

2013 IEEE 11th International Conference on Industrial Informatics

(INDIN 2013)

Bochum, Germany
29-31 July 2013



IEEE Catalog Number: CFP13INI-POD
ISBN: 978-1-4799-0750-2

TABLE OF CONTENTS

TECHNOLOGIES AND INFRASTRUCTURES

A Hybrid Energy-Efficient Routing Protocol for Wireless Sensor Networks.....	18
<i>F. Farazandeh, R. Abrishambaf, S. Uysal, T. Gomes, J. Cabral</i>	
Assessment of an Enterprise Energy Service Platform in a Smart Grid City Pilot.....	24
<i>S. Karnouskos, D. Ilie, P. Silva</i>	
Business Processes and Technical Processes A Comprehensive Meta Model for Execution and Development.....	30
<i>A. Schiller, U. Epple, J. Elger, A. Müller-Martin, U. Löwen</i>	
Distributed Relay Assignment with Interference Limitation for Industrial Wireless Networks	36
<i>T. Do, G. Lee, D. Kim</i>	
Extending Distributed Real-Time Java with Remote Memory Areas	42
<i>P. Basanta-Val, M. Garcia-Valls</i>	
Heightmap Generation for Printed Circuit Boards (PCB) Using Laser Triangulation for Pre-Processing Optimization in Industrial Recycling Applications.....	48
<i>T. Koch, M. Breier, W. Li</i>	
Path Loss Exponent Analysis in Wireless Sensor Networks: Experimental Evaluation.....	54
<i>J. Miranda, R. Abrishambaf, T. Gomes, P. Gonçalves, J. Cabral, A. Tavares, J. Monteiro</i>	
Segmentation and Classification of THC on PCBAs.....	59
<i>D. Herchenbach, W. Li, M. Breier</i>	
SMD Segmentation for Automated PCB Recycling.....	65
<i>W. Li, B. Esders, M. Breier</i>	
Virtualizing DDS Middleware: Performance Challenges and Measurements	71
<i>R. Serrano-Torres, M. García-Valls, P. Basanta-Val</i>	

COGNITIVE AND COMPUTATIONAL INTELLIGENCE

An Evaluation Method of Reduced Procurement Risks by Decentralized Ordering in Supply Chain	80
<i>M. Mori, R. Kobayashi, M. Samejima, N. Komoda</i>	
Dynamic Optimization of Virtual Machine Placement by Resource Usage Prediction	86
<i>K. Sato, M. Samejima, N. Komoda</i>	
Dynamic Spectrum Handoff for Industrial Cognitive Wireless Sensor Networks	92
<i>D. Nguyen, T. Pham, D. Kim</i>	

DISTRIBUTED, EMBEDDED, AND NETWORKED CONTROL SYSTEMS

Comparison on Technological Opportunities for In-Vehicle Ethernet Networks	108
<i>G. Malaguti, M. Dian, C. Ferraresi, M. Ruggeri</i>	
Composability and Compositionality in CAN-Based Automotive Systems Based on Bus and Star Topologies.....	116
<i>R. Kammerer, B. Froemel, R. Obermaisser, P. Milbrett</i>	
Developing Portable FPGA Applications - A Literature Review.....	123
<i>B. Klöpper, N. Cranston, M. Aleksey, M. Dix</i>	
Distributed Power Semiconductor Stress Test & Measurement Architecture	129
<i>B. Steinwender, S. Einspieler, M. Glavanovics, W. Elmenreich</i>	
Energy Consumption and Spatial Diversity Trade-Off in Autonomic Wireless Sensor Networks: The (m,k)-Gur Game Approach	135
<i>T. Semprebom, A. Pinto, C. Montez, F. Vasques</i>	
Implementation of a Flux-Based Controller for Active Magnetic Bearing System.....	141
<i>P. Jaatinen, R. Jastrzebski, T. Lindh, O. Pyrhönen</i>	
Partial Energy-Efficient Hop-By-Hop Retransmission in Wireless Sensor Networks	146
<i>D. Costa, L. Guedes, F. Vasques, P. Portugal</i>	
Performance Analysis of Mechatrolink-III	152
<i>T. Dang, J. Kim, J. Jeon</i>	

