Technical Program

Monday, 21 May 2012

10:00am - 11:30am

Humanoid Robotics
Room: 2
Chair: G. Cheng (Technische Universität München, Germany)

10:00 Graph-Based Action Models for Human Motion Classification
F. Endres, J. Hess, W. Burgard, (University of Freiburg, Germany)

10:20 Hardware Design and Mathematical Modeling for an Artificial Pneumatic Spine for a Biped Humanoid Robot
Ch. Bauer, M. Engelmann, I. Gaiser, R. Mikut, St. Schulz, Th. Stein, A. Fischer (Karlsruhe Institute of Technology (KIT), Germany)

10:40 A Dynamical Systems Approach to Adaptive Sequencing of Movement Primitives
T. Luksch (University of Kaiserslautern, Germany); M. Gienger, M. Mühlig, T. Yoshiike (Honda Research Institute Europe, Germany)

11:00 Playing Tangram with a Humanoid Robot
J. Hirth, N. Schmitz, K. Berns (University of Kaiserslautern, Germany)

Robotics in New Markets & Applications
Room: 4
Chair: F. Kirchner (DFKI, Bremen, Germany)

10:00 Robotic system for mapping 3D in-wall information for craftsmen
J. Vorndamme (Leibniz Universität Hannover, Germany); St. Petereit (Robert Bosch GmbH, Germany); B. Pitzer, Ph. Roan (Robert Bosch LLC, USA); T. Lilge (Leibniz Universität Hannover, Germany); A. Albert (Robert Bosch GmbH, Germany)

10:20 Integrated Vision/Force Robot System for Shelving and Rearranging of Imprecisely Placed Objects
M. Bdiwi (Chemnitz University of Technology, Germany)

10:40 An Autonomous Flying Robot for Network Robotics
Ch. Blum, V. Hafner (Humboldt University Berlin, Germany)

11:00 Piezo-driven Micro Robots for Different Environments: Prototypes and Experiments
F. Becker (Ilmenau University of Technology, Germany); V. Minchenya (Belarusian National Technical University, Minsk, Belarus); K. Zimmermann (Ilmenau University of Technology, Germany); T. Volkova (Lomonosov Moscow State University, Moscow, Russia)
Safety Requirements
Chair: T. Lüth (Technische Universität München, Germany)

10:00 Development of validation methods for the safety of mobile service robots with manipulator
Th. Jacobs, U. Reiser, M. Hägele, A. Verl (Fraunhofer IPA, Germany)

10:20 Safety of Industrial Robots: From Conventional to Collaborative Applications
J. Fryman (Robotic Industries Association, Ann Arbor MI, USA); B. Matthias (ABB AG Corporate Research, Germany)

10:40 Safety Challenges of Transferable Robotic Systems
T. Salm, O. Väätäinen (VTT, Technical Research Center of Finland, Finland)

11:00 Sensor- and Plausibility-based Surveillance of Human/Robot-Workspaces
M. Hänel, M. Fischer, St. Kuhn, D. Henrich (University of Bayreuth, Germany)

11:30am – 12:00pm Coffee Break

12:00pm - 12:45pm
Invited Talk I
Room: 5

12:45pm – 1:45pm Lunch Break

1:45pm - 3:15pm
Motion & Planning
Chair: G. Lawitzky (Siemens AG, Munich, Germany)

1:45 Comparison of sampling based motion planning algorithms specialized for robot manipulators
Ch. Fragkopoulos, K. Abbas, A. Eldeep, A. Graeser (University of Bremen, Germany)

2:05 Trajectory modification considering dynamic constraints of autonomous robots
Ch. Rösmann (TU Dortmund University, Germany); Th. Wösch, W. Feiten (Siemens Corporate Technology, Germany); F. Hoffmann, T. Bertram (TU Dortmund University, Germany)

