Manipulating Reality? Designing and Deploying Virtual Reality in Sensitive Settings

Jenny Waycott

Greg Wadley

Steven Baker

Hasan Shahid Ferdous

University of Melbourne

Parkville, Vic 3010, Australia

jwaycott@unimelb.edu.au

greg.wadley@unimelb.edu.au

steven.baker@unimelb.edu.au

hasan.ferdous@unimelb.edu.au

Thuong Hoang

Deakin University

Burwood, VIC 3125, Australia

thuong.hoang@deakin.edu.au

Kathrin Gerling

KU Leuven

Leuven, Belgium

Kathrin.gerling@kuleuven.be

Christopher Headleand

University of Lincoln

Brayford Pool, Lincoln, UK

cheadleand@lincoln.ac.uk

Adalberto Simeone

KU Leuven

Leuven, Belgium

adalberto.simeone@kuleuven.be

Abstract

Virtual reality (VR) is now being designed and deployed in diverse sensitive settings, especially for therapeutic purposes. For example, VR experiences are used for diversional therapy in aged care and as therapy for people conditions such as phobias and post-traumatic stress. While these uses of VR offer great promise, they also present significant challenges. Given the novelty of VR, its immersive nature, and its impact on the user's sense of reality, it can be particularly challenging to engage participants in co-design and predict what might go wrong when implementing these technologies in sensitive settings. This workshop provides a forum for researchers working in this emerging space to share stories about their experiences of designing and evaluating VR applications in settings such as aged care or mental health therapy. The workshop will develop a manifesto for good practice, outlining co-design strategies and ethical issues to consider when designing and deploying VR in sensitive settings.

Author Keywords

Virtual Reality; Vulnerability; Design; Deployment; Ethics

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Background and motivation

Virtual reality (VR) has come of age. According to the latest Gartner hype cycle, VR now sits on the "slope of enlightenment" [2]. After decades of being viewed as a high-tech simulation training and research tool that had limited broader potential, VR has now emerged as a promising, affordable consumer technology. In recent years mobile VR devices such as Google Cardboard and Samsung GearVR, along with gaming VR headsets such as the Oculus Rift, HTC Vive, and Playstation VR, have entered the market, enabling a diverse range of people to experience immersive, 3D virtual environments.

Alongside its commercial advancement, VR is now being explored as a therapeutic tool in various potentially sensitive settings, including aged care [7], mental health, and clinical rehabilitation [9]. In a recent review paper, Freeman [1] noted that VR is well-suited to treating mental illness because of its power to simulate the environmental conditions that trigger problems, helping therapists teach patients how to better deal with these situations. In this way, VR has been used to treat phobias, post-traumatic stress disorder, paranoia and social anxiety, and to induce self-compassion, empathy and pro-sociality [8]. VR has also been used for pain management: because VR is immersive, it can be an effective way of distracting chronic care patients from their experience of pain [3].

In addition, many commercial providers have begun to offer VR systems for use in aged care (see, for example http://www.solisvr.com; http://www.tribemix.co.uk),

although there is currently no research evaluating the effectiveness of these commercial systems. Again, the immersive quality of VR is beneficial here: VR experiences can be meditative and calming for people living with dementia, who often experience anxiety [7].

While therapeutic uses of VR offer great promise, they also present significant challenges. Many therapeutic applications are used in sensitive settings – for example, in hospitals, care facilities, or with people who have experienced trauma. Given the immaturity of research in this area, it is difficult to predict what might go wrong when implementing these complex technologies in these sensitive settings. This workshop will build on earlier discussions about "sensitive HCI" [12] by critiquing the opportunities and challenges that VR presents when designed and used in sensitive settings, especially for health and wellbeing therapy.

Workshop themes

The workshop discussions will focus on the following:

Practical challenges
The challenges of implementing VR are manifold. For example, in aged care, practical challenges include the cost of implementation and the need for one-on-one assistance from care staff when residents use VR [7]. A further practical challenge we have observed in our work in aged care arises from the fact that VR hardware (i.e. headset and computer) is expensive and therefore one headset is likely to be shared among many. A headset, of course, is worn over the head and face; it therefore must be cleaned when passed from one user to another in a setting such as aged care, where disease control is of paramount concern. These challenges are likely to also be prevalent in other

therapeutic settings in which VR is used. A general challenge commonly discussed is the tendency for some users to experience motion sickness when immersed in a virtual environment [4]. The technology has improved greatly in recent years, making this a less prominent concern, but researchers still need to be mindful of this when implementing VR in sensitive settings. These practical challenges are relatively straightforward but nevertheless important; workshop discussions will involve sharing experiences of practical challenges encountered and how they can be addressed.

Co-design and radical novelty
The HCI community is already well aware of the challenges, but also opportunities, inherent when co-designing technologies in sensitive settings. But what new challenges are introduced when we are designing and deploying such radically new technology-based experiences? For people accustomed to two-dimensional touch-screens and desktop interfaces, VR introduces new interaction techniques and metaphors, and best practice is yet to be fully defined. This unfamiliarity adds a layer of complexity for designers aiming to collaborate with their intended users in the design process. How do we ensure our participant-collaborators are aware of the possibilities and constraints that VR provides?

