



RAAD 2010

*June 23-25, 2010 @ Budapest, Hungary
June 26-27, 2010 @ Balatonfüred, Hungary*

Final Program and Book of Abstracts

Host: Óbuda University, Budapest, Hungary





Impressum

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Welcome from the General Chair

On behalf of RAAD International Scientific Committee, it is my pleasure to welcome you to the 19th International Workshop on Robotics in Alpe-Adria-Danube Region to be held in Budapest, and Satellite Workshop in Balatonfüred, Hungary.

The aim of the RAAD series is to provide researchers and practitioners from industry and academia with a platform to report on recent developments in the area of robotics. RAAD focuses on theory of robotics and various applications not only in engineering but in any other areas.

This time all RAAD papers are going to be included into IEEE Xplore database, which gives more precious level to the event.

The conference location is Óbuda University, Budapest, capital of Hungary.

We want to thank volunteers who have contributed tremendous time and effort to bring RAAD 2010 to you, especially we want to acknowledge the effort of all persons responsible for the background activities from local arrangements to secretariat.

Our pleasant duty is to gratefully acknowledge the support provided by the sponsors and co-sponsors of the conference: IEEE Joint Chapter of R&A and IES, Hungary, IEEE SMC Chapter, Hungary, IEEE Robotics and Automation Society, Hungarian Academy of Engineering, IFToMM, Hunorob Project, and our host, Óbuda University providing us with the technical facilities.

We hope that all attendance at RAAD 2010 will find this event intellectually stimulating and professionally rewarding. We wish you fruitful work and pleasant time.



A handwritten signature in blue ink, appearing to read 'Imre J. Rudas'.

Imre J. Rudas
RAAD 2010 General Chair



General Information

Date and Place

RAAD 2010 will take place on June 23-27, 2010, at Óbuda University, Budapest, and Balatonfüred, Hungary.

Official Language

The official language of the workshop is English. All presentations, including discussions and submissions, must be made in the official language. No translation will be provided.

Proceedings

Each accepted paper reaching us in time will be published in the Volume of CD Proceedings that will be distributed at the workshop registration desk to everyone who has paid the registration fee.

Cancellation and Refund

Cancellation regarding registration fee is possible in written form received no later than June 10, 2010. In this case 90% of the received sum will be transferred back. No reimbursement is possible after this deadline.

Opening Hours of the Registration Desk

The registration desk will be open during the workshop.

Presentation

All the presentations can be made by using OHP or Power Point. All authors are kindly asked to take their presentation on CD or USB drive. To present the paper it is not allowed to use own computer.

All conference rooms are supplied with OHP and data projector with PC.

Smoking

Please, be so kind to your lungs and your colleagues by not smoking in the building and social events of the workshop.



June 23, 2010 (Wednesday)

8:00 – 16:00	Registration	Aula
9:00 – 9:30	Opening Ceremony	Room F09
	Plenary Session I	Room F09
	Robotic Challenges in Future Space Research	
9:30 – 10:15	<i>Antal K. Bejczy</i> JPL, Caltech, Pasadena, California, USA Session Chair: Marco Ceccarelli University of Cassino, Italy	
10:15 – 10:30	Coffee Break	
	Plenary Session II	Room F09
	Time-Optimal Motion Planning for Robots	
10:30 – 11:15	<i>János Somló*</i> , <i>József Molnár**</i> *Óbuda University, Budapest, Hungary **Budapest University of Technology and Economics, Hungary Session Chair: Theodor Borangiu University Politehnica of Bucharest, Romania	
11:15 – 13:30	Lunch	
13:30 – 15:10	Parallel Sessions	
	Session on Control I	Room F09
13:30 – 15:10	Session Chair: Dorian Cojocaru University of Craiova, Romania	
	Wireless Synchronization Protocols for Collaborative Robotic and Sensor Environments	
13:30	<i>Bogdan Stratulat*</i> , <i>Sebastian Barzeianu*</i> , <i>Mihai Micea*</i> , <i>Voicu Groza**</i> * "Politehnica" University of Timisoara, Romania ** University of Ottawa, Canada	
	A Novel Approach to the Model Reference Adaptive Control of MIMO Systems	
13:50	<i>J. K. Tar*</i> , <i>I. J. Rudas*</i> , <i>J. F. Bitó*</i> , <i>K. R. Kozłowski**</i> , <i>C. Pozna***</i> * Óbuda University, Budapest, Hungary ** Poznań University of Technology, Poland *** University Transilvania of Brasov, Romania	