Performance Assessment of the PRIME MAC Layer Protocol	158
<i>G. Patti, G. Alderisi, L. Bello</i>	
Plug-and-Play Control - Theory and Implementation.....	165
<i>S. Bodenburg, J. Lunze</i>	
Preemptive Switched Ethernet for Real-Time Process Control System.....	171
<i>J. Kim, B. Lee, J. Park</i>	
UML State Machine Implementation in FPGA Devices by Means of Dual Model and Verilog	177
<i>M. Doligalski, M. Adamski</i>	

FACTORY AUTOMATION

A Method to Improve the Accuracy of Synchronous Control Systems	188
<i>M. Le, H. Hoang, J. Jeon</i>	
A Stochastic Method for the Detection of Anomalous Energy Consumption in Hybrid Industrial Systems	194
<i>S. Windmann, S. Jiao, O. Niggemann, H. Borcherding</i>	
An Approach for OSGi and DPWS Interoperability: Bridging Enterprise Application With Shop-Floor.....	200
<i>S. Iaroyi, J. Garcia, J. Lastra</i>	
An Effective Heuristic for Stockyard Planning and Machinery Scheduling at a Coal Handling Facility	206
<i>S. Hanoun, B. Khan, M. Johnstone, S. Nahavandi, D. Creighton</i>	
Assessment of IEC-61499 and CDL for Function Block Composition in Factory-Wide System Integration.....	212
<i>B. Ferrer, J. Izaguirre, J. Lastra</i>	
Dynamic Skill Allocation Methodology for Evolvable Assembly Systems	218
<i>S. Cavin, P. Ferreira, N. Lohse</i>	
Evolution of Production Facilities and its Impact on Non-Functional Requirements	224
<i>J. Ladiges, C. Haubeck, I. Wior, E. Arroyo, A. Fay, W. Lamersdorf</i>	
HIL Simulation Workbench for Testing and Validating PLC Programs.....	230
<i>J. Machado, E. Seabra</i>	
Ontology-Based Validation of Plant Models.....	236
<i>L. Abele, C. Legat, S. Grimm, A. Müller</i>	
Rule-Based Composition of Intelligent Mechatronic Components in Manufacturing Systems Using Prolog.....	242
<i>M. Sorouri, V. Vyatkin, Z. Salcic</i>	
Using OPC-UA for the Autoconfiguration of Real-time Ethernet Systems	248
<i>L. Dürkop, J. Imtiaz, H. Trsek, L. Wisniewski, J. Jasperneite</i>	
WirelessHART Fast Collect: A Decentralized Approach for Intermittent Field Devices.....	254
<i>I. Muller, J. Winter, J. Netto, C. Pereira</i>	

HUMAN-MACHINE INTERFACES

Automatic Deformation Transfer for Data-Driven Haptic Rendering.....	264
<i>S. Farag, W. Abdelrahman, D. Creighton, S. Nahavandi</i>	
Human Machine Interface for Virtual Prototyping of Industrial Instruments.....	270
<i>R. Valentina, M. Ruppert, P. Nenninger, F. Mendoza</i>	
Remote Rendering of Industrial HMI Applications	276
<i>P. Perez, B. Dorninger, W. Beer</i>	

MECHATRONICS AND ROBOTICS

A Genetic Algorithm for Optimizing Vector-Based Paths of Industrial Manipulators	286
<i>L. Mocetsuma, N. Lee, J. Lastra</i>	
A Method of Classifying Industrial Assembly and Packaging Equipment	293
<i>S. Loughlin, J. McGrory</i>	
A New Integrated Device to Read User Intentions When Walking With a Smart Walker	299
<i>M. Martins, C. Santos, E. Seabra, L. Basílio, A. Frizera</i>	
Adaptive Sliding Mode Control of Switched Constrained Robotic Manipulators	305
<i>I. Jasim, P. Plapper</i>	

An Efficient Nonlinear Model-Predictive Eco-Cruise Control for Electric Vehicles	311
<i>T. Schwickart, H. Voos, J. Hadji-Minaglou, M. Darouach</i>	
Configuration Optimization and Analysis of the Parallel Adjustment Platform for Satellite Integrated Assembly.....	317
<i>J. Yao, G. Wu, Y. Zhao</i>	
Design and Analysis of a Novel 2-DOF Rotational Decoupled Adjusting Parallel Mechanism.....	321
<i>D. Zeng, W. Lu, C. Zhang, W. Chang, Y. Hou</i>	
Large Scale Multi-Agent-Based Simulation Using NetLogo for the Multi-Robot Exploration Problem	325
<i>I. Muscalagiu, C. Illes, H.I Popa</i>	
Mechatronic Medical Device for Wrist Rehabilitation.....	331
<i>E. Seabra, L. Silva, P. Flores, J. Machado, M. Vu, M. Martins, R. Campos</i>	
Passive Bilateral Teleoperation with Bounded Control Signals.....	337
<i>L. Marton, J. Artigas, P. Haller, T. Vajda</i>	
The Forward Kinematic Modeling of a Stewart Platform Using NLARX Model With Wavelet Network	343
<i>Ramesh Kumar P, Bijnan Bandyopadhyay</i>	