2:25 Locomotion through Reconfiguration based on Motor Primitives for Roombots Self-Reconfigurable Modular Robots
St. Bonardi (Biorobotics Laboratory & EPFL, Switzerland); R. Moeckel, A. Sproewitz, M. Vespignani, A. Jan Ijspeert (EPFL, Switzerland)

2:45 Generating Behaviour Networks from Finite-State Machines
Ch. Armbrust, D. Schmidt, K. Berns (University of Kaiserslautern, Germany)
Object Detection & Collision Avoidance
Room: 4
Chair: U. Frese (DFKI, Germany)

1:45 Dynamic path planning and obstacle avoidance using an industrial manipulator
F. Leutert (University of Würzburg, Germany); Ch. Freier (Volkswagen AG, Germany); K. Schilling (University of Würzburg, Germany)

2:05 Fast Vision-based Grasp and Delivery Planning for unknown Objects
J. Baumgartl, D. Henrich (University of Bayreuth, Germany)

2:25 Object Pose Detection in Industrial Environment
M. Palzkill, A. Verl (Fraunhofer IPA, Germany)

2:45 A New Library for Real-time Continuous Collision Detection
H. Täubig, U. Frese (DFKI, Germany)

Domestic Robots
Room: 5
Chair: E. Prassler (Bonn-Rhine-Sieg University of Applied Sciences, Germany)

1:45 Safety Properties and Collision Behavior of Robotic Arms with Elastic Tendon Actuation
Th. Lens, O. von Stryk (Technische Universität Darmstadt, Germany)

2:05 An Aml Environment Implementation: Embedding TurtleBot into a novel Robotic Service Wall
Ch. Georgoulas, Th. Linner, A. Kasatkin, Th. Bock (Technische Universität München, Germany)

2:25 Visuell und kraftgeregeltes Öffnen und Schließen von Türen mit Hilfe eines mobilen Roboterarms
G. Milighetti, E. Hoffmann, H.-B. Kuntze (Fraunhofer IOSB, Germany)

2:45 A Visual Dirt Detection System for Mobile Service Robots
R. Bormann, J. Fischer, G. Arbeiter, A. Verl (Fraunhofer IPA, Germany)

3:15pm - 4:15pm
Poster Session
P1 Design of wheel modules for non-holonomic, omnidirectional mobile robots in context of the emerging control problems
Th. Jacobs, Ch. Connette, M. Hägele , A. Verl (Fraunhofer IPA, Germany)

P2 Unified Closed Form Inverse Kinematics for the KUKA youBot
S. Sharma (Bonn-Rhine-Sieg University of Applied Sciences, Germany); Ch. Scheurer (KUKA Laboratories GmbH, Germany); R. Bischoff (KUKA Robotics Corporation, Augsburg, Germany); G. Kraetzschmar (Bonn-Rhine-Sieg University of Applied Sciences, Germany)

P3 Uniform Cellular Design of Artificial Robotic Skin
Ph. Mittendorfer, G. Cheng (Technische Universität München, Germany)
P4 **An approach to locomotion systems based on 3D tensegrity structures with a minimal number of struts**
V. Böhm, A. Jentzsch, T. Kaufhold, F. Schneider, F. Becker, K. Zimmermann (Ilmenau University of Technology, Germany)

P5 **Development of Position Monitoring system for studying performance of wind tracking algorithms**
A. Jahangir Moshayedi, D. Gharpure (University of Pune, India)

P6 **Operating Unknown ConstrainedMechanisms with Compliant Robots**
E. Lutscher, G. Cheng (Technische Universität München, Germany)

P7 **Playing with allometry: combination of macroscopic engineering with microscopic biomimetics allows realization of new robot functions in meso dimension**
M. Fremerey, H. Witte (Ilmenau University of Technology, Germany)

P8 **Automatic Generation of Stable Poses and Drop Regions**
J. Jørgensen, L.-P. Ellekilde, H. Petersen (University of Southern Denmark, Denmark)

