Improving lifestyle of Visually Impaired People using Virtual Reality

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Abstract

For the visually impaired, exploring an unfamiliar area can be uncomfortable, inconvenient and dangerous. Over the years, practically using materials as learning and rehabilitation tool for crowd with disabilities has increased. In this study, we investigate the technological implications of virtual reality for people with disabilities such as visually impaired people in improving their daily lives. In this study, we analyze and describe current tools and processes in information technology to support visually impaired people in their daily activities. The main aim of the research is to show how technology can be used to solve the problem of exposed people and how they can benefit from new virtual reality strategies and discuss similar independent examples. Challenges faced that are to be addressed and bibliography are included.

Keywords

Virtual Reality, Visually Impaired, Blind Aided System

1. Introduction

Virtual reality technology is use of integrated image systems with displays and interactive tools that provide the effect of immersion in a cooperative 3D computer-generated interface known as visual environment.

Visual sensor has a key role in helping the observer to the unknown and helping him to reach his destination safely. Unfortunately, visually impaired or blind people encounter difficulties in performing such tasks. While delivering great power in a variety of application environments, current Virtual Reality solutions rely heavily on virtual reality response to provide a focused experience for visually impaired people, capable of realizing them visually. Most VR applications are inaccessible to people with visual impairments, which prevents them from achieving this important stage of emerging technology. Researchers have recognized the power of VR in accessibility and invented many VR applications to train and rehabilitate people with various disabilities.

Recently, many practical systems have been developed that can improve life quality , reduce the impact of disability, improve community engagement, and improve mobility , cognitive skills and life skills, while providing an inspiring and amusing experience for peoples with disabilities. Research on the implementation of haptic technology within VEs and their ability to support learning and retraining training has been reported in blind people. Audio-based VEs have been researched and developed. These research results show that users need high attention to hearing feedback. Technological advances in haptic performance technology enable blind people to enhance their spatial awareness through automated real-time haptic and audio feedback.

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In this study, we are investigating the technological implications of virtual reality in people with disabilities such as visually impaired people in improving their daily lives. In this study we analyze and describe current tools and techniques in information technology to support visually impaired people in their daily activities. The main objectives of the study are to show how technology can be used to address the problem of visually impaired people and how they can, benefit from new virtual reality strategies and discuss some of the same independent examples. Finally challenges to be discussed and a comprehensive bibliography included.

2. Research Reviews

Table 1: Related research work

Research	Proposed System	Limitations
VR Technology for Blind and Visual Impaired People: Reviews and Advances	This study describes the best tools and techniques in information technology to support people with disabilities such as the deaf and visually impaired in their activities such as travel programs, computer games, e-learning access, web-based information systems, and fingerprints. -a braille interface for the visually impaired.	1) VR technique is less accurate. 2) High computational cost 3) Poor technique toward tracking applications. 4) VR systems are not portable and comfortable for normal use. 5) Incorrect visualization algorithms have difficulty handling congestion, shutdown, and general conditioning problems.
Virtual Environment for Blind People – Usability Study	This study was performed and tested by the BlindAid program, which enable the user to traverse the physical area. The two main objectives of the study were: (a) multidisciplinary testing and navigation equipments, and (b) exploration of spatial cognition used by blind people.	1) Difficult to learn. 2) Cannot be operated independently. 3) Software and hardware are costly.
VR Systems as an Orientation Aid for People Who Are Blind to Acquire New Spatial Information	This study compared contact with similar spaces using different systems: BlindAid, Virtual Cane, and real-world.	1) Not enough samples. 2) Limited statistical test results

Enabling People with Visual Impairments to Navigate Virtual Reality with CANETROLLER	CANETROLLER is a haptic cane controller with a local sound response that allows Visually impaired people to use their real-world abilities and understanding to traverse different visual environments.	1) Unfinished break mechanism. 2) Lacked proper instruments. 3) Hardware was too heavy to use. 4) Unfit to use for daily activities.

3. Research Reviews

As a part of our research we have reviewed existed work of proposed system.

