



12th IEEE International Conference

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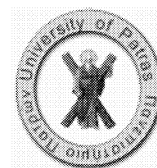
Emerging Technologies and Factory Automation

ETFA 2007 PROCEEDINGS

Volume 1 of 3

September 25-28, 2007

University of Patras, Greece



TECHNICAL PROGRAM

| | | | | | | | | |
|---|--|--|-------------------|--|--|--|--|--|
| Session: T1.1 | | | Room: I4 | | | Wednesday, Sep. 26, 11:30 - 13:00 | | |
| Communication in Automation Systems: Possibilities and Limitations | | | | | | | | |
| Chairing: Juergen Jasperneite, Alexander Fay | | | | | | | | |
| <i>Life-cycle Oriented Data Access for a Maintenance Framework</i> | | | | | | | | |
| <i>Andreas Gössling, Martin Wollschlaeger</i> | | | | | | 1 | | |
| <i>OWL Based Information Agent Services for Process Monitoring</i> | | | | | | | | |
| <i>Antti Pakonen, Teppo Pirttioja, Ilkka Seilonen, Teemu Tommila</i> | | | | | | 9 | | |
| <i>Limits of Increasing the Performance of Industrial Ethernet Protocols</i> | | | | | | | | |
| <i>Juergen Jasperneite, Markus Schumacher, Karl Weber</i> | | | | | | 17 | | |
| <i>Prediction of End-to-End Deadline Missing in Distributed Threads Systems</i> | | | | | | | | |
| <i>Patricia Della M ea Plentz, Carlos Montez, R mulo Silva de Oliveira</i> | | | | | | 25 | | |
| <i>Performance Evaluation and Prediction of a Bluetooth Based Real-Time Sensor Actuator System in Harsh Industrial Environments</i> | | | | | | | | |
| <i>Uwe Meier, Stefan Witte, Kai Helmig, Michael Hoeing, Markus Schnueckel, Hermann Krause</i> | | | | | | 33 | | |
| <i>Formalised specification of a test tool for safety related communication</i> | | | | | | | | |
| <i>Mathias M hlhause, Christian Diedrich, Matthias Riedl, Daniel Schmidt</i> | | | | | | 38 | | |
| Session: T6.1 | | | Room: I 10 | | | Wednesday, Sep. 26, 11:30 - 13:00 | | |
| Embedded Model Control and Emerging Ttechnologies | | | | | | | | |
| Chairing: E. Canuto, J. Ospina | | | | | | | | |
| <i>Embedded Model Control: principles and applications. Part I</i> | | | | | | | | |
| <i>Enrico Canuto, Luis David Prieto</i> | | | | | | 45 | | |
| <i>Embedded Model Control: principles and applications. Part II</i> | | | | | | | | |
| <i>Enrico Canuto, Luis David Prieto</i> | | | | | | 53 | | |
| <i>Embedded Model Control: sub-microradian horizontality of the Nanobalance thrust-stand</i> | | | | | | | | |
| <i>Enrico Canuto, Fabio Musso, Luca Massotti</i> | | | | | | 61 | | |
| <i>Emerging technologies in the ESA Science and Earth Observation Programme</i> | | | | | | | | |
| <i>Luca Massotti, Enrico Canuto</i> | | | | | | 69 | | |
| <i>Multilayer control of an optical reference cavity for space applications</i> | | | | | | | | |
| <i>Enrico Canuto, Jos  Ospina, Angelo Ripa, Fabio Musso, Franco Alasia, Fabrizio Bertinetto, Marco Bisi, Paolo Cordiale</i> | | | | | | 77 | | |
| Session: T3.1 | | | Room: I 11 | | | Wednesday, Sep. 26, 11:30 - 13:00 | | |
| Scheduling and Resource Management | | | | | | | | |
| Chairing: Bjorn Anderson, Luigi Sassoli | | | | | | | | |
| <i>Sensitization of Symbolic Runs in Real-Time Testing Using the ORIS Tool</i> | | | | | | | | |
| <i>Enrico Vicario, Luigi Sassoli, Laura Carnevali</i> | | | | | | 85 | | |
| <i>Virtual Execution Environment for Real-Time TDL Components</i> | | | | | | | | |
| <i>Claudiu Farcas, Wolfgang Pree</i> | | | | | | 93 | | |
| <i>Deriving Exact Stochastic Response Times of Periodic Tasks in Hybrid Priority-driven Soft Real-time Systems</i> | | | | | | | | |
| <i>Giordano Kaczynski, Lucia Lo Bello, Thomas Nolte</i> | | | | | | 101 | | |
| <i>Uniprocessor Scheduling Under Time-Interval Constraints</i> | | | | | | | | |
| <i>F bio Rodrigues de la Rocha, R mulo Silva de Oliveira, Carlos Montez</i> | | | | | | 111 | | |
| <i>Resource Management for Dynamically-Challenged Reconfigurable Systems</i> | | | | | | | | |
| <i>Muhammad Hasan, Sotirios Ziavras</i> | | | | | | 119 | | |
| <i>Reliable Scheduling of a Distributed Real-time Embedded Application Considering Common Cause Failures</i> | | | | | | | | |

