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SPS_COM110
Final Project

The Impact of Virtual and Augmented Realities on Our Daily Lives

Table of Contents

Introduction

The research question aims at understanding how AR technology has improved communication and provision of instant feedback in various aspects of life such as healthcare and online shopping. The VR has added a unique information layer that augments the physical environment with physical cyber information. In such a way, human beings can interact and communicate with items or products in the virtual environment in real time. Answering the above questions will shade lighter or illustrate course themes such as internet communications and engagement in a virtual environment. The central idea from the course for the research include the impact of technology advancement on daily communication and human interaction. Virtual Reality (VR) technology is described as the artificial recreation or simulation of real-life situations and the environment by the computer. Virtual Reality (VR) technology is described as the artificial recreation or simulation of real-life situations and the environment by the computer. In simple terms, AR integrates the virtual data or information with the real-world environment to enhance a specific reality[1] (White, Shmidt, & Golparvar-Fard, 2014). By connecting the physical world with the virtual environment, VR immerses individuals by making them experience the simulated reality, mainly through simulating the user's hearing and vision[2] (Hilken, Ruyter, Chylinski, Mahr, & Keeling, 2017). The technology layers the enhancements generated by the computer over the current reality to enhance its meaning. This is achieved through the interactivity capability that enables VR applications to blend digital parts in a real scenario.

How Virtual and Augmented Reality is Transforming the Online Shopping and Retailing
By Rickardo Henry

Introduction

. The reason for the adoption of the technologies is the ability to enhance, personalize, and customize the experience of users. In other words, the technologies offer sufficient information regarding the product to enable users to evaluate the features and make buying decisions with increased certainty (White, Shmidt, & Golparvar-Fard, 2014).

Current Trends of AR and VR in Retailing

In online retailing, the integration of the virtual information and the real environment leads to the formation of a specific reality that offers meaningful experience during the process

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[1] White, J., Shmidt, D., & Golparvar-Fard, M. (2014). Applications of Augmented Reality. *Proceedings of the IEEE, 102*(2), 120-125

[2] Hilken, T., Ruyter, K., Chylinski, M., Mahr, D., & Keeling, D. (2017). Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences. *J. of the Acad. Mark. Sci.*, 1-23.

of online purchasing[3] (Tony, B, & Baspin, 2017). In this aspect, the AR produces sufficient information about the product to be purchased making it more certain to carry out the real purchasing. VR and AR technologies are rapidly transforming both online and physical retailing with customers demanding real-time interactivity with the products. Companies which will continue to adopt these technologies will improve their competitive advantage. According to market statistics provided by the Retail Perception study, 40 percent of purchasers are willing to pay extra for an item offered through AR, 61 percent prefer buying from retails that have AR interactivity, and 71 percent will purchase more often from retailers with AR technologies (Fig. 1 below). For the enterprises, "the data implies that they should start offering more collaborating, customized, interactive, and personalized purchasing experience through e-commerce platforms to lower the uncertainty of clients, boost operating margins, and fulfill the unique preferences of technological savvy customers"[4] (Dongre, Dube , & Patil , 2016). A number of firms which have integrated VR in their online platforms have established a competitive advantage and enjoy sales increase.

