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IPA

Europe

ISR

International Symposium on Robotics

powered by IFR

September 26 – 27, 2023
Maritim Hotel – Alte Reithalle
Stuttgart, Germany

Robotics in the era of digitalisation:

www.isr-robotics.org

Organized by

VDE ITG

University of Stuttgart
Institute for Control Engineering
of Machine Tools and
Manufacturing Units (ISW)

**IFR
International
Federation of
Robotics**

Supported by

VDMA
Robotics + Automation

Welcome address
by the Chairs of the ISR Europe 2023

The 56th International Symposium on Robotics – ISR Europe 2023 – will be held in Stuttgart, Germany on September 26 – 27 2023.

The ISR Europe 2023 will be complemented by an exhibition area. The program is completed by the evening event at the traditional Cannstatt Folk Festival.

In two conference tracks over two days, the ISR Europe 2023 will offer an insight into state-of-the-art robot technologies to participants from both industry and research. A special session will be held for ROS-Industrial. In the ROS-Industrial Community Meeting, new technical and scientific developments made by the ROS-Industrial community will be presented and discussed. The meeting will focus on open-source robot software and applications including navigation, manipulation, motion planning, software engineering and hardware interfaces.

Prof. Alexander Verl,
University of Stuttgart,
Germany

Werner Kraus,
Fraunhofer IPA, Germany

Program Committee

Conference Chair

- Alexander Verl, University of Stuttgart, GER
- Werner Kraus, Fraunhofer IPA, GER

Co-Chair

- Hiroshi Fujiwara, JARA, JP
- Volker Spanier, VDMA Robotics, GER
- Jeff Burnstein (invited), RIA, US
- Marina Bill (invited), IFR, CH

Technical Program Committee

- Tamim Asfour (invited), KIT Karlsruhe, GER
- Mike Barth, KIT Karlsruhe, GER
- Karsten Berns, University of Kaiserslautern, GER
- Cornel Brisan (invited), UTCN Cluj-Napoca, RO
- Miguel Andrés Solís Cid, Universidad National Andrés Bello, CHL
- Franz Dietrich, Technical University Berlin, GER
- Klaus Dröder, TU Braunschweig, GER
- Norbert Elkmann, Fraunhofer IFF, GER
- Paul T. Evans (invited), Southwest Research Institute, USA
- Jörg Franke, University Erlangen, GER
- Horst-Michael Groß, Technical University Ilmenau, GER
- Björn Hein, Hochschule Karlsruhe, GER
- Christoph Hinze, University of Stuttgart, GER
- Marco Huber, Fraunhofer IPA, GER
- Steffen Ihlenfeldt, TU Dresden, GER
- Dirk Jacob (invited), HS Kempten, GER
- René Kirsten, ABB Forschungszentrum, GER
- Robert Koopmann, FANUC Deutschland
- Bernd Kuhlenkötter, Ruhr-Universität Bochum, GER

- Ren C. Luo, National Taiwan University, TWN
- Alexander Meißner (invited), Dürr Systems, GER
- Oliver Niggemann, HSU Hamburg, GER
- Mircea Nitulescu, Robotics Society of Romania, RO
- Jong-oh Park, Chonnam National University, KR
- Erwin Prassler (invited), Hochschule Bonn-Rhein-Sieg, GER
- David Reger (invited), Neura Robotics, GER
- Jürgen Roßmann, RWTH Aachen, GER
- Martin Ruskowski, DFKI Kaiserslautern, GER
- Mehdi Salihy, EPSON Deutschland, GER
- Thorsten Schüppstuhl, Technical University Hamburg-Harburg, GER
- Jan Seyler, FESTO, GER
- Ulrike Thomas, Technical University Chemnitz, GER
- Anna Valente, University of Applied Sciences and Arts of Southern Switzerland, CH
- Robert Weidner, Universität Innsbruck, AU
- Andreas Wortmann, University of Stuttgart, GER

Organized by

- ITG (VDE) Information Technology Society of VDE
- University of Stuttgart, Germany
- IFR International Federation of Robotics

Supported by

- VDMA Robotics + Automation

Keynotes

Tuesday, September 26

09:15 – 10:00   **1 / Jörg Rommelfanger, ABB AG (Germany)**
Supporting the evolution of industries

Joerg Rommelfanger looks back on more than 20 years of experience in the robotics and automation industry. After holding positions at carat robotic innovation GmbH and KraussMaffei Technologies GmbH, he started his career at ABB in 2012 and subsequently held various management positions - at local and global level - in operations and product management.

