Computer Engineering Series  
A Series of Reference Books and Textbooks**

**ISSN: 1790-5117**

**ISBN: 978-960-8457-92-8**



# **COMPUTER SCIENCE and TECHNOLOGY**

**Proceedings of the  
11th WSEAS International Conference on  
COMPUTERS  
(part of the 2007 CSCC Multiconference)**

**Agios Nikolaos, Crete Island, Greece, July 26-28, 2007**

# COMPUTER SCIENCE and TECHNOLOGY

## Proceedings of the 11th WSEAS International Conference on COMPUTERS

**Agios Nikolaos, Crete Island, Greece, July 26-28, 2007**

Published by World Scientific and Engineering Academy and Society Press  
<http://www.wseas.org>

**Copyright © 2007, 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: 1790-5117**  
**ISBN: 978-960-8457-92-8**



World Scientific and Engineering Academy and Society

**EDITORS:**

Professor N. E. Mastorakis, Hellenic Naval Academy, GREECE  
Professor S. Kartalopoulos, The University of Oklahoma, USA  
Professor D. Simian, "Lucian Blaga" University of Sibiu, ROMANIA  
Professor A. Varonides, University of Scranton, USA  
Professor V. Mladenov, Technical University of Sofia, BULGARIA  
Professor Z. Bojkovic, University of Belgrade, SERBIA  
Professor E. Antonidakis, TEI of Crete, GREECE

**SCIENTIFIC COMMITTEE:**

|                                       |                                   |
|---------------------------------------|-----------------------------------|
| Irwin W. Sandberg, USA                | Alfonso Farina, ITALY             |
| Asad A. Abidi, USA                    | Alfred O. Hero, USA               |
| Andreas Antoniou, USA                 | Ali H. Sayed, USA                 |
| Antonio Cantoni, AUSTRALIA            | Anders Lindquist, SWEDEN          |
| Lotfi Zadeh, USA                      | Arthur B. Baggeroer, USA          |
| George Szentirmai, USA                | Arye Nehorai, USA                 |
| Michael Peter Kennedy, IRELAND        | Benjamin Friedlander, USA         |
| Paresh C. Sen, CANADA                 | Bernard C. Levy, USA              |
| Michel Gevers, BELGIUM                | Bhaskar D. Rao, USA               |
| James S. Thorp, USA                   | Bin Yu, USA                       |
| Armen H. Zemanian, USA                | Boualem Boashash, AUSTRALIA       |
| Guanrong Chen, HONG KONG              | Brian D. O. Anderson, AUSTRALIA   |
| Edgar Sanchez-Sinencio, USA           | Bruce A. Francis, CANADA          |
| Jim C. Bezdek, USA                    | C. Richard Johnson, USA           |
| A. J. van der Schaft, THE NETHERLANDS | C. Sidney Burrus, USA             |
| Istvan Nagy, Hungary                  | Charles M. Rader, USA             |
| Wasfy B. Mikhael, USA                 | Desmond P. Taylor, NEW ZEALAND    |
| M. N. S. Swamy, CANADA                | Donald L. Duttweiler, USA         |
| M. Araki, JAPAN                       | Donald W. Tufts, USA              |
| Abbas El Gamal, USA                   | Douglas L. Jones, USA             |
| Franco Maloberti, Italy               | Earl E. Swartzlander, USA         |
| Alan N. Willson Jr., USA              | Ed F. Deprettere, THE NETHERLANDS |
| Yoji Kajitani, JAPAN                  | Edward A. Lee, USA                |
| Mohammed Ismail, USA                  | Edward J. Powers, USA             |
| Kemin Zhou, USA                       | Ehud Weinstein, ISRAEL            |
| Ruey-Wen Liu, USA                     | Eli Brookner, USA                 |
| Nabil H. Farhat, USA                  | Ezio Biglieri, ITALY              |
| John I. Sewell, UNITED KINGDOM        | Faye Boudreaux-Bartels, USA       |
| Jerry M. Mendel, USA                  | Georgios B. Giannakis, USA        |
| Magdy A. Bayoumi, USA                 | Gonzalo R. Arce, USA              |
| Bertram E. Shi, HONG KONG             | H. Vincent Poor, USA              |
| M. Omair Ahmad, CANADA                | Hagit Messer, ISRAEL              |
| N. K. Bose, USA                       | John V. McCanny, UNITED KINGDOM   |
| Igor Lemberski, LATVIA                | Joos Vandewalle, BELGIUM          |
| Alfred Fettweis, GERMANY              | Jose C. Principe, USA             |
| Brockway McMillan, USA                | Jose M. F. Moura, USA             |
| H. J. Orchard, USA                    | K. J. Ray Liu, USA                |
| Jacob Katzenelson, ISRAEL             | Kaushik Roy, USA                  |
| Vincent Poor, USA                     | Kenneth Rose, USA                 |
| Abraham Kandel, USA                   | Keshab K. Parhi, USA              |
| Bor-Sen Chen, CHINA                   | Kon Max Wong, CANADA              |
| C. S. George Lee, USA                 | Kung Yao, USA                     |
| Hamid R. Berenji, USA                 | Louis L. Scharf, USA              |
| Kevin M. Passino, USA                 | Martin Vetterli, USA              |
| Lawrence O. Hall, USA                 | Mati Wax, USA                     |
| Ronald R. Yager, USA                  | Meir Feder, ISRAEL                |
| Witold Pedrycz, CANADA                | Michael C. Wicks, USA             |
| Agoryaswami J. Paulraj, USA           | Michael D. Zoltowski, USA         |
| Ahmed H. Tewfik, USA                  | Michael T. Orchard, USA           |
| Alan V. Oppenheim, USA                | Michael Unser, SWITZERLAND        |

|                                    |                                     |
|------------------------------------|-------------------------------------|
| Miguel Angel Lagunas, SPAIN        | Antonio Vicino, ITALY               |
| Moeness G. Amin, USA               | Anuradha M. Annaswamy, USA          |
| Mohamed Najim, FRANCE              | Benjamin Melamed, USA               |
| Neil J. Bershad, USA               | Bruce H. Krogh, USA                 |
| P. P. Vaidyanathan, USA            | David D. Yao, USA                   |
| Patrick Dewilde, THE NETHERLANDS   | Donald Towsley, USA                 |
| Peter Willett, USA                 | Eduardo D. Sontag, USA              |
| Petre Stoica, SWEDEN               | Edward J. Davison, CANADA           |
| Phillip A. Regalia, FRANCE         | G. George Yin, USA                  |
| Pierre Duhamel, FRANCE             | Giorgio Picci, ITALY                |
| Pierre Moulin, USA                 | Graham C. Goodwin, AUSTRALIA        |
| Pramod K. Varshney, USA            | Han-Fu Chen, CHINA                  |
| Rabab Kreidieh Ward, CANADA        | Harold J. Kushner, USA              |
| Robert M. Gray, USA                | Hidenori Kimura, JAPAN              |
| Rolf Unbehauen, GERMANY            | Ian Postlethwaite, UNITED KINGDOM   |
| Ronald W. Schafer, USA             | Ian R. Petersen, AUSTRALIA          |
| Rui J. P. Figueiredo, USA          | Jan C. Willems, THE NETHERLANDS     |
| Russell M. Mersereau, USA          | Jim S. Freudenberg, USA             |
| Sadaoki Furui, JAPAN               | Karl Johan Astrom, SWEDEN           |
| Shun-Ichi Amari, JAPAN             | Lennart Ljung, SWEDEN               |
| Simon Haykin, CANADA               | M. Vidyasagar, INDIA                |
| Soo-Chang Pei, CHINA               | Mark W. Spong, USA                  |
| Soura Dasgupta, USA                | Matthew R. James, AUSTRALIA         |
| Stefan L. Hahn, POLAND             | Munther A. Dahleh, USA              |
| Steven Kay, USA                    | P .R. Kumar, USA                    |
| Takao Hinamoto, JAPAN              | Peter E. Caines, CANADA             |
| Takashi Matsumoto, JAPAN           | Pramod P. Khargonekar, USA          |
| Tapio Saramaki, FINLAND            | Richard T. Middleton, AUSTRALIA     |
| Tariq S. Durrani, UNITED KINGDOM   | Roberto Tempo, Italy                |
| Thomas F. Quatieri, USA            | Roger W. Brockett, USA              |
| Thomas L. Marzetta, USA            | Romeo Ortega, FRANCE                |
| Thomas S. Huang, USA               | Shankar Sastry, USA                 |
| Thomas W. Parks, USA               | Stephane Lafortune, USA             |
| Uri Shaked, ISRAEL                 | Steven I. Marcus, USA               |
| V. John Mathews, USA               | T. E. Duncan, USA                   |
| Vladimir Cuperman, USA             | Tamer Basar, USA                    |
| William A. Pearlman, USA           | W. M. Wonham, CANADA                |
| Wolfgang Fichtner, SWITZERLAND     | Weibo Gong, USA                     |
| Wu-Sheng Lu, CANADA                | Xi-Ren Cao, HONG KONG               |
| Yaakov Bar-Salom, USA              | Yu-Chi Ho, UNITED KINGDOM           |
| Yingbo Hua, USA                    | George Antoniou, USA                |
| Yong Ching Lim, SINGAPORE          | C. Manikopoulos, USA                |
| Yoram Bresler, USA                 | Ashraf Abdelbar, EGYPT              |
| Zhi Ding, USA                      | Alain Abran, CANADA                 |
| A. A. Goldenberg, CANADA           | Akshai Aggarwal, CANADA             |
| Angel Rodriguez-Vasquez, SPAIN     | Nestor thome, SPAIN,                |
| Erol Gelenbe, USA                  | Jose Aguilar, VENEZUELA             |
| F. L. Lewis, USA                   | Maria Isabella Garcia-Planas, SPAIN |
| Harry Wechsler, USA                | Philippe Dondon, FRANCE             |
| Howard C. Card, CANADA             | Constantinos Angelis, GREECE        |
| Lei Xu, P. R. CHINA                | Zahra Ahmadi Brooghani, IRAN        |
| Leon O. Chua, USA                  | Kostas Arvanitis, GREECE            |
| Marco Gori, ITALY                  | Ahmed Al Kindi, OMAN                |
| Narasimhan Sundararajan, SINGAPORE | Mansoor Al-A'ali, BAHRAIN           |
| Sankar K. Pal, INDIA               | Munir Al-Absisi, SAUDI ARABIA       |
| Tamas Roska, USA                   | Malik Alamaireh, JORDAN             |
| A. Stephen Morse, USA              | Muhammad Al-Gahtani, SAUDI ARABIA   |
| Alberto Isidori, USA               | Nima Amanifard, IRAN                |
| Ali Saberi, USA                    | Antonios Andreatos, GREECE          |
| Andrew R. Teel, USA                | Maja Atanasijevic-Kunc, SLOVENIA    |