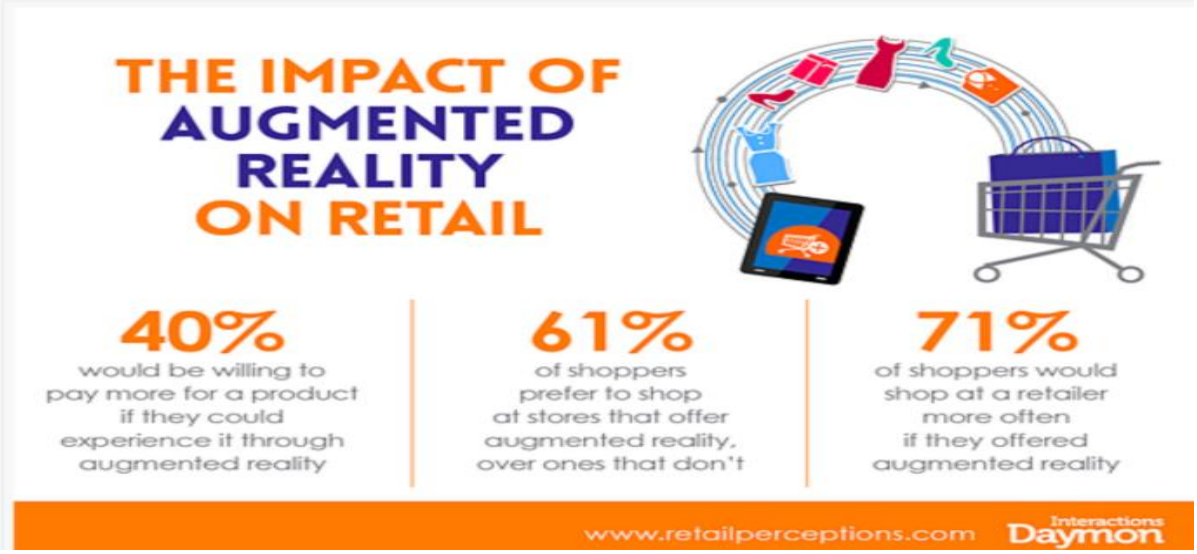

Figure 1: The projected impact of AR on retailers

Source: https://digitalmarketinginstitute.com/blog/2017-11-21-how-augmented-reality-is-transforming-retail

[3] Tony, T., B, M., & Baspin, R. M. (2017). Shopping application using Augmented Reality. *Imperial Journal of Interdisciplinary Research, 3*(3), 643-644. Retrieved from https://www.onlinejournal.in/IJIRV3I3/104.pdf

[4] Dongre, S., Dube, S., & Patil, P. (2016). Home Decor Shopping Using Augmented Reality. *International Journal of Computer Science and Engineering (IJCSE, 6*(2), 15-22.

Application of AR in Online Shopping

AR is described as disruptive technologies which facilitate communication across the world through the use of Head Mounted Displays (HMD) such as Samsung GearVR, HTC Vive, and Oculus Rift. With rapid technological advancements, retailers are differentiating their services to engage clients in a more effective way[5] (Tony, B, & Baspin, 2017). The firms are establishing a robust online presence to offer pleasing and convenient shopping experience. Despite the existence of mobile devices to enhance online shopping, these tools depict different problems such as mobile frictions brought about by slow loading times and smaller screens. The mobile friction hitch occurs mostly when the client is comparing products and searching for description information. However, VR is solving such problems by introducing product visualization as well as engaging the clients during the process of making shopping decisions. Customers are able to spend a substantial amount of time configuring and visualizing the products in their real existence. This reduces the buying uncertainty because the interaction eliminates possible doubts relating to the products descriptions and appearance[6] (Alkhamisi & Monowar, 2013). For the retailer, the AR technologies are offering immersive brand experiences, innovative product involvement, and interactive marketing propositions.

Virtual Reality is enabling customers to try various products on retail platforms without making a physical visit to the stores. This happens in different stages. First, the customer captures the reality to be augmented through the use of cameras and head-mounted display devices. Secondly, the VR application scans the captured reality to establish and describe the exact position to embed the virtual content. At this point, the location or position is identified by markers such as visual tags or tracking tools such as laser, infrared, sensors, and GPS. In the third phase, the VR application processes the scene to identify the exact position and request virtual content that corresponds to the physical information from different databases such as the internet. Lastly, the AR visualizes the scene by producing a mixture of images features both the virtual content and real space. The combination of the two offers the greater experience of the real products and the imagined world. For instance, a client can try a new shirt or dress to see how they fit on them while the other one might order a set of furniture and establish suitable space to place the equipment in their houses[7] (Dongre, Dube , & Patil , 2016)(Fig. 2 below).

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[5] Tony, T., B, M., & Baspin, R. M. (2017). Shopping application using Augmented Reality. *Imperial Journal of Interdisciplinarr Research, 3*(3), 643-644. Retrieved from https://www.onlinejournal.in/IJIRV3I3/104.pdf

[6] Alkhamisi, A. O., & Monowar, M. M. (2013). Rise of Augmented Reality: Current and future application areas. *International Journal of Internet and Distributed Systems, 1*, 25-34.

