2012 17th International Conference on Methods & Models in Automation & Robotics

(MMAR 2012)

Miedzyzdroje, Poland
27 – 30 August 2012
A1L-A  PLENARY: Biopsychically Inspired Cognitive Control

Date:  Tuesday, August 28, 2012  
Time:   09:00 - 10:00  
Room:   Casino  
Chair:  Jerzy Sasiadek

Biopsychically Inspired Cognitive Control for Autonomous Agents Based on Motivated Learning  
J. Jim Zhu², Xudan Xu¹  
¹Beihang University, China; ²Ohio University, United States

A2L-A  Special Session on the Occasion of the 80th Birthday of Prof. T. Kaczorek - Part I

Date:  Tuesday, August 28, 2012  
Time:   10:00 - 11:00  
Room:   Casino  
Chairs: Zbigniew Emirsajlow, Krzysztof Galkowski

New Frequency Domain Based Stability Tests for 2D Linear Systems  
Wojciech Paszke², Eric Rogers¹, Paolo Rapisarda¹, Krzysztof Galkowski², Anton Kummert³  
¹University of Southampton, United Kingdom; ²University of Zielona Gora, Poland; ³Universität Wuppertal, Germany

Consistent Control Hierarchies with Top Layers Represented by Timed Event Graphs  
Jörg Raisch¹, Xavier David-Henriet¹, Laurent Hardouin²  
¹Technische Universität Berlin, Germany; ²Université d’ Angers

Positive Observation of Takagi-Sugeno Systems  
Ines Zaidi², Fernando Tadeo³, Mohamed Chaabane³, Abdellah Benzaouia¹  
¹Cadi Ayyad University, Spain; ²Universidad Valladolid, Spain; ³University of Sfax, Tunisia

A2L-B  Identification - Part I

Date:  Tuesday, August 28, 2012  
Time:   10:00 - 11:00  
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Chair:  Bogdan Grzywacz

Parameter Identification of a DC Motor via Distribution Based Approach  
Dorin Sendrescu  
Universitatea din Craiova, Romania

Stratified Model Identification  
Zbigniew Ogonowski  
Silesian University of Technology, Poland

Mechanical Resonance Frequencies Identification of Direct Drive Using Wavelet Analysis  
Dominik Luczak  
Poznan University of Technology, Poland
A2L-C  Modeling and Simulation - Part I

Date: Tuesday, August 28, 2012
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On Singular Values Decomposition and Patterns for Human Motion Analysis and Simulation
Adrien Datas, Pascale Chiron, Jean-Yves Fourquet
Laboratoire Génie de Production de Tarbes, France

A Flowshop Scheduling Problem with Machine Deterioration and Maintenance Activities
Agnieszka Rudek, Radoslaw Rudek
Wroclaw University of Technology, Poland

Actuator Form of Singularly Perturbed Systems: a Bond Graph Approach
Noe Barrera Gallegos, Gilberto Gonzalez Avalos
University of Michoacan, Mexico

A3L-A  Special Session on the Occasion of the 80th Birthday of Prof. T. Kaczorek - Part II

Date: Tuesday, August 28, 2012
Time: 11:20 - 13:00
Room: Casino
Chairs: Zbigniew Emirsajlow, Krzysztof Galkowski

On the Control of Discrete Linear Repetitive Processes Using Previous Pass Windowed Information
Blazej Cichy\textsuperscript{2}, Krzysztof Galkowski\textsuperscript{2}, Eric Rogers\textsuperscript{1}
\textsuperscript{1}University of Southampton, United Kingdom; \textsuperscript{2}University of Zielona Góra, Poland

Constrained Controllability of Semilinear Systems with Delay in Control
Jerzy Klamka
Silesian University of Technology, Poland

On a Fractional Dirichlet Problem
Rafal Kamocki, Marek Majewski
University of Lodz, Poland