| Session: SS2.1 | Room: I 12 | Wednesday, Sep. 26, 11:30 - 13:00 |
|--|-------------------|--|
| Emerging Technologies to Enable Integrated Manufacturing and Service Systems (IMSS) | | |
| Chairing: Goh Kiah Mok, Cristian Vasar | | |
| <i>A Rapid Configurable Embedded Development Framework</i> | | |
| <i>Kiah Mok Goh, Benny Tjahjono, Anton J.R. Aendenrooier</i> | | 135 |
| <i>The Wireless Sensor Networks for Factory Automation: Issues and Challenges</i> | | |
| <i>L.Q. Zhuang, K.M. Goh, J.B. Zhang</i> | | 141 |
| <i>A Service Based Multi-Agent System Design Tool for Modeling Integrated Manufacturing and Service Systems</i> | | |
| <i>Han Yu, Zhiqi Shen, Chunyan Miao, Jing Wen, Qizhen Yang</i> | | 149 |
| <i>Model-based Monitoring and Failure Detection Methodology for Ball-nose End Milling</i> | | |
| <i>Sheng Huang, Kiah Mok Goh, Yoke San Wong, Geok Soon Hong, Kah Chuan Shaw</i> | | 155 |
| <i>Fault Detection Methods for Frequency Converters Fed Induction Machines</i> | | |
| <i>Lucian Mihet, Octavian Prosteian, Ioan Filip, Iosif Szeidert, Cristian Vasar</i> | | 161 |
| <i>Semantic Enhancement and Ontology for Interoperability in Integration of Design Information Systems</i> | | |
| <i>Qizhen Yang, Chunyan Miao</i> | | 169 |

| Session: T2.1 | Room: I4 | Wednesday, Sep. 26, 14:30 - 16:00 |
|---|-----------------|--|
| Wireless Industrial Communications | | |
| Chairing: Christos Koulamas, Julian Proenza | | |
| <i>Development and Performance Evaluation of an Antenna Diversity Module for Industrial Communication based on IEEE 802.15.4</i> | | |
| <i>Andreas Vedral, Thomas Kruse, Jörg Wollert</i> | | 177 |
| <i>Reasoning about communication latencies in real WLANs</i> | | |
| <i>Claudio Zunino, Gianluca Cena, Ivan Cibrario Bertolotti, Adriano Valenzano</i> | | 187 |
| <i>Fast Hand Off for Mobile Wireless Process Control</i> | | |
| <i>Orazio Mirabella, Lucia Lo Bello, Antonino Raucea, Michele Brischetto</i> | | 202 |
| <i>The Use of Clustered Wireless Mesh Networks in Industrial Settings</i> | | |
| <i>Urban Bilstrup, Katrin Bilstrup, Bertil Svensson, Per-Arne Wiberg</i> | | 211 |
| <i>Requirements, Drivers and Analysis of Wireless Sensor Network Solutions for the Oil & Gas Industry</i> | | |
| <i>Stig Petersen, Paula Doyle, Christian Salbu Aasland, Svein Vatland, Trond Michael Andersen, Dag Sjong</i> | | 219 |

| Session: T8 | Room: I 10 | Wednesday, Sep. 26, 14:30 - 16:00 |
|---|-------------------|--|
| Computational Intelligence in Automation | | |
| Chairing: E. Man, J. Tar | | |
| <i>Modeling Supply Chain's Reconfigurability using Fuzzy Logic</i> | | |
| <i>Bin Ma, Laura Xu, Roland Lim</i> | | 234 |
| <i>On the Application of Recurrent Neural Network Techniques for Detecting Instability Trends in an Industrial Process</i> | | |
| <i>Eva Portillo, Itziar Cabanes, Marga Marcos, Asier Zubizarreta</i> | | 242 |
| <i>Intelligent Control in Automation Based on Wireless Traffic Analysis</i> | | |
| <i>Kurt W. Derr, Milos Manic</i> | | 249 |
| <i>On-line Identification of Hybrid Systems Using an Adaptive Growing and Pruning RBF Neural Network</i> | | |
| <i>Tohid Alizadeh, Karim Salahshoor, Mohammad Reza Jafari, Abdollah Alizadeh, Mehdi Gholami</i> | | 257 |

Session: T5.1 **Room: I 11** **Wednesday, Sep. 26, 14:30 - 16:00**
Architectures, Methods and Technologies for Enterprise Integration
Chairing: Rei Itsuki, Jose Lastra

| | |
|--|-----|
| <i>Impact of the Delay of Subcontracting in a Context of Integrated Maintenance: Analytical Approach</i> <i>Mohammed Dahane, Christian Clementz, Nidhal Rezg</i> | 273 |
| <i>Development of Communications Protocols between Manufacturing Execution System and Production Equipment</i> <i>Satoshi Iwatsu, Yuji Watanabe, Kiminobu Kodama</i> | 280 |
| <i>On Ontology Mapping in Factory Automation Domain</i> <i>Corina Popescu, Jose L. Martinez Lastra</i> | 288 |
| <i>Integration of SOA-ready Networked Embedded Devices in Enterprise Systems via a Cross-Layered Web Service Infrastructure</i> <i>Stamatis Karnouskos, Oliver Baecker, Luciana Moreira Sa de Souza, Patrik Spiess</i> | 293 |
| <i>An Information Management System in Inter-organization Supply Chain by Secure RFID Tag</i> <i>Kazuhiro Kawashima, Norihisa Komoda</i> | 301 |
| <i>An Approach for Integrating Real and Virtual Production Automation Devices Applying the Service-oriented Architecture Paradigm</i> <i>Daniel Cachapa, Armando Colombo, Martin Feike, Axel Bepperling</i> | 309 |

Session: SS2.2 **Room: I 12** **Wednesday, Sep. 26, 14:30 - 16:00**
Planning and Integration Technologies for Manufacturing and Service Systems
Chairing: Angle Goh, He Wei

| | |
|--|-----|
| <i>Web 2.0 Concepts and Technologies for Dynamic B2B Integration</i> <i>Chong Minsk Goh, Siew Poh Lee, Wei He, Puay Siew Tan</i> | 315 |
| <i>Composing OWL-S Web Services</i> <i>B.D. Tran, P.S. Tan, A. Goh</i> | 322 |
| <i>An Investigative Approach on Improving B2B Interactions and Communication Capabilities for Enterprise Integration using Web 2.0 Technologies</i> <i>Wei He, Puay Siew Tan, Chong Minsk Goh, Siew Poh Lee, Eng Wah Lee</i> | 330 |
| <i>Common Capacity Modelling for Multi-site Planning: Case Studies</i> <i>F.Y. Wang, T.J. Chua, T.X. Cai, L.S Chai</i> | 336 |