Since January 2020, he has been Head of the Automotive Business Line in the Robotics Division in Germany and is thus responsible for the regional lead center for the automotive and supplier industry. ABB has also appointed Jörg Rommelfanger as the new Head of its Robotics Division in Germany, effective January 1, 2022. He holds a degree in mechatronics engineering from Bochum University of Applied Sciences and a postgraduate degree in business administration from Hagen University of Applied Sciences.

14:15 – 15:00   **2 / Werner Kraus, Fraunhofer IPA (Germany)**
50 years of robotics at Fraunhofer IPA: what's next?

Dr. Werner Kraus received his degree as Diplom-Ingenieur in mechanical engineering from the Karlsruhe Institute of Technology in 2011. Since then, he has been with Fraunhofer IPA in different positions and received his PhD on force-control of cable-driven parallel robots in 2015 from the University of Stuttgart. Since June 2019, he is head of the department robot and assistive systems. With a team of 75 colleagues, he is researching and implementing latest robot technologies in industry like for bin picking, small lot size welding, autonomous mobile robots and assembly automation as well as for the service sector, care applications, retail, or agricultural robotics. Since 2019, he has been member in the board of directors of euRobotics, academic chair of IFR service robot working group as well as member of the scientific advisory board at Flanders MAKE.

Keynotes *(continuation)*

Wednesday, September 27

09:00 – 09:45   **3 / Susanne Bieller, IFR International Federation of Robotics (Germany)**
Navigating the Global Robotics Landscape: Status, Trends, and Future Outlook

Susanne Bieller is General Secretary of the IFR, the International Federation of Robotics, since 2019. The International Federation of Robotics serves as the voice of the global robotics industry and invaluable source of statistics on the global robotics market. Founded in 1987 as a non-profit organization, IFR unites about 90 robotics companies, research organizations and national robot associations from over twenty countries and represents over 3000 robotics organizations around the globe.

Susanne is highly involved in advocacy topics in robotics concerning ethical, legal, societal, economic aspects of robotics and has in-depth knowledge of the global robotics market, and current technology trends. She is dedicated to promoting the benefits of robots for productivity, competitiveness, economic growth and quality of work and life.

Susanne has been elected among the "30 women in robotics you need to know about" in 2019 and among the "Top 10 Women in Robotics Industry" in 2020. She is passionate about increasing the share and visibility of women in STEM occupations.

14:00 – 14:45   **4 / David Reger, NEURA (Germany)**
Cognitive Robotics – Enabling AI to act physically

David Reger's career began in Switzerland as founder and manager of high-tech companies in the automation and robotics industry. This time gave the young entrepreneur two far-reaching insights: First, respect for existing technological achievements should never be the excuse for leaving the seemingly impossible untried. Second, only a completely new approach to robotics can overcome the technological barriers to making robots a natural companion in a modern, social society.

With the attitude of an experienced yet down-to-earth doer, David Reger founded NEURA Robotics GmbH in 2019 - and introduced the first production-ready cognitive robots in record time - based on a technological platform that combines artificial intelligence with groundbreaking sensor and hardware design, turning robots into smart phones with arms and legs.