P9 **Management and Manipulation of Modular and Reconfigurable Satellites**
J. Oberländer, K. Uhl, L. Pflotzer, M. Göller, A. Rönnau (FZI Forschungszentrum Informatik, Germany); R. Dillmann (Karlsruhe Institute of Technology (KIT), Germany)

P10 **Visibility-Based Path Planning for Autonomous Underwater Vehicle**
O. Gal (Technoin Israel, Israel)

P11 **Comparison of Localization Algorithms for AGVs in Industrial Environments**
Ch. Kirsch, F. Küнемund, D. Heß, Ch. Röhrig (Dortmund University of Applied Sciences and Arts, Germany)

P12 **Investigation on a Planar Cable-Driven Parallel Robot**
W. Kraus, V. Schmidt, A. Pott, A. Verl (Fraunhofer IPA, Germany)

P13 **Rule based Intention Generalization through Human-Robot Interaction**
M. Awais, D. Henrich (University of Bayreuth, Germany)

P14 **Gripping Point Calculation and Collision Avoidance in a Bin-Picking application**
F. Spenrath, A. Spiller, A. Verl (Fraunhofer IPA, Germany)

P15 **Automatic Path and Trajectory Planning for Robotic Spray Painting**
A. Gasparetto (University of Udine, Italy); R. Vidoni (Free University of Bozen-Bolzano, Italy); D. Pillan, E. Saccavini (CMA Robotics, Italy)

P16 **New developments and application spectrum for robotics in laser material processing - Challenges and opportunities for the flexible use of robot systems for laser welding**
E. Friedel, N. Wagner (TRUMPF Laser- und Systemtechnik GmbH, Germany)

P17 **Autonomous Foods Handling by Chopsticks for Meal Assistant Robot**
A. Yamazaki, R. Masuda (Tokai University, Japan)

P20 **Application of Hybrid A* to an Autonomous Mobile Robot for Path Planning in Unstructured Outdoor Environments**
J. Peterleit, T. Emter, Ch. Walter Frey (Fraunhofer IOSB, Germany); Th. Kopfstedt, A. Beutel (Diehl BGT Defence GmbH & Co. KG, Germany)

P21 **A mobile robot platform for socially assistive home-care applications**
M. Merten (Metralabs GmbH, Germany); H.-M. Gross (Ilmenau University of Technology, Germany)
P22 Simultaneous Localization and Mapping with the Kinect sensor
Th. Emter (Fraunhofer IOSB, Germany); A. Stein (Robert Bosch GmbH, Germany)

P23 An Easy to Use Framework for Educational Robots
R. Maas, E. Maehle (University of Lübeck, Germany)

P24 Conceptual Design of a Dynamic Risk-Assessment Server for Autonomous Robots
Ph. Ertle (University Duisburg-Essen, Germany); M. Tokic, T. Bystricky, M. Ebel, H. Voos (University of Applied Sciences Ravensburg-Weingarten, Germany); D. Söffker (University Duisburg-Essen, Germany)

P25 Development of a Hybrid Robot Assistance System for Welding of Assemblies - Ensuring Human Safety with Offline Simulation and Real-time Workspace Surveillance
B. Kuhlenkötter (TU Dortmund University, Germany)

4:15pm - 6:15pm

Perception I
Room: 2
Chair: R. Dillmann (Karlsruhe Institute of Technology (KIT), Germany)

4:15 Robust Real-Time Registration of RGB-D Images using Multi-Resolution Surfel Representations
J. Stückler, S. Behnke (University of Bonn, Germany)

4:35 Coarse Geometry acquisition of welding parts using a novel cheap depth sensor
Th. Gecks (University of Bayreuth, Germany); Ch. Müller (Blackbird Robotics GmbH, Germany); D. Henrich (University of Bayreuth, Germany); W. Vogl (Technical University Munich, Germany)