Session: T1.2 **Room: I4** **Wednesday, Sep. 26, 16:30 - 18:00**
IT in the Design Process of Automation Systems
Chairing: Alexander Fay, Juergen Jasperneite

| | |
|--|-----|
| <i>Introducing the Modeling and Verification process in SysML</i> <i>Marcos Vinicius Linhares, Rômulo Silva de Oliveira, Jean-Marie Farines, François Vernadat</i> | 344 |
| <i>Automated PLC Software Generation Based on Standardized Digital Process Elements</i> <i>Martin Bergert, Jens Kiefer, Christian Diedrich, Thomas Bär</i> | 352 |
| <i>A rule format for industrial plant information reasoning</i> <i>Till Schmidberger, Alexander Fay</i> | 360 |
| <i>Software Quality Measures to determine the Diagnosability of PLC Applications</i> <i>Mohammed Bani Younis, Georg Frey</i> | 368 |
| <i>Engineering Components for Flexible and Interoperable Real-Time Distributed Supervision and Control Systems</i> <i>Sandro Andrade, Raimundo Macêdo</i> | 376 |
| <i>Interactively Configurable Framework for Industrial Agents</i> | |

| | |
|---|-----|
| <i>Sebastian Theiss, Joern Ploennigs, Volodymyr Vasyutynskyy, Jens Naake, Klaus Kabitzsch</i> | 384 |
| <i>A Linear Programming Based Heuristic for Solving a Two-Stage Flowshop Scheduling Problem</i> <i>Ewa Figielska</i> | 392 |

Session: T6.2 Room: I 10 Wednesday, Sep. 26, 16:30 - 18:00

Industry/Bank Automation

Chairing: R. Vilanova, F. Koumboulis

| | |
|---|-----|
| <i>A Survey on Automata-based Methods for Modelling and Simulation of Industrial Systems</i> <i>Vasilis Deligiannis, Stamatias Manesis</i> | 398 |
| <i>On the automatic generation of timed automata models from ISA 5.2 diagrams</i> <i>Luiz Paulo Barbosa, Kyller Gorgônio, Antonio Marcus Lima, Angelo Perkusich, Leandro Silva</i> | 406 |
| <i>Bank Note Classification Using Neural Networks</i> <i>Sigeru Omatu, Michifumi Yoshioka, Toshihisa Kosaka</i> | 413 |
| <i>Feedforward Control for uncertain systems. Internal Model Control approach</i> <i>Ramon Vilanova</i> | 418 |

Session: T4 Room: I 11 Wednesday, Sep. 26, 16:30 - 18:00

Intelligent Sensors and Sensor Networks

Chairing: Pedro M. Ruiz Martinez, Paul M. Havinga

| | |
|---|-----|
| <i>Utilising Noise Effects on Infrared Pattern Reception for Position Estimation on a Grid Plane</i> <i>Nikos Petrellis, Nikos Konofaos, George Alexiou</i> | 426 |
| <i>A Tight Lower Bound for Art Gallery Sensor Location Algorithms</i> <i>Andrea Bottino, Aldo Laurentini, Luisa Rosano</i> | 434 |
| <i>Implementation and Evaluation of a Hybrid Network utilizing TinyOS-based systems and Ethernet</i> <i>Angelos Anastasopoulos, Dimitrios Tsitsipis, Spilios Giannoulis, Stavros Koubias</i> | 441 |
| <i>SensorScheme: Supply Chain Management Automation using Wireless Sensor Networks</i> <i>Leon Evers, Paul Havinga, Jan Kuper, Maria Lijding, Nirvana Meratnia</i> | 448 |
| <i>METATRO: A Real Time RFID enabled haulage monitoring system for perishable comestibles</i> <i>George Asimakopoulos, Spiros Loubros, Vassilis Triantafyllou</i> | 456 |
| <i>Performance Evaluation of Instrumentation Sensor Network Design Using a Data Reconciliation Technique Based on the Unscented Kalman Filter</i> <i>Karim Salahshoor, Mohammad Reza Bayat, Mohsen Mosallaei</i> | 460 |
| <i>50 Ways to Build your Application: A Survey of Middleware and Systems for Wireless Sensor Networks</i> <i>Ioannis Chatzigiannakis, Georgios Mylonas, Sotiris Nikolettseas</i> | 466 |

Session: SS1.1 Room: I 12 Wednesday, Sep. 26, 16:30 - 18:00

The IEC 61499 Function Block Model in Control and Automation

Chairing: Kleanthis Thramboulidis, Georg Frey

| | |
|---|-----|
| <i>Benchmarking of IEC 61499 runtime environments</i> <i>Christoph Sünder, Alois Zoitl, Hermann Rofner, Thomas Strasser, Jeroen Brunnenkreef</i> | 474 |
| <i>Educational Approaches for the Industrial Acceptance of IEC 61499</i> <i>Seppo A Sierla, James H Christensen, Kari O Koskinen, Jukka P Peltola</i> | 482 |
| <i>Incorporating Industrial Experience to IEC 61499 Based Development Methodologies and Toolsets</i> <i>Mika P. Strömman, Kleanthis C. Thramboulidis, Seppo A. Sierla, Nikolaos Papakonstantinou, Kari O. Koskinen</i> | 490 |
| <i>Implementing IEC 61499 Communication with the CIP Protocol</i> <i>Frans Weehuizen, Aidan Brown, Christoph Sünder, Oliver Hummer</i> | 498 |
| <i>Deployment of IEC 61499 Compliant Distributed Control Applications</i> | |

| | |
|--|-----|
| <i>Tanvir Hussain, Georg Frey</i> | 502 |
| <i>Integrating CNet and IEC 61499 function blocks</i> | |
| <i>Nils Hagge</i> | 506 |

