Multisensory AR for face-to-face interactions

Enhancing social interactions through vision, sound, smell, touch, and emotional feedback

Maryam Bandukda
m.bandukda@ucl.ac.uk
PhD Student
University College London Interaction Centre (UCLIC)
Global Disability Innovation Hub (GDI Hub)

INTRODUCTION

Augmented Reality (AR) is combining the physical and digital worlds; it's a contextual overlay of digital objects and interfaces and the interactions between the human, the digital, and the physical world [10]. In the last decade, AR has been a hot topic in HCI, as researchers explore opportunities to extend human capabilities and social interaction in both real and virtual realms. New developments in mobile technology have enabled people to create and share rich experiences in virtual and augmented reality. Particularly, there have been a growing number of AR applications in education [6], social media [5], navigation (e.g. AR Google Maps) [7, 12, 13] and retail [1, 8].

As AR becomes more pervasive, the privacy, ethical, and social issues also become more important to ensure the AR content and use is ethical, safe, and inclusive. Pokémon GO's exponential popularity around the world raised several questions around the ethics and privacy in AR. While the game encourages physical activity [REF: How Pokemon has changed my life] and social interaction, there are privacy concerns around location-sharing as players often explore new places to capture Pokémon. There are also safety concerns in co-located game play as the game is played by children and adults alike [2, 9]. Other implications for social AR design include appropriate public and private space use for posting AR content and privacy and anonymity in public spaces as facial recognition and visual search technologies become more advanced.

MULTISENSORY INTERACTIONS

In face-to-face interactions, the social issues of equality and inclusion are of great importance. As current AR applications predominantly involve visual objects and presentation that can be created and shared with others, this emerging and exciting new technology is yet to become fully accessible for blind and low vision (BLVs) users. As BLV users are more adept at employing their non-visual senses to create meaningful experiences, there is a need for social AR applications to explore multisensory (vision, sound, touch, smell, and emotional feedback) modalities of interaction.

Multisensory interaction for spatial augmentation and creating immersive experiences is not a new concept. In fact, multisensory AR exhibitions in museums have been used to enhance visitor experiences [3, 4]; for example, story of the forest exhibition [11] at the National Museum of Singapore is a multisensory immersive experience that aims to encourage learning about the natural history through the visual and auditory experience of the wildlife. Multisensory AR in the context of face-to-face interactions could also be used for sensory enhancement and substitution. Examples of which could include, vision enhancement for low vision users or audio descriptions to substitute the absence of vision. For hard of hearing users, auto-transcriptions or real-time sign language interpretation can enhance social interaction with others. Multisensory social interactions with AR have the

potential to create opportunities to support the social inclusion, empowerment, and enjoyment of people with disabilities.

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