4:55 Rapid Detection of Fast Objects in Highly Dynamic Outdoor Environments using Cost-Efficient Sensors
Ch. Connette, J. Fischer, B. Maidel, F. Mirus, S. Nilsson, K. Pfeiffer, A. Verl (Fraunhofer IPA, Germany); A. Durbec, B. Ewert, T. Haar, D. Grüdl (Valeo Schalter und Sensoren GmbH, Germany)

5:15 Efficient Monitoring of Process Plants by Telepresence and Attention Guidance
Ch. Connette, G. Arbeiter, F. Meßmer, M. Hägele, A. Verl (Fraunhofer IPA, Germany); S. Notheis, M. Mende, B. Hein, H. Wörn (Karlsruhe Institute of Technology (KIT), Germany)

5:35 MPG - Fast Forward Reasoning on 6 DOF Pose Uncertainty
M. Lang (Technische Universität München, Germany); W. Feiten (Siemens Corporate Technology, Germany)

Industrial Applications
Room: 4
Chair: B. Kuhlenkötter (TU Dortmund University, Germany)

4:15 Enabling robots in small-part assembly lines: The "ROSETTA approach" - an industrial perspective
R. Patel, M. Hedelind, P. Lozan-Villegas (ABB AG, Sweden)
4:35 **Advanced methods for small batch robotic machining of hard materials**  
D. Surdilovic, G. Schreck (Fraunhofer IPK, Germany)

4:55 **Optimised Pattern Recognition For Robotic Weldment Geometry Measuring**  
G. Hoffmeier, M. Plyusnina, B. Kuhlenkötter (TU Dortmund University, Germany); J. Bickendorf (Autocam Informationstechnik GmbH, Germany)

5:15 **A Flexible Haptic Test Bed**  
M. Bartelt, F. Domrös, B. Kuhlenkötter (TU Dortmund University, Germany)

5:35 **Auto-Calibration Method for Overconstrained Cable-Driven Parallel Robots**  
Ph. Miermeister, A. Pott, A. Verl (Fraunhofer IPA, Germany)

**Outdoor Robotics**

**Room: 5**

Chair: K. Berns (University of Kaiserslautern, Germany)

4:15 **Outdoor RGB-D SLAM Performance in Slow Mine Detection**  
S. Abbas, A. Muhammad (LUMS School of Science & Engineering, Pakistan)

4:35 **Visual Servoing of a Sensor Arm for Mine Detection Robot Marwa**  
T. Manzoor, A. Munawar, A. Muhammad (LUMS School of Science & Engineering, Pakistan)

4:55 **Optical Position Stabilization of an UAV for Autonomous Landing**  
M. Ax, St. Thamke, L. Kuhnert, J. Schlemper, K.-D. Kuhnert (University of Siegen, Germany)

5:15 **MONSUN II: A small and inexpensive AUV for underwater swarms**  
Ch. Osterloh, Th. Pionteck, E. Maehle (University of Lubeck, Germany)

5:35 **Advanced Mobile Robot Engineering with Virtual Testbeds**  
J. Rossmann, M. Schluse, B. Sondermann, M. Emde, M. Rast (RWTH Aachen University, Germany)

6:15pm – Get Together
Tuesday, 22 May 2012

8:45am - 10:15am

Perception II
Room: 2

Chair: P. Plöger (Bonn-Rhine-Sieg University of Applied Sciences, Germany)

8:45 **A Real-Time Optical Sensor Simulation Framework for Development and Testing of Industrial and Mobile Robot Applications**
J. Rossmann, N. Hempe, M. Emde, Th. Steil (RWTH Aachen University, Germany)

9:05 **Implementation of the Hungarian Method for object tracking on a camera monitored transportation system**
F. Lütteke, Xu Zhang (Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany)

9:25 **Extracting Semantics from Occupancy Grids**
Z. Liu, D. Chen (Technische Universität München, Germany); G. von Wichert (Siemens AG, Germany)

9:45 **Optimized Mobile Indoor Robot Navigation through Probabilistic Tracking of People in a Wireless Sensor Network**
M. Arndt, K. Berns (University of Kaiserslautern, Germany)