|   |  |
|---|--|
| <p> Carlos Aviles-Cruz, MEXICO<br/> Jamil Ayoub, JORDAN<br/> Jose Azana, CANADA<br/> Ina Taralova, FRANCE<br/> Leila Baccouche, TUNISIA<br/> Ahmad Bagheri, IRAN<br/> Harold S. Stone, USA<br/> Harry L. Van Trees, USA<br/> Henrique S. Malvar, USA<br/> Hsueh-Ming Hang, CHINA<br/> Jaakko Astola, Finland<br/> James R. Zeidler, USA<br/> Jan P. Allebach, USA<br/> Jitendra K. Tugnait, USA<br/> John M. Cioffi, USA<br/> John R. Treichler, USA<br/> Olga Martin, ROMANIA<br/> Zvone Balantic, SLOVENIA<br/> Tudor Barbu, ROMANIA<br/> Cassia Baruque, BRAZIL<br/> Lucia Baruque, BRAZIL<br/> Shariq Bashir, PAKISTAN<br/> Daniel Batas, GERMANY<br/> Radu Ciprian Bilcu, FINLAND<br/> Stefan Bruda, CANADA<br/> Miodrag Bulatovic, YUGOSLAVIA<br/> Martin Burke, IRELAND<br/> Stefano Cacciaguerra, ITALY<br/> Miriam Capretz, CANADA<br/> Leonarda Carnimeo, ITALY<br/> Ram Chakka, INDIA<br/> Nitin Chanderwal, INDIA<br/> Ching lung Chang, TAIWAN<br/> Fengming Chang, TAIWAN<br/> Huay Chang, TAIWAN<br/> Yun Seok Chang, KOREA<br/> Athanasios Chassiakos, GREECE<br/> John Chatzakis, GREECE<br/> Alexander Chatzigeorgiou, GREECE<br/> Yung-Fu Chen, TAIWAN<br/> Yangjun Chen, CANADA<br/> Toly Chen, TAIWAN<br/> Ching-Han Chen, TAIWAN<br/> R.C. Chen, TAIWAN<br/> Chi-bin Cheng, TAIWAN<br/> Chaochang Chiu, TAIWAN<br/> Yoonsik Choe, KOREA<br/> Hyung Rim Choi, KOREA<br/> Shihchieh Chou, TAIWAN<br/> Hwang-cherng Chow, TAIWAN<br/> Slo-Li Chu, TAIWAN<br/> Shun-Ping Chung, TAIWAN<br/> Rafa E. Al-Qutaish, CANADA<br/> Hsu Chun-liang, TAIWAN<br/> Giovanni Costantini, ITALY<br/> Octavian Cret, ROMANIA<br/> Krzysztof Cyran, POLAND<br/> Jerzy Dabrowski, SWEDEN<br/> Adrian Sergiu Darabant, ROMANIA<br/> Bhaskar Dasgupta, INDIA </p> | <p> Paul Davidsson, SWEDEN<br/> Felippe De Souza, PORTUGAL<br/> Sonia Degeratu, ROMANIA<br/> Carlo dell'Aquila, ITALY<br/> Metin Demiralp, TURKEY<br/> Lawrence Deng, TAIWAN<br/> Paolo Di Giamberardino, ITALY<br/> Vincenzo Di Lecce, ITALY<br/> Anne-Marie Di Sciullo, CANADA<br/> Zeljko Djurovic, SERBIA<br/> Valentin Dogaru Ulieru, ROMANIA<br/> Tomas Dostal, CZECH REPUBLIC<br/> Maitreyee Dutta, INDIA<br/> Anastasios Economides, GREECE<br/> Karl Edelmöser, AUSTRIA<br/> Erki Eessaar, ESTONIA<br/> Karim El Guemhioui, CANADA<br/> Hamed Elsimary, EGYPT<br/> Ehsan Esfandiary, IRAN<br/> Mehrez Essafi, TUNISIA<br/> Tchier Fairouz, SAUDI ARABIA<br/> Qi Feng, CHINA<br/> Hans Fernlund, USA<br/> Marta Fernandez, SPAIN<br/> Andreas Floros, GREECE<br/> Franco Frattolillo, ITALY<br/> Juan Frausto-Solis, MEXICO<br/> Richard Gallery, IRELAND<br/> Gao Gang-yi, CHINA<br/> Georgia Garani, GREECE<br/> Gloria Garcia, SPAIN<br/> Christos Georgiadis, GREECE<br/> Ahmad Ghanbari, IRAN<br/> Baluta Gheorghe, ROMANIA<br/> Ryszard Golanski, POLAND<br/> Alexander Grebennikov, MEXICO<br/> Andrea Guerriero, ITALY<br/> Oscar Gustafsson, SWEDEN<br/> Ofer Hadar, ISRAEL<br/> James Haralambides, USA<br/> Suhono Harso Supangkat, INDONESIA<br/> Hafiz Md. Hasan Babu, BANGLADESH<br/> Iraj Hassanzadeh, IRAN<br/> Mohsen Hayati, IRAN<br/> Maria Ines Herrero Platero, SPAIN<br/> Tzung-Pei Hong, TAIWAN<br/> Kuo-Hung Hou, TAIWAN<br/> Michel Houtermans, THE NETHERLANDS<br/> Chung-Yuan Huang, TAIWAN<br/> Zhou Huiwei, CHINA<br/> Ren-junn Hwang, TAIWAN<br/> Giuseppe Iazeolla, ITALY<br/> Mohamed Ibrahim, EGYPT<br/> Hirotaka Inoue, JAPAN<br/> Naohiro Ishii, JAPAN<br/> Yousuf Mahbulul Islam, BANGLADESH<br/> Juri Jatskevich, CANADA<br/> Cheng-chang Jeng, TAIWAN<br/> Zhang Jilong, CHINA<br/> Chanintorn Jittawiriyankoon, THAILAND </p> |
|---|--|