Session: SS3 Room: I4 Thursday, Sep. 27, 11:00 - 12:30
Methods and Instrumentation for Performance Measurement in Real-time Networks
Chairing: Alessandra Flammini, José A. Fonseca

| | |
|---|-----|
| <i>Precision of Ethernet Measurements based on Software Tools</i> | |
| <i>Ivan Schafer, Max Felser</i> | 510 |
| <i>Delay Measurement System for Real-Time Serial Data Streams</i> | |
| <i>Paulo Bartolomeu, Valter Silva, José Fonseca</i> | 516 |
| <i>A new distributed instrument for Real Time Ethernet networks: experimental tests and characterization</i> | |
| <i>Paolo Ferrari, Alessandra Flammini, Daniele Marioli, Andrea Taroni</i> | 524 |
| <i>Measuring the impact of vertical integration on response times in Ethernet fieldbuses</i> | |
| <i>Bruno Denis, Silvain Ruel, Jean-Marc Faure, Gaëlle Marsal, Georg Frey</i> | 532 |
| <i>Measuring Real Time Performances of PC-based Industrial Control Systems</i> | |
| <i>Micaela Caserza Magro, Paolo Pinceti</i> | 540 |

Session: T6.3 Room: I 10 Thursday, Sep. 27, 11:00 - 12:30
Control Theory and Applications
Chairing: A. Tzes, L. Massotti

| | |
|---|-----|
| <i>Stability margins characterization of a combined Servo/Regulation tuning for PID controllers</i> | |
| <i>Orlando Arrieta, Ramón Vilanova</i> | 548 |
| <i>I/O Decoupling And Disturbance Rejection For General Linear Time Delay Systems Via Measurement Output Feedback</i> | |
| <i>Fotis N. Koumboulis, George E. Panagiotakis</i> | 555 |
| <i>An Adaptive Input Shaping Technique for the Suppression of Payload Swing in Three-Dimensional Overhead Cranes with Hoisting Mechanism</i> | |
| <i>John Stergiopoulos, Anthony Tzes</i> | 565 |
| <i>Dynamic modeling of Proton Exchange Membrane Fuel Cell: The effect of temperature and membrane humidity</i> | |
| <i>Ahmad Haddad, Rachid Bouyekhf, Abdellah El Moudni, Maxime Wack</i> | 569 |
| <i>Automation of diagnosis of electric power transformers in Itaipu Hydroelectric Plant with a Fuzzy Expert System</i> | |
| <i>Jovelino Falqueto, Matheus Telles</i> | 577 |

Session: T5.2 Room: I 11 Thursday, Sep. 27, 11:00 - 12:30
Emerging Issues and Solutions
Chairing: Masanori Akiyoshi, Jose Lastra

| | |
|--|-----|
| <i>An Alert Management System for Concrete Batching Plant</i> | |
| <i>Jason C.S. Chung, Dickson K.W. Chiu, Eleanna Kafeza</i> | 591 |
| <i>Electric power service selection considered flexibility of contract</i> | |
| <i>Shigeyuki Tani, Masaharu Akatsu, Norihisa Komoda</i> | 599 |
| <i>Enforcing Transition Deadlines in Time Petri Nets</i> | |
| <i>Haisheng Wang, Liviu Grigore, Ugo Buy, Houshang Darabi</i> | 604 |
| <i>Controlling Residential Co-Generation System Based on Hierarchical Decentralized Model</i> | |
| <i>Takuya Matsumoto, Hisashi Tamaki, Hajime Murao</i> | 612 |
| <i>Construction of Traceability System by using Simple and Handy type RFID reader</i> | |
| <i>Rei Itsuki</i> | 619 |

Session: SS5 **Room: I 12** **Thursday, Sep. 27, 11:00 - 12:30**
Embedded Systems Security
Chairing: D.N. Serpanos, W.H. Wolf

| | |
|---|-----|
| Implementation of HSSEC: a High-Speed Cryptographic Co-processor <i>Athanasios Kakarountas, Haralambos Michail, Costas Goutis, Constantinos Efstathiou</i> | 625 |
| Using Value Locality to Reduce Memory Encryption Overhead in Embedded Processors <i>George Keramidas, Pavlos Petoumenos, Alexandros Antonopoulos, Stefanos Kaxiras, Dimitrios Serpanos</i> | 632 |
| An Integrated Security Model for Component-Based Systems <i>Nimal Nissanke</i> | 638 |
| Security - Lifetime Tradeoffs for Wireless Sensor Networks <i>Zdravko Karakehayov</i> | 646 |
| Security and DRM in Indoor/Outdoor Heterogeneous Networking Applications for User – Centric Frameworks <i>Tasos Fragopoulos, Antonios Athanasopoulos, Artemios Vogiatzis, Evangelos Topalis, John Gialelis, Stavros Koubias</i> | 651 |

Session: T7 **Room: I 13** **Thursday, Sep. 27, 11:00 - 12:30**
Distributed Intelligent Control for Flexible Manufacturing
Chairing: George Chryssolouris, Nidhal Rezg

| | |
|---|-----|
| Hierarchical Distributed Controllers - Design and Verification <i>Dirk Missal, Martin Hirsch, Hans-Michael Hanisch</i> | 657 |
| Dynamic Workflow Priorization Based on Block Finite Position Machines <i>Jesus Trujillo, Zbigniew Pasek, Enrique Baeyens</i> | 665 |
| Analytical Method for Generating Feasible Control Sequences in Controller Development <i>Jesus Trujillo, Zbigniew Pasek, Enrique Baeyens</i> | 673 |
| Structural Reasoning in Proving System Correctness <i>Andrei Lobov, Jose Luis Martinez Lastra</i> | 681 |
| Application Of The Supervisory Control Theory To Automated Systems Of Multi-Product Manufacturing <i>Daniel Balieiro, Eduardo Portela, Agnelo Vieira, Marco Busetti</i> | 689 |

