

Ethical Concerns in the Virtual World

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Abstract— Advancement in Virtual Reality (VR) had made it possible to provide cost effective, easy and reliable solutions to healthcare, government agencies, classroom and personal needs. However, ethical concerns have become part of the VR controversy. This paper will discuss the uses of VR and the physical, psychological and social risks associated with the use of VR. Finally, summary of perceptions of college students on VR will be mentioned.

Keywords— Ethics, Virtual reality, social implications of virtual reality, VR and physical, VR and psychological, VR and social.

1. Introduction

A. Definition

“Virtualization is defined as the process by which a human viewer interprets a patterned sensory impression to represent an extended object in an environment other than that in which is physically exists” [5]. There are three main elements of virtual reality that are manipulation, navigation, and immersion. Manipulation is being able to touch and move objects in the virtual world. Navigation allows a person to walk around and explore the virtual world. Immersion uses head mounted displays and audio to immerse the user.

Virtual Reality (VR) can be defined as “...a way for humans to visualize, manipulate, and interact with computers and extremely complex data” [14]. This interaction can be achieved by integrating real-time computer graphics and a variety of sensory input devices. Head-mounted displays, tracking systems, earphones, gesture-sensing gloves, interaction/navigational devices and sometimes haptic-feedback, data gloves, joysticks, 3D mice, treadmills devices allows the user to believe that he/she is experiencing and sensing real situations. In addition, other methods may incorporate projection walls and rooms, as well as basic flat screen computer systems. VR allows users a total immersion and interaction into a three dimensional computer generated world; however, it can still include a level of computer generated worlds that are not necessarily totally immersive. For example, one can simply engage in a game such as Second Life while sitting in front of his/ her computer. In such as case, VR allows us to interact with other people, by means of digital representation (avatars), or computer controlled environments and simulated people (bots). The area of interaction resembles a world like environment, which may contain parks, skies, homes, shops, road ways, and sometimes places as complex as cities. VR can be used as training aids by the military and medical professions. They can also be used to reconstruct crimes by the Law enforcement agencies. Engineers can use them to bring their

designs to life. Virtual reality simulation is, also, used as a tool for easing the pain of burn victims, teaching future doctors, and curing people from phobias and anxiety. In general, VR technologies are extremely expensive which is, currently, limiting their access to commercial users.

B. Origin of Virtual Reality and where it is Heading

The first VR technology was introduced by Ivan Sutherland of Stanford University when he experimented with computer graphics and wrote the software program called SketchPad which was used to bring engineering designs to life. One of the first forms of virtual reality date back to 1910 with the early flight simulators that was used to train new pilots in a quick, cheap and safe manner. By using controlled movements these simulators would roll and move, even though it did not resemble the exact airplane’s movements, it gave the new pilots an idea of what it would be like in the air in a safer environment. In addition, military projects include flight simulators, tank operation simulators, and even combat simulators that are designed to help train a soldier for combat without the need to use actual vehicles and placed in dangerous scenarios [15].

Logging into a virtual world or their avatar in Second Life is becoming a common activity nowadays. More households are using game consoles utilizing virtual environments. More companies are becoming web integrated, and are beginning to advertise in the virtual world. It is expected that different agencies and ordinary people will get more engaged in activities that involve virtual capabilities [13].

2. Healthcare

Healthcare training can be expensive and time consuming; however, it is important to make sure that surgeons are adequately trained to perform well in the real world operating room setting. VR simulation training can be an effective and easy to perform activity for surgical residents that can aid them to perform different surgeries. For example, VR was examined as a solution for surgeons practicing in minimally invasive surgery (MIS) [2] which is difficult to teach and hard to integrate into a surgical training program. Using VR has shown to be highly successful especially.

In addition to using VR as a way for long term training, it can also be used for short term memorization. Medical residents can engage in a real time and realistic environment as if they were performing an actual surgery procedure. The environment can be interactive and guide them with selecting what steps to complete first and correcting their mistakes in a

real time fashion [3]. In addition, VR simulations can teach medics to be able to handle the intense amount of stress by using relaxation training [12].

Treating anxiety and specific phobias can be done successfully by VR exposure therapy [7]. Anxiety and phobias negatively affect those who suffer from them by making it difficult for them to function normally in everyday life. The simulation adjusts to the patient's feelings and emotions. Research has shown that VR has a great potential for treating specific phobias, especially acrophobia (the fear of driving), social phobia, panic disorder, claustrophobia (the fear of having no escape), aviophobia (the fear of flying), post-traumatic stress disorder, and arachnophobia (the fear of spiders). For example, a patient with Acrophobia (fear of heights) can undergo treatments such as entering a virtual environment of heights. Some patients, after completing several successful sessions, reported having substantially lower levels of anxiety in flying, and using elevators [13]. VR had shown tremendous success with patients who suffer from burns and excruciating pain during burn wound debridement [9]. By projecting calming images, such as a peaceful winter environment, patients reported considerably less pain when VR was used because it provides a distraction for the patient's mind.

3. Government Agencies

The Centre for Disease Control and Prevention is experimenting with the use of VR technology for training emergency responders who face a variety of physically, emotionally, and mentally challenging situations that they may not be ready for. Immersive VR platform were designed to expose trainees to the sights, sounds, and smells that they may encounter as emergency responders. Simulations may incorporate smells of human waste, death, and decomposition and sounds of indigenous wildlife, native languages, coughing, and crying. These devices can help to ease the impact of post traumatic stress disorders for emergency responders [4].