|                                       |                                   |
|---------------------------------------|-----------------------------------|
| HJ Kadim ,UNITED KINGDOM              | Liyang Mi, JAPAN                  |
| Rihard Karba, SLOVENIA                | Angelos Michalas, GREECE          |
| Stephen Karungaru, JAPAN              | Hannah Michalska, CANADA          |
| Theodore Kaskalis, GREECE             | Wasfy Mikhael, USA                |
| Victor Kasyanov, RUSSIA               | Manki Min, USA                    |
| Osamu Kata,i JAPAN                    | Huang Minhuan, CHINA              |
| Demetrios Kazakos, USA                | Mihai Mitrea, FRANCE              |
| Vladimir Kazakov, MEXICO              | Payman Moallem, IRAN              |
| Ahad Kazemi, IRAN                     | Nermin Mohamed, EGYPT             |
| Evangelos Kehris, GREECE              | Bouhdai Mohamed, MOROCCO          |
| Mohamad Khaldi, LEBANON               | Farah Mohammadi, CANADA           |
| George Kliros, GREECE                 | S. Amirhassan Monadjemi, IRAN     |
| Peter Kokol, SLOVENIA                 | Bartolomeo Montrucchio, ITALY     |
| Samad Kolahi,NEW ZEALAND              | Eduardo Mosqueira-rey, SPAIN      |
| Stavros Konstantinidis, CANADA        | FRANCESCO Muzi, ITALY             |
| Karamanos Konstantinos, BELGIUM       | Ibtissem Nafkha, TUNISIA          |
| Chorng-shiuh Koong, TAIWAN            | Benedek Nagy, HUNGARY             |
| Guennadi Kouzaev, NORWAY              | Sang-Won Nam, KOREA               |
| Aphrodite Ktena, GREECE               | Hamed Nassar, EGYPT               |
| Deniss Kumlander, ESTONIA             | Pavel Nevriva, CZECH REPUBLIC     |
| Cheng-chien Kuo, TAIWAN               | Cat Ho Nguyen, VIETNAM            |
| Ioannis Kyprianidis, GREECE           | Elena Niculescu, ROMANIA          |
| Dan Lascu, ROMANIA                    | Vincenzo Niola, ITALY             |
| Mihaela Lascu, ROMANIA                | Javad Nourinia, IRAN              |
| Ljubomir Lazic, YUGOSLAVIA            | Juan Jesus Ocampo-Hidalgo, MEXICO |
| Minh Hung Le, AUSTRALIA               | Koji Ohashi, JAPAN                |
| Shih-kai Lee, TAIWAN                  | Roland Olsson, NORWAY             |
| Dong-liang Lee, TAIWAN                | Igor Ozimek, SLOVENIA             |
| Seongkee Lee, KOREA                   | Antonio Pacheco, PORTUGAL         |
| Ioannis Gonos, GREECE                 | Zeljko Panian, CROATIA            |
| Yong Woo Lee, KOREA                   | Eunkwang Park ,SINGAPORE          |
| Huey-Ming Lee, TAIWAN                 | Jin Park, USA                     |
| Somchai Lekcharoen, THAILAND          | Federico Perez, SPAIN             |
| Vrasidas Leopoulos, GREECE            | Anna Perez, VENEZUELA             |
| Stephen C. H. Leung, HONG KONG S.A.R. | Sakthivel Periyasamy, INDIA       |
| Sheng-Tun Li, TAIWAN                  | Pisit Phokharatkul, THAILAND      |
| Chunshien Li, TAIWAN                  | Olivier Ponsini, FRANCE           |
| Ying Li, TAIWAN                       | Mircea Popa, ROMANIA              |
| Ioannis Stathopoulos, GREECE          | Dan Popescu, ROMANIA              |
| Yiming Li, TAIWAN,                    | Mihaela Popescu, ROMANIA          |
| Wen-Yew Liang, TAIWAN                 | Nenad Popovich NEW ZEALAND        |
| Ioan Lie, ROMANIA                     | Serafim Poriazis, GREECE          |
| S. S. Lin, TAIWAN                     | Ali Pouyan, IRAN                  |
| Wilfred Lin, HONG KONG S.A.R.         | Marius Preda, FRANCE              |
| Lily Lin, TAIWAN                      | Kostas Psannis, GREECE            |
| Nikos Bardis, GREECE                  | Sorapak Pukdesri, THAILAND        |
| Hongbo Liu, CHINA                     | Ioannis Stephanakis, GREECE       |
| Ismael Lopez-Juarez, MEXICO           | Mohammadreza Rafiei, IRAN         |
| Ye Lu, CHINA                          | Dejan Rancic, YUGOSLAVIA          |
| Xiaolin Lu, CHINA                     | Nicolas Ratier, FRANCE            |
| Dan Macodiyo, JAPAN                   | Rabin Raut, CANADA                |
| Zaigham Mahmood, UNITED KINGDOM       | Fuji Ren, JAPAN                   |
| Bang-on Makdee, THAILAND              | Dimitrios Rigas, UNITED KINGDOM   |
| Mrinal Manda,l CANADA                 | Addison Rios-Bolivar, VENEZUELA   |
| Athanasios Manikas, UNITED KINGDOM    | Francklin Rivas, VENEZUELA        |
| Umar Manzoor, PAKISTAN                | Mercedes Ruiz, SPAIN              |
| Marius Marcu, ROMANIA                 | Jean Saade, LEBANON               |
| Ioannis Mavridis, GREECE              | Raafat Saade, CANADA              |
| Yulin Mei, CHINA                      | Mohammad Ali Sadrnia, IRAN        |
| Elisabeth Metais, FRANCE              | Ma Sadrnia, IRAN                  |

|  |  |
|--|--|
| <p>Iwata Sakagami, JAPAN<br/> Bouhouche Salah, ALGERIA<br/> Enrique San Millan, SPAIN<br/> Usiel Sandler, ISRAEL<br/> Oscar SanJuan, SPAIN<br/> Michael Schwarz, GERMANY<br/> Milos Seda, CZECH REPUBLIC<br/> Tsang-Ling Sheu, TAIWAN<br/> Chao-Cheng Shih, TAIWAN<br/> Khalil Shihab, OMAN<br/> YUE Shihong, CHINA<br/> JeongYon Shim, KOREA<br/> Young-chul Shim, KOREA<br/> Jungpil Shin, JAPAN<br/> Vairis Shtrauss, LATVIA<br/> Carmen Simion, ROMANIA<br/> Dharmender Singh Kushwaha, INDIA<br/> Efstratios Skafidas, AUSTRALIA<br/> Suripon Somkuarnpanit, THAILAND<br/> Hua Song, CHINA<br/> Arnd Steinmetz, GERMANY<br/> Rodica Stoian, ROMANIA<br/> Mu-Chun Su, TAIWAN<br/> Pushpa Suri, INDIA<br/> Miroslav Svitek, CZECH REPUBLIC<br/> Feruglio Sylvain, FRANCE<br/> Sabin Tabirca, IRELAND<br/> Razvan Tanasie, ROMANIA<br/> Shaohua Tang, CHINA<br/> Wang Tao, CHINA<br/> Stanislaw Tarasiewicz, CANADA<br/> Domenico Tegolo, ITALY<br/> Kah leng Ter, SINGAPORE<br/> Spyros Tragoudas, USA<br/> Issa Traore, CANADA<br/> Tsung-Han Tsai, TAIWAN<br/> Ruey-Chyn Tsaur, TAIWAN<br/> Shian-Shyong Tseng, TAIWAN<br/> John Tsiligaridis, USA<br/> Kazuhiko Tsuda, JAPAN<br/> Hassan Ugail, UNITED KINGDOM<br/> George Vachtsevanos, USA<br/> Hans Vandierendonck, BELGIUM</p> | <p>Ioannis Vardiambasis, GREECE<br/> Francisco Vasques, PORTUGAL<br/> Andreas Veglis, GREECE<br/> Carlos Velez, COLOMBIA<br/> Fernando Vidal, SPAIN<br/> Aristidis Vlachos, GREECE<br/> Luige Vladareanu, ROMANIA<br/> Mirela-Catrinel Voicu, ROMANIA<br/> Konstantinos Voudouris, GREECE<br/> Toshio Wakabayashi, JAPAN<br/> Shuming Wang, TAIWAN<br/> Yi-shun Wang, TAIWAN<br/> Ruye Wang, UNITED STATES<br/> Lin Wilfred, HONG KONG S.A.R.<br/> Kenneth K.Y. Wong, HONG KONG S.A.R.<br/> Lai Wuxing, CHINA<br/> Tianbing Xia, AUSTRALIA<br/> Weiwen Xu, FRANCE<br/> Koichi Yamada, JAPAN<br/> Kiyotaka Yamamura, JAPAN<br/> Thomas Yang, USA<br/> Hung-Jen Yang, TAIWAN<br/> Sheng-Yuan Yang, TAIWAN<br/> Kapseung Yang, KOREA<br/> Shun-Ren Yang, TAIWAN<br/> Hung-Jen Yang, TAIWAN<br/> Ping-Jer Yeh, TAIWAN<br/> Jyh-haw Yeh, UNITED STATES<br/> Hsu-Chun Yen, TAIWAN<br/> Eng-Thiam Yeoh, MALAYSIA<br/> Huifen Ying, CHINA<br/> Tetsuya Yoshida, JAPAN<br/> Enhai Yu, CHINA<br/> Jian Yu, CHINA<br/> Eugen Zaharescu, ROMANIA<br/> Nadia Zanzouri, TUNISIA<br/> Daniel Zapico, SPAIN<br/> Malika Zazi, MOROCCO<br/> Wenyu Zhang, CHINA<br/> Hong Zheng, CHINA<br/> Hong Zhu, UNITED KINGDOM<br/> Stelios Zimeras, GREECE<br/> Blaz Zmazek, SLOVENIA</p> |
|--|--|