Adaptive Finite Fractional Difference with a Time-Varying Forgetting Factor
Krzysztof Latawiec, Rafal Stanislawski, Wojciech Hunek, Marian Lukaniszyn
Politechnika Opolska, Poland

Stability of 3-D System Described by the Nonlinear Fornasini-Marchesini Model
Jerzy Kurek
Politechnika Warszawska, Poland

A3L-B  Signal Processing

Date: Tuesday, August 28, 2012
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Chair: Jerzy Sasiadek

An Analytical Approach to the Group Delay Compensation of Digital IIR Filters
Piotr Okoniewski, Jacek Piskorowski
West Pomeranian University of Technology, Szczecin, Poland
Multistage Pattern Recognition of Signals Represented in Wavelet Bases with Reject Option
Urszula Libal
Wroclaw University of Technology, Poland

The 3D Scanning System for the Machine Vision Based Positioning of Workpieces on the CNC Machine Tools
Krzysztof Okarma, Marek Grudzinski
West Pomeranian University of Technology, Szczecin, Poland

A Concept of Time-Varying FIR Notch Filter Based on IIR Filter Prototype
Slawomir Kocon, Jacek Piskorowski
West Pomeranian University of Technology, Szczecin, Poland

A3L-C Control Applications - Part I

Date: Tuesday, August 28, 2012
Time: 11:20 - 13:00
Room: Lehar
Chair: Harald Aschemann

Practical Verification of the Control Strategies for the Counter-Current Heat Exchanger
Piotr Łaszczyk, Jacek Czeczot, Rafał Czubasiewicz, Krzysztof Stebel
Silesian University of Technology, Poland

Modeling, Simulation and Control for Optimized Operating Strategies of Combustion Engine-Based Power Trains
Andreas Rauh, Julia Kersten, Harald Aschemann
Universität Rostock, Germany

Linearisation of Electrically Stimulated Muscles by Feedback Control of the Muscular Recruitment Measured by Evoked EMG
Christian Klauer, Joerg Raisch, Thomas Schauer
Technische Universität Berlin, Germany

UAV Glider Control System Based on Dynamic Contraction Method
Marian Bachuta², Roman Czyba², Wojciech Janusz², Valery Yurkevich¹
¹Novosibirsk State Technical University, Russia; ²Silesian University of Technology, Poland

Redundancy Resolution and Control of Manipulators Driven by Antagonistic Pneumatic Muscles
Mauro Calabria, Frank Schreiber, Yevgen Sklyarenko, David Inkermann, Annika Raatz, Thomas Vietor, Walter Schumacher
Technische Universität Braunschweig, Germany

A4L-A Invited Session: Control and Optimization of Infinite Dimensional Systems - Part I

Date: Tuesday, August 28, 2012
Time: 15:00 - 16:20
Room: Casino
Chairs: Adam Kowalewski
Jan Sokolowski

Feedback Stabilization of Quasilinear Hyperbolic Systems with Varying Delays
Markus Dick, Martin Gugat, Günter Leugering
Universität Erlangen-Nürnberg, Germany
Application of Topological Derivative to Accelerate Genetic Algorithm in Shape Optimization of Coupled Models

Antonio Andre Novotny2, Katarzyna Szulc1, Antoni Zochowski3
1Instytut Badan Systemowych PAN, Poland; 2Laborat6rio Nacional de Computagao Cientifica Petropolis, Brazil; 3Systems Research Institute of the Polish Academy of Sciences, Poland

Dual Look at Robust Regulation: Frequency Domain and State Space Approaches

Petteri Laakkonen, Lassi Paunonen, Seppo Pohjolainen
Tampere University of Technology, Finland

Sensitivity Analysis of Time Delay Parabolic-Hyperbolic Optimal Control Problems

Zbigniew Emirsajlow4, Anna Krakowiak2, Adam Kowalewski1, Jan Sokolowski3
1AGH University of Science and Technology, Poland; 2Technical University of Cracow, Poland; 3Universite Henri Poincare Nancy I, France; 4West Pomeranian University of Technology, Szczecin, Poland

