IXR '22: 1st 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, tele-surgery, interconnection in new buildings project chain, Cultural Heritage and Museum contents communication, are well on their way to integrate 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 the (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 complete IXR'22 workshop proceedings are available at: https://dl.acm.org/doi/proceedings/10.1145/3552483

CCS CONCEPTS

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

KEYWORDS

eXtended reality, interactive experiences, XR interfaces, immersive experiences

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 and XR) 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 effort from organizations such as ITU, JPEG and MPEG.

Despite remarkable advances, current Extended Reality (XR) applications are in their majority local and individual experiences. A plethora of interactive applications, such as teleconferencing, tele-surgery, interconnection in new buildings project chain, Cultural Heritage and Museum contents communication, are well on their way to integrate 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 the (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.

This is the inaugural workshop on this area of research. Our ambition is to establish a long line of yearly workshop 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, solutions addressing interactive XR systems. In particular, we aim to explore system designs for interactive XR experiences; algorithmic solutions aiding in 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 layer up to the network, transport and application layers (such as over the top protocols);

- Significative 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 interactivity of XR applications;
- Application of interactive XR to different areas of society, such as health (i.e., virtual reality exposure therapy), industry (Industry 4.0), XR e-learning (according to new global aims).

3 WORKSHOP ORGANIZERS

- Irene Viola is a tenure-track researcher at the Centrum Wiskunde en Informatica in Amsterdam, The Netherlands. She received her M.Sc. in Computer Engineering from the Polytechnic University of Turin, Italy, in 2015, and her PhD 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 in Immersive Media Experiences since 2017, and is actively involved in standardization bodies such as MPEG and ITU. She has served as Technical Program Chair for the MMSyS workshop MMVE in 2021, for MMSys in 2022, and will be taking the same role for QoMEX 2023.
- Hadi Amirpour is a postdoctoral researcher at the ATHENA Lab, University of Klagenfurt, Austria. He received his B.Sc. degrees in Electrical and Biomedical Engineering, and he pursued his M.Sc. in Electrical Engineering. He got his Ph.D. in computer science from the University of Klagenfurt in 2022. He was involved in the project EmergIMG, a Portuguese consortium on emerging imaging technologies, funded by the Portuguese funding agency and H2020. Currently, he is working on the ATHENA project in cooperation with its industry partner Bitmovin. He has served as a QUALINET chair for immersive media experiences and was a co-organizer of the SMS workshop in the ACM MobiSys'21 conference.
- Maria Torres Vega is a tenure-track assistant professor at KU Leuven (Leuven, Belgium) where her topic deals with immersive multimedia experience. 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. Between 2017 and 2022, she was a postdoctoral researcher for immersive multimedia delivery at Ghent University, Ghent, Belgium. Her research interests include quality of service and QoE in immersive multimedia systems and autonomous networks management. She currently serves 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 Quality of Experience Management (QoE-Management 2020), as Technical Program Committee (TPC) chair of the international Conference on Quality of Multimedia Experience (QoMex21) and as publication chair of the ACM Multimedia Systems conference (MMSys22). Finally she will co organize the 2023 edition of QoMEX.