

ETHICAL DESIGN FRAMEWORK FOR COMMERCIAL SENSORY AUGMENTATION TECHNOLOGY

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Commercial Sensory Augmentation technology enables customers to buy devices which augment their senses. Sensory Augmentation (SA) - 'the extension of the body's ability to sense aspects of the environment that are not normally perceivable by the body in its' natural state' - can create new embodied experiences (Hayles, 1999) by expanding the perceptual range of the sensory modalities (Kaspar et al., 2014). However, as a sub-category of Human Enhancement technology (HEt), specific regulation and testing procedures have not yet been developed (European Parliament, 2009; Jensen et al., 2018), without which potentially harmful devices may reach the market.

This research explores SA's ethical issues, particularly when the technology moves from the medical world to the commercial. Furthermore, it examines how these issues might affect, and be affected by, the design process of future devices (Verbeek, 2005; 2011). The aim is to create an ethical design framework for SA devices to inform ethical production and use.

This talk will focus on the use of design methodologies such as Participatory Design (Kensing and Bloomberg, 1998) and Critical Design (Malpass, 2017) and the combination of theoretical and primary research through design to critically analyse the ethical implications of SA use. The insights gained informs the creation of an ethical design framework to guide future development of SA technology, will be iteratively challenged and revised through design interaction with publics (Dewey, 1927). The framework aims to allow SA to enhance our experiences unhindered while addressing ethical issues that are pertinent those using it.

Keywords: sensory augmentation, design ethics, human enhancement

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Situating sensory substitution for the deaf and the blind

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Abstract

In the Netherlands, 21.1% of the population has a hearing impairment and 17.4% has a visual impairment. Sensory substitution technology, the translation of sensor data into sensory stimuli, can support people with such impairments in their daily lives in a revolutionary way. For example, the now classic study by Bach-y-Rita showed that people with visual impairments learned to “see with their skin” by translating camera images into tactile stimuli. Despite a broad acknowledgement of the potential of these and other forms of sensory substitution, the principle is not widely applied. The development and wider application of sensory substitution technology seems to be hindered by functional and social obstacles and limitations that translate into poor user-friendliness and acceptance. To overcome these obstacles and limitations, I propose (I) that current HCI design methods should incorporate better insight into the subjective experience of sensory substitution technology and relevant practical factors from the actual context of use. In order to do so, I propose (II) that sensory substitution requires more *situated* design approaches. Such approaches involve so-called ‘situated actions’; design actions that include intended use as well as actual use influenced by the limitations and possibilities of their context of use.

Title: Augmented Reality as the next wave of neuroenhancement

Joint project: Imre Bard (speaker) and Prof Peter Reiner

Abstract: The propriety of neuroenhancement has been fodder for ethical analysis for two decades. Discussions have primarily focused upon biomedical interventions such as pharmaceuticals, genetic engineering, neuromodulation, and brain-computer interfaces. These debates have plateaued, at least in part because technologies capable of achieving meaningful enhancement have not yet materialized, forcing the debates to focus upon hypothetical enhancements.

In the present study, we take up the question of whether augmented reality (AR) represents a form of neuroenhancement. Current AR devices are capable of expanding human sensory and perceptual capacities far beyond any previous mode of biological enhancement, and thereby qualify as *bona fide* neuroenhancements. Moreover, in the past few years AR devices have been deployed in the workplace where they are capable of providing hands-free, just-in-time contextual insight that enables novel modes of interaction with the environment. These AR devices represent an example of technologies that provide tangible neuroenhancement, and offer an opportunity to revisit the cognitive enhancement debate in a real-world context. This talk will draw on a set of interview studies conducted with enterprise users of AR, who have incorporated head-mounted displays into their everyday workflow, offering insights into the lived experience of AR as an extension of users' cognitive and perceptual toolkit.

Keywords: augmented reality; extended mind; neuroenhancement

When sensory enhancement takes place at work: ethical considerations for the management of an enhanced workforce

Nowadays, companies are also suggesting the use of enhancement technologies to their employees, be it microchip implants or connected exoskeletons. Soon, they will be able to suggest the use of exosenses, which allow individuals to perceive the world through an additional sense. Going beyond the individual, they may be able to enhance groups soon (Poli et al, 2014).

Enhancing organizations can be appealing to markets for several reasons. Firstly, enhancement can be steered to increase productivity exponentially (Buchanan, 2008). Secondly, some assume that enhancing several individuals could lead to spillover effects over entire groups. Exosenses could allow employees to accomplish tasks better and faster.

As companies are taking on the role of the architect of the human, deciding on how the body and mind that the individual lends for work should be like, the literature remains silent on what it means to enhance groups of workers. Considerations around enhancement at work, in organizations, are scarce (Academy of Medical Sciences et al, 2012). However, ethical issues related to human enhancement are numerous and the ethics of augmentation at work need to be discussed. Sensory augmentation also raises questions (Gauttier, 2019).

In this talk, we analyze the ethical issues stemming from the use of sensory augmentation at work, be it by individual employees or teams. We discuss the forms that human sensory augmentation can take in organizations and outline future research areas for the development of ethical design and practices of human sensory enhancement.

Keywords: applied ethics, human enhancement, sensory augmentation

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