[7] Dongre, S., Dube, S., & Patil, P. (2016). Home Decor Shopping Using Augmented Reality. *International Journal of Computer Science and Engineering (IJCSE, 6*(2), 15-22.

bedded Video on Application of AR in Online Shopping

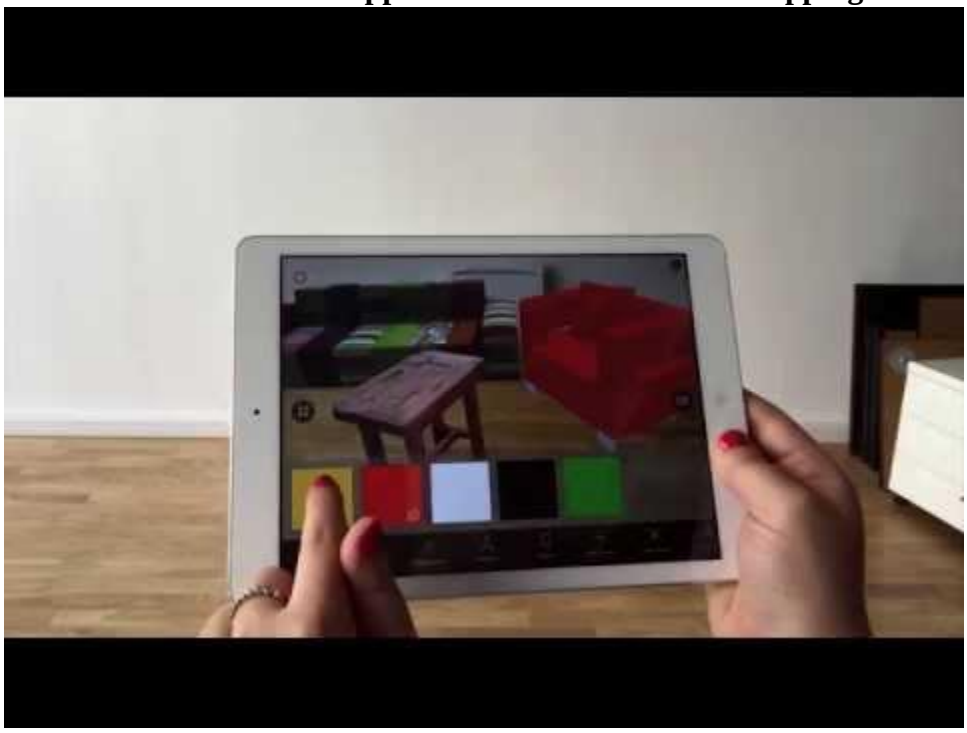

Figure 2: How VR work

Source: https://www.youtube.com/watch?v=lzBGuHNTdkU

Augmented Reality is used to develop and deliver products to the customers through the 3D approach where they can visualize all features from each and every angle[8] (Hilken, Ruyter, Chylinski, Mahr, & Keeling, 2017). For the online customer, AR has increased the level of product interactivity and purchasing experience. Interactivity is described as the degree to which the purchaser can take part in modifying both the content and form of the product in a mediated location in real time. The interaction level offered by AR entertains the clients and thus enabling them to personalize the product data in a three-dimensional virtual model. In fact, consumer enjoys when they interact with the virtual products compared when looking or handling the physical goods. As a result, the users will be more satisfied and willing to make more purchase. In addition, the VR enhances the user experience by enabling the customers to feel the product, understand how it works well, and view how it will fulfill their needs. During these processes,

[8] Hilken, T., Ruyter, K., Chylinski, M., Mahr, D., & Keeling, D. (2017). Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences. *J. of the Acad. Mark. Sci.*, 1-23.

VR is able to gather and personalize the private and sensitive information of the customers[9] (Hilken, Ruyter, Chylinski, Mahr, & Keeling, 2017). This makes them be more motivated in making online purchasing decisions.