Trajectory Generation & Mobile Robotics
Room: 4

Chair: M. Hägele (Fraunhofer IPA, Germany)

8:45 **Robots assisting in the packaging industry**
F. Wallhoff (Jade University of Applied Sciences, Germany); J. Blume, A. Bannat, W. Rösel, C. Zwicker, B. Appleton (Technische Universität München, Germany); A. Pichler (Profactor GmbH, Austria); P. Ferrara (Ferrobotics, Germany); R. Behrndt (MRK Systeme, Germany)

9:05 **Trajectory Description Conception for Industrial robots**
S. Alatartsev, F. Ortmeier (Otto-von-Guericke University of Magdeburg, Germany); M. Guedemann (INRIA Rhône-Alpes, France)

9:25 **AMADEUS - A robotic multipurpose solution for intralogistics**
A. Verl, M. Naumann, F. Meßmer, L. Halt, Th. Wochinger, M. Hermann (Fraunhofer IPA, Germany)

9:45 **Fast and Accurate Trajectory Generation for Non-Circular Omnidirectional Robots in Industrial Applications**
F. Küнемund, Ch. Kirsch, D. Heß, Ch. Röhrig (Dortmund University of Applied Sciences and Arts, Germany)
8:45 A Narrow Passage Assistance Functions on a Mobility Scooter for Elderly People  
D. Eck, Th. Heim, R. Hess, K. Schilling (University of Würzburg, Germany)

9:05 Book Detection and Grasping in Library Scenario  
St. Heyer, B. Enjarini, Ch. Fragkopoulos, A. Graeser (University of Bremen, Germany)

9:25 New wireless sensors will boost rehabilitation robotics  
J. Lempiäinen (Deltatron Ltd, Finland); J. Latokartano (Tampere University of Technology, Finland)

9:45 Micro-Macro Telemannipulator for Middle-Ear Microsurgery  
K. Entsfellner (Technische Universität München, Germany); G. Strauss, Th. Berger, A. Dietz (Universitätsklinik Leipzig, Germany); T. Lüth (Technische Universität München, Germany)

10:15am - 10:45am Coffee Break

10:45am - 12:15pm

Control I

Room: 2  
Chair: H.-B. Kuntze (Fraunhofer IOSB, Germany)

10:45 Position Control of Soft Robots with Rotary-Type Pneumatic Actuators  
J. Taghia, A. Wilkening, O. Ivlev (University of Bremen, Germany)

11:05 Control of physical interaction tasks using pneumatic soft-robots  
D. Baiden (Friedrich-Wilhelm-Bessel-Institute Research Company, Germany); Oleg Ivlev, S. Bartuszies (University of Bremen, Germany)

11:25 A Multi-Link-Flexible Robot Arm Catching Thrown Balls  
J. Malzahn, A. S. Phung, T. Bertram (Technische Universität Dortmund, Germany)

11:45 An Elephant's Trunk-Inspired Robotic Arm -- Trajectory Determination and Control  
R. Behrens, M. Poggendorf, E. Schulenburg, N. Elkmann (Fraunhofer IFF, Germany)

Programming & Architectures for Industrial Robots

Room: 4  
Chair: D. Kubus (TU Dortmund University, Germany)

10:45 Robot Programming for Surface Finishing based on CAD Model Including External Axes  
J. Dani (SITEC Automation GmbH, Germany); A. Winkler, J. Suchý (Chemnitz University of Technology, Germany)

11:05 Programming System for Efficient Use of Industrial Robots for Deburring in SME Environments  
Th. Dietz, M. Barho, S. Oberer-Treitz, M. Drust, U. Schneider, M. Hägele (Fraunhofer IPA, Germany)
11:25 A Framework for a fault tolerant and learning robotic assembly system  
M. Naumann, A. Verl, F. Nägele (Fraunhofer IPA, Germany)

