

## Mixed, Augmented, and Virtual Reality: Co-designed Services and Applications

Osmo Mattila  
University of Helsinki  
[osmo.mattila@helsinki.fi](mailto:osmo.mattila@helsinki.fi)

Jani Holopainen  
University of Helsinki  
[jani.m.holopainen@helsinki.fi](mailto:jani.m.holopainen@helsinki.fi)

Juho Hamari  
Tampere University  
[juho.hamari@tuni.fi](mailto:juho.hamari@tuni.fi)

Essi Pöyry  
University of Helsinki  
[essi.poyry@helsinki.fi](mailto:essi.poyry@helsinki.fi)

### Abstract

During the past five years, virtual reality, augmented reality, mixed reality and related technologies have gained a lot of media attention, and availability and usability of the technology is improving. Using VR/AR/MR devices is more pleasant as there are less cables and controllers involved and boundaries between the technologies are diminishing. The technological development has been rapid: user experience of the current software and hardware is often astonishing. Even though there is still demand for research on the technology itself, the focus has gradually changed from technologies to services, experiences and how they are created and shared. Not only in entertainment but also in business and education, the technologies are increasingly seen as tools that allow things to be done differently.

In this session, we are bridging the research gap in studying user experiences, decision-making and technology side-by-side in order to understand the value the technologies create. The key value drivers for users are, for example, cost-saving through out-of-home and out-of-office access, total control and high level of personalization, going beyond reality, personal efficacy experiences, feeling of safety, privacy and confidentiality and immersive experiences. From this point of view, the major challenge for VR, AR and MR technologies is to convince users with the value proposition that is significant enough to compete with other available systems and offerings. This minitrack concentrates on showcasing research on technology and application development with specific orientation towards user experience and behavior.

Eight papers were submitted to this session and three were accepted. The first paper discusses the concept of immersion. The study has been implemented in the context of highly immersive VR

games. The second paper covers the topic of service design as it has been recognized that stakeholders such as application developers, service providers, and customers may have different views on how to use immersive technologies. The third paper is a laboratory study about agency and body ownership in virtual reality. The paper tackles the topic of the features of an avatar and their effects on the experience.

For the next year, we encourage everyone in the audience and those who are presenting to submit papers to the session. Interesting research avenues are, for example, user decision-making, customer value and service design. The outcome is hoped to be accelerated customer-value-guided development of the technologies and consequent innovative business models and service applications.

Fields of research that can contribute to the minitrack include computer science, information systems science, e-commerce, decision-making or any scholarly or industry field developing MR, AR and VR applications. We welcome contributions from all contexts and industries. Previously, there has been an emphasis on healthcare, e-commerce, travel, sports, education and industrial solutions, but new areas are welcome as well. We seek empirical and conceptual research papers, methodological papers, quantitative analyses, case studies, reviews and practitioner reports. Contributions on new technologies are also appreciated. In addition to the regular HICSS criteria, the degree of novelty in both the technology employed and innovativeness of the application is given considerable weight in the evaluation of the papers.