3.1 The Blind Aided System

The BlindAid program was developed in collaboration with engineers and scientists studying at MIT's Touch Lab, VE's 3D (3D) audio experts, and Carroll Center for the Blind's O & M faculty. The app provides visual maps for the visually impaired and includes PC applications installed on haptic devices and stereo headphones. The BlindAid system approach gives the user the freedom to explore her VE based on her previous geographic skills. Therefore, BlindAid uses real landmarks (tactile and automatic).

BlindAid programs can play an important role in many potential applications. BlindAid can help visually impaired and congenital people proactively identify and collect location information. Viewers have access to a visual map so they can access their location online. Multimodal local systems (visual, audio, tactile) provide location information to many people (including visually impaired, visually impaired, elderly) to go to shopping centers, public buildings, hiking trails, colleges. Can do.

The Blind Assistance Program looks promising, but there are still a number of issues that need to be addressed, such as making it easier to learn, making it work independently, using affordable software and hardware, etc., before it can be fully utilized.

3.2 Virtual Cane

Accessible interactions were created using the Nintendo Wii Remote (Wii mote) device, and other Wii technologies. Virtual Cane uses the Wiimote capability to define the body inside the 3D space to provide a visual connection to the 3D visual field.

The Wii Cane System creates a real-world location map and Wiimote position to that of its visual counterparts within the 3D simulated space for use as a stick within nature. Sound, verbal and vibrant feedback is provided in a variety of ways that blind and partially sighted individuals can move around in their visible surroundings.

Using this program, people with visual impairments can explore new spaces to help them improve space maps, and build their self-confidence in real-world travel, which will greatly improve their ability to travel around the world independently. This means that it will be of great help in supporting independent navigation for those with severe visual impairment.

Using Wii technology has many advantages, at least in that it is common, easily accessible and cheap, which means it will be easily accessible to all.

However Virtual Cane is in its early stages of development and needs further research and testing and moreover anything that makes it easy to understand and readable to the average person.

3.3 Cantaroller

Guided by research findings, the Canetroller was designed, a haptic cane controller with a local sound response that allows VIPs to use their real cane skills to explore a variety of visual areas.

The design of the Canetroller is inspired by real interactions with white canes. To enjoy VR, users can wear a VR headset with headphones to listen to 3D sounds and hold Kanetroller up to hear exciting reactions. Canetroller is a wearable controller containing five main components. A braking system worn on the user's waist, a stick-driven controller that does not sweep or tamp like a real stick, sliding between the brake and the controller. It provides horizontal body drag generated by braking, a voice coil to generate vibrations in the controller for haptic response, and a 3D position control monitor for stick controllers.

Canetroller has proven to be a promising tool to enable visually impaired users to explore and navigate the visual world. Canetroller is strong in various fields such as entertainment, O&M training and environmental preparation. This can be seen as an incentive for researchers and designers to create more efficient tools to make his VR more engaging.

Just like Virtual Cane, Canetroller is in a growing phase it makes it unsuitable for everyday use and requires a lot of research and development before it can be used.

3.4 Full Immersive Virtual Reality Proposition

Full dive VR is an immersive digital experience that transcends the limits of human awareness. It helps to think of it as a Semiconscious state or a vivid dream. The full dive virtual reality technology pushes VR beyond the fixed earphones and makes the user machineable via Brain Computer Interface, or BCI. The dive virtual reality technology is rapidly emerging from science fiction pages into the lab. VR technology is still in its infancy. But many real-world applications show its promising future as Humble Beginning, The Paralyzed Walk, and ECT.