Figure 3: AR Dressing Room

Author: Intel Free Press

Source: https://www.flickr.com/photos/intelfreepress/8656830324/in/photolist

Retailers Currently Using VR and AR Technologies

Home Décor, a furniture company uses the VR technology. Customers doing online purchasing have the ability to visualize how different types of furniture will fit their rooms and the resulting appearance[10] (Dongre, Dube, & Patil, 2016).

Ikea, a furniture company, experienced a significant growth in online sales after adopting the VR technology. The Apple's iOS11 ARKit, an AR application, enables IKEA's customers to virtually placed the preferred furniture in their houses and view how they match the existing

[9] Hilken, T., Ruyter, K., Chylinski, M., Mahr, D., & Keeling, D. (2017). Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences. *J. of the Acad. Mark. Sci.*, 1-23.

[10] Dongre, S., Dube, S., & Patil, P. (2016). Home Decor Shopping Using Augmented Reality. *International Journal of Computer Science and Engineering (IJCSE*, *6*(2), 15-22.

decorations in the room. With this application, customers are inspired to try different types of furniture with varying colors and styles in a real-life environment.

The American Apparel offers the AR functionality to its customers. In this case, clients are able to view how clothes can look in various colors and match with other outfits. Besides, customers can easily place orders on the preferred fashions as well as the gift the products to families or friends.

Top Shop, a fashion retailer, has established an AR dressing room through the use of Microsoft's Kinect Technology. With this technology, customers can virtually view how various clothes fit them without changing the apparels physically.

Sephoram, a cosmetic brand, adopted the ARKit in 2016. Through this kit, costumes are able to see how various cosmetic products fit their appearance before they make a purchase. In addition, the clients are able to receive comments from friends on which products are the best through the ARKit.

Challenges of Adopting AR and AR in Retailing

Despite the increasing deployment of these technologies, retailers are faced with a number of challenges. First, most costumes are not fully familiarized to wearing the AR devices[11] (Mekni & Lemieux, 2014). VR, on the other hand, is mostly used for gaming purposes. Secondly, the retailers are faced with the challenge of applying these technologies in both online and brick and mortar stores. For instance, deploying the VR technologies in the stores involves interacting with clients either through the windows of the retail or within the real walls of the traditional buying environment, that is, dressing rooms for clothing enterprises and sales floor for furniture firms. On the other hand, the off-shore of online application of AR will require costumes to engage with the enterprise virtually from their homes or other physical locations. For example, firms that operate exclusively through online platforms will have to open a three dimension (3D) channel to enhance client interaction with the products stored[12] (Mekni & Lemieux, 2014).

How VR is Improving the Healthcare Sector by Susan Campbell

[11] Mekni, M., & Lemieux, A. (2014). Augmented Reality: Applications, challenges, and future trends. *Applied Computational Science*, 205-215. Retrieved from http://www.wseas.us/elibrary/conferences/2014/Malaysia/ACACOS/ACACOS-29.pdf

[12] Mekni, M., & Lemieux, A. (2014). Augmented Reality: Applications, challenges, and future trends. *Applied Computational Science*, 205-215. Retrieved from http://www.wseas.us/elibrary/conferences/2014/Malaysia/ACACOS/ACACOS-29.pdf

Introduction

Although virtual reality (VR) technology has been around for many years, it has become more accessible, especially in healthcare, in improving the quality of care an individual receives in our society. With more people learning how this technology works, and improvements of the VR applications and devices, such as head-mounted display (HMD) headsets, simulators, and manipulation/navigation devices, makes this technology a more valuable tool to use in the virtual environment. Physicians, medical students, and other healthcare professionals are using VR to acquire new skills and techniques, as well as diagnosing, phobia treatment, robotic surgery, and surgery simulation[13] (Li et al., 2017). Patients are using it to improve their physical, neurological and cognitive deficits. This tool has become efficient and engaging to its users, and is becoming more cost-effective; consequently, it is impacting many areas in the healthcare sector. As health professionals develop new life-saving techniques, improve rehabilitation by motivating patients, and reduce a patient's anxiety disorders and pain, more clinicians will have patients use this technology, which may help save lives in the future as this technology advances.