Reger has been appointed to key thought leadership and advisory positions, including the Senate of German Business and the European Senate of Business and Technology.
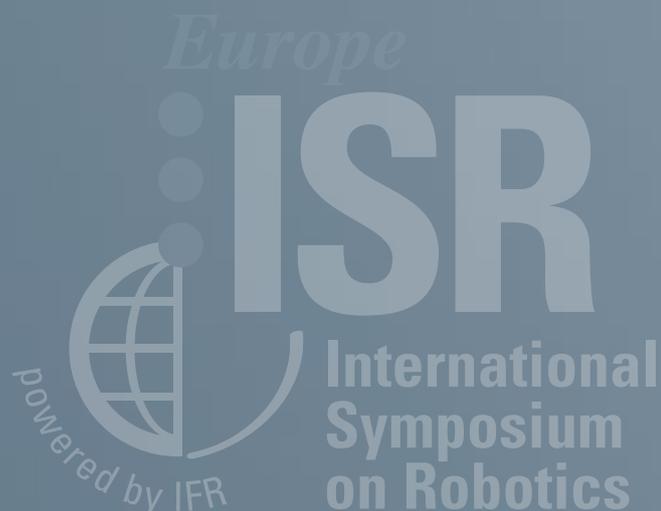
Location
Maritim Hotel – Alte Reithalle

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Maritim Hotel – Alte Reithalle

Seidenstraße 34
70174 Stuttgart / Germany

Tuesday, September 26

	Alte Reithalle – Hotel Maritim	Seminarraum – ISW	ISW Lab
09:00	Welcome		
09:15	**Keynote 1:** Supporting the evolution of industries		
10:00	**Session 1:** AI in Robotics – Robotic Applications that use AI	**Session 2:** Human-robot-collaboration / Future of work	
11:00	Industry Exhibitor Pitch		
11:30	**Session 3:** AI in Robotics – Robotic Applications that use AI	**Session 4:** Human-robot-collaboration / Future of work	
12:30	Lunch Break Group 1		ISW Lab Tour Group 2
13:30	Lunch Break Group 2		ISW Lab Tour Group 1
14:15	**Keynote 2:** 50 years of robotics at Fraunhofer IPA: what's next?		
15:00	**Session 5:** AI in Robotics – Robotic Applications that use AI	**Session 6:** Components & Technologies	
16:00	Coffee Break + Exhibition		
16:30	**Session 7:** AI in Robotics – Robotic Applications that use AI	**Session 8:** Robotics in Service / Mobile Robotics	
17:30	Travelling to the Evening Event		
18:30– 22:00	Evening Event at Cannstatter Wasen		

Wednesday, September 27

	Alte Reithalle – Hotel Maritim	Seminarraum – ISW	ISW Lab
09:00	**Keynote 3:** Navigating the Global Robotics Landscape: Status, Trends, and Future Outlook		
09:45	**Session 9:** Modeling, Planning and Control	**Session 10:** Robotics in Production / Industrial Robots	
10:45	Coffee Break + Exhibition		
11:15	**Session 11:** Modeling, Planning and Control	**Session 12:** Robotics in Production / Industrial Robots	
11:45			Lunch Break Presenters Poster Session
12:15	Lunch Break Group 2		Poster Session @ ISW
13:00	Lunch Break Group 1		Poster Session @ ISW
14:00	**Keynote 4:** Cognitive Robotics – Enabling AI to act physically		
14:45	**Session 13:** Modeling, Planning and Control	**Session 14:** Robotics in New Markets & Applications	
15:45	Short coffee break		
16:00	**Session 15:** Robotics in Production / Industrial Robots		
16:45	Best Paper Award		
17:00	Travel to IPA building		
17:30– 19:00	IPA Lab tour, Snacks & Closing		

Conference Program

Tuesday, September 26

Room: Alte Reithalle - Hotel Maritim

09:00 Welcome

Room: Alte Reithalle - Hotel Maritim

09:15 **Keynote 1:**
Supporting the evolution of industries
Jörg Rommelfanger, ABB AG (Germany)

Room: Alte Reithalle - Hotel Maritim	*Room: Seminarraum - ISW*
Session 1: AI in Robotics – Robotic Applications that use AI *Chair: Alexander Verl*	**Session 2:** Human-robot-collaboration / Future of work *Chair: Christoph Hinze*