Dystopian perceptions
VR captures the public imagination, partly due to media hype and earlier portrayals of VR in science fiction. Works such as *Neuromancer* (Gibson, 1984), *The Matrix* (1999) and *Black Mirror* (2016) portray dystopian roles for VR. This association was evidenced in the reaction to the 2016 photo of Mark Zuckerberg with a group of tech devotees wearing VR headsets [5].

This may lead to negative perceptions of VR in sensitive settings such as hospitals, mental health clinics, and homes for the aged, resulting in the need to carefully manage people's expectations about VR.

Ethical challenges
Vines et al described the ethical challenges encountered when using Google Glass with people living with Parkinson's disease [10]. Some of these challenges were due to the novelty of the technology and things not working as expected, which participants viewed as a sign of "failure" on their part. We need to be cautious about the potential that similar challenges can occur when implementing VR for therapeutic purposes. In aged care, for example, VR content needs to be carefully designed and tailored to the needs of individual residents. Using VR involves being immersed in an alternate reality. There is therefore great potential for VR experiences to cause confusion, which may be particularly problematic for people living with dementia. VR could also amplify people's experience of age-related cognitive decline or induce a sense of failure/inadequacy if they find the experience confusing. There is the danger of provoking trauma, especially in immersive VR environments, from which users cannot easily "escape". An under-water virtual environment might aim to provide a soothing meditative experience, but could be challenging for a person who has had a near-drowning experience in the past. How do we ensure that VR experiences offered in sensitive settings are personalized and appropriate for each individual person? This is an important consideration for all VR being used for therapeutic purposes, especially with people who have experienced past trauma, such as those with PTSD.

Workshop duration and goals

This one-day workshop aims to provide a forum for researchers working in this emerging space to share stories about their experiences of involving vulnerable audiences in the design and evaluation of VR applications, and discuss challenges and opportunities when leveraging these technologies in an effort to improve quality of life. By opening up this conversation, we aim to develop a shared understanding of good practice, which will inform the future ethical design of VR experiences for health and wellbeing purposes.

References

1. D. Freeman, S. Reeve, A. Robinson, A. Ehlers, D. Clark, et al. 2017. Virtual reality in the assessment, understanding, and treatment of mental health disorders, *Psychological Medicine*. 1-8.

2. Gartner. 2017. Future trends in the Gartner Hype Cycle for Emerging Technology, 2017. *Forbes*. Retrieved October 14, 2017 from https://www.forbes.com/sites/gartnergroup/2017/08/18/future-trends-in-the-gartner-hype-cycle-for-emerging-technologies-2017/#53240b774b97

3. Diane Gromala, Xin Tong, Amber Choo, Mehdi Karamnejad, Chris D. Shaw. 2015. The virtual meditative walk: Virtual reality therapy for chronic pain management. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 521-524.

4. Hettinger, L. J., & Riccio, G. E. (1992). Visually induced motion sickness in virtual environments. Presence: Teleoperators & Virtual Environments, 1(3), 306-310.

5. Rich McCormick. 2016. This image of Mark Zuckerberg says so much about our future, *The Verge*. https://www.theverge.com/2016/2/22/11087890/mark-zuckerberg-mwc-picture-future-samsung

6. Roisin McNaney, John Vines, Daniel Roggen, Madeline Balaam, Pengfei Zhang, Ivan Poliakov, and Patrick Olivier. 2014. Exploring the acceptability of google glass as an everyday assistive device for people with Parkinson's. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '14), 2551-2554. https://doi.org/10.1145/2556288.2557092

7. Wendy Moyle, Jones, C., Dwan, T. and Petrovich, T. 2017. Effectiveness of a Virtual Reality Forest on People With Dementia: A Mixed Methods Pilot Study. *The Gerontologist*, Advance online publication.

8. Scozzari, S. & Gamberini, L. Virtual Reality as a Tool for Cognitive Behavioral Therapy: A Review. In: *Advanced Computational Intelligence Paradigms in Healthcare 6*, edited by Brahnam, S., Jain, L. C, Springer, 2011, SCI 337: 63–108.

9. Lucia R. Valmaggia, Leila Latif, Matthew J. Kempton, and Maria Rus-Calafell. 2016. Virtual reality in the psychological treatment for mental health problems: A systematic review of recent evidence. *Psychiatry Research, 236*:189-195.

10. John Vines, Roisin McNaney, et al. 2017. Our year with the glass: expectations, letdowns and ethical dilemmas of technology trials with vulnerable people. *Interacting with Computers*, 29, 1:27-44.

11. Peter Washington et al. 2016. A wearable social interaction aid for children with autism. In CHI '16 Extended Abstracts, 2348-2354.

12. Jenny Waycott, Greg Wadley, Stefan Schutt, Arthur Stabolidis, and Reeva Lederman. The challenge of technology research in sensitive settings: Case studies in 'sensitive HCI'. In *Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction* (OzCHI 2015), 240-249. https://doi-org.ezp.lib.unimelb.edu.au/10.1145/2838739.2838773