VR Applications and Devices

Virtual Reality is a term used to describe three-dimensional (3D) computer-generated environments that replace the normal reality in which our everyday lives play out[14] (Metalife, 2018). VR headsets or goggles are wearable devices (google glass) that are used to experience the VR environment, such as Oculus VR or HTC Vive and Google Cardboard[15] (Riva, & Wiederhold, 2015). These types of headsets are used in the healthcare industry to train new and experienced surgeons. Computer-based simulators are also used to educate surgeons. In VR simulations, the computer display simulates the physical world and user interactions are via the computer within that simulated virtual world[16] (Guze, 2015). Therefore, the purpose of the simulation is to imitate real patients, anatomic regions, or clinical tasks, and/or mirror real-life situations[17] (Liu, Tendick, Cleary, & Kaufmann, 2003). With these applications and devices, they are helping to make complicated concepts and tasks easier to understand and execute.

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[13] Li, L., Yu, F., Shi, D., Shi, J., Tian, Z., Yang, J., Jiang, Q. (2017). Application of virtual Reality technology in clinical medicine. *American Journal of Translational Research, 9(9), 3867– 3880.* Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5622235/

[16] Guze, P. A. (2015). Using Technology to Meet the Challenges of Medical Education. Transactions of the American Clinical and Climatological Association, 126, 260–270. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/26330687

[17] Liu, Alan & Tendick, Frank & Cleary, Kevin & Kaufmann, Christoph. (2003). *A Survey of Surgical Simulation: Applications, Technology, and Education. Presence. 1*2. 599

Embedded Video Player: 3D and VR Medical Education

Figure 4: 3D and VR Medical Education
User: n/a - Added: 7/21/17

YouTube URL**:** http://www.youtube.com/watch?v=EyEnbbfGFDU

VR in Medical Education and Training

There are many challenges in the medical field, one of which is training students to perform surgeries safely and effectively. Using VR for medical education and training, with the help of MRI, CT scans, and X-rays, the image produces high-resolution 3D images. Students can work on a virtual model created from these images to venture inside organs, for example, and identify potential difficulties that could be encountered in real-life situations and plan how these could be avoided during an actual surgical procedure.

VR simulator is a tool used to show real-world procedures and scenarios that are impossible or extremely expensive to re-create in the real world. Surgical procedures performed in the operating room the conventional way have shown to be inefficient, time-consuming, and potentially risky for patients; consequently, a greater chance to cause injury, damage tissue or failure to proceed with surgery[18] (Li et al., 2017). Depending on the procedure, VR simulators can be useful to expand specific surgical skills. Lap Mentor (3-D System, USA) is one tool that uses a simulated interactive environment for training to help perfect these skills and minimize

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614. 10.1162/105474603322955905. Retrieved from https://www.researchgate.net/publication/220090180_A_Survey_of_Surgical_Simulation_Applications_Technology_and_Education

[18] Li, L., Yu, F., Shi, D., Shi, J., Tian, Z., Yang, J., Jiang, Q. (2017). Application of virtual Reality technology in clinical medicine. *American Journal of Translational Research, 9(9), 3867– 3880.* Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5622235/

risk. Computer-generated images for 3D visualization can help guide surgeons to determine the safest and most efficient way to "locate tumors, place surgical incisions or practice difficult procedures ahead of time"[19] (Liu, Tendick, Cleary, & Kaufmann, 2003). Moreover, this offers a safe and less risky training environment not only for the students but for new and experienced doctors. VR medical education can be further explored by visualizing 3D models of the heart, brain, and skull, which can help them understand important physiological principles and/or anastomotic variants (see above video). Showing real-world footage in a 3D environment can help students learn and feel more engaged; more importantly, it may innovative thinking of with new ways to use this technology.

