Introduction to Minitrack: Mixed, Augmented and Virtual Reality: Co-designed Services and Applications

Petri Parvinen, Minitrack Chair
University of Helsinki
petri.parvinen@helsinki.fi

Juho Hamari
University of Tampere
juho.hamari@uta.fi

Essi Pöyry
University of Helsinki
essi.poyry@helsinki.fi

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:

- Realistic virtual humans in immersive environments
- AR applications for personal health decision-making
- Enabling sociability in around VR experiences
- Critical reflection on VR learning
- Decision making about enterprise architecture using AR

References

[1] Botella, C., Baños, R. M., Perpiñá, C., Villa, H., Alcaniz, M., & Rey, A. (1998). Virtual reality treatment of claustrophobia: a case report. Behaviour research and therapy, 36(2), 239-246.

[2] Botella, C., Quero, S., Baños, R. M., Perpiña, C., Garcia-Palacios, A., & Riva, G. (2004). Virtual reality and psychotherapy. Cybertherapy, 99, 37-52. Cabiria, J. (2012). Augmenting engagement: Augmented reality in education. In C. Wankel & P. Blessinger (Eds.), Increasing student engagement and retention using immersive interfaces: Virtual worlds, gaming, and simulation. Bingley: Emarald.

[3] Cabiria, J. (2012). Augmenting engagement: Augmented reality in education. In Increasing Student Engagement and Retention Using Immersive Interfaces: Virtual Worlds, Gaming,

and Simulation (pp. 225-251). Emerald Group Publishing Limited.

[4] Côté, S. & Bouchard, S. (2005). Documenting the efficacy of virtual reality exposure with psychophysiological and information processing measures. Applied Psychophysiology and Biofeedback, 30 (3), 217–232.

[5] Gorini, A., & Riva, G. (2008). Virtual reality in anxiety disorders: the past and the future. Expert Review of Neurotherapeutics.

[6] Jayaram, S., Jayaram, U., Wang, Y., Tirumali, H., Lyons, K., & Hart, P. (1999). VADE: A virtual assembly design environment. IEEE Computer Graphics and Applications, 19(6), 44-50.

[7] Milgram, P., Takemura, H., Utsumi, A., & Kishino. F. (1994). Augmented reality: A class of displays on the reality-virtuality continuum. Proceedings of Telemanipulator and Telepresence Technologies. 2351–2334.

[8] Repetto, C., & Riva, G. (2011). From virtual reality to inter-reality in the treatment of anxiety disorders. Neuropsychiatry, 1(1), 31-43.

[9] Saggio, G. & Ferrari, M. (2012). New Trends in Virtual Reality Visualization of 3D Scenarios. INTECH Open Access Publisher

[10] Steuer, J. (1992). Defining virtual reality: Dimensions determining telepresence. Journal of Communication, 42 (4), 73–93

[11] Wiederhold, B. K., & Wiederhold, M. D. (1998). A review of virtual reality as a psychotherapeutic tool. CyberPsychology & Behavior, 1(1), 45-52.

[12] Zimand, E., Rothbaum, B., Tannenbaum, L., Ferrer, M. S., & Hodges, L. (2003). Technology meets psychology: Integrating virtual reality into clinical practice. The Clinical Psychologist, 56, 5-11.

[13] Zyda, M. (2005). From visual simulation to virtual reality to games. Computer, 38(9), 25-32.