Session: WIP 1 **Room: I4** **Thursday, Sep. 27, 16:00 - 17:00**
Industrial Networks and Factory Automation
Organizer: Thilo Sauter

| | |
|---|-----|
| Topology Discovery in PROFINET <i>Iwan Schafer, Max Felser</i> | 704 |
| Retrieval of Diagnostic Information from PROFINET Networks <i>Tim Keane, Hassan Kaghazchi</i> | 708 |
| Uniform Engineering of Distributed Control Systems – The VAN Approach <i>Martin Hoffmann, Mathias Muehlhause, Marco Chiari, Christian Schwab</i> | 712 |
| Context-aware infrastructure to support distributed industrial services <i>Loubna Ali, Mayyad Jaber, Sodki Chaari, Frederique Biennier</i> | 716 |
| Development of Web-Based Software for a Multi-Fieldbus Diagnosis Tool <i>Scott Warner, Hassan Kaghazchi</i> | 720 |
| Assessment of the Ontological Approach in Factory Automation from the Perspectives of Connectionism <i>Aleksandra Dvorynachikova, Jose Lastra</i> | 724 |

| | |
|--|-----|
| OPC server implementation with MMS over Ethernet <i>Hubert Kirmann, Sébastien Chatelant, Michael Obrist</i> | 728 |
| Modeling Logical and Temporal Conditions to Formally Validate Factory Automation Web Services <i>Corina Popescu, Jose L. Martinez Lastra</i> | 732 |
| Message-Oriented Middleware for Automated Piezomotor Manufacturing <i>Patrick Otto, Bernd Lindner, Martin Wollschlaeger</i> | 736 |
| A Simulation Study of Ethernet Powerlink Networks <i>Stefano Vitturi, Lucia Seno</i> | 740 |
| Using a Packet Manipulation Tool for Security Analysis of Industrial Network Protocols <i>Tiago H. Kobayashi, Aguinaldo B. Batista Jr., Agostinho M. Brito Jr., Paulo S. Motta Pires</i> | 744 |

Session: WIP 2 Room: I 10 Thursday, Sep. 27, 16:00 - 17:00
Embedded Systems and Tools
Organizer: Thilo Sauter

| | |
|--|-----|
| A Power Manager for Deeply Embedded Systems <i>Geovani R. Wiedenhoft, Arliones Hoeller Jr., Antônio A. Fröhlich</i> | 748 |
| Coprime factorization based strong stabilizing controller design <i>Salva Alcántara, Carles Pedret, Ramon Vilanova, Romualdo Moreno</i> | 752 |
| A Constraint Logic Programming Framework for the Synthesis of Fault-Tolerant Schedules for Distributed Embedded Systems <i>Kåre Harbo Poulsen, Paul Pop, Viacheslav Izosimov</i> | 756 |
| Embedded linux scheduler monitoring <i>Zdenek Slanina, Vilem Srovnal</i> | 760 |
| Enhanced Engineering of Downtimeless System Evolution by use of Hardware Capability Descriptions within the eCEDAC Approach <i>Christoph Sünder, Oliver Hummer, Bernard Favre-Bulle</i> | 764 |
| Security in Agent-based Automation Systems <i>Basit Ahmed Khan, Jörgen Mad, Albert Treytl</i> | 768 |
| Automating Security Tests For Industrial Automation Devices Using Neural Networks <i>Joao Paulo S. Medeiros, Allison C. da Cunha, Agostinho M. Brito Jr., Paulo S. Motta Pires</i> | 772 |
| New Developments in EPOS Tools for Configuring and Generating Embedded Systems <i>Rafael Luiz Cancian, Marcelo Ricardo Stemmer, Antônio Augusto Fröhlich</i> | 776 |
| Genetic Algorithms Multiobjective Optimization of a 2 DOF Micro Parallel Robot <i>Dan Stan, Vistrian Maties, Radu Balan</i> | 780 |
| A Hidden Markov Models Tool for Estimating the Deterioration Level of a Power Transformer <i>Fotios Sotiropoulos, Panayiotis Alefragis, Efthymios Housos</i> | 784 |
| A Graphical Editor for the Input-Output Place-Transition Petri Net Class <i>Ricardo Nunes, Luis Gomes, Joao Paulo Barros</i> | 788 |
| Feasibility Conditions with Kernel Overheads for Mixed Preemptive FP/FIFO Scheduling with Priority Ceiling Protocol on an Event Driven OSEK System <i>Franck Bimbard, Laurent George</i> | 792 |

Session: SS9 Room: I 11 Thursday, Sep. 27, 16:00 - 17:30
Business Intelligence and its Applications in Industrial Ecosystems
Chairing: Elizabeth Chang, Tharam Dillon

An FCA-based mapping generator

| | |
|--|-----|
| <i>Paolo Ceravolo, Zhan Cui, Alex Gusmini, Marcello Leida</i> | 796 |
| Addressing The Challenges Of Enetwork Cyberengineering <i>Miheala Ulieru, Mohsin Sohail</i> | 804 |
| Trust based Decision Making Approach for Protein Ontology <i>Amandeep Sidhu, Farookh Hussain, Tharam Dillon, Elizabeth Chang</i> | 810 |
| Application of SPARQL in Semantic Search <i>Hai Dong, Farookh Hussain, Elizabeth Chang</i> | 816 |
| Quantifying the Level of Failure in a Digital Business Ecosystem Interactions <i>Omar Hussain, Elizabeth Chang, Farookh Hussain, Tharam Dillon</i> | 820 |
| An Overview of the interpretations of trust and reputation <i>Omar Hussain</i> | 826 |
| Ontology Engineering and (Digital) Business Ecosystems: a case for a Pragmatic Web <i>Peter Spyns, Robert Meersman</i> | 831 |

