

Andreas Pichler, Peter M. Roth, Robert Sablatnig, Gernot Stübl,
and Markus Vincze (eds.)

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Editors

Andreas Pichler, Peter M. Roth, Robert Sablatnig, Gernot Stübl, and Markus Vincze

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Preface

The ARW and OAGM Workshop on “Vision and Robotics” is organized this year by Profactor in the beautiful city of Steyr. The main intention is to bring together researchers, students, professionals, and practitioners from the fields of Computer Vision and Robotics to present and actively discuss latest research and developments. While in the past there has been a perceivable gap between these two research directions, one may note that the borders get more and more blurred. During the preparation of the workshop this observation was underpinned by interesting contributions addressing both scientific communities. From over 50 submissions, an international program committee selected 48 for the presentation at the workshop. Based on the decisions, we could assemble an interesting and lively program with 30 talks and 18 posters both in plenum and parallel sessions. During the joint workshop, outstanding contributions will be awarded with prizes sponsored by OAGM and IEEE RAS. We are also very proud that four invited international established researchers support the event: Jiří Matas (Czech Technical University of Prague), Manfred Tscheligi (Austrian Institute of Technology & University of Alin Albu-Schäffer (German Aerospace Center).

We wish an interesting and fruitful event,

Andreas Pichler, Markus Vincze (ARW Chairs)

Gernot Stübl, Robert Sablatnig, Peter M. Roth (OAGM Chairs)

Steyr, May 2019

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OAGM Award 2018

The

OCG Best Paper Award 2018

was awarded to the paper

Globally Consistent Dense Real-Time 3D Reconstruction from RGBD Data

by

Rafael Weilharter, Fabian Schenk, and Friedrich Fraundorfer.

ARW Awards 2018

The

IEEE RAS Austria Best Research Paper Award

was awarded to the paper

Analysis of Feature Tracking Methods for Vision-Based Vibration Damping of Flexible Link Robots

by

Florian Pucher, Hubert Gattringer, and Andreas Müller.

The

Best Student Paper

sponsored by the ABB-Group was awarded to the paper

Development of a 3D-Printed Bionic Hand with Muscle- and Force Control

by

Florian Dannereder, Paul Herwig Pachschröll, Mohamed Aburaia, Erich Markl, Maximilian Lackner, and Corinna Engelhardt-Nowitzki.

The

Best Student Poster

sponsored by the ABB-Group was awarded to the paper

Extension of the Action Verb Corpus for Supervised Learning

by

Matthias Hirschmanner, Stephanie Gross, Brigitte Krenn, Friedrich Neubarth, Martin Trapp, Michael Zillich, Markus Vincze.

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Keynote Talks

Visual Tracking of Fast Moving Objects

Jiri Matas

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Abstract

Visual tracking is a classical computer vision problem with many applications. I will first overview the diverse setting in which it has been studied: single view vs. multi-camera, color or intensity vs. RGBD, short-term vs. long-term, with vs. without a prior model of the tracked object. Next, I will discuss the state-of-the-art and the influence of the "CNN revolution" on the field. In the second part of the talk I will present a method for tracking of objects that move fast with respect to camera, at a speed that makes them appear as blurred streaks. Tracking of such object requires inversion of the image formation that involves a blurring and matting process. We will show that the presented method recovers the inter- and intra-frame trajectory in an interesting class of cases.

Automation Experience: An Experience Centered View Into Automated Contexts

Manfred Tscheligi

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Abstract

User Experience is an omnipresent qualitative issue in almost all application contexts. More and more this is and has to be tackled as key ingredient of technological developments. The presentation will deliver a comprehensive view into the divers facets of user experience, both from research as well as an industrial perspective. What automated contexts inhabited by the co-existence of autonomous artifacts could gain from a wider experience perspective? This includes the discussion of (future) relevant experience qualities (e.g. an interaction material view on interaction) as well the relevance of a wider over time-considerations of experience with automated systems. The presentation will also introduce a wider view on technology including acceptance as another success parameter.

Computer Vision for Complex Activities

Horst Bischof

Graz University of Technology
Institute of Computer Graphics and Vision
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Abstract

Understanding complex human activities is a requirement for efficient human-robot interaction as well as several other tasks in a production environment. This talk will highlight challenges that arise when analyzing complex human activities (eg., assembly tasks) with a computer vision system. We will demonstrate our recent work in that area and describe some of the major research challenges, including training these systems with minimal supervision, representations of complex activities etc.

Humanoid Assistance Robots: Designing and Controlling Robots for Direct Interaction with Humans

Alin Albu-Schäffer

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Abstract

The talk will address several implications resulting from the paradigm of putting the humans in the centre of robot design. First, assistance robots are supposed to closely interact with their human users. Therefore, they need to be compatible to humans in terms of size and weight, but also regarding velocity and power. They need to be safe and compliant, able to perceive human motions and fast changing environments in real time and to also plan and execute their reactions at human compatible time scales. This poses substantial challenges in terms of hardware and algorithms design, as well as in term of system integration. I will present here the evolvement of DLR robot design and control from compliantly controlled robots with joint torque sensing to intrinsically compliant systems with variable compliance actuation.

As our hardware and control became more and more advanced and reliable, closing the perception/action loop in real human environments is becoming the major challenge. I will present some of our steps on this way, from telepresence and teleoperation over shared control, towards autonomy. Second, putting the human in the centre of robot development also means to use robotics research in order to better understand human motion and intelligence in a synthesizing way by using the analytic tools of robotics. I will particularly highlight in this respect the interplay of biomechanics and neuro-control with robot design and advanced robotics control. Humans can also directly benefit from this research through the development of better human machine interfaces, robotized medical procedures, and prosthetic and rehabilitation devices which will even more reduce the barrier between humans and robots in the future.