Embedded Video Player: VR's Healthcare Revolution: Transforming Medical Training at CHLA

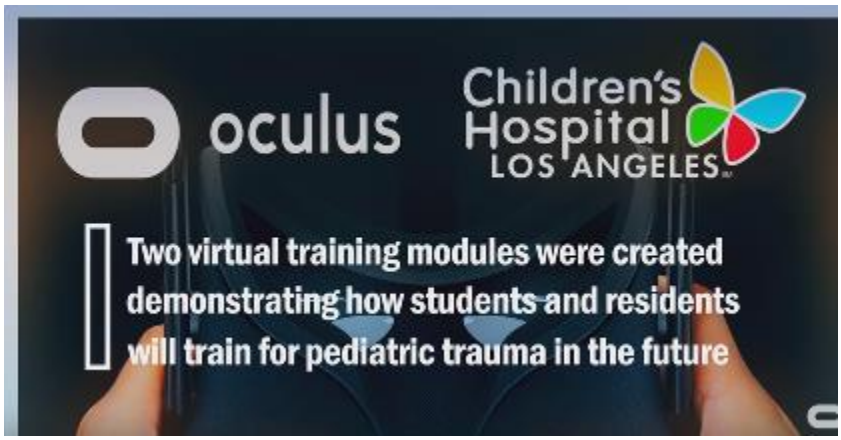

Figure 5: VR's Healthcare Revolution: Transforming Medical Training at CHLA
User: n/a - Added: 7/7/17

YouTube URL**:** http://www.youtube.com/watch?v=4om8g0u9a4M

VR used for treating patients

Going beyond the usefulness of VR in surgery, VR is also important for the treatment of many other conditions. For instance, there are VR many tools to treat someone who requires physical therapy after having a stroke, brain injury or a surgical procedure. In addition, the VR experience can have possibility help someone learn how to manage a problematic situation related to his/her

[19] Liu, Alan & Tendick, Frank & Cleary, Kevin & Kaufmann, Christoph. (2003). *A Survey of Surgical Simulation: Applications, Technology, and Education. Presence. 12*. 599 614. 10.1162/105474603322955905. Retrieved from https://www.researchgate.net/publication/220090180_A_Survey_of_Surgical_Simulation_Applications_Technology_and_Education

disturbance, such as a phobia, anxiety, and/or pain[20] (Riva, & Wiederhold, 2015). Furthermore, VR is changing how patients interact with this technology. It is also becoming a cost-effective, engaging tool for medical interventions, such as behavioral and mental health issues.

Smartphones and wearable devices can be used by the patient and continuously assessed in both the virtual and real world by tracking their behavioral and emotional status in the context of challenging tasks. Feedback can be provided to improve both the initial evaluation as well as they are coping[21] (Riva, & Wiederhold, 2015). VR headsets can help to reduce a patient's fear and pain via immersion into a peaceful virtual world that takes the focus off their discomfort, which associated with their medical problems and/or treatments. Burn patients can also benefit from VR technology. According to Hoffman, a 3D virtual world game called, "SnowWorld" has helped to distract burn patients from excessive pain during wound care. Also, people with spider phobias, for example, may get over their fear just by physically touching a virtual spider.

Treating Mental illness with Virtual Reality by Ambra Thomas

Introduction

Mental illness is very common and affects thousands of people around the world. Mental illness can be defined as "Medical condition that disrupts a person's thinking, feeling, mood, ability to relate to others and daily functioning. Serious mental illnesses include major depression, schizophrenia, bipolar disorder, post-traumatic stress disorder and borderline personality disorder" (National Alliance on Mental illness). Also according to the National Alliance, one in five adults experience some type of mental health problem each year. There are millions suffering from mental illness which affects major areas of their lives. However, many people are getting treated by virtual reality. It is especially used to treat mental and behavior problems. Virtual reality offers a realistic and powerful way to activate real-life situations in mental health issues. Virtual reality (VR) is a convenient gadget that makes mental health treatment accessible to all. Although VR is known for gaming, it has many benefits for the healthcare, especially mental health.

Treatment of Mental Illness Using VR

In the article *Why virtual reality could be a mental health, gamechanger* Virtual reality has the ability to create powerful simulations of scenarios flying, for example, or the shocking events that often lie behind PTSD — can be conjured at the click of a mouse. The in-situ coaching that's so effective for so many disorders can now be delivered in the consulting room, with the simulations graded in difficulty and repeated as often as necessary. Virtual Reality has great advantages for mental illness. According to the UCLA although it is computer-generated our brains react differently to virtual reality than they do to real-world environments.