Session: SS6.1 Room: I 12 Thursday, Sep. 27, 16:00 - 17:30
Interoperability Issues and Research Work in Progress
Chairing: Vincent Chapurlat, Athanasios Kalogeras

| | |
|--|-----|
| Enterprise modelling and verification approach for characterizing and checking organizational interoperability <i>Vallespir Bruno, Chapurlat Vincent</i> | 839 |
| Enterprise Semantic Modelling for Interoperability <i>Nacer Boudjlida, Hervé Panetto</i> | 847 |
| An Ontology-based Interoperability Framework for Distributed Manufacturing Control <i>Daniel Diep, Christos Alexakos, Thomas Wagner</i> | 855 |
| Interoperable Language Family for Agent Communication in Industrial Applications <i>Thomas Wagner, Albert Treytl, Basit Ahmed Khan</i> | 863 |
| Multilevel Order Decomposition in Distributed Production <i>Daniela Wuensch, Aleksey Bratukhin</i> | 872 |

Session: WIP 3 Room: I 13 Thursday, Sep. 27, 16:00 - 17:00
Sensors and Actuators
Organizer: Thilo Sauter

| | |
|---|-----|
| Accuracy analysis of a 3D measurement system based on a laser profile scanner mounted on an industrial robot with a turntable <i>Mohamed Rahayem, J.A.P Kjellander, Sören Larsson</i> | 880 |
| Group Management System of RFID Passwords for Item Life Cycle <i>Yuichi Kobayashi, Toshiyuki Kuwana, Yoji Taniguchi, Norihisa Komoda</i> | 884 |
| Service Oriented Architecture for Mobile Robot Localization <i>Camilo Christo, Carlos Cardeira</i> | 888 |
| Active Beacon System with the fast processing architecture for Indoor Localization <i>Byoung-hoon Kim, Jong-suk Choi</i> | 892 |
| Line based robot localization using a rotary sonar <i>Danilo Navarro, Ginés Benet, Milagros Martínez</i> | 896 |
| Surveillance of Mobile Objects using Coordinated Wireless Sensor Nodes <i>Tony Larsson</i> | 900 |
| RAVEN: A Maritime Surveillance Project Using Small UAV <i>Siu O'Young, Paul Hubbard</i> | 904 |
| Intelligent Multisensorsystem for In-line Process- and Quality Monitoring of Welding Seams using Methods of Pattern Recognition | |

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|---|-----|
| <i>Michael Kuhl, Reimund Neugebauer, Paul-Michael Mickel</i> | 908 |
| Sensor Enabled Rule Based Alarm System for the Agricultural Industry <i>Christos Gogos, Panayiotis Alefragis, Efthymios Housos</i> | 912 |
| Matching Images of Imprinted Tablets <i>Ziga Spiclin, Marko Bukovec, Franjo Pernus, Bostjan Likar</i> | 916 |
| Wireless Vibrating Monitoring (WiVib) An industrial case study <i>Jonas Neander, Stefan Svensson, Tomas Lennvall, Mats Björkman, Mikael Nolin</i> | 920 |

Session: T3.2 Room: I 10 Thursday, Sep. 27, 17:00 - 18:00
Real-Time and Control
Chairing: José A. Fonseca

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|--|-----|
| Optimal Flow Routing in Multi-hop Sensor Networks with Real-Time Constraints through Linear Programming <i>Jiri Trdlicka, Zdenek Hanzalek, Mikael Johansson</i> | 924 |
| Simple PID Control Algorithm adapted to Deadband Sampling <i>Volodymyr Vasyutynskyy, Klaus Kabitzsch</i> | 932 |
| Second order sliding mode real-time network control of a robotic manipulator <i>Luca Capisani, Tullio Facchinetti, Antonella Ferrara</i> | 941 |
| On the practical issues of implementing the VTPE-hBEB protocol in small processing power controllers <i>Jose Fonseca, Paulo Bartolomeu, Valter Silva, Francisco Carreiro</i> | 949 |

Session: T9.1 Room: I4 Friday, Sep. 28, 10:00 - 11:30
Intelligent Robots I
Chairing: Josep M. Mirats, Yolanda Bolea

| | |
|--|-----|
| A New Time-Independent Image Path Tracker to Guide Robots Using Visual Servoing <i>Gabriel J. García, Jorge Pomares, Fernando Torres</i> | 957 |
| Real-Time Architecture for Mobile Assistant Robots <i>Pedro Sousa, Rui Araújo, Urbano Nunes, Luis Alves, Ana Lopes</i> | 965 |
| Hierarchical Distributed Architectures for Autonomous Mobile Robots: a Case Study <i>Jose Azevedo, Bernardo Cunha, Luis Almeida</i> | 973 |
| Camera Localization and Mapping using Delayed Feature Initialization and Inverse Depth Parametrization <i>Rodrigo Munguia, Antoni Grau</i> | 981 |
| An Outdoor Guidepath Navigation System for AMRs Based on Robust Detection of Magnetic Markers <i>Ana Lopes, Fernando Moita, Urbano Nunes, Razvan Solea</i> | 989 |
| Decision Making among Alternative Routes for UAVs in Dynamic Environments <i>Jose J. Ruz, Orlando J. Arevalo, Gonzalo Pajares, Jesus M. de la Cruz</i> | 997 |

Session: T5.3 Room: I 11 Friday, Sep. 28, 10:00 - 11:30
Automated Manufacturing Systems
Chairing: Toshiya Kaihara, Jose Lastra

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|---|------|
| Development of a holistic Guidance System for the NC Process Chain for benchmarking Machining Operations <i>Ulrich Berger, Ralf Kretzschmann, Matthias Aner</i> | 1005 |
| Design and Realization of a STEP-NC Compliant CNC Embedded Controller <i>Francesco Calabrese, Giovanni Celentano</i> | 1010 |
| A Study on Automated Scheduling Methodology for Machining Job Shop <i>Yoshihiro Yao, Toshiya Kaihara, Kentaro Sashio, Susumu Fujii</i> | 1018 |

