

Program

Session 1: AI in Robotics - Robotic Applications that use AI

Chair: Alexander Verl

<i>UAVs and Neural Networks for search and rescue missions</i>	1
Hartmut Surmann, Artur Leinweber, Gerhard Senkowski, Dominik Slomma and Julien Meine	
<i>Guidance of Agricultural Ground Robots Team with an Aerial Vehicle: A Cost-Effective Solution</i>	9
Halil Ibrahim Ugurlu, Deniz Bardakci, Huy Pham and Erdal Kayacan	
<i>ORB-Net: End-to-end Planning Using Feature-based Imitation Learning for Autonomous Drone Racing</i>	16
Huy Pham, Micha Heiß, Dung Tran, Minh Anh Nguyen, Anh Quang Nguyen and Erdal Kayacan	

Session 2: Human-robot-collaboration / Future of work

Chair: Christoph Hinze

<i>Task-Level Programming by Demonstration for Mobile Robotic Manipulators through Human Demonstrations based on Semantic Skill Recognition</i>	22
Luisa Mayershofer, Peter Lehner, Daniel Leidner and Alin Albu-Schäffer	
<i>Graph Neural Networks for joint Action Recognition, Prediction and Motion Forecasting for Industrial Human-Robot Collaboration</i>	30
Dimitrios Lagamtzis, Fabian Schmidt, Jan Seyler, Thao Dang and Steffen Schober	
<i>Human Model in a Simulation-Assisted Risk Assessment Tool for Safe Robot Applications</i>	38
Nikolaj W. Leth and Henrik Petersen	

Session 3: AI in Robotics - Robotic Applications that use AI

Chair: Steffen Ihlenfeldt

<i>Modeling of Load-dependent Friction in Robot Joints Using Long Short-term Memory Networks</i>	46
Ehsan Latif and Ramvijas Parasuraman	
<i>Data-centric and Goal-oriented AI for Robotic Repair Tasks</i>	54
Kristina Dachtler, Michael Ortner, Massimo Ferri, Christof Eberst and Alexander Schiendorfer	
<i>Real-to-sim Robotic Scene Generator</i>	62
Jascha Petter, Fabian Schreier and Shahram Eivazi	

Session 4: Human-robot-collaboration / Future of work

Chair: Robert Koopmann

<i>Method for Integrating Exoskeletons into Ergonomics Assessment.....</i>	70
Lennart Ralfs, Johannes Schütz, Katharina Schmerbeck and Robert Weidner	
<i>Assessing the Impact of Human-Robot Collaboration on Stress Levels and Cognitive Load in Industrial Assembly Tasks</i>	78
Andrea Bussolan, Stefano Baraldo, Luca Maria Gambardella and Anna Valente	
<i>Expectations of usability aspects for human-robot interactions in manufacturing settings change with experience.....</i>	86
Susanne Niehaus, Miriam Funk, Patricia Helen Rosen, Alberto Ranavolo, Giorgia Chini, Tiwana Varrecchia, Marta Petyx, Francesco Draicchio and Sascha Wischniewski	

Session 5: AI in Robotics - Robotic Applications that use AI

Chair: Werner Kraus

<i>An Android Robot Head as Embodied Conversational Agent.....</i>	93
Marcel Heisler and Christian Becker-Asano	
<i>Resilience for Adversarial Attack on Next-best-view Prediction using Spherical Harmonics</i>	100
Alexandru Pop and Levente Tamas	
<i>Euclidean and Riemannian Metrics in Learning-based Visual Odometry.....</i>	107
Olaya Alvarez-Tunon, Yury Brodskiy and Erdal Kayacan	

Session 6: Components & Technologies

Chair: Klaus Dröder

<i>Simulation Technology and Application of Safe Collaborative Operations in Human-Robot Interaction</i>	112
Oscar Alberto Juiña Quilachamín and Nicolás Navarro-Guerrero	
<i>A soft pneumatic robotic finger integrated with sound sensor for texture identification of cloths through friction.</i>	119
Vasileios Lazaridis, Panagiotis Koustoumpardis and Pantelis Nikolakopoulos	
<i>Modelling of a Dual-Motor Robotic Drive with Estimation, Preload, and Guidance of Backlash.....</i>	125
Benedikt Kaiser, Adrian Schäfer, Andreas Schuetz, Nejila Parspour, Armin Lechler and Alexander Verl	

Session 7: AI in Robotics - Robotic Applications that use AI

Chair: Andreas Wortmann

<i>EfficientPPS: Part-aware Panoptic Segmentation of Transparent Objects for Robotic Manipulation.....</i>	131
Benjamin Alt, Minh Dang Nguyen, Andreas Hermann, Darko Katic, Rainer Jäkel, Rüdiger Dillmann and Eric Sax	