10:00	**UAVs and Neural Networks for search and rescue missions** *Hartmut Surmann, Artur Leinweber, Gerhard Senkowski, Dominik Slomma and Julien Meine*	**Task-Level Programming by Demonstration for Mobile Robotic Manipulators through Human Demonstrations based on Semantic Skill Recognition** *Luisa Mayershofer, Peter Lehner, Daniel Leidner and Alin Albu-Schäffer*
10:20	**Guidance of Agricultural Ground Robots Team with an Aerial Vehicle: A Cost-Effective Solution** *Halil Ibrahim Ugurlu, Deniz Bardakci, Huy Pham and Erdal Kayacan*	**Graph Neural Networks for joint Action Recognition, Prediction and Motion Forecasting for Industrial Human-Robot Collaboration** *Dimitrios Lagamtzis, Fabian Schmidt, Jan R. Seyler, Thao Dang and Steffen Schober*
10:40	**ORB-Net: End-to-end Planning Using Feature-based Imitation Learning for Autonomous Drone Racing** *Huy Pham, Micha Heiß, Dung Tran, Minh Anh Nguyen, Anh Quang Nguyen and Erdal Kayacan*	**Human Model in a Simulation-Assisted Risk Assessment Tool for Safe Robot Applications** *Fan Dai, Silke Klose, Tom P Huck, Florian Stuhlenmiller and Christoph Ledermann*

Room: Alte Reithalle - Hotel Maritim

11:00 Industry Exhibitor Pitch

	Room: Alte Reithalle - Hotel Maritim	*Room: Seminarraum - ISW*
	Session 3: AI in Robotics – Robotic Applications that use AI *Chair: Steffen Ihlenfeldt*	**Session 4:** Human-robot-collaboration / Future of work *Chair: Robert Koopmann*
11:30	**Modeling of Load-dependent Friction in Robot Joints Using Long Short-term Memory Networks** *Minh Trinh, Yannick Pellenz, Lukas Gründel, Oliver Petrovic and Christian Brecher*	**Method for Integrating Exoskeletons into Ergonomics Assessment** *Lennart Ralfs, Johannes Schütz, Katharina Schmermbeck and Robert Weidner*
11:50	**Data-centric and Goal-oriented AI for Robotic Repair Tasks** *Kristina Dachtler, Michael Ortner, Massimo Ferri, Christof Eberst and Alexander Schiendorfer*	**Assessing the Impact of Human-Robot Collaboration on Stress Levels and Cognitive Load in Industrial Assembly Tasks** *Andrea Bussolan, Stefano Baraldo, Luca Maria Gambardella and Anna Valente*
12:10	**Real-to-sim Robotic Scene Generator** *Jascha Petter, Fabian Schreier and Shahram Eivazi*	**Expectations of usability aspects for human-robot interactions in manufacturing settings change with experience** *Susanne Niehaus, Miriam Funk, Patricia Helen Rosen, Alberto Ranavolo, Giorgia Chini, Tiwana Varrecchia, Marta Petyx, Francesco Draicchio and Sascha Wischniewski*
	Room: Alte Reithalle - Hotel Maritim	*Room: ISW Lab*
12:30	Lunch Break Group 1	ISW Lab Tour Group 2
	Room: ISW Lab	*Room: Alte Reithalle - Hotel Maritim*
13:30	ISW Lab Tour Group 1	Lunch Break Group 2

Conference Program

Tuesday, September 26 *(continuation)*

Room: Alte Reithalle - Hotel Maritim

14:15 **Keynote 2:**
50 years of robotics at Fraunhofer IPA: what's next?
Werner Kraus, Fraunhofer IPA (Germany)

Room: Alte Reithalle - Hotel Maritim | *Room: Seminarraum - ISW*

Session 5:
AI in Robotics –
Robotic Applications that use AI
Chair: Werner Kraus

Session 6:
Components & Technologies
Chair: Klaus Dröder

15:00
An Android Robot Head as Embodied Conversational Agent
Marcel Heisler and Christian Becker-Asano

A Biomimetic Fingerprint for Robotic Tactile Sensing
Oscar Alberto Juiña Quilachamín and Nicolás Navarro-Guerrero

15:20
Resilience for Adversarial Attack on Next-best-view Prediction using Spherical Harmonics
Alexandru Pop and Levente Tamas

