
Proceedings of the Robowork Workshop at AIROV 2026

Vedant Dave
Chair of Cyber Physical Systems
TU Leoben, Austria
vedant.dave@unileoben.ac.at

Elmar Rueckert
Chair of Cyber Physical Systems
TU Leoben, Austria
elmar.rueckert@unileoben.ac.at

Thomas Thurner
Chair of Cyber Physical Systems
TU Leoben, Austria
thomas.thurner@unileoben.ac.at

Siegfried Altmann
Rosendahl Nextrom
Austria
siegfried.altmann@rosendahlnextrom.com

Yassine El Manyari
Rosendahl Nextrom
Austria
yassine.elmanyari@rosendahlnextrom.com

Abstract

Recent progress in machine learning, sensing, embedded computing, and humanoid robotics is enabling a new generation of robotic systems with the potential to operate in complex, human-centered industrial environments. Humanoid robots are increasingly expected to influence future manufacturing, logistics, and even everyday private life, making early engagement with this technology essential for maintaining industrial competitiveness. The RoboWork Workshop provides an interdisciplinary forum for examining these challenges in the context of industrial humanoid robotics. It brings together researchers, developers, and industrial stakeholders from artificial intelligence, robotics, computer vision, simulation, digital twins, industrial automation, and system integration. The workshop aims to assess the current state of humanoid robot advances, exchange practical deployment experiences, and identify technical and organizational requirements for reliable, scalable, and economically sustainable integration into industrial value chains.

1 Introduction

Automation and industrial robotics have fundamentally transformed production and logistics technologies over recent decades. The ongoing digitalization driven by Industry 4.0, IoT connectivity, high-fidelity simulations, and digital twins is creating increasingly integrated and fully connected industrial environments. At the same time, advances in machine learning, artificial intelligence, sensing, microelectronics, and embedded computing technologies are enabling a new leap forward in humanoid robotic systems.

Many industry experts predict that humanoid robots will significantly shape the future of industrial workplaces and influence everyday private life as well. Early engagement with this emerging technology is therefore crucial for securing the long-term competitiveness of manufacturing and logistics companies.

The Third Austrian Symposium on AI, Robotics, and Vision (AIROV26).

The RoboWork Workshop provides a platform to discuss key questions, existing challenges, technological solutions, and practical experiences relevant to deploying humanoid robot systems in industrial settings. The goal is to foster exchange between researchers, developer communities, and industrial partners, to consolidate knowledge, and to support the safe, effective, and economically viable introduction of humanoid robotics in industry.

2 Robowork Workshop Objectives and Topics

2.1 Objectives

The primary objective of the workshop is to facilitate interdisciplinary exchange between leading communities in:

- Artificial Intelligence
- Robotics and humanoid systems
- Computer Vision
- Simulation and Digital Twins
- Industrial automation and system integration

as well as industrial partners who are already testing humanoid robots or planning their deployment. The workshop aims to strengthen dialogue, create synergies, and identify pathways for integrating humanoid robotic systems safely, at scale, and in a practical manner into industrial value chains.

2.2 Topics

The workshop addresses a broad range of current and emerging technological, organizational, and industrial challenges. Key topics include:

- AI methods for humanoid robotics
- Motion learning methods, including reinforcement learning, imitation learning, foundation models, diffusion policies, and vision-language-action models
- Tactile, visual, and acoustic sensing for humanoid robot perception
- AR/VR technologies for development, training, teleoperation, and evaluation
- Simulation of industrial environments and digital-twin-based validation
- Safety requirements, hazard assessment, standards, and compliance procedures
- Trustworthy AI and regulatory aspects, including the EU AI Act
- Industrial use cases, application requirements, and deployment constraints
- Insights from pilot projects and real-world test environments
- Scalability, reliability, maintainability, and component availability
- Integration challenges and opportunities for humanoid robotic systems in industrial processes

3 Organization, submission and review process

3.1 Organizing Committee

The RoboWork workshop is organised by a committee bringing together academic and industrial expertise in cyber-physical systems, humanoid robotics, industrial automation, measurement technologies, and real-world robotic deployment. The organizing members include

- Vedant Dave: Chair of Cyber Physical Systems, TU Leoben
- Elmar Rueckert: Chair of Cyber Physical Systems, TU Leoben
- Thomas Thurner: Chair of Automation & Measurement, TU Leoben
- Siegfried Altmann: Rosendahl Nextrom
- Yassine El Manyari: Humanoid AI Robot Program, Rosendahl Nextrom

Table 1: Submission Statistics

Total Submissions: 6, Accepted: 5, Rejected: 1			
Paper ID	Description	Authors	Camera-ready
23	ZeroShop: Automated Metric Mesh Generation for Zero-Shot 6D Object Pose Estimation	Stefan Lechner, Philipp Ausserlechner, Markus Vincze	Yes
88	PASTA: Vision Transformer Patch Aggregation for Weakly Supervised Target and Anomaly Segmentation	Melanie Neubauer, Elmar Rueckert, Christian Rauch	No
90	1D Profiles vs. Spectral Images: A Comparative Study of Machine Learning Models for Mineral and Rock Classification	Sai Puneeth Reddy Gottam, Martin Johannes Findl, Robert Galler, Klaus Philipp Sedlazeck, Elmar Rueckert	Yes
91	When to Trust the Teacher? Adaptive Coupling in Interactive Robot Learning	Nikolaus Feith, Elmar Rueckert	No
94	Towards Robust Gaussian Splatting SLAM: Lessons from Benchmarking and Pipeline Analysis	Björn Ellensohn, Peyman Kahrizi, Christian Rauch, Elmar Rueckert	No