A4L-B Robotics Applications - Part I

Date: Tuesday, August 28, 2012
Time: 15:00 - 16:20
Room: Kalman
Chair: Ignacy Duleba

Advanced Dynamic Window Based Navigation Approach Using Model Predictive Control

Domokos Kiss, Gábor Tevesz
Budapest University of Technology and Economics, Hungary

Numerical Simulations and Analytical Analyses of the Orbital Capture Manoeuvre as a Part of the Manipulator-Equipped Servicing Satellite Design

Tomasz Rybus1, Jakub Lisowski2, Karol Seweryn1, Tomasz Barcinski3
1Space Research Centre of the Polish Academy of Sciences, Poland; 2Space Research Centre of the Polish Academy of Sciences / West Pomeranian University of Technology, Poland; 3West Pomeranian University of Technology, Szczecin, Poland

Absolute and Relative Angles Nonlinear Control of an Underactuated 5-Link Biped with Dynamic Singularities

Adam Lukomski
West Pomeranian University of Technology, Szczecin, Poland

Large-Amplitude Base-Motion Compensation of a Serial Robot Using an Inertial Measurement Unit

Vladimirs Leontjevs1, Francisco Geu Flores3, Jesus López2, Leonids Ribickis1, Andres Kecskeméty2
1Riga Technical University, Latvia; 2Universidad Nacional de Educacion a Distancia, Spain; 3Universität Duisburg-Essen, Germany

Nonparametric Identification of Robot Flexible Joint Space Manipulator

Adam Krzyzak2, Jerzy Sasiadek1, Steve Ulrich1
1Carleton University, Canada; 2Concordia University, Canada
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Using a Recursive Least Square Algorithm for Identification of Interconnected Linear Discrete-Time Delay Multivariable Systems

Saïda Bedoui, Majda Ltaief, Kamel Abderrahim
University of Gabès, Tunisia

Modelling and Identification of Magnetorheological Vehicle Suspension

Piotr Krauze
Silesian University of Technology, Poland

The Evaluation of Saturation Level for SMSE Cost Function in Identification of Elementary Bilinear Time-Series Model

Łukasz Malinski
Silesian University of Technology, Poland

Model Identification Using Quantized Data - a Disturbance-Free Case

Jarosław Figwer
Silesian University of Technology, Poland

An Approach to Autonomous Navigation Based on Unscented Hybrid SLAM

Amirhossein Monjazeb¹, Jerzy Sasiadek¹, Dan Neculescu²
¹Carleton University, Canada; ²University of Ottawa, Canada

Neural Networks in Local State Estimation

Ladislav Král, Miroslav Simandl
University of West Bohemia, Czech Rep.

Cooperation and Negotiation of Agents by Means of Petri Net-Based Models

Frantisek Capkovic
Slovak Academy of Sciences, Slovakia

Identity of a Companion, Migrating Between Robots Significantly Different in Terms of Expressive Capabilities: Initial Results of VHRI Study

Krzysztof Arent, Bogdan Kreczmer, Łukasz Malek
Wroclaw University of Technology, Poland

Adaptive Impedance Control in Robotic Cell Injection System

Hanmei Wu², Wenkang Xu¹, Chenxiao Cai¹
¹Nanjing University of Science and Technology, China; ²Nantong Radio and Television University, China
### B1L-A  PLENARY: Lifelong Education in Robotics & Mechatronics

- **Date:** Wednesday, August 29, 2012
- **Time:** 09:00 - 10:00
- **Room:** Casino
- **Chair:** Andrzej Bartoszewicz

**Lifelong Education in Robotics and Mechatronics**

Andreja Rojko¹, Krzysztof Kozlowski²

¹Delft University of Technology, Slovenia; ²Poznan University of Technology, Poland

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### B2L-A  Adaptive and Predictive Control - Part I