A soft pneumatic robotic finger integrated with sound sensor for texture identification of cloths through friction
Vasileios Lazaridis, Panagiotis Koustoumpardis and Pantelis Nikolakopoulos

15:40
Euclidean and Riemannian Metrics in Learning-based Visual Odometry
Olaya Alvarez-Tunon, Yury Brodskiy and Erdal Kayacan

Modelling of a Dual-Motor Robotic Drive with Estimation, Preload, and Guidance of Backlash
Benedikt Kaiser, Adrian Schäfer, Andreas Schuetz, Nejila Parspour, Armin Lechler and Alexander Verl

Room: Alte Reithalle - Hotel Maritim

16:00 Coffee Break + Exhibition

Room: Alte Reithalle - Hotel Maritim

Room: Seminarraum - ISW

	Session 7: AI in Robotics – Robotic Applications that use AI *Chair: Andreas Wortmann*	**Session 8:** Robotics in Service / Mobile Robotics *Chair: Mircea Nitulescu*
16:30	**EfficientPPS: Part-aware Panoptic Segmentation of Transparent Objects for Robotic Manipulation** *Benjamin Alt, Minh Dang Nguyen, Andreas Hermann, Darko Katic, Rainer Jäkel, Rüdiger Dillmann and Eric Sax*	**6DoF State Estimation with a Mesh Constrained Particle Filter For Wheeled Robots** *Pete Schroepfer, Georges Chahine and Cedric Pradalier*
16:50	**Online 3D Deformable Object Classification for Mobile Cobot Manipulation** *Khang Nguyen, Tuan Dang and Manfred Huber*	**Measuring 3D-reconstruction quality in probabilistic volumetric maps with the Wasserstein Distance** *Stephanie Aravecchia, Antoine Richard, Marianne Clausel and Cedric Pradalier*
17:10	**Depth Image Enhancement with Sensor Fusion CycleGAN for Bin Picking Applications** *Emily Stückelmaier, Manuel Mönnig, Markus Völk, Werner Kraus and Richard Bormann*	**Educating Future Software Engineers for Industrial Robotics** *Berit Schuerrle, Andrey Morozov, Andreas Wortmann, Jerome Pfeiffer, Philipp Grimmeisen and Thilo Zimmermann*

17:30	Travelling to the Evening Event

Room: Cannstatter Wasen

18:30	Evening Event at Cannstatter Wasen

Conference Program

Wednesday, September 27

Room: Alte Reithalle - Hotel Maritim

09:00 **Keynote 3:**
Navigating the Global Robotics Landscape: Status, Trends, and Future Outlook

Susanne Bieller, IFR International Federation of Robotics (Germany)

Room: Alte Reithalle - Hotel Maritim	*Room: Seminarraum - ISW*
Session 9: Modeling, Planning and Control *Chair: Christoph Hinze*	**Session 10:** Robotics in Production / Industrial Robots *Chair: Alexander Meißner*

09:45	**MobileRobot: Control of a Redundant Kinematic using Drive-Steering Modules for Mobile Manipulation** *Daniel Heß, Buu Hai Dang Trinh, Mathias Parys and Christof Röhrig*	**Easy-to-Use Seamtracking through weld-arc sensor signals for collaborative robot welding applications** *Caren Dripke and Ronil Sutariya*
10:05	**Inertia-Controller Extending Reset-free Trial-and-Error Learning for Robot Damage Recovery** *Max-Ole Bastian von Waldow and Javad Ghofrani*	**A Robotic Printer for Nonplanar Additive Manufacturing of Carbon Fiber Reinforced Polymers** *Johann Kipping, Doran Nettig, Zsolt Kállai and Thorsten Schüppstuhl*
10:25	**Light Monocular Camera-based Obstacle Detection and Avoidance Algorithm for Small UAV Flying in an unknown Maze** *Jeryes Danial and Yosi Ben Asher*	**Automated Grinding for Surface Defect Removal on Aircraft Components** *Falko Kähler, Sören Masekowsky and Thorsten Schüppstuhl*