The military uses VR simulation to train pilots for combat missions. Recently they have begun to use VR immersive simulation to prepare Humvee drivers for roadside bombs. The simulation helps the trainee to experience actual combat and teaches safety response to military personal. Therapists are using virtual simulation of war zones to help aid soldiers dealing with Post-traumatic stress disorder [4].

Law enforcement agencies are able to use VR platform programs to help re-create crime scenes to aid with their investigations. Crime scenes can be re-constructed using information such as photographs, measurements, and crime scene data. Some programs are powerful enough to reveal dust on surfaces, blood spatter patterns, and body position and injury projections [4].

4. Classrooms

Although, in the classroom setting, VR experience may not be fully immersive, there is a lot to be gained from VR platform software for computer systems. For example, Economical learning systems can be used with college students to help give the students hands on approach to see how buying and selling affects the economy. Such Games and applications help keep students attention and aid them in visually seeing the results and impacts in a lifelike manner. VR can be used to better educate individuals about other locations in the world or how something works by allowing them to gain first hand experience by immersing them into a situation or scenario that allows them to interact with a another person or a machine [13].

5. Games

The research on VR and gaming has increased rapidly, especially in enhancing interactivity and immersiveness which is very useful in order to perform virtual reality gaming [11]. Games offer entertainment such as Adventure, Competing Tasks, Specific Target, and other game elements. Serious gaming which consists of tasks that include specific knowledge can be attached to game modules. Additional information can be presented using messages, tutorials and experience like in real life [6]. The impression of interactivity and immersiveness in virtual reality gaming can be achieved by using good visualization and animation of characters. In addition, researchers have analysed human emotion through haptic devices [1].

6. Risks Associated with the use of Virtual Reality

A. Physical

Physical risks are present with the use of VR applications. The majority of these risks are minor side effects such as nausea and eye strain. For example flight simulations may leave the user feeling disoriented when walking. Similar to cell phones warnings, VR electronics can emit small amounts of radiation which contributes to biological breakdown and can lead to cancers. Flickering of the visual screen can cause eye strain but it can even cause seizures [10].

B. Psychological

Psychological impact can be profound because creating a Utopia type world may allow the user to become immersed and become dangerous. For example, a user who has a psychological disorder may become confused about reality and the virtual world. Addiction to VR could directly cause other forms of psychological disorder such as becoming aggressive as a result of playing aggressive games [10].

C. Social

Many people are connecting socially online, buying online, and creating communities online. Many worry that this will create a disconnect among people. To start with, some argues that VR gives the ability to manipulate a person's perception, their self control, and trust in a virtual level which raises the question of whether it is acceptable for this to continue. For example, some behaviour is not regarded as acceptable in the real world so why should it be acceptable in the virtual world. Some researchers suggest that the ethical guidelines should be re-designed to fit the VR spectrum, and bring into account individuals rights and respects [10].

Several crimes have been reported that occurred in the VR realm. For example, a Japanese lady "killed" her online "husband" she met while playing Maplestory. A 16year old boy in Tokyo defrauded people out of \$360,000 in an online game. In addition, cyber crimes such as online theft and identity theft have increased because of virtual reality [8].

One of the ethical concerns addressed when using VR to train surgeons, questions how technically advanced is the equipment used for the simulation.

7. Perception of College Students on Virtual Reality

When interviewing students regarding their perception of VR, their opinion is mainly affected by their knowledge about the subject. Their initial reaction was related, for example, to the movies that describe the use of VR. Few had any knowledge regarding the uses of VR outside the movie industry or gaming. When students were asked to discuss ethical issues related to the use of VR, they started to develop more systematic conclusions.

One student indicated that with regard to VR and healthcare, doctors should be the ones consulted. Another student indicated that it is "extremely smart to spend more money to advance VR" in the "scientific forefront" and those individuals who have concerns regarding technology and the use of VR should get past their concerns as VR can advance healthcare.

Others believe that similar to the non-virtual world, morally good people will act the same in both non-virtual and virtual world and immoral people will act the same in both worlds. One student is "not confident that the human race is responsible enough to have the power of that type of technology with customized virtual worlds at their disposal." Some students would like to have this technology used by the military, emergency, medical training and educational.

Students agree that virtual reality continues to grow and create opportunities that were never thought possible. Some

argue that virtual reality should be monitored by professionals but without full control from the government. This group argues that if users are being ethical and not breaking any laws, there is no need for total government control. One student indicated that there is a need for professional monitoring. Users should enjoy the benefits of virtual reality, but be careful regarding the information they provide to others.

Students understand that virtual societies are much like their real world counterparts, and how some actions that are acceptable in one may not be in the other. One student indicated that the decisions made in the virtual world may affect real life and world's influences may affect the virtual as well.

8. Conclusions

Advancement in VR had made it possible to provide cost effective, easy and reliable solutions to different agencies. It allows surgeons to get adequately trained to perform well in the real world operating room setting in a cost and time effective manner. It facilitates training emergency responders who face a variety of physically, emotionally, and mentally challenging situations. It provides educational games and environment to classroom students. It engages people in virtually based games and worlds. As the use of VR technologies evolve and increase, physical, psychological and social issues and risks have become part of the VR controversy. Physical risks may include nausea, eye strain, feeling disoriented and cancer. Psychological risks are highly associated with users that are already having psychological disorders; or it may increase aggressiveness. Finally, many are worried that being involved in cyber worlds may disconnect people who will loose the feeling of being actually connected to other people.

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