Sketch book 2

Weghorst, S., Seibel, E., Oppenheimer, P., Hoffman, H., Schowengerdt, B., & Furness, T. A. (2008). Medical interface research at the HIT lab.*Virtual Reality, 12*(4), 201-214. doi:http://dx.doi.org/10.1007/s10055-008-0107-9

Weghorst et al. (2018)

Weghorst et al. (2018)

People with Parkinson’s disease can acquire Akinesia which means their steps become small and shuffled and patients with akinesia will experience difficulty moving across doorways or in narrow hallways. Kinesia paradox is a treatment for Akinesia in which perpendicular lines are placed in front of the patient at equal intervals. These lines help the patient walk normally. The HIT lab has used augmented reality googles to produce these lines in the patients vision so they can walk normally in public.

People with poor vision that can’t be corrected as glasses are categorized as having “low vision.” A wearable low vision aid, using augmented reality principles, was invented to detect and notify the user of obstacles in their path. The user is notified by having a virtual image of the obstacles projected onto their retina.

Did an experiment to see if virtual reality could be used to cure the fear of spiders. Spider phobic participants were exposed to virtual spider for four one-hour sessions. After, participants filled out a questionnaire, researchers then measured how close they were willing to get to a real spider, and a doctor rated their fear. The results showed that 83% of the participants showed significant improvements.

They also used virtual reality to help those with post-traumatic stress disorder. Those traumatized by the world trade center attack on September 11, were exposed to a virtual rendition of that event. The researcher found this treatment to be successful.

They also used virtual reality to reduce pain during painful burn treatments. Those undergoing the painful procedure were put in a virtual snow world where they could shoot snowballs and snowmen. Participants and MRI scans showed a significant increase in pain tolerance.

Suzuki and Hattori (2008)

Suzuki, N., & Hattori, A. (2008). The road to surgical simulation and surgical navigation.*Virtual Reality, 12*(4), 281-291. doi:http://dx.doi.org.erl.lib.byu.edu/10.1007/s10055-008-0103-0

Researchers created a virtual soft tissue organ that would provide force and tactile feedback in response to touching the virtual organ. This provides a realistic way for surgeons to push, grasp, and preform incisions and resections on the virtual organ. The program is also able to assess the performance of the surgeon.

Researchers liked the idea of a surgeon using robots to perform a surgery many miles from the patient. This technology was not been invented at that time but researcher thought the first step towards this would be to give surgeons three-dimensional imagery of the internal organs. They accomplished this by using endoscopic robots that were able to render three-dimensional models or the organ they were inserted into.

Liang, W. Y., & O’Grady, P. (2003). The internet and medical collaboration using virtual reality. *Computerized Medical Imaging & Graphics*, *27*(6), 525. <https://doi.org/10.1016/S0895-6111(03)00042-9>

Liang and Grady (2003) argues that three-dimensional models received from radiologists should be able to be explored and interacted with to make fast accurate diagnosis. There also would be great advantages if this model could be used remotely by doctors for consulting purposes. This should be possible according to their research on current virtual reality technology.

Liang and Grady (2003) have come up with mathematical algorithms to demonstrate how medical data of organs can be used to reproduce three-dimensional images on the internet. The algorithms first focuses on calculating object boundaries of two-dimensional segmentations then uses those to calculate the three-dimensional segmentations. The following formula is used to remove any noise in the pixel values.



This is the general explanation of the equations but added equations can be found in Liang and Grady (2003)’s article. Liang and Grady (2003) state that their formalism provides the steps to creating a virtual, internet based, three-dimensional world for doctors to collaborate in.

Djukic, Mandic and Filipovic (2013) – Djukic et al. (2013)

Djukic, T., Mandic, V., & Filipovic, N. (2013). Virtual reality aided visualization of fluid flow simulations with application in medical education and diagnostics.*Computers in Biology and Medicine, 43*(12), 2046-52. doi:http://dx.doi.org/10.1016/j.compbiomed.2013.10.004

Djukic et al. (2013) believes the current education model can be drastically improved by virtual reality technologies.

Djukic et al. (2013) believes virtual reality has the potential to allow medical student to perform treatments to virtual patients with not risk of harm to patient or equipment. Virtual reality is also able to produce rare operations that the normal student or trainee would probably not experience. They have also observed powerful virtual reality technologies in recent years to become inexpensive. These capabilities would also decrease medical training costs and times.

Djukic et al. (2013) have found the medical personnel prefer using two-dimensional cross sections over a three-dimensional image on a screen. So they have used virtual reality to display these three-dimensional models to see if medical personnel would find the virtual model useful. They also added fluid flow simulation to show medical experts stresses on artery walls. Their hope is that the virtual model will provide experts a quicker and more accurate way of diagnosing issues related to the virtual model.

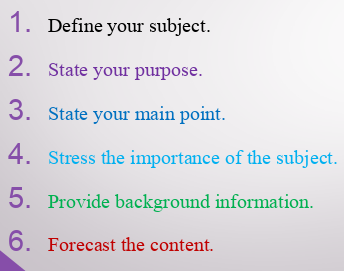
Djukic et al. (2013) designed the program so that it could be run on any modern computer.

Djukic et al. (2013) medical personnel are able to move, rotate and scale the three-dimensional images in order to find anomalies in tissues or organs. In order to give personnel a more immersive experience, the 5DT DataGlove was used to allow the user to easily manipulate the model.

Djukic et al. (2013) states that virtual models can easily be changed to represent other things like organs and tumors.

Djukic et al. (2013) conducted no experiment but concluded that their system along with other virtual reality systems could advance the medical world. By reducing education cost, improving diagnostics, and surgical operation planning.

Introduction:



This review covers what work has been done with virtual reality to improve medical education and medical practice. This review provides researchers with a quick summary of the many uses and effectiveness that virtual reality provides. Effective uses have been found in teaching anatomy, emergency medical training, medical device assembly training, surgical training, and therapy sessions, helping the handicapped, pain reduction and surgery. This summary of information can help medical schools, hospitals, research labs and clinics know how to make advancements in their fields with virtual reality. Zajtchuk and Satava (1997) claimed more than 20 years ago that Virtual reality is being used to enhance medicine in many ways. Virtual reality technology has advanced in the last 20 years by using stronger computers and algorithms to produce realistic imagery and haptic sensory. This article will first cover the many ways virtual reality is being used in education and its effectiveness. Then it will go over how it is being used in medical practice and its effectiveness. It will then conclude by comparing the general advantages of virtual reality found by each article in this review.