**ADDITIONAL REVIEWERS:**

|  |   |
|--|---|
| <p>Deepal Dahiya, INDIA<br/> Leyla Y. Tokman, TURKEY<br/> Li Bing Nan, MACAU<br/> Mircea Dobriceanu, ROMANIA<br/> Narongrit Waraporn, THAILAND<br/> Suhono Harso Supangkat, INDONESIA<br/> Pavel Todorov Stoyno, BULGARIA<br/> Debasis Ghosh, INDIA<br/> George Mavrommatis, GREECE<br/> Shariful Hasan Shaikot, USA</p> | <p>Kin-Yeung Wong, CHINA<br/> Por Lip Yee, MALAYSIA<br/> Terje Gjengedal, NORWAY<br/> B. De Baets, BELGIUM<br/> M. Holena, CZECH REPUBLIC<br/> R. Nakkeeran, INDIA<br/> T. D. Popescu, ROMANIA<br/> S. Tenqchen, TAIWAN<br/> F. G. Crespi, SPAIN<br/> E. Ercelebi, TURKEY</p> |
|--|---|



## Preface

The book you are currently holding contains the Proceedings of the 11<sup>th</sup> WSEAS International Conference on COMPUTERS (July 26-28, 2007), which is a part of the 11<sup>th</sup> WSEAS CSCC (Circuits, Systems, Communications, Computers) Multiconference, Agios Nikolaos, Crete Island, Greece, July 23-28, 2007.

Computer Science continuously opens new horizons in our lives, while it's probably the science with the greatest impact on other sciences. Software Engineering, Hardware Engineering, Data Bases, Expert Systems, Artificial Intelligence, Knowledge Engineering, Industrial systems, Autonomic and autonomous systems, Knowledge data systems, Knowledge Mining, Web-based education, E-Activities (E-Commerce, E-Education, E-Health, E-Government), Security, Cryptology, Computer Vision, Intelligent Techniques, Computer Logic, Multimedia, Video Systems, Internet Technologies, Signal Processing, Image Processing, Language-Speech processing, Digital Systems Design, Remote Sensing, Quantum Computing, Nano-Computing, DNA Computing and Biologically Inspired Algorithms, Robotics, Computer Vision, Visualization and Virtualization, Computational Intelligence (Neural Networks, Fuzzy Logic, Evolutionary Computing), Cognitive Systems, Systems performance, Networking and Telecommunications, Digital Communications, Applied Electromagnetics (Microwaves, Antennas, Radar, Scattering), Numerical Analysis and Scientific Computation, Algorithms and Complexity, Graph Theory, Parallel and Distributed Systems, Supercomputing, Computers in Education are some of the most important branches of Modern Computer Science. Many papers from all these branches are published in this Volume.

The CSCC conference is organized annually by the World Scientific and Engineering Academy and Society (WSEAS) in collaboration with important university laboratories, academies and research centers. In 2007 the CSCC international multiconference was organized by WSEAS in collaboration with IARAS (<http://www.iaras.org>) and the Computer Science Laboratory of Hellenic Naval Academy. Several other universities laboratories contributed with special sessions and plenary lectures as one can see below. In 2008 it will be organized by WSEAS and Universidade do Algarve in Algarve, Portugal (June 11-13, 2008).

A variety of topics constituted the focus of paper submissions. Prominent lectures provided key-note speeches for the conference. Moreover, special sessions were organized, and invited lectures were given by well-known researchers.

For this CSCC conference, the Chairmen of the International Scientific Committee were:

Prof. Nikos E. Mastorakis, Hellenic Naval Academy, GREECE, Prof. Stamatios Kartalopoulos, University of Oklahoma, USA, Prof. Panos Pardalos, University of Florida, USA, Prof. Argyrios Varonides, University of Scranton, USA, Prof. Ioannis Pountourakis, National Technical University of Athens, GREECE, Prof. Valeri Mladenov, Technical University of Sofia, BULGARIA, Prof. Zoran Bojkovic, Technical University of Belgrade, SERBIA, Prof. Emmanuel Antonidakis, Techn. Educational Institute of Crete, GREECE

The Plenary Speeches of CSCC'07 were:

- *A New Look at Convexity, Duality, and Optimization*  
by Prof. Dimitri Bertsekas, MIT (Massachusetts Institute of Technology Lab. for Information and Decision Systems Cambridge, MA 02139, USA)
- *Key Technologies in Next Generation Optical Networks*  
by Prof. Leonid Kazovsky, Stanford University, USA
- *Numerical and Parametrical Optimisation for the Simulation of a Turbulent Combustion Phenomenon in a Well-Stirred Reactor in Steady State Conditions*  
by Professor Vincenzo Niola, Department of Mechanical Engineering for Energetic, University of Naples "Federico II", ITALY
- *Study of controllability of two-order singular systems under an algebraic point of view*  
by Prof. M. Isabel Garcia-Planas, Universitat Politecnica de Catalunya, Spain
- *System Identification with Quantized Observations*  
by Prof. Le Yi Wang, Wayne State University, Detroit, USA
- *Island hopping with Optical Wireless: deployment and security*  
by Prof. Stamatios Kartalopoulos, University of Oklahoma, USA
- *PEM Fuel Cells Using Neural Networks*  
by Prof. Jose Carlos Quadrado, Instituto Superior de Engenharia de Lisboa, Portugal
- *Information Aggregation as one of the Pillars of Intelligent Systems*  
by Prof. Imre J. Rudas, Institute of Intelligent Engineering Systems, John von Neumann Faculty of Informatics, Hungary
- *Non-Linear Symbolic Program Analysis for Increased Parallelization*  
by Prof. Kleanthis Psarris, Department of Computer Science, University of Texas at San Antonio, U.S.A.
- *Novel Transform Domain Principal Component Analysis(PCA) Techniques and Some Applications : Facial and Automatic Target Recognition*  
by Prof. Wasfy B Mikhael, School of Electrical Engineering and Computer Science, University of Central Florida, Orlando, Florida, USA
- *A Concurrent Modular Neural System for Pattern Recognition and its Applications in Biometrics and Satellite Imagery*  
by Prof. Victor-Emil Neagoe, Polytechnic University of Bucharest, Romania

We would like to thank all members of the organizing laboratories for their contribution to the organization of the conference.

The contents of this Book, together with the contents of 3 other books, are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: [www.worldses.org/indexes](http://www.worldses.org/indexes).

In addition, the papers of this book are permanently available to all the scientific community via the WSEAS E-Library. Another additional feature of CSCC'07 was that the WSEAS society provided the participants with a username and password without an expiry date for on-line access in the WSEAS Conference proceedings (1996 -...).

Expanded and enhanced versions of papers published in these conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, Compendex, INSPEC, CSA .... see: [www.worldses.org/indexes](http://www.worldses.org/indexes) ) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal).

We cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

The Editors

# 11th WSEAS International Conference on COMPUTERS

## TABLE OF CONTENTS

|  |    |
|--|----|
| <b>Ontological Scheme for Intelligent Database</b><br><i>Ana Munoz, Jose Aguilar</i>   | 1  |
| <b>An Evolutionary Data Clustering Algorithm</b><br><i>Jose Aguilar</i>  | 7  |
| <b>Optimization of Memory System in Real-Time Embedded Systems</b><br><i>A. R. Mahajan, M. S. Ali</i>  | 13 |
| <b>The V4DB Testbed - Evaluating of Real-Time Database Transaction Processing Strategies</b><br><i>Vaclav Krol, Jan Pokorny</i>  | 20 |
| <b>Human Computer Interaction based on Hand Gesture Ontology</b><br><i>Lawrence Y. Deng, Dong-Liang Lee, Yi-Jen Liu, Nick C. Tang</i>                                  | 26 |
| <b>An Ontological Multi-Agent System for Web Services</b><br><i>Sheng-Yuan Yang</i>  | 32 |
| <b>Video Event Mining and Content Management System Using Shot Ontology Description</b><br><i>Dong-Liang Lee, Lawrence Y. Deng, Yi-Jen Liu, Nick C. Tang</i>           | 38 |
| <b>OWLET: An Object-Oriented Environment for OWL Ontology Management</b><br><i>Agostino Poggi</i>  | 44 |
| <b>Security Analysis of Batch Verification on Identity-based Signature Schemes</b><br><i>Han-Fei Chiang, Sung-Ming Yen, Hsi-Chung Lin</i>                              | 50 |
| <b>An Application of Data Mining Technique in Engineering to Facilitate Production Management of Garments</b><br><i>Hai-Fen Lin, Chih-Hung Hsu, Mao-Jiun J. Wang</i>   | 56 |
| <b>A Web-Based Comparative Analysis Decision Support System: Wedding Arch</b><br><i>L. Y. Por, R. F. Boey, T. F. Ang, C. S. Liew</i>                                   | 62 |
| <b>Setting of Moving Object Location with Optimized Tree Structure</b><br><i>Ognian Nakov, Dessislava Petrova</i>  | 67 |
| <b>An Evaluation of Test Statistics for Detecting Level Change in BL(1,1,1,1) Models</b><br><i>Ibrahim Mohamed, Azami Zaharim, Shahrum Abdullah, Mohd. Sahar Yahya</i> | 72 |
| <b>A Decomposition Problem of a Natural Number for a Rectangular Cutting-Covering Model</b><br><i>Paul Iacob, Daniela Marinescu, Kinga Kiss-Iakab</i>                  | 76 |
| <b>A Topological Order for a Rectangular Covering Problem</b><br><i>Daniela Marinescu, Paul Iacob, Kinga Kiss-Iakab</i>  | 82 |
| <b>Self-Referencing Agents for Inductive Non-Algorithmic e-Learning</b><br><i>Iulian Pah, Andrei Moiceanu, Ioana Moisil, Boldur E. Barbat</i>                          | 86 |
| <b>Godelian Self-Reference in Agent-Oriented Software</b><br><i>Boldur E. Barbat, Andrei Moiceanu, Iulian Pah</i>  | 92 |

|  |     |
|--|-----|
| <b>A Lane-Changing Model Based on Queue Length at an Urban Signalised Intersection</b><br><i>Amiruddin Ismail, Shahrum Abdullah, Azami Zaharim, Ibrahim Ahmad</i>                    | 98  |
| <b>An Iterative Method for Finite-Element Solutions of the Nonlinear Poisson-Boltzmann Equation</b><br><i>Ren-Chuen Chen</i>   | 103 |
| <b>Specifying Module Interfaces with Finitely Defined Automata</b><br><i>Ryszard Janicki</i>   | 108 |
| <b>Computational Results for Integral Modeling in some Problems of Electrical Engineering</b><br><i>Lechoslaw Hacia, Karol Bednarek, Andrzej Tomczewski</i>                          | 114 |
| <b>Adaptive Testing System Modeled Through Fuzzy Logic</b><br><i>J. Suarez-Cansino, R. A. Hernandez-Gomez</i>  | 120 |
| <b>Fuzzy Membership, Partial Aggregation and Reinforcement in Multi-Sensor Data Fusion</b><br><i>S. Banerjee</i>   | 125 |
| <b>Intelligent Sensor Fault Detection and Identification for Temperature Control</b><br><i>Seda Postalcioglu, Kadir Erkan, Emine Dogru Bolat</i>                                     | 131 |
| <b>Multi-Objective Pareto Optimization of Centrifugal Pump Using Genetic Algorithms</b><br><i>N. Nariman-Zadeh, N. Amanifard, A. Hajiloo, P. Ghalandari, B. Hoseinpoor</i>           | 135 |
| <b>Improving SVM Classifiers Training Using Artificial Samples</b><br><i>A. Labeled, M. Nadil, D. E. Daouadi</i>   | 140 |
| <b>New Self-Organizing Maps with Non-Conventional Metrics and Their Applications for Iris Recognition and Automatic Translation</b><br><i>Victor-Emil Neagoe</i>                     | 145 |
| <b>Predicate Gates for Spatial Logic</b><br><i>Guennadi A. Kouzaev, Atanas N. Kostadinov</i>   | 151 |
| <b>The Implementation of a Relationship Database In Hidrology. HYDROweb Application</b><br><i>Emil Marin Popa, Mihai Voda, Calin Avram, Alina Elena Pitic, Cristina Elena Raulea</i> | 157 |
| <b>Advanced Modelling for E-Learning Platforms</b><br><i>Eduard A. Stoica, Bogdan A. Brumar</i>  | 162 |
| <b>A Highest-Label Preflow Algorithm for the Minimum Flow Problem</b><br><i>Laura Ciupala, Eleonor Ciurea</i>  | 167 |
| <b>Basic Blocks and Traces for Intermediate Representation</b><br><i>Ioan Daniel Hunyadi</i>   | 171 |
| <b>Production Planning by Shuffle Operation</b><br><i>Adalbert Golomety, Alina Pitic, Iulia Golomety, Antoniu Pitic</i>  | 177 |
| <b>WMHAS Model for Improvement Document Classification</b><br><i>Ioan Pop</i>  | 183 |
| <b>Performance Analysis of MANET Clustering Algorithm in Group Mobility Model</b><br><i>Xiao-Hui Kuang, Gang Zhao, Yong Guo, Ming Liang</i>  | 189 |
| <b>Associativity based Clustering Algorithm in Mobile Ad Hoc Networks</b><br><i>Gang Zhao, Xiao-Hui Kuang, Yong Guo</i>  | 194 |

|  |     |
|--|-----|
| <b>A Workflow based Academic Management System using Multi Agent Approach</b><br><i>Syed Imran Jami, Zubair A. Shaikh</i>  | 201 |
| <b>Wireless Sensor Network: Channel Propagation Measurements and Comparison With Simulation</b><br><i>Weilian Su, Mohamad Alzaghal</i>   | 207 |
| <b>QoS-Enabled Integration of Wireless Sensor Networks and the Internet</b><br><i>Weilian Su, Bassam Almaharmeh</i>  | 213 |
| <b>Multi-Agent Information System for the Assistance to Urban Mobility</b><br><i>Hayfa Zgaya, Slim Hammadi</i>   | 219 |
| <b>Parallel Homologous Search with Hirschberg Algorithm: A Hybrid MPI-Pthreads Solution</b><br><i>Nuraini Abdul Rashid, Rosni Abdullah, Abdullah Zawawi Hj. Talib</i>  | 227 |
| <b>Minimum PACS System based on DICOM Standard</b><br><i>Armando Jimenez-Herrera, Carlos Aviles-Cruz, Rene Arechiga-Martinez</i>   | 233 |
| <b>Application of Stochastic Learning Automata to Intelligent Vehicle Control</b><br><i>Florin Stoica, Emil M. Popa</i>  | 240 |
| <b>Fix Point Internal Hierarchy Specification for Context Free Grammars</b><br><i>Vasile Craciunean, Ralf Fabian, Daniel Hunyadi, Emil Marin Popa</i>  | 246 |
| <b>The Simulation of the Fields of Flow and Temperature into a Furnace of a Burning Installation with Methane as Consequence the Variation of Heat Density of Burners Using the Finite Element Method</b><br><i>Mihai D. L. Talu, Stefan D. L. Talu, Mihai Negru</i> | 251 |
| <b>Advanced Techniques for Metamodelling</b><br><i>Bogdan A. Brumar, Emil M. Popa</i>  | 257 |
| <b>The Simulation with the Finite Element Method of the Velocity and Temperature Fields for a Nonturbionar Jet Burner of 35MW Feeding with Pulverized Coal</b><br><i>Mihai D. L. Talu, Stefan D. L. Talu, Mihai Negru</i>  | 262 |
| <b>Computer-Aided Semiosis. Threads, Trends, Threats</b><br><i>Boldur E. Barbat, Sorin C. Negulescu, Alina E. Lascu, Emil M. Popa</i>  | 268 |
| <b>Multi Level Recursive Specifications for Context Free Grammars</b><br><i>Vasile Craciunean, Cristina Aron, Ralf Fabian, Daniel Hunyadi</i>  | 274 |
| <b>Internet Usage for Health-Related Purposes among Greek Consumers</b><br><i>Daphne Halkias, Nicholas Harkiolakis, Paul Thurman, Sylva Caracatsanis</i>   | 280 |
| <b>IDD Personalizing Model</b><br><i>L. Y. Por</i>   | 289 |
| <b>Development of a Grid-based Learning Management System</b><br><i>Felicia Ionescu, Vlad Nae, Elena-Cristina Stoica</i>   | 294 |
| <b>Taxonomy Learning for Semantic Annotation of Web Services</b><br><i>Viorica R. Chifu, Ioan Salomie, Emil St. Chifu</i>  | 299 |
| <b>Designing E-portfolio Module for Open Source LMS</b><br><i>Marjan Krasna, Branko Kaucic</i>   | 305 |
| <b>An Automated Approach to Assessment Management of Higher Education Institutions</b><br><i>Nicholas Harkiolakis</i>  | 311 |