- **Date:** Wednesday, August 29, 2012
- **Time:** 11:20 - 13:00
- **Room:** Casino
- **Chair:** Teturo Itami

**Adaptive Neuro-Predictive Control of Robot Manipulators in Work Space**

Hourieh Mazdarani, Mohammad Farrokhi

Iran University of Science and Technology, Iran

**Adaptive Tracking Control of Uncertain SISO Nonlinear Systems**

Zenon Zwierzewicz

Szczecin Maritime University, Poland

**A Model Reference Adaptive Approach for State Estimation in Electromagnetic Actuators**

Felix Praufle, Johannes Reuter

Hochschule Konstanz für Technik, Wirtschaft und Gestaltung, Germany

**Nonlinear Indirect Adaptive Control of a Fed-Batch Fermentation Bioprocess**

Dan Selisteau, Emil Petre, Dorin Sendrescu, Monica Roman

Universitatea din Craiova, Romania

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### B2L-B  Robotics Applications - Part II

- **Date:** Wednesday, August 29, 2012
- **Time:** 11:20 - 13:00
- **Room:** Kalman
- **Chair:** Krzysztof Kozlowski

**Path Simulator for Machine Tools and Robots**

Kvitoslav Belda², Pavel Novotný¹


**Proposal of Recovery Strategy from Loss of Leg Incident for Legged Walking Robot**

Filipp Seljanko

Tallinn University of Technology, Estonia

**Fast Grid Based Collision Avoidance for Vessels Using A* Search Algorithm**

Michael Blaich¹, Michael Rosenfelder¹, Michael Schuster¹, Oliver Bittel¹, Johannes Reuter²

¹Hochschule für Technik, Wirtschaft und Gestaltung, Germany; ²Hochschule Konstanz für Technik, Wirtschaft und Gestaltung, Germany
**B2L-C Control and Systems Theory - Part I**

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Northwestern Polytechnical University, China

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Universität Rostock, Germany

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Universität Rostock, Germany
B3L-A Invited Session: Control and Optimization of Infinite Dimensional Systems - Part III

Date: Wednesday, August 29, 2012
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Room: Casino
Chairs: Adam Kowalewski
Jan Sokolowski

Optimal Control of a Time Delay Hyperbolic System with the Neumann Boundary Condition
Adam Kowalewski
AGH University of Science and Technology, Poland

Shape Sensitivity and Asymptotic Analysis for Inclusions
Jan Sokolowski¹, Antoni Zochowski¹
¹Systems Research Institute of the Polish Academy of Sciences, Poland; ²Universite Henri Poincare Nancy I, France

Optimal Control of a Ball Pitching Robot
Esubalewe Lakie Yedeg, Eddie Wadbro
Umea University, Sweden

Sufficiency Conditions for Pole Assignment in Column-Regularizable Implicit Linear Systems
Tatiana Korotka³, Petr Zagalak¹, Vladimir Kucera²
¹Academy of Sciences of the Czech Republic, Czech Rep.; ²Czech Technical University in Prague, Czech Rep.; ³Technical University of Liberec, Czech Rep.

B3L-B Modeling and Simulation - Part II

Date: Wednesday, August 29, 2012
Time: 15:00 - 16:40
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Bond Graph Modeling, DAE Formulation and Numeric Simulation of a Three Phase Rectifier
Noe Villa-Villaseñor, Gilberto González-Ávalos, Jesús Rico-Melgoza
Universidad Michoacana de San Nicolás de Hidalgo, Mexico

Modeling and Control of a Novel Fes Driven Assisted Cycling Mechanism
Shwan Abdulla, Omar Sayidmarie, Samad Gharooni, Osman Tokhi
University of Sheffield, United Kingdom

Some New Concepts of Setup Costs in Multimode Resource-Constrained Project Scheduling Problem
Marek Mika, Rafal Różycki, Grzegorz Waligóra
Poznan University of Technology, Poland

