Virtual Reality, Realistically Speaking

Eric Lee

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Introduction

Over the past few years, there has been a growing surge in reality. Virtual reality (VR) or augmented reality (AR) has grown exponentially in popularity thanks to big companies like Oculus, owned by FaceBook, and Samsung bringing virtual reality headsets to the open global market. Recent advancement actually allows people to experience a simulation to a whole new world by simply covering their whole face through a headset. VR has been around for quite some time but the recent surge has everyone using it such as the medical and agriculture industry. Similar to all uprising technologies, there are costs and benefits associated with it. This paper will highlight the current use of the technology, limitations, social implications and health concerns, technological and ethical implications, and the future use of virtual reality and its simulations.

Current Use of Virtual Reality

Right now, virtual reality has largely been used for gaming and gaming related simulations. However, it has been appreciated well from doctors and surgeons in the medical field as they have used it to practice surgery and various operations. Even though the popularity of VR goes to gaming, it extends to other industries that use it to test various things. For example, in an article by Karkee, Steward, Kelkar, and Kemp, makers of agricultural and construction machines were tested through simulations which can ultimately save money and materials as it is more efficient to test beforehand rather than make the product and then test for anything defective afterward. Karkee et al. writes, “Detecting anomalies in the design prior to building physical prototypes and expensive testing leads to significant cost savings” (Karkee et al., 2011). They go on to say how they administered the study to which they created “several off-road vehicle dynamics models…as well as automatic guidance controller models and a

controller area network interface to embedded controllers and user input devices" (Karkee et al., 2011). This new simulation testing can really advance the machinery used agricultural and construction industry and possibly help upgrade the technology for future use. Also benefitting from the current use of VR is the medical field. Surgeons have been thrilled at how efficient and effective virtual reality is when it comes to the operating room. According to Palter and Grantcharov (2010), they believe entry level medical students can gain some realistic experience through simulations which are specifically designed to assess their skills levels with certain "levels of difficulty" without the need of a supervising, experienced surgeon. Fields where a hands on traditional approach such as medicine or areas where it is too hassling to build a machine up from scratch are using virtual reality simulations every day to help mitigate or learn from errors and mistakes to improve overall function and utilization.

Limitations to Virtual Reality

Many of VR's limitations come from the gaming world where large headsets are used to play games. It is a very tricky and awkward scene as the headset almost encapsulates the head with almost no space in front except between the eyes and the mini screen. Also, wires become almost haphazard as it has a limited range and the possibility of tripping and falling is very likely. However, it depends on the type of system to run the simulation and the necessary accessories to view it. With that being said, the technology has not seen a price that is relatively affordable yet. Palter and Grantcharov (2010) state, "Virtual-reality models have been criticized, however, for high initial cost of system acquisition, limited force-feedback with use of surgical instruments and lack of realism of graphics." Many companies are facing the cost-benefits analysis challenge to which there is a debate to how effective VR would be at a high cost. A recent magazine article by Rachel Metz (2016) noted the Oculus Rift costing five hundred

ninety-nine dollars while computers designed to run VR and its simulations may be somewhere north of a thousand dollars. It seems that companies would love to use these kinds of systems but may be very hesitant to the initial cost, training, and a potential replacement cost, if damaged. VR is a hefty investment considering not just the cost but also the people needing time and training to use it for the purpose of benefit to the company.

Social Implications and Health Concerns

Though there are not many implications as to the social aspects, there are many health concerns over the extended use of virtual reality. As stated previously, people using VR would need to wear a headset to view a simulation. Extended periods of simulation and augmentation have the potential to trigger what is called "Cybersickness" or "Simulation Sickness." Jon Van (1995) of the Chicago Tribune wrote an article about how a volunteer of a medical program tried drinking a soda after using a headset for a prolonged amount of time and failed to pour the liquid into her mouth. The attributed disorientation from the extensive program time resulted in her having soda in her eyes rather than her mouth. In addition to disorientation, nausea is another common result of long-term use. Metz (2016) adds nausea "…tends to happen when the visuals being presented to your brain don't match up with the motion your body is actually experiencing" and recommends it "…is best suited for experiences not much longer than 20 minutes." It seems as though a company investment may not be worthwhile as the health a person can be severely impacted through prolonged use. Another health effect may stem from a new Oculus Rift game called Wicked Paradise, which is playing itself off as an erotic adventure game. An article by Jordan Erica Webber details how dangerous this game can be by implementing sex into a game and the disruption it may cause in normal stimulation. She claims "some players may feel ill and carry on anyway, and end up feeling simultaneously sick and aroused enough times to produce

an adverse effect when aroused in future" (Webber, 2013). She basically explains the dissociation of arousal and how adversely bad it is in-game and outside of the game. The bottom line is that the mind can be corrupted or scrambled when VR is used for too long and the potential for companies to use VR may be deterred by the listed effects.

Technological and Ethical Implications

Though there is not a large discussion regarding the technological and ethical implications of virtual reality, there are a few minor points to be made. Technical concerns deal more with privacy rather than security. Carmigniani, Furht, Anisetti, Ceravolo, Damiani, & Ivkovic (2011) write that MIT currently has an application using facial recognition of real people and can scan faces to retrieve information about a random person. This feature may be highly unwanted similar to certain privacy controls of social media applications like location use and other types of unwanted access. Privacy is still an ongoing discussion in today's connected society as new forms of social media are introduced every year using different aspects of our identity. Not many virtual reality applications use facial recognition however addressing those operating in such a fashion is critical.