|  |     |
|--|-----|
| <b>Employing Melanoma Diagnosis Support using Ajax and Topic Maps</b><br><i>A. Papastergiou, A. Hatzigaidas, G. Tryfon, D. Ioannidis, G. Grammatikopoulos</i>  | 317 |
| <b>An AsmL model for an Intelligent Vehicle Control System</b><br><i>Florin Stoica</i>   | 322 |
| <b>Approximation Properties of a Sequence of Linear and Positive Operators</b><br><i>Daniel Florin Sofonea</i>   | 328 |
| <b>On a Sequence of Approximation Operators Constructed by Means of Generating Functions for Binomial Polynomials</b><br><i>Emil C. Popa</i>   | 333 |
| <b>Finite Element Method in Modal Analysis of the IO 220 kV High Voltage Circuit Breaker Structure</b><br><i>Mihai Negru, Dumitru Bolcu, Ion Manea</i>   | 338 |
| <b>Software Systems Reliability Characteristics</b><br><i>Marian Pompiliu Cristescu, Gabriel Sofonea</i>   | 342 |
| <b>Seism Simulation of the SMEP 400kV High-Voltage Disconnecter Structure using Finite Element Method</b><br><i>Mihai Negru, Dumitru Bolcu, Ion Manea</i>  | 351 |
| <b>Logic Programs Using Semantic Trees</b><br><i>Ionela Maniu, Daniel Hunyadi, George Maniu</i>  | 355 |
| <b>The Formal Moulding in Economics</b><br><i>Mircea Iosif Neamtu, Emil Marin Popa</i>   | 361 |
| <b>An Interpolation Problem in Generalized Degree Polynomial Spaces</b><br><i>Dana Simian, Corina Simian</i>   | 366 |
| <b>Adaptive I frame Positioning for MPEG Bit Rate Improvement</b><br><i>H. Farouk</i>  | 371 |
| <b>Dynamic Autoregressive Neuromagnetic Causality Imaging (DANCI)</b><br><i>Richard E. Frye, Meng Hung Wu, George Zouridakis</i>   | 375 |
| <b>Live-Cell Image Enhancement using Centre Weighted Median Filter</b><br><i>Rosalina Abdul Salam, Tan Saw Keow, Nuraini Abdul Rashid</i>  | 381 |
| <b>Multilevel Scalable Compression System based on RWT</b><br><i>F. A. Perez, P. M. Iriondo, D. Orive-Revillas, I. Calvo-Gordillo</i>  | 385 |
| <b>Brain White Mater Differences Between Normal Subjects and ALS Patients Assessed by Diffusion Tensor Imaging</b><br><i>G. Zouridakis, C. Karmonik, M. C. Shih, E. Simpson, H. Haykal, S. H. Appel</i>        | 391 |
| <b>An Effective Automated Grading System for HCC in Biopsy Images</b><br><i>Y. H. Lai, P. W. Huang, P. L. Lin</i>  | 395 |
| <b>Minimum-Change Drawings for Labeled Graphs</b><br><i>Michael A. Bekos, Katerina Potika, Antonios Symvonis</i>   | 402 |
| <b>Digital Image Analysis for the Comparative Study of Skin Erythema After Skin Closure of Surgical Wounds</b><br><i>Sofia M. Parara, Andreas Manios, Eelco De Bree, Androniki Tosca, Dimitris D. Tsiftsis</i> | 408 |
| <b>How to Make a Simple and Robust 3D Hand Tracking Device Using a Single Camera</b><br><i>Andrea Bottino, Aldo Laurentini</i>   | 413 |

|  |     |
|--|-----|
| <b>Novel Transform Domain Principal Component Analysis (PCA) Techniques and Some Applications: Facial and Automatic Target Recognition</b> | 419 |
| <i>W. B. Mikhael, Moataz M. Abdelwahab, P. Ragothaman</i>  |     |
| <b>Traveling Salesperson Problem and Neural Networks. A Complete Algorithm in Matrix Form</b>  | 426 |
| <i>Nicolae Popoviciu, Mioara Boncut</i>  |     |
| <b>Implementation of CTL Model Checker Update</b>  | 431 |
| <i>Laura F. Cacovean, Emil M. Popa, Cristina I. Brumar</i>   |     |
| <b>Stigmergy-based Software Toolkit for Virtual Enterprises</b>  | 437 |
| <i>Ralf Fabian, Sorin Plesca</i>   |     |
| <b>Basic Software Components for Economic Processes Modeling, Simulation, Analysis and Optimization</b>                                    | 441 |
| <i>Cristina Elena Aron, Mircea Adrian Musan, Emil Marin Popa</i>   |     |
| <b>Modeling University as a Production Industry: A Quantitative Approach</b>   | 447 |
| <i>Zulkifli M. Nopiah, Abdul Halim Amat Kamaruddin, Wan Rosmanira Ismail, Shahrudin Abdullah, Ibrahim Ahmad</i>                            |     |
| <b>On Lagrange Multivariate Interpolation Problem in Generalized Degree Polynomial Spaces</b>  | 455 |
| <i>Corina Simian, Dana Simian</i>  |     |
| <b>Comparative Evaluation of the Recent Linux and Solaris Kernel Architectures</b>   | 459 |
| <i>Stergios Papadimitriou, Konstantinos Terzidis</i>   |     |
| <b>Efficiency of RINGO Algorithm for Large Terrain Rendering</b>   | 463 |
| <i>Aleksandar Dimitrijevic, Dejan Rancic</i>   |     |
| <b>Evaluation of User Cognitive Abilities for HCI</b>  | 468 |
| <i>Nebojsa Dordevic, Dejan Rancic, Aleksandar Dimitrijevic</i>   |     |
| <b>Why Use Case Driven Approach?</b>   | 474 |
| <i>Julijana Linic</i>  |     |
| <b>Voice Activity Detection Using Laplacian Model and UMP Test</b>   | 480 |
| <i>Keun Won Jang, Dong Kook Kim, Joon-Hyuk Chang</i>   |     |
| <b>Service Oriented Architecture: Tools and Technologies</b>   | 484 |
| <i>Zaigham Mahmood</i>   |     |
| <b>Service Oriented Architecture: A New Paradigm for Enterprise Application Integration</b>  | 490 |
| <i>Zaigham Mahmood</i>   |     |
| <b>Service Oriented Architecture: Potential Benefits and Challenges</b>  | 496 |
| <i>Zaigham Mahmood</i>   |     |
| <b>Workflow Models Enhanced with Process Algebra Verification for Industrial Business Processes</b>  | 501 |
| <i>Ioan Salomie, Tudor Cioara, Ionut Anghel, Mihaela Dinsoreanu, Tudor Ioan Salomie</i>  |     |
| <b>Computational Analysis of a Nonstationary Fatigue Data Using the ARIMA Approaches</b>   | 507 |
| <i>S. Abdullah, M. D. Ibrahim, A. Zaharim</i>  |     |
| <b>A Feasibility Study on the Use of a Remote Supercomputer in a Collaborative Virtual Environment with Force Feedback</b>                 | 513 |
| <i>Lucio T. De Paolis, Alessio Agrimi, Alessandro Zocco, Giovanni Aloisio</i>  |     |
| <b>Cooperating Systems Based on Maximal Graphs in Semantic Schemas</b>   | 517 |
| <i>Nicolae Tandareanu</i>  |     |