11:45 High-level integration of components into a robot cell using semantically annotated state chart descriptions  
M. Naumann, A. Verl (Fraunhofer IPA, Germany)

Navigation and Mapping  
Room: 5  
Chair: W. Burgard (University of Freiburg, Germany)

10:45 A Toolkit for Automatic Generation of Polygonal Maps - Las Vegas Reconstruction  
Th. Wiemann, K. Lingemann (University of Osnabrück, Germany); A. Nüchter (Jacobs University of Bremen, Germany); J. Hertzberg (University of Osnabrück, Germany)

11:05 Ground Plan Based Exploration with a Mobile Indoor Robot  
J. Wettach, K. Berns (University of Kaiserslautern, Germany)

11:25 Real-Time Visual SLAM Using FastSLAM and the Microsoft Kinect Camera  
J. Hartmann, D. Forouher, M. Litza, J. H. Klüssendorff, E. Maehle (University of Lübeck, Germany)

11:45 Efficient Mobile Robot Navigation using 3D Surfel Grid Maps  
J. Kläß, J. Stückler, S. Behnke (University of Bonn, Germany)

12:15pm – 1:15pm Lunch Break

1:15pm - 2:00pm  
Invited Talk II  
Room: 5

2:00pm - 3:30pm  
Object Recognition & Grasping  
Room: 2  
Chair: A. Knoll (Technische Universität München, Germany)

2:00 Shape-Primitive Based Object Recognition and Grasping  
M. Nieuwenhuisen, J. Stückler, S. Behnke, A. Berner, R. Klein (University of Bonn, Germany)

2:20 Conceptual Similarity as a Key to High-Level Robot Programming by Demonstration  
R. Cubek, W. Ertel (University of Applied Sciences Ravensburg-Weingarten, Germany)

2:40 Rotary Surface Object Manipulation by Multifingered Robot Hand  
Q. Li, R. Haschke, H. Ritter (Bielefeld University, Germany); B. Bolder (Honda Research Institute Europe, Germany)

3:00 k-TR Theory for Balance of Nature and Nurture in Robotic Perception
Control II
Room: 4
Chair: J. Suchý (Chemnitz University of Technology, Germany)

2:00 Control with a Compliant Force-Torque Sensor
F. Lange, M. Suppa, G. Hirzinger (German Aerospace Center (DLR), Germany)

2:20 Force controlled handling with cooperating industrial robots
A. Spiller, A. Verl (Fraunhofer IPA, Germany)

2:40 Filtering and Corner Detection in Predictive Robotic Contour Following
H. Koch, A. König, K. Kleinmann, A. Weigl-Seitz (University of Applied Sciences Darmstadt, Germany); J. Suchý (Chemnitz University of Technology, Germany)

3:00 AR-based Approach for Evaluation of new Model-based Control Algorithms
S. Notheis, W. August, B. Hein, H. Wörn (Karlsruhe Institute of Technology (KIT), Germany)

Perception III
Room: 5
Chair: P. Levi (University of Stuttgart, Germany)

2:00 A framework for object training and 6 DoF pose estimation
J. Fischer, G. Arbeiter, R. Bormann, A. Verl (Fraunhofer IPA, Germany)

2:20 Segmenting Cylindrical and Box-like Objects in Cluttered 3D Scenes
L. C. Goron (Technical University of Cluj-Napoca, Romania); Z. C. Marton (Technische Universität München, Germany); G. Lazea (Technical University of Cluj-Napoca, Romania); M. Beetz (Technische Universität München, Germany)

2:40 Extraction of Solids of Revolution from Point Cloud Scenes for Grasp Planning Tasks
St. E. Navarro, H. Wörn, D. Braun, T. Klock (Karlsruhe Institute of Technology (KIT), Germany)

3:00 From Saliency Based Image Features Towards Semantic Mapping
P. Neubert, N. Sünderhauf, P. Protzel (Chemnitz University of Technology, Germany)

3:30pm Closing Ceremony