"However, with augmented reality, it will be very important for the developers to remember that AR aims at simplifying the user's life by enhancing, *augmenting* the user's senses, not interfering with them" (Carmigniani et al., 2011, p. 371). Reference to what they are mentioning can be portrayed in the previous section about Health Concerns and the similar problems arising from the Wicked Paradise game. Some people may not understand that it is meant to create an alternate experience rather than replacing one. Just like the Wicked Paradise game, sexual arousal from the game is not meant to substitute real arousal. Medical problems can arise from such beliefs and can result in the conditions listed previously.

Future Use

In the future, more support for virtual reality will hopefully be more present in terms of hardware and software support for Oculus and systems alike. Metz (2016) said "many folks probably won't be interested until the headsets are slimmed down further and can work untethered from bulky computers." Controllers and overall movement need a lot of work since it captures head movements well but not the rest of the body. Metz (2016) adds "there's still not all that much you can do with Rift: as of early June, there were just over 70 games, apps, and such available from the Oculus Store" but believes there is high potential for what it can do in the future in terms of gaming. Besides gaming, there is the potential to assist the disabled using VR. A good portion of the population in the United States is disabled and could greatly benefit from this technology. Carmigniani et. al adds, "…AR could be used as a sense substitution device. Hearing-impaired users could receive visual cues informing them of missed audio signals and sightless users could receive audio cues notifying them of unknown visual events" (Carmigniani et. al, 2011, p. 371). The potential is still great to use in other fields but until then necessary adjustments in VR will need to be made in order to provide efficiency and accurate data.

Summary

Virtual reality can be highly beneficial however it has its own drawbacks and cost benefits side to it. Currently, VR is quite costly and the market has not seen a very affordable price decrease yet. Minor problems lie within privacy concerns and a user's perception of how to use a VR device. Prolonged use of virtual reality has been reported to have unhealthy side effects such as disorientation, changes in perception, and changes in stimulation. Room for improvements and upgrades to the technology are needed and will hopefully be fixed in the near future.

References

Carmigniani, J., Furht, B., Anisetti, M., Ceravolo, P., Damiani, E., & Ivkovic, M. (2011). Augmented reality technologies, systems and applications. *Multimedia Tools and Applications, 51*(1), 341-377. http://dx.doi.org/10.1007/s11042-010-0660-6

I decided to use the article referenced thanks to one of my peers who recommended it upon doing her own minor research on my topic. It talks about the "current applications" of VR and the survey that was conducted. Similar to the article by Karkee, Steward, Kelkar, and Kemp, it is roughly 5 years old. Most publications regarding virtual reality are still relevant today, even those twenty years old. I think the article is a good source as it evaluates current and future aspects of VR.

Karkee, M., Steward, B. L., Kelkar, A. G., & Kemp, Z. T. (2011). Modeling and real-time simulation architectures for virtual prototyping of off-road vehicles. *Virtual Reality, 15*(1), 83-96. http://dx.doi.org/10.1007/s10055-009-0150-1

I found this article somewhat useful in two areas. It explains how well virtual reality helps with pre-production and simulation of machinery which ultimately saves money. The other thing is that VR is spreading to the manufacturing and construction industries. The publication is five years old but it definitely holds relevance. Authors hold credibility from the sources they cited and the publication of this article was in a journal dedicated to VR.

Metz, R. (2016). Oculus rift is too cool to ignore. *Technology Review, 119*, 104-107. Retrieved from http://search.proquest.com/docview/1810080446?accountid=14541

I found the Oculus article very interesting as it unraveled everything there is to know about the company and VR. The opening paragraphs describing a simulation of the

Apollo 11 mission which was highly intriguing. The author also mentions the various other simulations available through the Oculus store and a thorough evaluation of what Oculus can improve. Metz's magazine article is very recent publication and definitely brings in current information into my paper. This covers many aspects and headings of my paper making it very useful.

Palter, V. N., M.D., & Grantcharov, Teodor P,M.D., PhD. (2010). Simulation in surgical education. *Canadian Medical Association.Journal*, *182*(11), 1191-6. Retrieved from http://search.proquest.com/docview/746782467?accountid=14541

The "Simulation in surgical education" article is a highly beneficial article as it was a very good match for what I was searching. It talks about both simulation using virtual reality and surgical education which directly gave me great information and was straight to the point. In the article, it mentioned how they were testing the technology on the lowest level- residents with very limited to no experience. I think the results they found correlate well into my paper and show how effective they are. This article is somewhat old however it carries much significance through the years.

Van, J. (1995). Actual Side Effects From Virtual Reality. Retrieved September 16, 2016, from http://articles.chicagotribune.com/1995-08-14/business/9508140011_1_cybersickness-psychologist-with-essex-corp-virtual-reality

I thought that Van's article was beneficial in talking about the side effects or health problems related to VR. I did not really find anything that had social, ethical, or legal implications so I decided to use this article as a basis for a "health concerns" section. The article highlights numerous side effects of using VR for an extended period of time. I think that it helps reiterate the conversation of how healthy certain technology is for us

and how much we should utilize it. Van published his writing almost twenty years ago however, as stated previously, it is applicable to today's society as well as my paper.

Webber, J. E. (2013). The Dangers of Virtual Reality Erotica - IGN. Retrieved September 16, 2016, from http://www.ign.com/articles/2013/12/16/the-dangers-of-virtual-reality-erotica

VR, as stated previously, has spread to many different industries, like the sex industry. Webber's article is about that but in the context of how people who use it can develop "Simulator Sickness." I found the "Sickness" useful for one of the sections about health in my paper. The author does hold credibility as she uses experts to help explain the health problems associated. This article is similar to Van's article though much more recent.