Room: Alte Reithalle - Hotel Maritim

10:45 Coffee Break + Exhibition

Room: Alte Reithalle - Hotel Maritim | *Room: Seminarraum - ISW*

Session 11: Modeling, Planning and Control *Chair: Jan Seyler*	**Session 12:** Robotics in Production / Industrial Robots *Chair: Dirk Jacob*
11:15 **A Model-driven and role-oriented approach to software deployment in robotics** *Ruichao Wu, Nadia Hammoudeh Garcia, Björn Kahl and Christoph Hellmann Santos*	**Mobile Preassembly Systems with Cooperative Dual-Arm Manipulation – A Concept for Industrial Applications in the Near Future** *Jonas Christoph Wittmann, Mathias Laile, Johannes Rainer, Johannes Fottner and Daniel Rixen*
11:35 **Towards Robustification of Incremental Model Predictive Control Deploying an Adaptive Tube Technique** *Tian Zheng, Hengrui Li, Yongchao Wang, Jing Xie, Marion Leibold and Jinoh Lee*	**Task-Specific Reconfiguration of Variable Workstations using Automated Planning of Workcell Layouts** *Timo Jens Bachmann, Oliver Eiberger, Thomas Eiband, Florian Lay, Promwat Angsuratanawech, Ismael Rodriguez, Peter Lehner, Freek Stulp and Korbinian Nottensteiner*

11:45 Lunch Break Presenters Poster Session

| **11:55** **Optimal Robot Motion Generation Respecting Position-Dependent Safety Constraints**
Debora Clever, Florian Stuhlenmiller, Arne Wahrburg, Bjoern Matthias and Nima Enayati | **Human Robot Collaborative Assembly Using Behavior Trees and Dynamic Tree Dispatching**
Mohamed Behery, Jonas Deutsch, Minh Trinh, David Kötter, Christian Brecher and Gerhard Lakemeyer |

Room: Alte Reithalle - Hotel Maritim

12:15 Lunch Break Group 2

Conference Program

Wednesday, September 27 *(continuation)*

Room: ISW Lab

Poster Session @ ISW

12:15	**Hexapod Robot, Basic Obstacles Strategies and Simulation Results** *Mircea Nitulescu*
12:17	**Graph-based Design Languages for the Development of a Robotic Cell with Compliant Grippers** *Tobias Grüble, Ralf Stetter, Timo Schuchter, Markus Till and Stephan Rudolph*
12:20	**Evaluation of external control of KUKA Industrial Robots for laboratory and prototype environments** *Malte Mehner, Nikolas Matkovic, Edgar Mühlbeier, Dominik Mayer, Jürgen Fleischer and Alexander Verl*
12:22	**Technology packages for industrial robots to enable human-robot collaboration** *Peter Heiligensetzer*
12:25	**A prototype adjuster for motion planning of redundant robots** *Ryszard Leniowski, Lucyna Leniowska, Dominik Ożóg and Krzysztof Tomecki*
12:28	**MEMS LiDAR Sensor Simulation for Autonomous Driving: A Novel Framework Using Open-source Tools** *Felix Berens, Stefan Elser and Markus Reischl*
12:30	**A Study on a New Illuminance Sensing System Based on Color Image of Objects** *Keisuke Kakishima and Takashi Yoshimi*
12:33	**Towards a Semantic Digital Twin for Marine Robotics** *Derrick Odonkor, Jeremy Paul Coffelt, Jorn Syrbe and Michael Beetz*
12:35	**Implementation of a ROS-based Digital Twin Approach of a Multi-Robot Cell for Incremental Manufacturing** *Anna Marie Opolka, Rudolf Griemert, Christian Wacker, Arne Wagner and Klaus Dröder*
12:38	**Performance analysis of a novel cutting tool for hole generation on a CFRP material via robot machining** *Daniela Sawyer, Huseyin Celikag, Erdem Ozturk and Mark Walsh*
12:41	**Using Solana Blockchain and OPC UA for Trusted Third Party Industrial Robot Control Services** *Axel Vick, Wei Chen and Jörg Krüger*
12:43	**Door Manipulation as a Fundamental Skill Realized on Robots With Differential Drive** *Tristan Müller, Steffen Mueller and Horst-Michael Gross*
12:46	**Bridging Distance with a Collaborative Telepresence Robot for Older Adults – Report on Progress in the CO-HUMANICS Project** *Söhnke B. Fischedick, Kay Richter, Tim Wengefeld, Daniel Seichter, Andrea Scheidig, Nicola M Doering, Wolfgang Broll, Stephan Werner, Alexander Raake and Horst-Michael Gross*
12:48	**Towards a Robotic-Based Development Environment for Designing and Evaluating Exoskeletons** *Niclas Hoffmann, Milad Mirlatifi, Rajal Nagwekar and Robert Weidner*
12:51	**The influence of an interactive user training on perceived safety in HRI** *Sharon Exeler, Simone Nertinger, Olivia Herzog, Abdeldjallil Naceri and Sami Haddadin*
12:54	**Benchmark on deep reinforcement learning-based placing using a robot arm** *Andreas Kernbach, Kathrin Hoffmann, Oliver Sawodny and Shahram Eivazi*
12:56	**Virtual AI training and observation environment based on multiplayer game design** *Lorenz Halt and Lukas Ganter*