TOOLS

An Architecture for CFD Workflow Management	352
<i>C. Gargiulo, D. Pirozzi, V. Scarano</i>	
Developing Modular Reusable IEC 61499 Control Applications with 4DIAC	358
<i>A. Zoitl, T. Strasser, G. Ebenhofer</i>	
SysGrid: IEC 61850 and IEC 61499 Based Engineering Process for Smart Grid System Design	364
<i>G. Zhabelova, C.i Yang, V. Vyatkin</i>	

NEW PARADIGMS

Collaborative Environment for Service-Enhanced Products.....	374
<i>L. Camarinha-Matos, H. Afsarmanesh, P. Macedo, A. Oliveira, F. Ferrada</i>	
Evaluation of the Scalability of an Energy Market for Smart Grid Neighbourhoods	380
<i>P. Silva, S. Karnouskos, D. Ilic</i>	
Self-Learning Production Systems (SLPS) - Optimization of Manufacturing Process Parameters for the Shoe Industry.....	386
<i>G. Orio, G. Cândido, J. Barata, S. Scholze, O. Kotte, D. Stokic</i>	
Self-Organizing Multiagent Mechatronic Systems in Perspective.....	392
<i>L. Ribeiro, J. Barata</i>	

APPLICATIONS

A Wireless Motor-Condition, Precise Analysis System Using a High Efficient Vibration-Energy Harvester	402
<i>T. Shimanouchi, O. Toyoda, F. Nakazawa</i>	
Developing a Web Application for Monitoring and Management of Smart Grid Neighbourhoods.....	408
<i>S. Karnouskos, P. Silva, D. Ilic</i>	
Evaluation of SIFT in Machine Vision Applied to Industrial Automation	414
<i>G. Loch, C. Szymanski, M. Stemmer</i>	
Roll Stabilization: A Higher Order Sliding Mode Approach.....	420
<i>P. Trivedi, B. Bandyopadhyay, S. Chaudhuri, S. Mahata</i>	
The Use of Power Gyrator Structures for Energy Processing in Photovoltaic Solar Facilities	426
<i>H. Martinez-Garcia, A. Grau-Saludes, Y. Bolea-Monte</i>	

INDUSTRIAL INFORMATICS IN SMART GRIDS

A Comparative Analysis of Smart Metering Data Aggregation Performance	434
<i>D. Ilic, S. Karnouskos, M. Wilhelm</i>	
Analyzing the Need for a Common Modeling Language for Smart Grid Applications	440
<i>F. Andrén, T. Strasser, S. Rohjans, M. Uslar</i>	

Assessing Reliability of Distributed Units with Respect to the Provision of Ancillary Services	447
<i>M. Blank, S. Lehnhoff</i>	
Short-Term Wind Power Forecasting Based on Numerical Weather Prediction Adjustment	453
<i>G. Qu, J. Mei, D. He</i>	
Smart Grid Applications with IEC 61499 Reference Architecture	458
<i>G. Zhabelova, S. Patil, C. Yang, V. Vyatkin</i>	
Towards Implementation of IEC61850 GOOSE Messaging in IEC61499 Environment	464
<i>J. Xu, C. Yang, G. Zhabelova, V. Vyatkin, S. Berber</i>	