|  |     |
|--|-----|
| <b>ERP Information System Service Quality under a System Dynamics View</b><br><i>Ho-Li Yang, Chin-Huang Lin, Chih-Hung Hsu, Jing-Yi Horng</i>  | 523 |
| <b>Analysis &amp; Recommendations for the Management of COTS - Computer Off The Shelf - Software Projects</b><br><i>Mansoor Al-A'Ali, Seema Al-Mahmood</i>                             | 529 |
| <b>Achieving Organism Clustering Analysis by Using PC Cluster Architecture with MPI Techniques</b><br><i>Williams Tsai, Neng-Mu Shih, Kun-Lin Hsieh</i>                                | 535 |
| <b>An Implementation View on Job Shop Scheduling Based on CPM</b><br><i>Milos Seda</i>   | 540 |
| <b>Contributions to IT Security in Outsourcing</b><br><i>Norbert Neidenbach, Edwin Wolf, George Savii</i>  | 546 |
| <b>Mobile Multimedia for Improving the Administrative and Security Services</b><br><i>Cosmin Porumb, Sanda Porumb, Aurel Vlaicu, Bogdan Orza</i>                                       | 550 |
| <b>Automated Peer-to-Peer Security-Update Propagation Network</b><br><i>Zakiya M. Tamimi</i>   | 555 |
| <b>Authentication and Authorization User Management within a Collaborative Community</b><br><i>Sylvia Encheva, Sharil Tumin</i>  | 563 |
| <b>Digital Design of a Cryptographic card (LAM) Embedded Smart Card Reader</b><br><i>Panagiotis Margaronis, Kostantinos Lambrinouidakis, Stefanos Gritzalis, Emmanouil Antonidakis</i> | 569 |
| <b>Learning Patterns of Application Architecture by Looking at Code</b><br><i>Paulo Sousa</i>  | 575 |
| <b>C# and .NET Framework for uC Communication Protocol Implementation</b><br><i>C. D. Căleanu, V. Tiponut, I. Bogdanov, S. Ionel, I. Lie</i>   | 581 |
| <b>Real - Time Implementation of Petri Nets into PLC</b><br><i>Petr Pivonka, Ludek Chomat</i>  | 585 |
| <b>Design Steps for Developing Software Measurement Standard Etalons for ISO 19761 (COSMIC-FFP)</b><br><i>Adel Khelifi, Alain Abran</i>  | 590 |
| <b>Macula Precise Localization using Digital Retinal Angiographies</b><br><i>C. Marino, S. Pena, M. G. Penedo, J. Rouco, J. M. Barja</i>   | 599 |
| <b>On Parametric Model Estimation</b><br><i>Luminita Giurgiu, Mircea Popa</i>  | 606 |
| <b>A General Algorithm for Triangular Meshes Simplification</b><br><i>Bostjan Pivec, Vid Domiter</i>   | 611 |
| <b>Automated Cell Differentiation in Multispectral Microscopy</b><br><i>Shishir Shah, James Thigpen, Fatima Merchant</i>   | 616 |
| <b>Decision-Level Fusion for Vehicle Detection</b><br><i>Zehang Sun, George Bebis, Nikolaos Bourbakis</i>  | 622 |
| <b>Recognizing the Effects of Voluntary Facial Activations Using Heart Rate Patterns</b><br><i>Toni Vanhala, Veikko Surakka</i>  | 628 |
| <b>Viewpoints on Obtaining Aggregated Value Sets</b><br><i>Mirela-Catrinel Voicu, Gabriela Mircea</i>  | 633 |

|  |     |
|--|-----|
| <b>Method of Navigation of Autonomous Moving Object</b><br><i>Ognian Nakov, Desislava Petrova, Tasho Tashev</i>  | 639 |
| <b>Two Algorithms for Decomposition of a Numerical Semigroup as an Intersection of Irreducibles</b><br><i>M. B. Branco, Nuno Franco</i>  | 642 |
| <b>Graham's Anomalies in Case of Parallel Computation Electromagnetic Phenomena</b><br><i>Jakub Kolota, Jakub Smykowski, Slawomir Stepien</i>  | 646 |
| <b>Proposal to Improve Data Format Conversions for a Hybrid Number System Processor</b><br><i>Lucian Jurca, Aurel Gontean, Florin Alexa, Daniel-Ioan Curiac</i>  | 651 |
| <b>Algorithm for Defining the Distribution of Zeros of Random Polynomials</b><br><i>Efraim Shmerling</i>   | 657 |
| <b>Sing-a-Ring: a Custom Ring Tone Creation System for Mobile Platforms</b><br><i>Andrew Moedinger, Daniel Plante</i>  | 661 |
| <b>Planning and Management of the Production Factors based on the SCDA Framework</b><br><i>Jorge Chacal, Cesar Bravo, Jose Aguilar, Mariela Cerrada, Francisco Hidrobo, Franklin Rivas</i>                               | 667 |
| <b>Automatic Vehicle Location in Public Bus Transportation System</b><br><i>Bratislav Predic, Dejan Rancic, Dragan Stojanovic, Aleksandar Milosavljevic</i>  | 673 |
| <b>Comparative Evaluation of Multi Layer Perceptrons, to Hybrid Multi Layer Percetrons, with Multicriteria Hierarchical Discrimination and Logistic Regression in Corporate Financial Analysis</b><br><i>N. Loukeris</i> | 679 |
| <b>Corporate Financial Analysis with Efficient Logistic Regressions and Hybrids of Neuro-Genetic Networks</b><br><i>N. Loukeris</i>  | 687 |