Model Development and Optimal Control of Quadrotor Aerial Robot
Radoslaw Zawiski, Marian Blachuta
Silesian University of Technology, Poland
Time-Varying Sliding-Coefficient-Based Approach to the Decoupled Terminal Sliding Mode Controller Design
Husnu Bayramoglu, Hasan Komurcugil
Eastern Mediterranean University, Turkey

Using Genetic Algorithms to Fix a Route for an Unmanned Surface Vehicle
Tomasz Praczyk, Piotr Szymak
Polish Naval Academy, Poland

Observer-Based Control of an Electro-Pneumatic Clutch Using Extended Linearisation Techniques
Harald Aschemann, Dominik Schindele, Robert Prabel
Universität Rostock, Germany

Model-Based Controller Design for Antagonistic Pairs of Fluidic Muscles in Manipulator Motion Control
Frank Schreiber, Yevgen Sklyarenko, Gundula Runge, Walter Schumacher
Technische Universität Braunschweig, Germany

The Crane Control Systems: a Survey
Pawel Hyla
AGH University of Science and Technology, Poland

Adaptive Cruise Control System Using Balance-Based Adaptive Control Technique
Payman Shakouri¹, Jacek Czeczot², Andrzej Ordys³
¹Kingston University, United Kingdom; ²Silesian University of Technology, Poland

LabVIEW-Based Implementation of Balance-Based Adaptive Control Technique
Piotr Laszczyk, Rafał Czubasiewicz, Jacek Czeczot
Silesian University of Technology, Poland

Study of Predictive Control for Permanent Magnet Synchronous Motor Drives
Kvitoslav Belda

Observer-Based Predictive Temperature Control for Distributed Heating Systems Based on the Method of Integrodifferential Relations
Andreas Rauh, Luise Senkel, Christina Dittrich, Harald Aschemann
Universität Rostock, Germany
C1L-A  PLENARY: Variable-, Fractional-Order Discrete PID Controllers

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Lodz University of Technology, Poland

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1 Systems Research Institute, Polish Academy of Sciences, Poland; 2 Università degli Studi di Udine, Italy

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**Room:** Lehar  
**Chair:** Tadeusz Kaczorek

**The Grünwald-Letnikov Formula and its Equivalent Horner's Form Accuracy Comparison and Evaluation for Application to Fractional Order PID Controllers**  
Dariusz Brzezinski, Piotr Ostalczyk  
*Łódź University of Technology, Poland*

**Compactness of Fractional Imbeddings**  
Dariusz Idczak, Stanislaw Walczak  
*University of Łódź, Poland*

**Closed - Loop System Synthesis with the Variable-, Fractional - Order PID Controller**  
Piotr Ostalczyk, Piotr Duch  
*Łódź University of Technology, Poland*

### C3L-A Control and Systems Theory - Part II

**Date:** Thursday, August 30, 2012  
**Time:** 11:20 - 13:00  
**Room:** Casino  
**Chair:** Andrzej Bartoszewicz

**Interval-Based Sliding Mode Control and State Estimation for Uncertain Systems**  
Andreas Rauh, Harald Aschemann  
*Universität Rostock, Germany*

**Specification of Control Goals for Mechanical Systems as Function Minimization Problem**  
Pawel Cesar Sanjuan Szklarz, Elzbieta Jarzebowska  
*Politechnika Warszawska, Poland*

**Maximal Asymptotics of Neutral Type Systems**  
Grigory M. Sklyar, Piotr Polak  
*University of Szczecin, Poland*

**A Transfer Function Representation for a Class of Hyperbolic Systems**  
Krzysztof Bartecki  
*Opole University of Technology, Poland*

**The Path Following Control of a Unicycle Based on the Chained Form of a Kinematic Model Derived with Respect to the Serret-Frenet Frame**  
Joanna Plaskonka  
*Wroclaw University of Technology, Poland*

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**Date:** Thursday, August 30, 2012  
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University of Szczecin, Poland