Open Manufacturing Control with Agile Reconfiguring of Robot Services

14:10

Theodor Borangiu*, S. Răileanu*, D. Trentesaux**, T. Berger**

* University Politehnica of Bucharest, Romania

** University Lille Nord of France, France

Quadrotor Control Based on Partial Sensor Data

14:30

László Kis, Béla Lantos

Budapest University of Technology and Economics, Hungary

Pneumatronic Unit for Motion of Bows

14:50

Enrico Ravina

University of Genoa, Italy

Session on Man-Machine Interaction

Room F08

13:30 – 15:10

Session Chair: **Franc Hanžič**

University of Maribor, Slovenia

Hierarchical Myoelectric Control of a Human Upper Limb Prosthesis

13:30

S. Herle, S. Man, Gh. Lazea, C. Marcu, P. Raica, R. Robotin

Technical University of Cluj-Napoca, Romania

Multimodal Control Interface for an Anthropomorphic Gripper

13:50

A. Itu, I. Staretu

Transilvania University of Brasov, Romania

Safe and Reliable Human-Robot Interaction in Manufactory, within and beyond the Workcell

14:10

O. O. Ogorodnikova

Budapest University of Technology and Economics, Hungary

Exercise Device for Upper-Extremity Sensory-Motor Capability Augmentation Based on Magneto-Rheological Fluid Actuator

14:30

Roman Kamnik, Jernej Perdan, Tadej Bajd, Marko Munih

University of Ljubljana, Slovenia

Human-Robot Collaboration by Intention recognition using Probabilistic State Machines

14:50

Muhammad Awais, Dominik Henrich

Lehrstuhl für Angewandte Informatik III, Bayreuth, Germany



Session on Medical Application and Application in Agriculture		Room F07
13:30 – 15:10	<p>Session Chair: Enrique Bauzano Nuñez University of Malaga, Spain</p>	
13:30	<p>A Multi-Behavior Algorithm for Auto-Guided Movements in Surgeon Assistance <i>E. Bauzano, V. F. Muñoz, I. Garcia-Morales</i> University of Malaga, Spain</p>	
13:50	<p>Maneuvers Recognition System for Laparoscopic Surgery <i>B. Estebanez, P. Saz-Orozco, V. F. Muñoz, I. García-Morales</i> University of Malaga, Spain</p>	
14:10	<p>An Integrated Device for Saffron Flowers Detaching and Harvesting <i>Andrea Manuello Bertetto, C. Falchi, R. Pinna, R. Ricciu</i> University of Cagliari, Sardinia, Italy</p>	
14:30	<p>Robotic Cell with Redundant Architecture and Force Control: Application to Cutting and Boning <i>Grégory Guire*, Laurent Sabourin*, Grigore Gogu*, Eric Lemoine**</i> * Clermont Université, France ** Développement de l'Institut de la Viande, France</p>	
14:50	<p>A Setup of Mobile Robotic Unit for Fruit Harvesting <i>A. A. Aljanobi, S. A. Al-hamed, S. A. Al-Suhaibani</i> King Saud University, Riyadh, Saudi Arabia</p>	
Poster Session		Aula
13:30 – 15:10	<p>Measuring the Time needed for Training a Neural Network Based on the Number of Training Steps <i>M. Stoica, G. A. Calangiu, F. Sisak</i> Transilvania University, Brasov, Romania</p>	
15:10 – 15:30	Coffee Break	



Demo Presentation on Virtual Collaboration Arena

Aula

Barna Reskó

MTA SZTAKI, Hungary

15:30 – 16:00

The demonstration is about a software system named Virtual Robot Collaboration Arena (VIRCA). The goal of this software system is to allow a human user to interact and collaborate with distant, real robots and other intelligent agents by the means of the virtual world. The system integrates the advantages of a virtual environment, the information density of cognitive infocommunication channels, including 3D visual perception, and allows the combination of the precision and speed of AI with the high levels of human intelligence.