<i>Online 3D Deformable Object Classification for Mobile Cobot Manipulation</i>	139
Khang Nguyen, Tuan Dang and Manfred Huber	
<i>Depth Image Enhancement with Sensor Fusion CycleGAN for Bin Picking Applications</i> ..	147
Emily Stükelmaier, Manuel Mönning, Markus Völk, Werner Kraus and Richard Bormann	

Session 8: Robotics in Service / Mobile Robotics

Chair: Mircea Nitulescu

<i>6DoF State Estimation with a Mesh Constrained Particle Filter For Wheeled Robots</i>	155
Pete Schroepfer, Georges Chahine and Cedric Pradalier	
<i>Measuring 3D-reconstruction quality in probabilistic volumetric maps with the Wasserstein Distance</i>	161
Stephanie Aravecchia, Antoine Richard, Marianne Clausel and Cedric Pradalier	
<i>Educating Future Software Engineers for Industrial Robotics</i>	168
Berit Schuerle, Andrey Morozov, Andreas Wortmann, Jerome Pfeiffer, Philipp Grimmeisen and Thilo Zimmermann	

Session 9: Modeling, Planning and Control

Chair: Christoph Hinze

<i>MobileRobot: Control of a Redundant Kinematic using Drive-Steering Modules for Mobile Manipulation</i>	176
Daniel Heß, Buu Hai Dang Trinh, Mathias Parys and Christof Röhrig	
<i>Inertia-Controller Extending Reset-free Trial-and-Error Learning for Robot Damage Recovery</i>	184
Max-Ole Bastian von Waldow and Javad Ghofrani	
<i>Light Monocular Camera-based Obstacle Detection and Avoidance Algorithm for Small UAV Flying in an unknown Maze</i>	189
Jeryes Danial and Yosi Ben Asher	

Session 10: Robotics in Production / Industrial Robots

Chair: Alexander Meißner

<i>Easy-to-Use Seamtracking through weld-arc sensor signals for collaborative robot welding applications</i>	197
Caren Dripke and Ronil Sutariya	
<i>A Robotic Printer for Nonplanar Additive Manufacturing of Carbon Fiber Reinforced Polymers</i>	205
Johann Kipping, Doran Nettig, Zsolt Kállai and Thorsten Schüppstuhl	
<i>Automated Grinding for Surface Defect Removal on Aircraft Components</i>	213
Falko Kähler, Sören Masekowsky and Thorsten Schüppstuhl	

Session 11: Modeling, Planning and Control

Chair: Jan Seyler

<i>A Model-driven and role-oriented approach to software deployment in robotics.....</i>	219
Ruichao Wu, Nadia Hammoudeh Garcia, Björn Kahl and Christoph Hellmann Santos	
<i>Towards Robustification of Incremental Model Predictive Control Deploying an Adaptive Tube Technique</i>	227
Tian Zheng, Hengrui Li, Yongchao Wang, Jing Xie, Marion Leibold and Jinh Lee	
<i>Optimal Robot Motion Generation Respecting Position-Dependent Safety Constraints.....</i>	234
Debora Clever, Florian Stuhlenmiller, Arne Wahrburg, Bjoern Matthias and Nima Enayati	

Session 12: Robots in Production / Industrial Robots

Chair: Dirk Jacob

<i>Mobile Preassembly Systems with Cooperative Dual-Arm Manipulation - A Concept for Industrial Applications in the Near Future</i>	242
Jonas Christoph Wittmann, Mathias Laile, Johannes Rainer, Johannes Fottner and Daniel Rixen	
<i>Task-Specific Reconfiguration of Variable Workstations using Automated Planning of Workcell Layouts</i>	250
Timo Jens Bachmann, Oliver Eiberger, Thomas Eiband, Florian Lay, Promwat Angsuratanawech, Ismael Rodriguez, Peter Lehner, Freek Stulp and Korbinian Nottensteiner	
<i>Human Robot Collaborative Assembly Using Behavior Trees and Dynamic Tree Dispatching</i>	258
Mohamed Behery, Jonas Deutsch, Minh Trinh, David Kötter, Christian Brecher and Gerhard Lakemeyer	

Poster Session @ ISW

<i>Hexapod Robot, Basic Obstacles Strategies and Simulation Results</i>	264
Mircea Nitulescu	
<i>Graph-based Design Languages for the Development of a Robotic Cell with Compliant Grippers.....</i>	270
Tobias Grüble, Ralf Stetter, Timo Schuchter, Markus Till and Stephan Rudolph	
<i>Evaluation of external control of KUKA Industrial Robots for laboratory and prototype environments</i>	278
Malte Mehner, Nikolas Matkovic, Edgar Mühlbeier, Dominik Mayer, Jürgen Fleischer and Alexander Verl	
<i>Technology packages for industrial robots to enable human-robot collaboration.....</i>	285
Peter Heiligensetzer	
<i>A prototype adjuster for motion planning of redundant robots</i>	290
Ryszard Leniowski, Lucyna Leniowska, Dominik Ożóg and Krzysztof Tomecki	

