

The Impact of Virtual Reality Technology on Our Lives: A Summary of the Present and Future Uses and Restriction

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1. Abstract:

Although virtual reality (VR) was first promoted for gaming, there are other current and potential uses for VR in a variety of industries and domains, such as training, education, simulations, and even fitness and medical care. Regretfully, general knowledge of the advantages and disadvantages of VR as a technology across a range of application sectors is still lacking. Thus, the purpose of this study of the literature is to add to the body of knowledge on virtual reality technology, its practical uses, and some of its current limitations. Important VR applications from a variety of industries, including engineering, entertainment, education, and medical, were examined in terms of how they are being used now or may be used in the future. Overall, this literature review shows how virtual reality technology has the potential to be a greatly beneficial tool in a multitude of applications and a wide variety of fields. VR as a technology is still in its early stages, but more people are becoming interested in it and are optimistic about seeing what kind of changes VR can make in their everyday lives.

Keywords: Virtual reality (VR), simulation, immersive and non-immersive, applications, training, education, games, healthcare, and entertainment.

2. Introduction:

Purpose of this study of the literature is to add to the body of knowledge regarding the uses of virtual reality (VR), its potential future applications, and some of its advantages and disadvantages. A computer that can project 3D information onto a display such as a head-mounted display (HMD) or a standalone screen and user identification sensors is usually required to access virtual reality (VR), which is a computer-generated, three-dimensional virtual environment that users can interact with. The two primary categories of virtual reality are immersive and non-immersive. Non-immersive VR displays virtual information on a number of screens encircling the user. Driving is an unusual illustration of this. Driving or flight simulators are an unusual form of this, where the user sits in a chair with several screens surrounding them, simulating being in the driver's seat or cockpit without being completely submerged. Immersive VR is the process of allowing users to experience 360 degrees of the virtual world by tracking their movements using a wearable display, such as an HMD, and presenting the VR information according to their position. One of the most marketable features of VR technology is this immersive experience, which is what most people associate with it.

Augmented reality (AR) sits in between immersive and non-immersive virtual reality. Stores that offer a virtual fitting program so that

customers may "try on" clothing are just one example of how augmented reality (AR) uses computer-generated visuals superimposed on real-world physical items. By fusing AR and VR, mixed reality (XR) enables users to be somewhat grounded in reality while simultaneously immersing themselves in a virtual world, symbolizing the spectrum between the actual and virtual worlds. Morton's invention of the Telesphere Mask and the Sensorama in the 1960s marked the introduction of the VR concept. The original technologies were designed to give the viewer the impression that they are a part of the film by immersing them in the surrounding visual display. Ivan Sutherland came up with the concept for the Ultimate display, which uses a number of input and output devices to create a computer-generated environment that immerses the viewer.

The next significant surge in VR technology development took place in the early 2010s, following the development of the Sensorama and the concept of the Ultimate display in the 1960s. 1960s, the early 2010s saw the next significant surge in VR technology development. At this time, virtual reality was still regarded as a novelty because it was costly and wasn't thought to be a technology that the general population would ever adopt. However, this began to change in 2012 when Palmer Luckey unveiled his initial Oculus prototype. The popularity of VR devices for home usage significantly increased when Facebook purchased Oculus in 2014 after observing the interest it attracted. Since then, virtual reality has gained popularity and become more widely available to the general public. There are now more VR headsets on the market, including the HTC Vive, Samsung VR, Oculus, Google Cardboard, and others. Although virtual reality (VR) was first promoted for gaming, there are other prospective and current VR applications in a variety of industries and professions, such as training, education, simulations, and even exercise and healthcare. Regrettably, general knowledge of the advantages and disadvantages of VR as a technology across a range of application sectors is still lacking. Current VR technology has a number of difficult-to-solve problems, ranging from technical to economical and health-related ones. The tech industry is currently working to address

technological limitations related to users experiencing discomfort or illness while wearing a VR headset, the fact that most people cannot afford the associated hardware, and the absence of technical standardization.

Overall, the goal of this literature review is to discuss the various ways that VR applications might be used, as well as to provide details on the benefits and disadvantages of applying VR technology across a range of application areas.

I. Method:

A thorough search was conducted utilizing popular journal search engines and websites, such as Google Scholar, JSTOR, MDPI, ResearchGate, PubMed, and Science Direct, which comprise peer-reviewed research and articles, in order to produce a trustworthy literature evaluation. When looking for sources, the terms "VR" or "virtual reality" are combined with "education," "simulation," "games," "virtual," "immersive," "non-immersive," "training," "application," "manufacturing," "industrial," "medical," "healthcare," and "entertainment." The range of keywords produced distinct outcomes for VR as a technology and in significant use cases where it has previously been applied to various sectors and domains. After then, a review of the collected papers and articles was conducted in order to further choose current and representative evidence.