16:00 – 17:40 Parallel Sessions

Session on Control II

Room F09

16:00 – 17:40

Session Chair: **Štefan Havlík**

Institute of Informatics, Slovak Academy of Sciences,
Banska Bystrica, Slovak Republic

Programming and Control of Humanoid Robot Football Playing Tasks

16:00

A. Kos, J. Babič

Jožef Stefan Institute, Ljubljana, Slovenia

The Process Control for P-single Operators

16:20

Liberios Vokorokos, Norbert Ádám, Branislav Madoš

Technical University of Košice, Slovakia

New Approach of the Navigation Control of Small Size UAVs

16:40

András Molnár, Dániel Stojcsics

Óbuda University, Budapest, Hungary

Polynomial Control Technique for Adaptive Positioning Within Sub-Micrometer Scale

17:00

Gregor Škorc*, Riko Šafarič, Andreja Rojko****

* Resistec UPR d.o.o. & Co. k.d., Kostanjevica na Krki, Slovenia

** University of Maribor, Slovenia

Robotic Control System for Hydraulic Telescopic Handler

17:20

Justin Činkelj, Roman Kamnik, Peter Čepon, Matjaž Mihelj, Marko Munih

University of Ljubljana, Slovenia



Session on Simulation and Motion Planning

Room F08

16:00 – 17:40

Session Chair: Sorin Herle

Technical University of Cluj-Napoca, Romania

3D Graphical Simulation of an Articulated Serial Manipulator based on Kinematic Models

16:00

Cosmin Marcu, Gheorghe Lazea, Sorin Herle, Radu Robotin, Levente Tamas

Technical University of Cluj-Napoca, Romania

Simulation of Interaction Tasks for Pneumatic Soft Robots using *SimMechanics*

16:20

Xiaodong Zhang, Oleg Ivlev

Friedrich-Wilhelm-Bessel-Institute Research Company /
University of Bremen, Germany

CAD-based Techniques for Workspace Analysis and Representation of the 3CRS Parallel Manipulator

16:40

Khaled A. Arrouk*, Belhassen-Chedli Bouzgarrou**, Grigore Gogu**

* Clermont-Université, Université Blaise Pascal, France

** Clermont Université, France

Optimizing Parameters of Trajectory Representation for Movement Generalization: Robotic Throwing

17:00

Andrej Gams, Tadej Petrič, Leon Žlajpah, Ales Ude

Jožef Stefan Institute, Ljubljana, Slovenia

Motion Planning for a Mobile Robot

17:20

Anca S. Popa, Mircea Popa, Marius Marcu

“Politehnica” University, Romania

Session on Design

Room F07

16:00 – 17:40

Session Chair: Nicola Pio Belfiore

Sapienza University of Rome, Italy

The Development of a MEMS/NEMS-based 3 D.O.F. Compliant Micro Robot

16:00

Marco Balucani, Nicola Pio Belfiore, Rocco Crescenzi, Matteo Verotti

Sapienza University of Rome, Italy

Open Architecture for Robot Controllers

16:20

Theodor Borangiu, Florin Daniel Anton, Silvia Anton

University Politehnica of Bucharest, Romania



16:40	<p>Parallel Manipulator Architectures from CAPAMAN Design</p> <p><i>Ceccarelli Marco</i></p> <p>University of Cassino, Italy</p>	
17:00	<p>A Working Lunar Rover: Passive Gripper Mechanism and Actuated Leg</p> <p><i>A. Ambu, A. Manuello Bertetto, C. Falchi</i></p> <p>University of Cagliari, Sardinia, Italy</p>	
17:20	<p>Some Issues on Holonic Systems Analysis, Design and Implementation</p> <p><i>Doru Pănescu, Carlos Pascal</i></p> <p>“Gheorghe Asachi” Technical University of Iasi, Romania</p>	
	<p>Poster Session</p>	Aula
16:00 – 17:40	<p>Use of Particle Swarm Optimization in Path Planning for Rough Terrain</p> <p><i>Negar ZakeriNejad*, Amir Hossein Bakhtiary **, Mohammad Reza Jahed Motlagh*</i></p> <p>* Iran University of Science and Technology, Tehran, Iran ** University of Tehran, Iran</p>	
18:00	<p>Welcome Reception</p>	NIK Aula

June 24, 2010, Thursday

8:30 – 16:00	<p>Registration</p>	
9:00 – 9:45	<p>Plenary Session III</p> <p>High-Flying Service Robot: a Ceiling-based Approach</p> <p><i>Gábor Stépán, László Kovács, András Tóth</i></p> <p>Budapest University of Technology and Economics, Hungary</p> <p><u>Session Chair:</u> Leon Žlajpah Jožef Stefan Institute, Ljubljana, Slovenia</p>	Room F09
9:45 – 10:00	<p>Coffee Break</p>	



