Introduction to Minitrack: Mixed, Augmented and Virtual Reality

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Virtual reality (VR) refers to computer technologies that use software to generate the realistic images, sounds and other sensations that represent an immersive environment and simulate a user's physical presence in this environment [10]. Mixed reality (MR) refers to combining real and virtual contents with the aid of digital devices [3]. Mixed reality is seen to consist of both augmented reality (i.e., virtual 3D objects in immersive reality), and augmented virtuality (i.e., captured features of reality in immersive virtual 3D environments) [7]. All these technologies have recently peaked in terms of media attention as they are expected to disturb existing markets like PCs and smartphones did when they were introduced to the markets.

The first wave of VR came already in 1990's when a number of industries were inspired by games [1, 11, 6]. However, the user experience was still unpleasant and the hype soon passed. After 2005, a second wave of VR emerged and was more successfully employed in different fields such as engineering, medicine, mental health, design, architecture and construction, education and training, arts, entertainment, business, communication, marketing, military and travel [9, 13, 6]. Now, device, component, software and user-interface development is globally moving fast forward and many world-leading players in manufacturing and e-commerce, for example, are adopting these technologies.

Current academic research in the MR sector has concentrated on technology and user-interface research but there is a research gap in studying user experiences and decision-making, technology advancement and application development side-by-side in order to understand their value-in-use. The user-value drivers are numerous and should drive application development. So far, the key value drivers have been identified to be 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 [1, 2, 4, 5, 8, 12]. A co-created envisioning of an immersive experience also elevates institutions of agreement, commonly coined as a feeling of win-win. From this point of view, the major challenge for both VR and AR technologies is to convince users that the added value is high enough to compete with the current systems and offerings in desktops, notebooks, tablets, smartphones and related video and game-like applications.

The minitrack encouraged submissions from both cutting edge technology and practical applications. The minitrack showcases research on how virtual reality applications can be used to enhance learning (Henrik Kampling: The Role of Immersive Virtual Reality in Individual Learning) and what kinds of short- and long-term effects augmented reality applications have in informal learning environments (Peter Sommerauer, Oliver Mueller: Augmented Reality in Informal Learning Environments: Investigating Short-term and Long-term Effects). Representing a completely different kind of use area, Broach and colleagues studied the use of smart glasses in mass casualty incidents (John Broach, Alexander Hart, Matthew Griswold, Jeffrey Lai, Edward W. Boyer, Aaron B. Skolnik, Peter R. Chai: Usability and Reliability of Smart Glasses for Secondary Triage During Mass Casualty Incidents). Finally, Mütterlein provides a generalizable view over the three key factors that are thought to create additional value in virtual reality as opposed to other technological tools: immersion, presence and interactivity (Joschka Mütterlein: The Three Pillars of Virtual Reality? Investigating the Roles of Immersion, Presence, and Interactivity).

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