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|--|------|
| <i>A Heuristic Approach For Scheduling Multi-Chip Packages For Semiconductor Backend Assembly</i> | 1024 |
| <i>Tay Jin Chua, Tian Xiang Cai, Xiao Feng Yin</i> | |
| <i>A Formal Approach for the Specification, Verification and Control of Flexible Manufacturing Systems</i> | 1031 |
| <i>Sajeh Zairi, Belhassen Zouari, Laurent Piétrac</i> | |

Session: SS8 **Room: I 12** **Friday, Sep. 28, 10:00 - 11:30**
Design and Analysis of Distributed Automation Systems
Chairing: Georg Frey, Alexander Fay

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|--|------|
| <i>Formal verification of redundant media extension of Ethernet PowerLink</i> | 1045 |
| <i>Steve Limal, Bruno Denis, Jean-Jacques Lesage, Stéphane Potier</i> | |
| <i>DesLaNAS – a language for describing Networked Automation Systems</i> | 1053 |
| <i>Jürgen Greifeneder, Georg Frey</i> | |
| <i>Simulation Approach for Evaluating Response Times in Networked Automation Systems</i> | 1061 |
| <i>Liu Liu, Georg Frey</i> | |
| <i>UML-based safety analysis of distributed automation systems</i> | 1069 |
| <i>Sebastian Schreiber, Till Schmidberger, Alexander Fay, Jörg May, Jörn Drewes, Eckeard Schnieder</i> | |
| <i>Incremental design of distributed control systems using GAIA-UML</i> | 1076 |
| <i>Arndt Lüder, Jörn Peschke</i> | |
| <i>Distributed control programming in Java - The JAKOBI system</i> | 1084 |
| <i>Michael Heinze, Joern Peschke</i> | |

Session: T3.3 **Room: I 13** **Friday, Sep. 28, 10:00 - 11:30**
Distributed Real-time Systems
Chairing: Thomas Nolte, Orazio Mirabella

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|--|------|
| <i>Simulation for end-to-end delays distribution on a switched Ethernet</i> | 1092 |
| <i>Jean-Luc Scharbarg, Christian Fraboul</i> | |
| <i>Exploiting a Prioritized MAC Protocol to Efficiently Compute Interpolations</i> | 1100 |
| <i>Björn Andersson, Nuno Pereira, Eduardo Tovar</i> | |
| <i>Master Replication and Bus Error Detection in FTT-CAN with Multiple Buses</i> | 1107 |
| <i>Valter Silva, Joaquim Ferreira, José Fonseca</i> | |
| <i>Embedded Web Services for Industrial TCP/IP Services Monitoring</i> | 1115 |
| <i>Francisco Maciá-Pérez, Diego Marcos-Jorquera, Virgilio Gilart-Iglesias</i> | |

Session: T10 **Room: I4** **Friday, Sep. 28, 12:00 - 13:30**
Emerging Issues
Chairing: Gianluca Cena, Dacfey Dzung

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|---|------|
| <i>The Effect of Quartz Drift on Convergence-Average based Clock Synchronization</i> | 1123 |
| <i>Eric Armengaud, Andreas Steininger, Alexander Hanzlik</i> | |
| <i>Supply Chain Performance Evaluation from Structural and Operational Levels</i> | 1131 |
| <i>Zhengping Li, Arun Kumar, Xiaoxia Xu</i> | |
| <i>Common Approach to Functional Safety and System Security in Building Automation and Control Systems</i> | 1141 |
| <i>Thomas Novak, Albert Treytl, Peter Palensky</i> | |
| <i>A Development Process for Mechatronic Products: Integrating Software Engineering and Product Engineering</i> | 1149 |
| <i>Ana Patrícia Magalhães, Aline Andrade, Leila Silva, Herman Lepikson</i> | |
| <i>A Novel Class of Multi-Agent Algorithms for Highly Dynamic Transport Planning Inspired by Honey Bee Behavior</i> | |

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|---|------|
| Testing Approach for Online Hardware Self Tests in Embedded Safety Related Systems Thomas Tamandl, Peter Preininger, Thomas Novak, Peter Palensky | 1270 |
| BuST: Budget Sharing Token Protocol for Hard Real-Time Communication Gianluca Franchino, Giorgio C. Buttazzo, Tullio Facchinetti | 1278 |

Session: SS6.2 Room: I 13 Friday, Sep. 28, 12:00 - 13:30

Interoperability Applications

Chairing: Athanasios Kalogeras, Ioannis Gialelis

| | |
|--|------|
| Semantically-Enabled Inter-Enterprise Integration in the Tourist Sector Christos Alexakos, Panagiotis Konstantinopoulos, Kostas Charatsis, Stavros Koubias | 1286 |
| Interoperability Issues in Virtual Organization – How to Proceed? Taivo Kangilaski | 1293 |
| Towards an ontology-based system for intelligent prediction of firms with fraudulent financial statements Dimitris Kanellopoulos, Sotiris Kotsiantis, Vasilis Tampakas | 1300 |
| AHP Based Supply Chain Performance Measurement System Laura Xiao Xia Xu | 1308 |

Session: T9.2 Room: I4 Friday, Sep. 28, 13:30 - 15:00

Intelligent Robots II

Chairing: Antoni Grau, Gabriel J. Garcia

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|--|------|
| Accurate Range Image Registration: Eliminating or Modelling Outliers Yonghuai Liu, Honghai Liu, Longzhuang Li, Baogang Wei | 1316 |
| A Two Stage Robot Control for Liquid Transfer Maria P. Tzamtzi, Fotis N. Koumboulis, Nicholas D. Kouvakas | 1324 |
| Dynamic equations of motion for a 3-bar tensegrity based mobile robot Josep M. Mirats Tur, Sergi Hernandez Juan, Albert Graells Rovira | 1334 |
| Onto computing the Uncertainty for the Odometry Pose Estimate of a mobile robot Josep M. Mirats Tur | 1340 |
| Solving the Inverse Kinematics Problem Symbolically by Means of Knowledge-Based and Linear Algebra-Based Methods Michael Wenz, Heinz Wörn | 1346 |
| Multivariable Iterative Feedback Tuning – A Step-Wise Safe Switching Approach Fotis N. Koumboulis, Maria P. Tzamtzi, George E. Chamilothis | 1354 |
| Fuzzy Cooperative Control of Automated Ground Passenger Vehicles Francesco M. Raimondi, Maurizio Melluso | 1364 |