## Authors Index

|                       |                     |                        |                       |                      |               |
|-----------------------|---------------------|------------------------|-----------------------|----------------------|---------------|
| Abdelwahab, M. M.     | 419                 | Chiang, H.-F.          | 50                    | Ioannidis, D.        | 317           |
| Abdul Rashid, N.      | 227, 381            | Chifu, E. St.          | 299                   | Ionel, S.            | 581           |
| Abdul Salam, R.       | 381                 | Chifu, V. R.           | 299                   | Ionescu, F.          | 294           |
| Abdullah, R.          | 227                 | Chomat, L.             | 585                   | Iriondo, P. M.       | 385           |
| Abdullah, S.          | 72, 98,<br>447, 507 | Cioara, T.             | 501                   | Ismail, A.           | 98            |
| Abran, A.             | 590                 | Ciupala, L.            | 167                   | Ismail, W. R.        | 447           |
| Agrimi, A.            | 513                 | Ciurea, E.             | 167                   | Jami, S. I.          | 201           |
| Aguilar, J.           | 1, 7, 667           | Craciunean, V.         | 246, 274              | Jang, K. W.          | 480           |
| Ahmad, I.             | 98, 447             | Cristescu, M. P.       | 342                   | Janicki, R.          | 108           |
| Al-A'Ali, M.          | 529                 | Curiac, D.-I.          | 651                   | Jimenez-Herrera, A.  | 233           |
| Alexa, F.             | 651                 | Daouadi, D. E.         | 140                   | Jurca, L.            | 651           |
| Ali, M. S.            | 13                  | De Bree, E.            | 408                   | Kamaruddin, A. H. A. | 447           |
| Almaharmeh, B.        | 213                 | De Paolis, L. T.       | 513                   | Karmonik, C.         | 391           |
| Al-Mahmood, S.        | 529                 | Deng, L. Y.            | 26, 38                | Kaucic, B.           | 305           |
| Aloisio, G.           | 513                 | Dimitrijevic, A.       | 463, 468              | Keow, T. D.          | 381           |
| Alzaghal, M.          | 207                 | Dinsoreanu, M.         | 501                   | Khelifi, A.          | 590           |
| Amanifard, N.         | 135                 | Domiter, V.            | 611                   | Kim, D. K.           | 480           |
| Ang, T. F.            | 62                  | Dordevic, N.           | 468                   | Kiss-Iakab, K.       | 76, 82        |
| Anghel, I.            | 501                 | Encheva, S.            | 563                   | Kolota, J.           | 646           |
| Antonidakis, E.       | 569                 | Erkan, K.              | 131                   | Kostadinov, A. N.    | 151           |
| Appel, S. H.          | 391                 | Fabian, R.             | 246, 274, 437         | Kouzaev, G. A.       | 151           |
| Arechiga-Martinez, R. | 233                 | Farouk, H.             | 371                   | Krasna, M.           | 305           |
| Aron, C. E.           | 274, 441            | Franco, N.             | 642                   | Krol, V.             | 20            |
| Aviles-Cruz, C.       | 233                 | Frye, R. E.            | 375                   | Kuang, X.-H.         | 189, 194      |
| Avram, C.             | 157                 | Ghalandari, P.         | 135                   | Labed, A.            | 140           |
| Banerjee, S.          | 125                 | Giurgiu, L.            | 606                   | Lai, Y. H.           | 395           |
| Barbat, B. E.         | 86, 92, 268         | Golometry, A.          | 177                   | Lambrinouidakis, K.  | 569           |
| Barja, J. M.          | 599                 | Golometry, I.          | 177                   | Lascu, A. E.         | 268           |
| Bebis, G.             | 622                 | Gontean, A.            | 651                   | Laurentini, A.       | 413           |
| Bednarek, K.          | 114                 | Grammatikopoulos, G.   | 317                   | Lee, D.-L.           | 26, 38        |
| Bekos, M. A.          | 402                 | Gritzalis, S.          | 569                   | Liang, M.            | 189           |
| Boey, R. F.           | 62                  | Guo, Y.                | 189, 194              | Lie, I.              | 581           |
| Bogdanov, I.          | 581                 | Hacia, L.              | 114                   | Liew, C. S.          | 62            |
| Bolat, E. D.          | 131                 | Hajiloo, A.            | 135                   | Lin, C.-H.           | 523           |
| Bolcu, D.             | 338, 351            | Halkias, D.            | 280                   | Lin, H.-C.           | 50            |
| Boncut, M.            | 426                 | Hammadi, S.            | 219                   | Lin, H.-F.           | 56            |
| Bottino, A.           | 413                 | Harkiolakis, N.        | 280, 311              | Lin, P. L.           | 395           |
| Bourbakis, N.         | 622                 | Hatzigaidas, A.        | 317                   | Linic, J.            | 474           |
| Branco, M. B.         | 642                 | Haykal, H.             | 391                   | Liu, Y.-J.           | 26, 38        |
| Bravo, C.             | 667                 | Hernandez-Gomez, R. A. | 120                   | Loukeris, N.         | 679, 687      |
| Brumar, B. A.         | 162, 257            | Hidrobo, F.            | 667                   | Mahajan, A. R.       | 13            |
| Brumar, C. I.         | 431                 | Horng, J.-Y.           | 523                   | Mahmood, Z.          | 484, 490, 496 |
| Cacovean, L. F.       | 431                 | Hoseinpoor, B.         | 135                   | Manea, I.            | 338, 351      |
| Caleanu, C. D.        | 581                 | Hsieh, K.-L.           | 535                   | Manios, A.           | 408           |
| Calvo-Gordillo, I.    | 385                 | Hsu, C.-H.             | 56, 523               | Maniu, G.            | 355           |
| Caracatsanis, S.      | 280                 | Huang, P. W.           | 395                   | Maniu, I.            | 355           |
| Cerrada, M.           | 667                 | Hung Wu, M.            | 375                   | Margaronis, P.       | 569           |
| Chacal, J.            | 667                 | Hunyadi, I. D.         | 171, 246,<br>274, 355 | Marinescu, D.        | 76, 82        |
| Chang, J.-H.          | 480                 | Iacob, P.              | 76, 82                | Marino, C.           | 599           |
| Chen, R.-C.           | 103                 | Ibrahim, M. D.         | 507                   | Merchant, F.         | 616           |
|                       |                     |                        |                       | Mikhael, W. B.       | 419           |

## Authors Index

|                    |                       |                  |  |                    |             |
|--------------------|-----------------------|------------------|--|--------------------|-------------|
| Milosavljevic, A.  | 673                   | Popa, E. C.      | 333  | Su, W.             | 207, 213    |
| Mircea, G.         | 633                   | Popa, E. M.      | 157, 240, 246,<br>257, 268, 361,<br>431, 441 | Suarez-Cansino, J. | 120         |
| Moedinger, A.      | 661                   |                  |  | Sun, Z.            | 622         |
| Mohamed, I.        | 72                    | Popa, M.         | 606  | Surakka, V.        | 628         |
| Moiceanu, A.       | 86, 92                | Popoviciu, N.    | 426  | Symvonis, A.       | 402         |
| Moisil, I.         | 86                    | Por, L. Y.       | 62, 289                                      | Talib, A. Z. H.    | 227         |
| Munoz, A.          | 1                     | Porumb, C.       | 550  | Talu, M. D. L.     | 251, 262    |
| Musan, M. A.       | 441                   | Porumb, S.       | 550  | Talu, S. D. L.     | 251, 262    |
| Nadil, M.          | 140                   | Postalcioglu, S. | 131  | Tamimi, Z. M.      | 555         |
| Nae, V.            | 294                   | Potika, K.       | 402  | Tandareanu, N.     | 517         |
| Nakov, O.          | 67, 639               | Predic, B.       | 673  | Tang, N. C.        | 26, 38      |
| Nariman-Zadeh, N.  | 135                   | Ragothaman, P.   | 419  | Tashev, T.         | 639         |
| Neagoe, V.-E.      | 145                   | Rancic, D.       | 463, 468, 673                                | Terzidis, K.       | 459         |
| Neamtu, M. I.      | 361                   | Raulea, C. E.    | 157  | Thigpen, J.        | 616         |
| Negru, M.          | 251, 262,<br>338, 351 | Rivas, F.        | 667  | Thurman, P.        | 280         |
|                    |                       | Rouco, J.        | 599  | Tiponut, V.        | 581         |
| Negulescu, S. C.   | 268                   | Salomie, I.      | 299, 501                                     | Tomczewski, A.     | 114         |
| Neidenbach, N.     | 546                   | Savii, G.        | 546  | Tosca, A.          | 408         |
| Nopiah, Z. M.      | 447                   | Seda, M.         | 540  | Tryfon, G.         | 317         |
| Orive-Revillas, D. | 385                   | Shah, S.         | 616  | Tsai, W.           | 535         |
| Orza, B.           | 550                   | Shaikh, Z. A.    | 201  | Tsiftsis, D. D.    | 408         |
| Pah, I.            | 86, 92                | Shih, M. C.      | 391  | Tumin, S.          | 563         |
| Papadimitriou, S.  | 459                   | Shih, N.         | 535  | Vanhala, T.        | 628         |
| Papastergiou, A.   | 317                   | Shmerling, E.    | 657  | Vlaicu, A.         | 550         |
| Parara, S. M.      | 408                   | Simian, C.       | 366, 455                                     | Voda, M.           | 157         |
| Pena, S.           | 599                   | Simian, D.       | 366, 455                                     | Voicu, M.-C.       | 633         |
| Penedo, M. G.      | 599                   | Simpson, E.      | 391  | Wang, M.-J. J.     | 56          |
| Perez, F. A.       | 385                   | Smykowski, J.    | 646  | Wolf, E.           | 546         |
| Petrova, D.        | 67, 639               | Sofonea, D. F.   | 328  | Yahya, M. S.       | 72          |
| Pitic, A. E.       | 157, 177              | Sofonea, G.      | 342  | Yang, H.-L.        | 523         |
| Pivec, B.          | 611                   | Sousa, P.        | 575  | Yang, S.-Y.        | 32          |
| Pivonka, P.        | 585                   | Stepien, S.      | 646  | Yen, S.-M.         | 50          |
| Plante, D.         | 661                   | Stoica, E. A.    | 162  | Zaharim, A.        | 72, 98, 507 |
| Plesca, S.         | 437                   | Stoica, E.-C.    | 294  | Zgaya, H.          | 219         |
| Poggi, A.          | 44                    | Stoica, F.       | 240, 322                                     | Zhao, G.           | 189, 194    |
| Pokorny, J.        | 20                    | Stojanovic, D.   | 673  | Zocco, A.          | 513         |
| Pop, I.            | 183                   |                  |  | Zouridakis, G.     | 375, 391    |