4. System Architecture

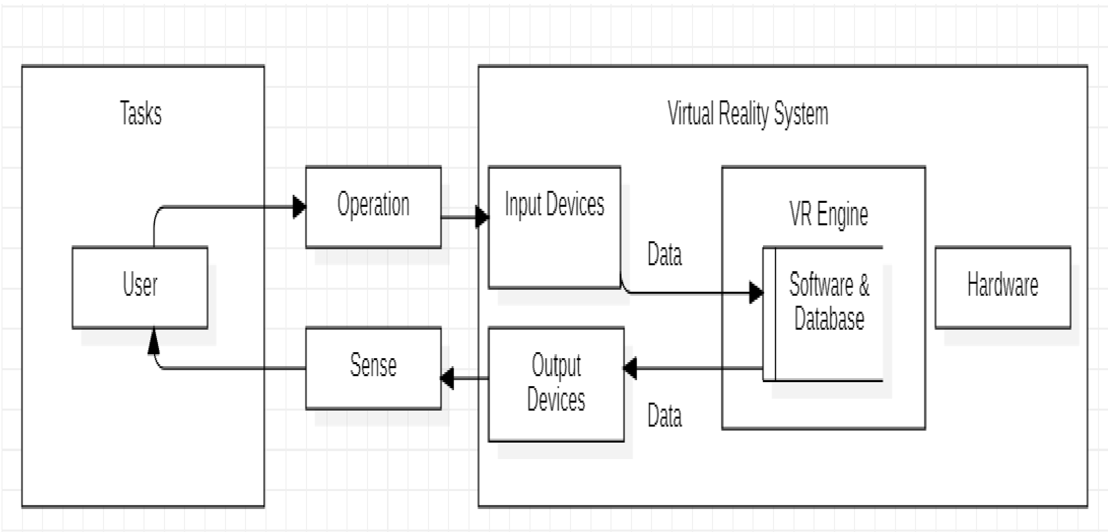

Figure 1: Proposed System Architecture

The system will be a gear that communicates directly with the brain by sending sensory signals directly to it, a sourcing camera, a VR system that will convert the captured image from camera to 3D Virtual Reality and Neural Signal data converter that will convert 3D VR data into neural signals. The user will wear a gear that will send neural data directly to the brain of the person wearing it. The gear camera will continuously capture the sour spot that it will send to the VR system. The VR program will convert that image into 3D Virtual Reality data. 3D Virtual Reality data will then be sent to a Neural Signal converter that will convert it into neural information signals. These modified signals of neural information will then be sent directly to the brain allowing the user to see his or her location as a lucid dream. This will allow anyone and even blind people to see their nature directly in their mind thus eliminating the need for vision. This device will allow visually impaired or blind people to live their daily life as a normal visual aid.

5. Conclusion and Challenges

This chapter discusses and investigates a variety of virtual reality techniques for people with disabilities, especially people who are blind and visually impaired in order to improve their daily lives. We have described the various tools, their uses and the barriers to information technology to support people with disabilities such as the visually impaired and blind in their daily activities. In addition, we showed how people with physical disabilities can benefit from new virtual reality techniques and discussed some examples that show how virtual reality technology can be used to address the problem of blind and visually impaired people.

The main challenges of VR systems are to improve accuracy, reduce computational costs and improve the proposed tracking system. There are many challenges that need to be covered by a VR system that supports accurate registration in an internal or external unattended environment. To make your VR system portable, you need a comfortable, unobtrusive portable system. The VR system needs to track everything: all other body parts and all objects and people in space. Systems that use vision-based lighting systems to obtain real-time depth information are a step forward in this regard. New detection algorithms are needed to address overloading, shutdowns, and general context awareness issues. While many VR application concepts and examples have been developed, what is lacking are validation tests and demonstrations of limited performance improvements for VR applications. Such evidence is necessary to justify the cost and effort of deploying this new technology. The underlying apparent contradiction and apparent deception caused by the actual visible combination requires further investigation. Test results should guide and validate interaction with display modes developed for VR systems. Most VR applications only require simple images such as wireframes and text captions, but the main goal is to provide visual elements so they don't appear in the real world. This should be done in real time without the intervention of artists or programmers. Often not in real time, but some steps are taken in this way. Removing real objects from the environment is an important skill and requires the development of these real mediation techniques. Technical issues aren't the only obstacles to accepting VR applications.

Considering all of the above it is clear that we can create technology that can help even the visually impaired to see and feel everything a visual person can do by combining fully immersive technology with other VR technology, which will really work, allowing them to symbolize their place in their brain instead of vision which leads to the complete elimination of visual acuity of the visual implants, enabling them to live their daily lives as normal visionary people.

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