3.2 Submissions

The RoboWork workshop solicits original contributions aligned with the objectives described in Section 2. Submissions are evaluated through a double-blind peer-review process, with each paper assessed by at least one independent reviewer. The review criteria consider: (i) originality and relevance of the proposed contribution; (ii) technical soundness and methodological rigour; (iii) clarity of presentation, reproducibility, and practical interpretability of the results; and (iv) relevance to humanoid robotics, industrial automation, system integration, safety, and deployment in real-world industrial environments.

All accepted submissions are required to present a poster. For RoboWork, all accepted papers were also allocated a 10 + 5-minute oral presentation slot. In addition, all camera-ready papers are included in the official proceedings. Submissions for which no camera-ready version was provided are excluded from the proceedings. Table 1 reports the submission statistics for the RoboWork workshop.

3.3 Review Process

The evaluation of contributed papers will be conducted through a double-blind review process. Each submission will be assessed by at least one independent reviewer. The assessment will consider the clarity of the proposed contribution, technical soundness, methodological quality, reproducibility, and relevance to the workshop themes, particularly the deployment, integration, and evaluation of humanoid robotic systems in industrial environments.

4 Program Overview

The one-day RoboWork workshop programme combines invited keynote presentations with peer-reviewed contributed talks, providing both high-level perspectives on humanoid robotics and focused technical discussions on learning, perception, safety, and industrial deployment.

4.1 Keynote Presentations

The programme features three invited keynote presentations:

- Prof. Dr. Rudolf Lioutikov (KIT, Germany) presents recent developments in vision-language-action models, with a focus on making VLA run on smaller systems, action representations, and the role of VLAs in household and human-centered robotic settings.
- Prof. Justus Piater (University of Innsbruck, Austria) discusses sparsity in reinforcement learning, including dynamic sparsity assumptions and how principles observed in natural systems can inspire more efficient and adaptive robot learning methods.
- Yassine El Manyari (Rosendahl Nextrom, Austria) presents industrial perspectives on humanoid robotics, focusing on the current limitations, deployment challenges, and practical requirements for integrating humanoid robots into industrial applications.

4.2 Contributed Oral Presentations

The peer-reviewed oral session includes one technical presentations of all the accepted papers (see Table 1). Table 2 summarises the programme schedule and presentations.

Table 2: Programme Schedule

Time	Title	Speaker
09:00	Opening of RoboWork / ARW Workshops	Organisers
09:05	Keynote on Vision-Language-Action Models and Humanoid Robotics	Prof. Dr. Rudolf Lioutikov
09:35	Keynote on Latest Results	Prof. Justus Piater
10:00	Keynote on Limitations of Humanoid Robots in Industrial Applications	Yassine El Manyari
10:15	ZeroShop: Automated Metric Mesh Generation for Zero-Shot 6D Object Pose Estimation	Stefan Lechner

5 Conclusion and Outlook

The RoboWork workshop at AIROV 2026 highlights industrial humanoid robotics as an emerging research and deployment domain at the intersection of robot learning, perception, simulation, safety, and industrial automation. The workshop brought together academic and industrial perspectives on the current capabilities and limitations of humanoid robots, with particular emphasis on vision-language-action models, motion learning, sparse and adaptive reinforcement learning, perception for manipulation, and the practical constraints encountered in real industrial environments. By combining invited talks with peer-reviewed technical contributions, the workshop provided a forum for discussing both algorithmic progress and the engineering, organizational, and safety requirements needed for deploying humanoid robots beyond laboratory settings. A central outcome of the workshop is the recognition that industrial humanoid robotics cannot be addressed solely as a control or perception problem. Reliable deployment requires the joint treatment of embodiment, sensing, task specification, simulation fidelity, system integration, safety validation, and long-term maintainability. In particular, the discussions emphasized the need for methods that remain robust under changing environments, imperfect sensing, limited training data, and constraints imposed by existing industrial infrastructure. The contributions further indicate that digital twins, AR/VR-based development tools, scalable learning methods, and multimodal perception will play an important role in reducing the gap between experimental demonstrations and operational industrial systems. Future research directions emerging from RoboWork include the development of benchmark environments that reflect realistic industrial tasks, the systematic evaluation of humanoid robot reliability under deployment-relevant perturbations, and the integration of safety and regulatory constraints into learning and control pipelines. Further work is required on efficient vision-language-action models, robust imitation and reinforcement learning methods, tactile and visual perception for contact-rich tasks, and simulation-to-reality transfer in human-centered workspaces. From an industrial perspective, future progress will also depend on scalable component availability, safe system architectures, transparent validation procedures, and close collaboration between robotics researchers, automation engineers, and end users. The RoboWork workshop therefore serves as a platform for consolidating these challenges and

for supporting the transition of humanoid robotics from isolated prototypes toward safe, economically viable, and practically useful industrial systems.

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