Plenary Session IV

Room F09

Hybrid System for Event-Based Planning and Control of Robot Operation

10:00 – 10:45

Karel Jezernik, Aleš Hace

University of Maribor, Slovenia

Session Chair: **Karol Dobrovodský**

Institute of Informatics, Bratislava, Slovakia

11:00 – 13:00

Lunch

13:00 – 14:40

Parallel Sessions

Session on Kinematics

Room F09

13:00 – 14:40

Session Chair: **Jaroslav Hricko**

Slovak University of Technology, Bratislava, Slovak Republic

Isotropy in *any* RR Planar Dyad under Active Joint Stiffness Regulation

13:00

Nicola Pio Belfiore, Paolo Di Giamberardino*, Imre J. Rudas**, Matteo Verotti**

*Sapienza University of Rome, Italy

**Óbuda University, Budapest, Hungary

Matrix Formulations for Solving the Configuration-Dependent Eigenvalue Problem of a Two-Link Flexible Manipulator

13:20

Carmelo di Castri, Arcangelo Messina

Università del Salento, Lecce, Italia

Stewart Gough Platforms with Linear Singularity Surface

13:40

Georg Nawratil

Vienna University of Technology, Austria

Combined Snake Robot: Analysis and Verification of Designed Structure

14:00

Jan Sitar, Tomas Hulmik, V. Racek

Alexander Dubcek University of Trencin, Slovak Republic

Collision and Proximity Avoidance for Robust Behaviour of Real-Time Robot Applications

14:20

Alexandru Dumitrache, Theodor Borangiu, Anamaria Dogar

University Politehnica of Bucharest, Romania



Session on Mobile Robots

Room F08

13:00 – 14:40

Session Chair: **Nicolae Joni**
ROBCON Timișoara, Romania

3D Object Classification for Mobile Robots in Home-Environments Using Web-Data

13:00

Walter Wohlkinger, Markus Vincze

Vienna University of Technology, Austria

Adaptive Sliding Mode Controller Design for Mobile Robot Fault Tolerant Control. Introducing ARTEMIC

13:20

Cristian Axenie, Daniela Cernega

"Dunarea de Jos" University, Galati, Romania

Biped Robot "ROTTTO": Stiff and Compliant

13:40

Andriy Melnykov, Frank Palis, A. Rudskyy, Mykhaylo Konyev and RobotsLab Team

Otto-von-Guericke-University Magdeburg

Experimental Comparison of AdaBoost Algorithms Applied on Leg Detection with Different Range Sensor Setups

14:00

Srećko Jurić-Kavelj, Ivan Petrović

University of Zagreb, Croatia

Mobile Robot Pose Tracking by Correlation of Laser Range Finder Scans in Hough Domain

14:20

Davor Graovac, Srećko Jurić-Kavelj, Ivan Petrović

University of Zagreb, Croatia

Session on Education and Machine Learning

Room F07

13:00 – 14:40

Session Chair: **Dragan Kusić**
University of Maribor, Slovenia

Practical Aspects of Undergraduate Education in Robotics

13:00

Mircea Popa, Anca S. Popa, Marius Marcu

"Politehnica" University, Timișoara, Romania

Projects in Mechatronics Program: Practical Examples

13:20

Andreja Rojko, Marijan Španer, Karel Jezernik

University of Maribor, Slovenia

Properties of Classes, Subclasses and Objects in an Abstraction Model

13:40

Claudiu Pozna, Radu-Emil Precup†, Nicusor Minculete**, Csaba Antonya*, Claudia-Adina Dragos†*

* University Transilvania of Brasov, Romania

† "Politehnica" University of Timișoara, Romania

** University Dimitrie Cantemir of Brasov, Romania



14:00	<p>Learning of a Ball-in-a-Cup Playing Robot <i>Bojan Nemec, Matej Zorko, Leon Žlajpah</i> Jožef Stefan Institute, Ljubljana, Slovenia</p>	
14:20	<p>Robot Learning by Gaussian Process Regression <i>Denis Forte, Aleš Ude, Andrej Kos</i> "Jožef Stefan" Institut, Ljubljana, Slovenia</p>	
<p>Poster Session</p>		Aula
13:00 – 14:40	<p>Application for Controlling a Thickness Regulating Member used in Paper Manufacturing <i>M. Badea, S. A. Moraru, Costin M. Grigorescu</i> University Transilvania of Brasov, Romania</p>	
14:40 – 15:00	<p>Coffee Break</p>	
15:00 – 15:30	<p>Demo Presentation on Nao Interaction <i>Marc Duruy, David Gouaillier</i> Aldebaran Robotics, France Nao is a humanoid robot developed and manufactured by Aldebaran Robotics, a French company based in Paris, France. The demonstration will show how the robot interacts autonomously and the capacities of high level programming through Choregraphe software. You will also discover the last development of Nao</p>	Aula
15:30 – 17:10	<p>Parallel Sessions</p>	
15:30 – 17:10	<p>Session on Measuring Instrumentation Session Chair: Andrei Nick Ivanescu University Politehnica of Bucharest, Romania</p>	Room F09
15:30	<p>Using Natural Human Gait for a Humanoid Robot <i>A. Byagowi, Peter Kopacek</i> Vienna University of Technology, Austria</p>	
15:50	<p>Implementation of the Three Degrees-of-Freedom Parallel Platform in Human Posture Analysis <i>Goran Škorja, Jan Babič</i> Jožef Stefan Institute, Ljubljana, Slovenia</p>	
16:10	<p>An Experimental Evaluation of Earthquake Effects on Mechanism Operation <i>S. Sula*, G. Carbone**, D. Pisla*</i> * Technical University of Cluj-Napoca, Romania ** University of Cassino, Italy</p>	



