IXR '25: 3rd International Workshop on Interactive eXtended Reality

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Abstract

Despite remarkable advances, current Extended Reality (XR) applications are in their majority local and individual experiences. A plethora of interactive applications, such as teleconferencing, telesurgery, interconnection in new buildings project chain, cultural heritage, and museum contents communication, are well on their way to integrating immersive technologies. However, interconnected, and interactive XR, where participants can virtually interact across vast distances, remains a distant dream. In fact, three great barriers stand between current technology and remote immersive interactive life-like experiences, namely (i) content realism, (ii) motion-to-photon latency, and accurate (iii) human-centric quality assessment and control. Overcoming these barriers will require novel solutions at all elements of the end-to-end transmission chain. This workshop focuses on the challenges, applications, and major advancements in multimedia, networks, and end-user infrastructures to enable the next generation of interactive XR applications and services. The workshop proceedings can be found at: https://dl.acm.org/doi/proceedings/10.1145/3746269

CCS Concepts

• **Human-centered computing** → **Virtual reality**; **Mixed / augmented reality**; **Collaborative interaction**; • **Networks** → *Network performance analysis*; • **Information systems** → *Multimedia streaming*.

Keywords

eXtended reality, immersive experience, interactivity, visualization

ACM Reference Format:
Irene Viola, Silvia Rossi, Marta Orduna, and Maria Torres Vega. 2025. IXR '25: 3rd International Workshop on Interactive eXtended Reality. In *Proceedings of the 33rd ACM International Conference on Multimedia (MM '25), October 27–31, 2025, Dublin, Ireland*. ACM, New York, NY, USA, 2 pages. https://doi.org/10.1145/3746027.3762385

MM '25, Dublin, Ireland

ACM ISBN 979-8-4007-2035-2/2025/10
https://doi.org/10.1145/3746027.3762385

1 Introduction

Over the years the development and optimization of multimedia systems from traditional media (static 2D imagery and 2D video) to immersive media (manipulable 3D) have been tailored towards delivering better experiences in remote communication. This has been essential for enhancing the sensation of presence and interactivity provided by immersive media, where users are no longer passive consumers but assume active engagement and decision-making. The topic has attracted a lot of attention from academia as well as industry players, with several publications and patents published every year on the topic, in addition to relevant standardization efforts from organizations such as ITU, JPEG and MPEG.

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After the success of the inaugural edition of this workshop in 2022 and its follow-up in 2023, we are continuing in our purpose to make this the reference venue in the area of interactive XR. With this third edition, we are establishing a long line of yearly workshops on the topic, to attract novel ideas, challenges, and solutions from both academia and industry addressing the aforementioned issues.

2 Objective And Topics Of Interests

The objective of the workshop is to present and discuss new ideas, challenges, and solutions addressing interactive XR systems. In particular, we aim to explore system designs for interactive XR experiences; algorithmic solutions aiding in the compression and

delivery of contents for XR systems; and evaluation of human aspects in XR environments. Topics of interest for this workshop include but are not limited to:

- Novel low-latency encoding techniques for interactive XR applications;
- Novel networking systems and protocols to enable interactive immersive applications. This includes optimizations ranging from hardware (i.e., millimeter-wave networks or optical wireless), physical and MAC layers up to the network, transport, and application layers (such as over-the-top protocols);
- Significant advances and optimization in 3D modeling pipelines for AR/VR visualization, accessible and inclusive GUI, interactive 3D models;
- Compression and delivery strategies for immersive media contents, such as omnidirectional video, light fields, point clouds, dynamic and time-varying meshes;
- Quality of Experience management of interactive immersive media applications;
- Novel rendering techniques to enhance the interactivity of XR applications;
- XR applications and experiences in the era of LLMs: how can AI aid creation and delivery of immersive experiences?
- Application of interactive XR to different areas of society, such as health (i.e., virtual reality exposure therapy), industry (Industry 4.0), and XR e-learning (according to new global aims).