Room: Alte Reithalle - Hotel Maritim

13:00   Lunch Break Group 1

Room: ISW Lab

Poster Session @ ISW

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Mircea Nitulescu

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Lorenz Halt and Lukas Ganter

Conference Program

Wednesday, September 27 *(continuation)*

Room: Alte Reithalle - Hotel Maritim

14:00

Keynote 4:
Cognitive Robotics – Enabling AI to act physically
David Reger, NEURA (Germany)

Room: Alte Reithalle - Hotel Maritim	*Room: Seminarraum - ISW*
Session 13: Modeling, Planning and Control *Chair: Alexander Verl*	**Session 14:** Robotics in New Markets & Applications *Chair: René Kirsten*

14:45

Automatic Path Planning for Robotic Grinding and Polishing Tasks based on Point Cloud Slicing *Julian Raible, Christopher Braun and Marco Huber*	**Autonomous robotics in agriculture – a preliminary techno-economic evaluation of a mechanical weeding system** *Andreas Rossmadl, Stefan Kopfinger, Markus Gandorfer and Axel Busboom*

15:05

Improved Dynamic Behaviour of Industrial Robots through Hybrid Drives *Stephan Hansen, Tobias Hamann, Christian Böhlmann, Christian Möller and Wolfgang Hintze*	**Upside down: affordable high-performance motion platform** *Nayan Man Singh Pradhan, Patrick Frank, An Mo and Alexander Badri-Spröwitz*

15:25

A Concept for Unifying the Performance Assessment of Industrial Robot Systems with Closed-loop Dynamic Trajectories *Martin Satoshi Finkbeiner, Tobias Schäfle, Joshua Beck, Johannes T Stoll, Werner Kraus and Markus Giftthaler*	**Recurrent Neural Network for Modelling a Contractive Soft Actuator** *Annika M. Kienzlen, Manuel Zürn, Shahab Kazemi, Peter Xu, Leo Cheng, Martin Stommel and Alexander Verl*

Room: Alte Reithalle - Hotel Maritim

15:45

Short coffee break

Room: Alte Reithalle - Hotel Maritim

Session 15:
Robotics in Production / Industrial Robots
Chair: Werner Kraus

16:00 **Denoising and Segmentation of SONAR Images for Rescue Operations**
Hannan Ejaz Keen, Amjad Haider and Karsten Berns

16:22 **Learning Multiple Radiation Source Distribution Models using Gaussian Processes**
David De Schepper, Mattias Simons, Wouter Schroeyers, Karel Kellens and Eric Demeester

Room: Alte Reithalle - Hotel Maritim

16:45 Best Paper Award

17:00 Travel to IPA building

17:30 IPA Lab tour, Snacks & Closing

We would like to thank our sponsors of ISR Europe 2023

MHI e.V.

The MHI e.V. is a network of leading university professors from German-speaking countries who are successfully conducting research in assembly, handling and industrial robotics, both in a basic research-oriented and application-oriented manner. The society was founded in spring 2012. The MHI e.V. currently has 26 members, representing about 1,000 scientists through their institutes and chairs.

