Final Paper:

Accessibility and Mixed Reality
Abstract

As we know innovations are must in IT Sector for them to grow or rather grow. Although not latest but we are going to discuss about an innovation that sparked attention few years back. The **Mixed Reality**.

Let’s first talk about its roots, i.e. Virtual Reality and Augmented Reality.

**Virtual Reality** (VR) is a computer generated artificial environment that mimics reality. To experience it/interact with it we need head mounted displays and some controllers.

On the other hand, if we talk about **Augmented Reality** (AR), it augments digital objects in our real world in a way to enhance our experience of reality.

Now this digital information that we are talking about can be visual, auditory or in the form of vibration also known as haptic feedback.

These two technologies have significant boundaries when we talk about them separately. But with Mixed Reality, you won't be questioned if you switch from an AR experience to a VR experience saying that this is out of syllabus. In theory, mixed reality is also known as hybrid reality and it tries to combine the best aspects of VR and AR. It's like traversing on a rope from purely real world to a purely digital world. (*Reality–Virtuality continuum concept given by Paul Milgram*).
This mixed reality is the technology based on the concept of **Human Computer Interaction**. HCI explores the relationship between human input and computer input.

When this HCI is processed with the perception of the real environment, we get Mixed Reality. Currently, MR market is filled with humongous content. We have so many apps in app stores, we have Oculus Rift and HTC vive headsets we have Microsoft Holo Lens head mounted display. Now people can interact with the virtual objects using controllers and using hand gestures. Create 3D content inside VR using these controllers.

Also we have seen the importance of **Accessibility** in IT Products/Industry. The market is ever growing and making a product accessible means it broader market scope and more market revenue.

As we can understand a product in its inception phase look more towards establishing itself rather than thinking to make their adaptable for larger audiences.

Same has been the case with Mixed Reality. It has not yet taken steps in reaching the market beyond so called normal users. Hence missing out on a certain market.
Talking about 4 categories of disability, each category has certain disadvantages when it comes to their usability for world of Mixed Reality.

**First category is Visual Impairment**

The most obstructing disability that limits one MR experience is Visual Impairment. One can easily understand that MR content is heavily visual based. Problem with Visually impaired person is that VR platform are not designed to work with screen readers. There are basically no accessibility guidelines being followed when it comes to Mixed Reality.

Solutions could be Haptic feedback designed specifically for Visually Impaired people. These haptic feedback works like vibrators in mobile devices that guides user for instructions or feedback.

Web 3d consortium is the organization that is trying to develop X3D, xml based file format that supports 3D.

**Second category is Hearing Impairment**

Virtual experiences designed and developed these days rely heavily on audible cues. Few users are not able to perform voice commands as well due to the fact that hearing impaired user are not able to communicate using voice.

Solutions could be that the VR/AR platform should be able to
understand sign languages. Haptic feedback could be used as an alternate to audio instructions. Adding caption will make their virtual experience realistic since VR depends lot on visual aspects of virtual reality.

**Third category is Cognitive Impairment**

Visual experience might be difficult to learn for some users as roaming around a Virtual world require certain understanding and skills. Users may suffer from motion sickness due to o conflicts between sensory cues or between the virtual environment and what is felt be the body.

Solutions involves making design changes in the VR experience models to make them more soothing and pain free experience. VR can be used to support error-free training, which can assist cognitive disorders, it has a potential to diminish pain perception amongst chronic and acute pain sufferers

**Forth category is Mobility Impairment**

Often visual experiences involve precise click targets, use of controllers and head trackers which leaves people with mobility impairment unable to perform any actions. They may not be able to sense the haptic cues.

Solutions can be adding audio inputs which can help move the user from one place to another. Adding the options of Avatars which allows them to allows users to customise how they present themselves to others.
References & Appendix

Author Biography

Nandan Chhabra likes to play with new gadgets and technologies. He had been interested and following updates on Augmented Reality/Mixed Reality from quite a long time. He has presented in STC twice before. He likes to make hypothesis on where this technology is heading and how we can benefit with this.

Samnoon Afaq loves to be updated with New technology around the around. Playing with different mobile devices is one of my hobbies. Haven’t presented in STC before, but have a lot of enthusiasm to present on the largest Platform in the country. Also loves to Explore in world of Test Automation.

THANK YOU!