Session: WIP 4 Room: I 10 Friday, Sep. 28, 13:30 - 14:30

Wireless and Dependable Networks

Organizer: Thilo Sauter

| | |
|---|------|
| Implementation of Power Aware Features in AODV for Ad Hoc Sensor Networks. A Simulation Study Konstantina Pappa, Antonis Athanasopoulos, Evangelos Topalis, Stavros Koubias | 1372 |
| Integrating Building Automation Systems and Wireless Sensor Networks Erik Pramsten, Daniel Roberthson, Fredrik Österlind, Joakim Eriksson, Niclas Finne, Thiemo Voigt | 1376 |
| Multicast Communication in Wireless Home and Building Automation: ZigBee and DCMP Christian Reinisch, Wolfgang Kastner, Georg Neugschwandtner | 1380 |
| Using Time-Triggered Communications over IEEE 802.15.4 Nuno Ferreira, José A. Fonseca | 1384 |

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|--|------|
| On a IEEE 802.15.4/ZigBee to IEEE 802.11 Gateway for the ART-WiSe Architecture <i>João Leal, André Cunha, Mário Alves, Anis Koubâa</i> | 1388 |
| Performance measurements of 802.11 WLANs with burst background traffic <i>Claudio Zunino</i> | 1392 |
| IEC 62439 PRP: Bumpless Recovery for Highly Available, Hard Real-Time Industrial Networks <i>Hubert Kirmann, Mats Hansson, Peter Müri</i> | 1396 |
| A Two-Competitive Approximate Schedulability Analysis of CAN <i>Björn Andersson, Nuno Pereira, Eduardo Tovar</i> | 1400 |
| Modelling MajorCAN with UPPAAL <i>Matias Bonet, Gabriel Donaire, Julian Proenza</i> | 1404 |
| A Decentralized Intrusion Detection System for Increasing Security of Wireless Sensor Networks <i>Ioannis Chatzigiannakis, Andreas Strikos</i> | 1408 |
| Energy Efficient Authentication in Wireless Sensor Networks - An industrial case <i>Rickard Soderlund, Stefan Svensson, Tomas Lennvall</i> | 1412 |

Session: WIP 5 **Room: I 11** **Friday, Sep. 28, 13:30 - 14:30**

Control

Organizer: Thilo Sauter

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|--|------|
| A Visual-Servoing System for a Humanlike Shape Memory Alloy Actuated Finger <i>Konstantinos Andrianesis, Anthony Tzes, Efthymios Kolyvas, Yannis Koveos</i> | 1417 |
| Optimization rules for mill cutter and cutting parameters selection incorporating a control algorithm <i>Luis Rubio, Manuel De la Sen</i> | 1421 |
| Ontology-driven Control Application Design Methodology <i>Athanasios Kalogeras, Luca Ferrarini, Arndt Lueder, John Gialelis, Christos Alexakos, Joern Peschke, Carlo Veber</i> | 1425 |
| A Metaheuristic Approach for Controller Design of Multivariable Processes <i>Fotis N. Koumboulis, Maria P. Tzamtzi</i> | 1429 |
| Robust Controller Design for Active Hydraulic Suspension <i>Michael G. Skarpetis, Fotis N. Koumboulis, Achilleas S. Ntellis, Apostolis Sarris</i> | 1433 |
| Robust Lane Keeping for a Tractor-Trailer <i>Michael G. Skarpetis, Fotis N. Koumboulis, Achilleas S. Ntellis, Thomas E. Tsimos</i> | 1437 |
| Fuzzy Control of Sparing in Disk Arrays <i>Guillermo Navarro, Milos Manic</i> | 1441 |
| CARUSO - Towards a Context-Sensitive Architecture for Unified Supervision and Control <i>Rolf Kistler, Stefan Knauth, Daniel Käslin, Alexander Klapproth</i> | 1445 |
| Smoothing out the Adaptive Variable Structure Control Law for Induction Motors <i>Oscar Barambones, Patxi Alkorta, Izaskun Garrido, Aitor Garrido</i> | 1449 |
| Industrial robot motion control with real-time Java and EtherCAT <i>Sven Robertz, Klas Nilsson, Roger Henriksson, Anders Blomdell</i> | 1453 |

Session: T2.3 **Room: I 12** **Friday, Sep. 28, 13:30 - 14:30**

Clock Synchronization and Multimedia Real-time Communications

Chairing: Thomas Nolte, Christos Koulamas

| | |
|---|------|
| A PLL-Based Approach to Clock Synchronization for Trajectory Rebuilding in Event-Triggered Communication Systems <i>Carlo Rossi, Manuel Spera</i> | 1457 |
| A Simulation Framework for Fault-Tolerant Clock Synchronization in Industrial Automation Networks <i>Fritz Praus, Wolfgang Granzer, Georg Gaderer, Thilo Sauter</i> | 1465 |
| Dynamic QoS Management for Multimedia Real-Time Transmission in Industrial Environments | |

Javier Silvestre, Luis Almeida, Ricardo Marau, Paulo Pedreiras 1473
Integration of a flexible time triggered network in the FRESCOR resource contracting framework
Ricardo Marau, Paulo Pedreiras, Luis Almeida, Michael Harbour, Daniel Sangorrin, Julio Medina 1481

Session: SS1.2 Room: I 13 *Friday, Sep. 28, 13:30 - 15:00*
IEC61499 Implementations
Chairing: Kleanthis Thramboulidis, Georg Frey

RTAI-based Execution Environments for Function Block Based Control Applications
George Doukas, Alessandro Brusaferrri, Marco Colla, Kleanthis Thramboulidis 1489