XR4PAI: Extended Reality Interfaces for Physical AI and Embodied Robots
Workshop at IEEE VR 2027, Melbourne, Australia

Workshop Website Link: To be included

Overview

As physical AI and embodied robotic systems become increasingly capable and autonomous, a key challenge for the Extended Reality (XR) community is how immersive and spatial interfaces can support effective human interaction with intelligent physical agents.

XR offers a powerful interaction layer by combining immersive visualisation, spatial computing, 3D interaction, embodiment, and multimodal feedback. These capabilities are enabling new approaches to robot teleoperation, teaching, shared autonomy, supervision, intent visualisation, digital twins, and human–robot collaboration. However, research in these areas remains distributed across the XR, robotics, human–robot interaction (HRI), and artificial intelligence (AI) communities.

XR4PAI: Extended Reality Interfaces for Physical AI and Embodied Robots aims to bring these communities together and explore XR as the human interaction layer for increasingly intelligent physical systems.

The workshop is centred around the question:

> How can extended reality interfaces enable humans to effectively control, teach, supervise, understand, and collaborate with increasingly autonomous physical robots and embodied AI systems?

XR4PAI welcomes research spanning direct teleoperation, human-in-the-loop interaction, shared autonomy, and increasingly autonomous Physical AI systems, with a focus on the design and evaluation of effective XR interfaces for embodied intelligence.

Topics of Interest

We invite contributions addressing the design, development, and evaluation of XR interfaces for Physical AI and embodied robotic systems. Topics include, but are not limited to:

- XR interaction techniques for Physical AI and embodied robots
- Immersive teleoperation and telepresence
- 3D interfaces for robot control and task specification
- XR-based robot teaching and programming
- Shared autonomy and human-in-the-loop interaction
- Robot state, intent, and uncertainty visualisation
- Immersive supervision of autonomous robots
- Embodiment, presence, and agency in XR–robot interaction

- Multimodal interaction using gaze, gesture, voice, and touch
- Haptic and multisensory feedback
- Digital twins and spatial robot representations
- Multi-user and multi-robot XR interaction
- Human factors, usability, and situational awareness
- Trust, transparency, explainability, and safety
- Evaluation and real-world deployment of XR-mediated Physical AI

We particularly encourage contributions that investigate how established and emerging concepts from XR and 3D user interaction can shape the way humans interact with the next generation of intelligent physical systems.

Participation and Submission

Paper Types

XR4PAI welcomes two categories of paper submissions.

- Research Papers: 4–6 pages + up to 1 page of references
  Research papers should present original research related to the design, implementation, or evaluation of XR interfaces for Physical AI and embodied robotic systems.

- Position Papers : 2–4 pages + up to 1 page of references
  Position papers may present emerging ideas, early-stage research, conceptual frameworks, critical perspectives, open research challenges, or future research directions. We particularly welcome contributions that identify research gaps, challenge existing interaction paradigms, or propose new approaches for XR interaction with increasingly autonomous embodied systems.

Submission Requirements

All submissions must:

- Be written in English
- Be submitted in PDF format
- Follow the IEEE Computer Society VGTC conference format used by IEEE VR
- Present original work that is not simultaneously under review elsewhere

Submissions will undergo a single-blind peer-review process, with each paper reviewed by at least two reviewers with relevant expertise.

The accepted papers will be published in the IEEE Digital Library as part of the IEEE VR Abstract and Workshop proceedings. It is mandatory for at least one author from each accepted paper to register, attend, and present their work at XR4PAI 2027.

Papers must be submitted electronically through the XR4PAI 2027 submission portal: [Submission link to be added].

Further information, workshop agenda, and updates will be available on the XR4PAI workshop website: [Workshop website link to be added].

Important Dates

All deadlines are 23:59:59 Anywhere on Earth (AoE), UTC−12.

Event	**Date**
Paper Submission Deadline	18 December 2026
Notification of Acceptance	6 January 2027
Camera-Ready Submission	10 January 2027
XR4PAI Workshop	To be decided

Organising Committee

Dr Elena Marie Vella (Research Fellow), Centre for Transformative Media Technologies, Swinburne University of Technology, Australia- emvella@swin.edu.au

Dr Mariadas Capsran Roshan (Research Fellow), School of Engineering, Swinburne University of Technology, Australia – mroshan@swin.edu.au

Professor John McCormick, Centre for Transformative Media Technologies, Swinburne University of Technology, Australia - jmccormick@swin.edu.au

Professor Pan Hui, Centre for Metaverse and Computational Creativity, The Hong Kong University of Science and Technology (Guangzhou), China – panhui@ust.hk

Contact

For enquiries, please contact Dr Elena Marie Vella (emvella@swin.edu.au) or Dr Mariadas Capsran Roshan (mroshan@swin.edu.au).