16:30	<p>Experimental Implementation of Energy Consumption by Robot Movement</p> <p><i>Zdeněk Kolíbal, Anna Smetanová</i></p> <p>Institute of Production Machines, Systems and Robotics, Brno, Czech Republic</p>	
16:50	<p>Multifunctional Sensor Networks for Automation, Process Monitoring and Robotic Applications</p> <p><i>Gokul Balakrishnan, Somashekhar S Hiremath</i></p> <p>Indian Institute of Technology Madras, India</p>	
15:30 – 17:10	<p>Session on Vision Systems</p> <p>Session Chair: Andrea Manuello Bertetto University of Cagliari, Sardinia, Italy</p>	Room F08
15:30	<p>Dual Camera Mechatronic Tracking System</p> <p><i>Karol Dobrovodský, Pavel Andris</i></p> <p>Institute of Informatics, Bratislava, Slovakia</p>	
15:50	<p>Vision System for Human Body Infrared Thermography</p> <p><i>Nick Andrei Ivanescu, Liviu Ciupitu</i></p> <p>University Politehnica of Bucharest, Romania</p>	
16:10	<p>Real-Time 3D Marker Tracking with a WIIMOTE Stereo Vision System: Application to Robotic Throwing</p> <p><i>Tadej Petrič, Andrej Gams, Ales Ude, Leon Žlajpah</i></p> <p>Jožef Stefan Institute, Ljubljana, Slovenia</p>	
16:30	<p>Detection of Cylindrical Objects in Tabletop Scenes</p> <p><i>Mario Richtsfeld, Robert Schwarz, Markus Vincze</i></p> <p>Vienna University of Technology, Austria</p>	
16:50	<p>Non-Contact Sensing System for Telerobotic Applications</p> <p><i>M. Karkoub*, M-G. Her**, M-I. Ho**, J-C. Huang**</i></p> <p>* Texas A&M University, Qatar ** Tatung University, Taipei, Taiwan</p>	
15:30 – 17:10	<p>Poster Session</p> <p>A Knowledge-based System Designed for Making Task Execution more Efficient for a Robot Arm</p> <p><i>G. A. Calangiu, M. Stoica, F. Sisak</i></p> <p>Transilvania University, Brasov, Romania</p>	Aula
18:00	<p>Bus departure to banquet site</p>	
19:00 – 22:00	<p>Banquet</p>	



June 25, 2010, Friday

8:30 – 11:00 **Registration**

9:00 – 10:40 **Parallel Sessions**

Session on High Precision Systems

Room F09

9:00 – 10:40

Session Chair: **Carmelo di Castri**
Università del Salento, Lecce, Italia

Improving Accuracy of Compliant Robotic (Micro) Devices

9:00

Štefan Havlík

Institute of Informatics, Slovak Academy of Sciences, Banská Bystrica, Slovak Republic

Modeling for Engineering Processes in Integrated Robot Definition

9:20

László Horváth, Imre J. Rudas

Óbuda University, Budapest, Hungary

Optimization in Designing Compliant Robotic Micro-Devices

9:40

J. Hricko, Š. Havlík*, R. Hart'anský****

* Institute of Informatics, Slovak Academy of Sciences, Banská Bystrica, Slovak Republic

** Slovak University of Technology, Bratislava, Slovak Republic

Calibration Machine for Linear Scales

10:00

Gyula Hermann*, Miklós Báthor, Zsolt Bánki****

*Budapest Tech

**Cortex Ltd

A Particle Swarm and Neural Network Approach for Position Control of XY Piezo Actuator Stage