Through cooperation and continuous communication of the members, the aim is to optimize the teaching and research in the field of assembly, handling and industrial robotics. Furthermore, the association cooperates in partnership with other scientific societies, associations and federations.

www.wgmhi.com

KUKA Aktiengesellschaft

KUKA was founded in 1898 by Johann Josef Keller and Jakob Knappich as an acetylene plant for lighting in Augsburg, Germany, where the headquarters are still located today. The telegram abbreviation from the first letters of the company name "Keller und Knappich Augsburg" became over time the brand name KUKA, which today stands for first-class automation and innovation competence worldwide. For 125 years, the company's mission has been to make life and work easier for people. Today, around 15,000 employees in more than 40 countries support the realization of this mission.

From industrial robots, software and robotic cells to fully automated systems and digital services: KUKA offers everything from a single source - especially in markets such as automotive, with a focus on e-mobility and battery, as well as in the markets, electronics, metal & plastic, consumer goods, e-commerce, retail and healthcare, but also in new business fields such as modular house construction. With easy to use automation, KUKA is also increasingly targeting small and medium-sized enterprises.

www.kuka.com

NEURA Robotics GmbH

NEURA Robotics was founded in 2019 by David Reger in Metzingen, southern Germany, with the goal of bridging important innovation gaps in robotics and establishing the age of cognitive robots. Like a smartphone manufacturer, NEURA Robotics combines all components and sensors as well as artificial intelligence in one device and offers part-ners a platform for the joint development of apps for a wide range of specialist areas. The resulting and steadily growing NEURAverse offers unmatched flexibility and cost efficiency in automation and attracts many international market leaders. For instance, Kawasaki, the third-largest robotics manufacturer worldwide by revenue, has recently unveiled a product range "powered by NEURA." All the new technological components required for this approach, including AI, are developed in-house by NEURA Robotics. This made it possible to set new standards in intelligence, precision, and safety. NEURA's cognitive robots can see, hear, and have a sense of touch; they act completely autonomously and learn from experience. Today, NEURA is right on track to bring the first multi-purpose humanoid robot to market.

www.neura-robotics.com

Schunk

SCHUNK – Worldwide partner and technology supplier of the manufacturing industry

Hand in hand for tomorrow

Shaping the future with innovative technologies – that is the claim of SCHUNK. To this end, the experienced automation and production specialist is pushing the further devel-opment and digitalization of its product and service portfolio in order to make industrial processes more efficient, transparent and sustainable. The family-owned company with headquarters in Lauffen/Neckar is a global leader in toolholding and workholding, grip-ping technology and automation technology.

Approximately 3,500 employees in 8 plants and 34 directly owned subsidiaries and distribution partners in more than 50 countries throughout the world ensure an intensive market presence.

www.schunk.com

More information

Detailed information about the conference can be found on the event website:

www.isr-robotics.org/isr

Organizer

This international conference is jointly organized by the Institute for Control Engineering of Machine Tools and Manufacturing Units (ISW) at the University of Stuttgart, Fraunhofer IPA, and the Information Technology Society (ITG) within the Association for Electrical, Electronic & Information Technologies (VDE), supported by VDMA Robotics + Automation.

**VDE Association for Electrical,
Electronic and Information Technologies**
Merianstr. 28
63069 Offenbach am Main
Germany

Within the VDE organization, five technical societies together with standardization and product testing departments, are responsible for knowledge transfers and the exchange of information regarding technical trends. VDE experts work on the mapping of innovation strategies and foster an ongoing dialogue among researchers, developers and users.

The VDE works to ensure that technical innovations benefit people in their daily lives. It is a driving force behind securing the highest standards for engineering studies in the nation's universities. VDE studies and analyses provide engineers, companies, politicians and the public with the technical information needed for shaping policies and making decisions.

Contact

Organizer

VDE ITG

University of Stuttgart
Institute for Control Engineering
of Machine Tools and
Manufacturing Units (ISW)

**IFR
International
Federation of
Robotics**

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