Virtual reality is being used to treat people with posttraumatic stress disorder (PTSD), specifically people who have experienced combat trauma. Virtual reality enables the person to experience the situation in a safe and supervised way. The controlled computer-generated environment is modified to look like the traumatic memory. The traumatic memory helps the person revisit so they can reduce anxiety during the process. Skipp Rizzo, associate director for medical virtual reality has been working with the U.S. Army on ways to use Virtual Reality (VR) to treat soldiers' Post-Traumatic Stress Disorder for over a decade. His system, "Bravemind,", recreates the war zone, like Iraq, to activate "extinction learning" which can deactivate a deep-seated "flight or fight response," relieving fear and anxiety. “Bravemind” is a treatment made to relieve PTSD symptoms, it was also mentioned in this article that The Army as found “Bravemind” can also help treat other traumas like sexual assault. “Bravemind” is operated based on the person’s needs, modified by certain types of questions and played back and forth, slow or fast, or the frame can be frozen.

Embedded Video Player: Treating PTSD With Virtual Reality Therapy: A Way to Heal Trauma

Figure 6: Treating PTSD With Virtual Reality Therapy: A Way to Heal Trauma
User: n/a - Added**:** 10/1/16

YouTube URL**:** http://www.youtube.com/watch?v=QCCWH_CNjM0

Treating phobias and anxiety disorder using virtual reality

Like PTSD, Virtual reality has been used to treat phobias and anxiety disorders. Anxiety disorder is the most common mental illness in the U.S., affecting 40 million adults in the United States. People with anxiety disorders are more likely to visit a doctor or hospitalized for the psychiatric disorder than people who have an anxiety disorder. Specific phobia affects about 19 million individuals in the U.S., According to research done by meta-analysis virtual reality exposure therapy (VRET) in total, 14 clinical trials on specific phobias have revealed patients who experience VRET did significantly better on behavioral assessment following treatment than before treatment, with an aggregated uncontrolled effect. Furthermore, the results of the behavioral assessment have shown a remarkable difference between the VRET and the exposure. Virtual Better Inc., is also another software company which has been creating virtual tools for over 20 years. It provides high-quality clinical services to help children adolescents and families,

adults experiencing difficulties in their lives, and assessments and treatments of all Anxiety Disorders. Like fear of flying, alcohol and tobacco, fear of heights (bridges 7 elevators), fear of public speaking, fear of storms, and brave mind (virtual Iraq & Afghanistan).

Embedded Video Player: VR exposure therapy: Fear of Flight

Figure 7: VR exposure therapy: Fear of Flight
User: n/a - Added: 10/11/17

YouTube URL: http://www.youtube.com/watch?v=lB8ohVOmcRs

Conclusion

In conclusion, the VR and AR technologies are continuing to0 revolutionize the traditional physical stores (brick and mortar) by integrating the physical environments with virtual online reality. The aim of this augmentation is to increase customer interactions and provide online shoppers with high levels of experiential benefits. AR is offering customers with easy access to enriched information regarding the product in terms of design, functioning, and operations. Through VR applications and related technologies, both the physical and online retailers are taking a more interactive shape where consumers are able to interact with products and visualize them in a real way The ability to view the product information and interact with them in a virtual environment increases the purchase certainty, customer satisfaction, and boosts shopping experience. In general, people are highly motivated to shop using the VR and AR technologies. The three dimensional (3D) visualization of the product and the immersed engagement facilitates a more customized and personalized shopping experience. Online shoppers are left with no doubt during purchasing because VR encourages them to spend significant time configuring and visualizing the preferred item in a real-world perspective. In the health sector, VR simulator used to indicate the real-world procedures and scenarios that are impossible or extremely expensive to re-create in the real world. VR has transformed the conventional surgical procedures performed in the operating room. Such traditional approaches are inefficient, time-consuming, and potentially risky for patients. As a result, they pose greater chances of causing injury, damage to tissue or failure to proceed with surgery. In addition, VR and AR are being used in treating mental illness and carrying out therapy treatments.