<i>MEMS LiDAR Sensor Simulation for Autonomous Driving: A Novel Framework Using Open-source Tools</i>	298
Felix Berens, Stefan Elser and Markus Reischl	
<i>A Study on a New Illuminance Sensing System Based on Color Image of Objects</i>	304
Keisuke Kakishima and Takashi Yoshimi	
<i>Towards a Semantic Digital Twin for Marine Robotics</i>	310
Derrick Odonkor, Jeremy Paul Coffelt, Jorn Syrbe and Michael Beetz	
<i>Implementation of a ROS-based Digital Twin Approach of a Multi-Robot Cell for Incremental Manufacturing</i>	318
Anna Marie Opolka, Rudolf Griemert, Christian Wacker, Arne Wagner and Klaus Dröder	
<i>Performance analysis of a novel cutting tool for hole generation on a CFRP material via robot machining</i>	326
Daniela Sawyer, Huseyin Celikag, Erdem Ozturk and Mark Walsh	
<i>Using Solana Blockchain and OPC UA for Trusted Third Party Industrial Robot Control Services</i>	332
Axel Vick, Wei Chen and Jörg Krüger	
<i>Door Manipulation as a Fundamental Skill Realized on Robots With Differential Drive</i>	338
Tristan Müller, Steffen Mueller and Horst-Michael Gross	
<i>Bridging Distance with a Collaborative Telepresence Robot for Older Adults – Report on Progress in theCO-HUMANICS Project</i>	346
Söhnke B. Fishedick, Kay Richter, Tim Wengefeld, Daniel Seichter, Andrea Scheidig, Nicola M Doering, Wolfgang Broll, Stephan Werner, Alexander Raake and Horst-Michael Gross	
<i>Towards a Robotic-Based Development Environment for Designing and Evaluating Exoskeletons</i>	354
Niclas Hoffmann, Milad Mirlatifi, Rajal Nagwekar and Robert Weidner	
<i>The influence of an interactive user training on perceived safety in HRI</i>	361
Sharon Exeler, Simone Nertinger, Olivia Herzog, Abdeldjallil Naceri and Sami Haddadin	
<i>Benchmark on deep reinforcement learning-based placing using a robot arm</i>	369
Andreas Kernbach, Kathrin Hoffmann, Oliver Sawodny and Shahram Eivazi	
<i>Virtual AI training and observation environment based on multiplayer game design</i>	376
Lorenz Halt and Lukas Ganter	

Session 13: Modeling, Planning and Control

Chair: Alexander Verl

<i>Automatic Path Planning for Robotic Grinding and Polishing Tasks based on Point Cloud Slicing</i>	382
Julian Raible, Christopher Braun and Marco Huber	
<i>Improved Dynamic Behaviour of Industrial Robots through Hybrid Drives</i>	390
Stephan Hansen, Tobias Hamann, Christian Böhlmann, Christian Möller and Wolfgang Hintze	

A Concept for Unifying the Performance Assessment of Industrial Robot Systems with Closed-loop Dynamic Trajectories 398
Martin Satoshi Finkbeiner, Tobias Schäfle, Joshua Beck, Johannes T Stoll, Werner Kraus and Markus Gifftthaler

Session 14: Robotics in New Markets & Applications

Chair: René Kirsten

Autonomous robotics in agriculture - a preliminary techno-economic evaluation of a mechanical weeding system 405
Andreas Rossmadl, Stefan Kopfinger, Markus Gandorfer and Axel Busboom

Upside down: affordable high-performance motion platform 412
Nayan Man Singh Pradhan, Patrick Frank, An Mo and Alexander Badri-Sprowitz

Recurrent Neural Network for Modelling a Contractive Soft Actuator 419
Annika M. Kienzlen, Manuel Zürn, Shahab Kazemi, Peter Xu, Leo Cheng, Martin Stommel and Alexander Verl

Session 15: Robotics in Production / Industrial Robots

Chair: Werner Kraus

Denoising and Segmentation of SONAR Images for Rescue Operations 426
Hannan Ejaz Keen, Amjad Haider and Karsten Berns

Learning Multiple Radiation Source Distribution Models using Gaussian Processes 432
David De Schepper, Mattias Simons, Wouter Schroeyers, Karel Kellens and Eric Demeester