INDUSTRIAL APPLICATIONS OF CYBER-PHYSICAL SYSTEMS

A Hybrid MAC Layer for Localization and Data Communication in Ultra Wide Band Based Wireless Sensor Networks	474
<i>M. Janssen, A. Busboom, U. Schoon, C. Koch, G. Cölln</i>	
An Formal Engineering Approach for Control and Monitoring Systems in a Service-Oriented Environment	480
<i>K. Nagorny, R. Harrison, A. Colombo, G. Kreutz</i>	
Remote Engineering Solutions for Industrial Maintenance	488
<i>A. Kolesnikow, R. Behrens, M. Rafrafi, N. Colin, C. Westerkamp, H. Kremer</i>	
Reusability Assessment of Financial Card Readers Security Mechanisms in Process Control Devices	494
<i>A. Ray, J. Åkerberg, M. Gidlund, M. Björkman, C. Tremlet</i>	
Scalability of OPC-UA Down to the Chip Level Enables "Internet of Things"	500
<i>J. Imtiaz, J. Jasperneite</i>	
Time and Memory-Aware Runtime Monitoring for Executing Model-Based Test Cases in Embedded Systems	506
<i>P. Iyenghar, E. Pulvermueller, M. Spieker, J. Wuebbelmann, C. Westerkamp</i>	

KNOWLEDGE AND INFORMATION MANAGEMENT

Shortening of Product Ramp-Up By Using a Centralized Knowledge Base	516
<i>R. Willmann, E. Serral, W. Kastner, S. Biffl</i>	
Business Context Sensitive Business Documents: Business Context Aware Core Components Modeling Using the E-UCM Model	523
<i>D. Novakovic, C. Huemer</i>	
Multidimensional Data Warehousing and Mining - An Approach for Managing Multiple Reservoir Ecosystems	529
<i>S. Nimmagadda, H. Dreher, O. Shtukert, N. Zolotoi</i>	
Ontology based Multidimensional Data Warehousing and Mining of Heterogeneous Unconventional-Reservoir Ecosystems	535
<i>S. Nimmagadda, H. Dreher, P. Mora, A. Lobo</i>	
Sedimentary Basin - A Petroleum Digital Ecosystem	541
<i>S. Nimmagadda, H. Dreher, A. Noventianto, M. Aswin, P. Halley</i>	
Semantic Reasoning for Intelligent Emergency Response Applications	547
<i>A. Hristoskova, F. Ongena, F. Turck</i>	

MODERN SOFTWARE ENGINEERING METHODS FOR INDUSTRIAL AUTOMATION SYSTEMS

Applying Software Engineering Practices for Development of Industrial Automation Applications	558
<i>R. Jetley, A. Nair, P. Chandrasekaran, A. Dubey</i>	
Reverse Engineering and Visualization of the Reactive Behavior of PLC Applications	564
<i>H. Prähofer, C. Wirth, R. Berger</i>	
System Requirements in Industrial Automation - A Review of Modeling Methodologies for Control Software Architectures	572
<i>C. Insaurralde, A. Zoitl</i>	
Verification of Hierarchical IEC 61499 Component Systems With Behavioral Event Contracts	578
<i>H. Prähofer, A. Zoitl</i>	

EMBEDDED SYSTEMS AND RECONFIGURABLE SoCS

Exploiting Dataflows and Petri Nets Mappings	590
<i>J. Rocha, O. Dias, L. Gomes</i>	
OpenCV Based Road Sign Recognition on Zynq	596
<i>M. Russell, S. Fischaberg</i>	
The MATISSE MATLAB Compiler - A MATrix(MATLAB)-Aware Compiler InfraStructure for Embedded Computing SystEms	602
<i>J. Bispo, P. Pinto, R. Nobre, T. Carvalho, J. Cardoso, P. Dimiz</i>	

NETWORK-BASED CONTROL SYSTEMS AND APPLICATIONS

Analysis and Prediction of Jitter of Internet One-Way Time-Delay for Teleoperation Systems	612
<i>J. Hua, Y. Cui, Y. Yang, H. Li</i>	
Discrete-Time Flow Control for Connection-Oriented Communication Network Via Reduced Model.....	618
<i>P. Baburaj, B. Bandyopadhyay</i>	
Lossy Link-Aware Routing Algorithm for ISA100.11a Wireless Networks	624
<i>T. Pham, D. Kim</i>	
Low-Power Wireless Accelerometer-Based System for Wear Detection of Bandsaw Blades.....	630
<i>M. Magno, A. Bravin, A. Libri, M. Storace, L. Benini, E. Popovici</i>	
Network Fabric Fault-Tolerance for Ethernet-Based Networked Control Systems	636
<i>C. Alfi, Y. Hilal, G. Aziz, H. Halawa, T. Refaat, R. Daoud, H. Amer, H. ElSayed</i>	
Simulation Environment for Time-Triggered Ethernet	642
<i>M. Abuteir, R. Obermaisser</i>	
Traffic-Aware Message Scheduling Method for ISA100.11a	649
<i>T. Nhon, K. Dong-Seong</i>	
Visual Programming of an Interactive Smart Home Application Using LabVIEW	655
<i>A. Meliones, D. Giannakis</i>	