10:20

Dragan Kusić, Jure Čas

University of Maribor, Slovenia

Session on Application, Control and Optimization

Room F08

9:00 – 10:40

Session Chair: **Justin Činkelj**
University of Ljubljana, Slovenia

ARM-Cortex Microcontroller Fuzzy Position Control on an Automatic Door Test-Bed

9:00

Hanžič Franc, Riko Šafarič

University of Maribor, Slovenia



9:20	<p>A Possible Control Structure for Production Lines Optimization</p> <p><i>György Schuster, Rita Lovassy</i></p> <p>Óbuda University, Budapest, Hungary</p>	
9:40	<p>Robotized Welding of Large One-Dimensional Structures</p> <p><i>A. Dobra*, Nicolae Joni**</i></p> <p>* Politehnica University of Timișoara, Romania ** ROBCON Timișoara, Romania</p>	
10:00	<p>A Hybrid Approach to Decision Making and Problem Analysis</p> <p><i>Norbert Sram</i></p> <p>Óbuda University, Budapest, Hungary</p>	
10:20	<p>Control of a Hyper-Redundant Robot</p> <p><i>Ionut Dinulescu, A. Predescu, G. Boccolato, R. T. Tanasie, Dorian Cojocar</i></p> <p>University of Craiova, Romania</p>	
<p>Poster Session</p>		Aula
9:00 – 10:40	<p>Modeling of a Vehicle with Continuously Variable Transmission</p> <p><i>C.-A. Dragos*, Stefan Preitl*, Radu-Emil Precup*, D. Pirlea*, C.-S. Nes*, E. M. Petriu**, Claudiu Pozna***, ****</i></p> <p>* "Politehnica" University of Timișoara, Romania ** University of Ottawa, Canada *** Transilvania University of Brasov, Romania **** Széchenyi István University, Győr, Hungary</p> <p>Comprehensive Analysis on the Effect of Static Air Gap Eccentricity on Cogging Torque</p> <p><i>Szilárd Jagasics</i></p> <p>Óbuda University, Budapest, Hungary</p>	
10:40 – 11:00	<p>Coffee Break</p>	
<p>Plenary Session V</p>		Room F09
11:00 – 11:45	<p>Robots for the Human</p> <p><i>Oussama Khatib</i></p> <p>Stanford University, USA</p> <p>Session Chair: Roman Kamnik University of Ljubljana, Slovenia</p>	
11:45 -13:00	<p>Lunch</p>	
14:00	<p>Bus leaves for Balatonfüred</p>	



18:00 **Satellite Workshop Welcome Reception** At Hotel

June 26, 2010, Saturday

10:00 **Opening Ceremony** Room
Erzsébet

10:10 – 11:50 **Session on Recent Advances in Robot Applications** Room
Erzsébet

Session Chair: **Krzysztof Kozłowski**
Poznań University of Technology, Poland

10:10 **Trajectory Tracking for Multiple Unicycles in the Environment with Obstacles**

Wojciech Kowalczyk, Krzysztof Kozłowski*, József K. Tar***

* Poznań University of Technology, Poland
** Óbuda University, Budapest, Hungary

10:30 **Indoor Navigation for Quadrotor UAVs Using Schematic Environment Maps**

Tomasz Krokowicz, **, Miguel Gasca*, Holger Voos*, Dariusz Ucinski***

* University of Applied Sciences Ravensburg-Weingarten, Germany
** University of Zielona Gora, Poland

10:50 **Engineering for Industrial Robots in Content-based Virtual Space**

**László Horváth, *Imre J. Rudas, **Karel Jezernik*

* Óbuda University, Budapest, Hungary
** University of Maribor, Slovenia

11:10 **Control Performance Optimization by Convex Hull Manipulation**

Patricia Gróf, Péter Baranyi, Péter Korondi
Computer and Automation Research Institute/Cognitive Informatics Research Group, Hungary
Budapest University of Technology and Economics, Hungary

11:30 **Control design for Impedance Model with Feedback Delay**

Péter Galambos, Péter Baranyi, Péter Korondi
Computer and Automation Research Institute, Hungarian Academy of Sciences, Budapest, Hungary
Budapest University of Technology and Economics, Hungary



Poster Session

10:10 – 11:50 **Virtual Classrooms for Robotics and other Engineering Applications**

József Gáti, Gyula Kártyás

Óbuda University, Budapest, Hungary

11:50 **Closing Ceremony**

12:00 **Lunch**

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