3 Workshop Organizers

- Irene Viola is a senior (tenured) researcher at the Centrum Wiskunde en Informatica (CWI) in Amsterdam, The Netherlands. She received her M.Sc. in Computer Engineering from the Polytechnic University of Turin, Italy, in 2015, and her Ph.D. in Electrical Engineering from the Ecole Polytechnique Federale de Lausanne, Switzerland, in 2019. Her research interests include compression, delivery, and QoE for immersive media systems. She has served as a Qualinet chair for the task force on Immersive Media Experiences since 2017 and is actively involved in standardization bodies, including MPEG and ITU. She has served as Technical Program Committee (TPC) chair for the ACM Multimedia Systems conference (MMSys) workshop Immersive Mixed And Virtual Environment Systems (MMVE) in 2021, for MMSys in 2022, for Quality of Multimedia Experiences (QoMEX) in 2023, and ACM International Conference on Interactive Media Experiences (IMX) in 2024, and has organised three editions of the Spring School in Social XR (2023-2025).
- Silvia Rossi is a senior PostDoc of the Distributed and Interactive Systems (DIS) group at CWI in the Netherlands. She received her BSc and MSc degrees, both in Electronic and Telecommunication Engineering from the University of Bologna - Cesena (Italy), and her Ph.D in Electronic and Electrical Engineering from UCL, London (UK) in 2022. Truly passionate about multimedia and technology, her research interests are around immersive media systems, at the crossroads between multimedia processing, data processing and analysis, machine learning, and communication systems. She is also an active member of the multimedia community being part of the Special Interest Group of Multimedia (SIGMM) executive board and Records team. She has served as program coordinator and TPC chair for ACM Multimedia system conference (MMSys'25), workshop chair for MMVE'24, and she is one of the organizers of the Spring School on Social XR (2023-2025).
- Marta Orduna is a Telecommunication Engineer, BSc and MSc degrees in Telecommunication Engineering both from Universidad Politécnica de Madrid (UPM). In 2023, she received her PhD from UPM entitled "Understanding and Assessing Quality of Experience in Immersive Communications". In 2023, she joined Nokia XR Lab in Spain, where she continues her research line in the area of quality of experience in extended reality. She serves as the Nokia delegate at ITU-T SG-12 and is actively involved in VQEG-IMG. She has served as chair of a workshop at ACM CHI'22, ACM CSCW'23, and TAS'24, industry chair of ACM IMX'24, demo chair of ACM IMX'25, diversity and inclusion chair of QoMEX'25, and workshop chair of MMVE'25. She has been one of the organizers of the EURASIP International Summer School on XRXT'25. She is a member of the Governing Board of the Spanish Official College of Telecommunications Engineers (COIT-AEIT).
- Maria Torres Vega is a tenure track assistant professor at KU Leuven (Belgium), where her research focuses on devising human-driven control and management mechanisms for enhancing the perception of immersive systems. She received her M.Sc. degree in Telecommunication Engineering from the Polytechnic University of Madrid, Spain, in 2009 and her Ph.D. from the Eindhoven University of Technology, The Netherlands in 2017. In 2022 she received the CNOM Young professional Award, granted by the IEEE Communication Society Technical Committee on Network Operation and Management. Moreover in 2023, she received the Rising Star in Networking and Communications 2023 award granted by the IEEE Communication Society N2Women section.the Rising Star Her research interests include quality of service and QoE in immersive multimedia systems and autonomous networks management. She has served as chair of the Qualinet Task Force on Immersive Media Experiences. Moreover, she is a very active member of the multimedia and Quality of Experience community. For instance, she has served as general chair of the International conference on Quality of Multimedia Experiences (QoMEX 2023).

Acknowledgments

We would like to thank the ACM MM '25 conference organizers for agreeing to host our workshop and for their support, and the TPC for their time and helpful contributions. The workshop is partially supported by the European Union Horizon Europe research and innovation programme under grant agreement No 101070109 (TRANSMIXR) and by the Spanish Administration Agency CDTI under Project TIC-20240154 (DAWN6G).