CYBER SECURITY OF INDUSTRIAL SYSTEMS

Coordinated Attack Detection through Cyber-Physical Alert Correlation	PIC
<i>S. Sridhar, A. Ashok, M. Govindaraju</i>	
Industrial Control Systems Security: What is Happening?	670
<i>M. Krotofil, D. Gollmann</i>	
Performance Evaluation of MAC Algorithms for Real-Time Ethernet Communication Systems	676
<i>B. Czybik, S. Hausmann, S. Heiss, J. Jasperneite</i>	
Policy Implementation Check in Industrial Networks	682
<i>M. Cheminod</i>	
Privacy Handling for Critical Information Infrastructures.....	688
<i>N. Ulltveit-Moe, T. Gjøsæter, S. Assev, G. Køien, V. Oleshchuk</i>	
Secure Design of Engineering Software Tools in Industrial Automation and Control Systems	695
<i>A. Hristova, S. Obermeier, R. Schlegel</i>	
Securing Energy Metering Software With Automatic Source Code Correction.....	701
<i>I. Medeiros, N. Neves, M. Correia</i>	

ENSURING SAFETY IN INDUSTRIAL CRITICAL SYSTEMS

Formal Specification and Automated Verification of Railway Software with Frama-C	710
<i>J. Gerlach, V. Prevosto, J. Burghardt, K. Hartig, K. Völlinger, H. Pohl</i>	
Graphical Modelling Meets Formal Methods	716
<i>S. Gulán, S. Johr, R. Kretschmer, S. Rieger, M. Ditzé</i>	
Model-Based Automated Testing of Critical PLC Programs.....	722
<i>B. Adiego, E. Viñuela, J. Tournier, V. Súarez, S. Bliudze</i>	
Supporting Industrial Use of Probabilistic Timing Analysis with Explicit Argumentation	734
<i>Z. Stephenson, J. Abella, T. Vardanega</i>	

The AltaRica 3.0 Project for Model-Based Safety Assessment	741
<i>T. Prosvirnova, M. Batteux, A. Rauzy, L. Kloul</i>	

SUPPORTING DESIGN AND DEVELOPMENT OF PROACTIVE DECISION ENGINES AND OF DISTRIBUTED COOPERATIVE HUMAN-MACHINE-SYSTEMS

A Builder for Adaptable Human Machine Interfaces for Mobile Devices.....	750
<i>O. Millan, N. Lee, J. Lastra, R. Camp</i>	
A Cooperative Driver Model for Traffic Simulations.....	756
<i>J. Vokrinek, P. Janovsky, J. Faigl, P. Benda, F. Tango, D. Pinotti</i>	
A Probabilistic Model for Cognitive-Affective User State Awareness.....	762
<i>S. Fernandez, F. Muñoz, I. Lázaro, E. Gilabert, A. Arnaiz, L. Castellanos</i>	
An Intelligent SA-Adaptive Interface to Aid Supervisory Control of a UAV Swarm.....	768
<i>F. Fortmann, A. Liidtke</i>	
DCoS-XML: A Modelling Language for Dynamic Distributed Cooperative Systems.....	774
<i>J. Osterloh, H. Bracker, H. Müller, J. Kelsch, B. Schneider, A. Liidtke</i>	
Emergencia: Pro-Active Decision Support for Emergency Coordination Through Actionable Emergency Plans.....	780
<i>N. González-Deleito, E. Tsiporkova</i>	
Modeling Approach to Multi-Agent Systems of Human and Machine Agents: Application in Design of Early Experiments for Novel Aeronautics Systems	786
<i>Z. Moravek, I. Lacko, F. Rister, J. Osterloh, F. Dehais, S. Scannella</i>	
Pro-Active Content Managing System for Efficient Human Machine Interaction in Data Intensive Environments	790
<i>N. Lee, Y. Evchina, A. Dvoryanchikova, J. Lastra</i>	
The Cooperation Between Unmanned Aerial Vehicles Using a Mission Planner.....	797
<i>T. Truong, G. Hattenberger, C. Gonfle-Nadaud</i>	
Author Index	