3. Review of VR Technology:

VR's technology applications have progressed to the point that they can be used in a wide variety of sectors and fields outside of gaming and entertainment. Many people have begun using virtual reality (VR) to complete jobs that are difficult to practice because of a lack of resources or the risks and dangers that come with them. VR's technology applications have progressed to the point that they can be used in a wide variety of sectors and fields outside of gaming and entertainment. Many people have begun using virtual reality (VR) to complete jobs that are difficult to practice because of a lack of resources or because of the risks and dangers involved, which can occasionally have disastrous results. The biggest advantage of virtual reality is that it allows people to practice skills that can

occasionally have disastrous outcomes in a safe environment. The main advantage of virtual reality is that it allows users to perform these activities in a secure environment while additionally being enough absorbed to feel authentic and applicable to the real world, and portray practically any scenario with accuracy. This section discusses some of the primary VR application types and offers illustrations of how these applications are used or can be utilized in many sectors and for a variety of use cases.

The simulation component of VR is one of its most popular and broadly applicable uses; it may be specially designed and tailored to customers' requirements. Immersion and non-immersion are the two primary categories of simulations. As previously stated, non-immersive VR simulations typically consist of several screens and a platform or piece of equipment that replicates the jobs or activities in real life. Using head-mounted displays (HMDs) in place of screens, immersive VR simulations can either be totally enclosed within a virtual environment and not require any external setups or platforms, or they can make use of a control platform or other equipment like those used in non-immersive simulations. There is no discernible difference in performance between users who choose immersive versus non-immersive VR simulations, and the outcomes seem to be very comparable in terms of satisfying simulation's purpose. There is, however, a slight advantage to using immersive VR simulations with HMDs, as they are capable of fully immersing the user in the simulated environment and giving them a more thorough experience.

3.1 Education Simulation:

Virtual reality (VR) has not yet been widely used in education, but there are numerous promising examples and studies of how beneficial VR can be in an educational setting. Using VR can help increase student attention by keeping them engaged with what is happening inside the VR environment. Most teenage students find it difficult to pay attention in class, especially when they feel that the topics being discussed are not relevant to them. When students use exciting technologies like VR, they are more interested and engaged with what they are learning while immersed in a virtual environment. VR headsets are also helpful in

reducing visual and auditory distractions, which allows students to better focus on the teaching materials.

Through relevant encounters, virtual reality also gives pupils the chance to build and practice their own knowledge. Pupils can participate in educational activities in an immersive manner and improve their comprehension of the subject. Students can study and explore a variety of subjects safely and effectively by using virtual reality (VR) to move them to diverse surroundings. This can be particularly helpful in illustrating areas, such as underwater or space, that are not feasible to visit in real life. One extended VR application that can be used in authentic learning settings, including investigating lab experiments, is mixed reality. In order to replicate what is replicated for them in virtual reality, students can interact with objects in reality while wearing an HMD that displays details and instructions about the lab they will be visiting. In essence, students have a better visual comprehension and representation of their activity while remaining completely aware of their surroundings. This can help students make fewer mistakes, become more independent, and maintain their attention and engagement.

As VR technology develops, it may potentially be utilized for synchronous, live classes where students may interact in real time with teachers and peers from the convenience of their homes. This would have been particularly helpful during the epidemic when schools were closed, but it can also give students a way to continue their education even if they are ill, traveling, or living abroad, among other situations. Despite the fact that virtual reality has not yet been used extensively for live classrooms, such applications may be created in the future, particularly given some of the advancements being made in social interaction and asynchronous learning.

3.2 Public Health:

VR has also been used in the fields of wellness and public health. Because virtual reality is so immersive, it can be utilized to replicate events that have a direct effect on people's health. Providing medical staff with realistic training simulations, introducing a novel kind of exercise or meditation, and giving therapists chances to better assist and comprehend their patients are a few examples.

3.2.1 Medical Training:

Medical students can train in an interactive virtual environment that can be designed with various scenarios to teach them how to do procedures. This allows the students to encounter real-life scenarios with virtual patients. To help the learner get more prepared and habituated to the various circumstances they might encounter with future patients, the virtual environment can be created in a wide variety of ways. When the user looks at a tool or object, the simulation can be set up to play a movie that teaches how to use it properly. Students can also receive step-by-step instructions or recommendations from the simulation to help them carry out the procedure correctly. VR is an ideal tool to support student learning because all of these activities are far more practical than reading a textbook and more realistic than practicing on mannequins with little risk to a real patient.

3.3 Social Interaction:

Virtual reality (VR) offers the ability to take users to a virtual environment where they can interact with other users, giving them the chance to build social connections that might otherwise be difficult to establish or maintain. Social interaction through VR can be particularly beneficial for individuals with autism, as it gives them a way to practice their communication skills. Users can take part in virtual cognition training to improve their social skills, such as emotion recognition, social attribution, and analogical reasoning. Additionally, there are programs that are specifically designed to help young adults with high-functioning autism that train users to better recognize body language, facial expressions, and emotions from a person's voice. Users benefit from these programs for a long time since they learn to identify different people's feelings during the program, which they can use in their future lives.

Additionally, social virtual reality offers a new means of long-distance communication: virtual spaces can be created within a virtual reality environment, allowing users to interact with each other in a realistic setting; users can have realistic avatars and communicate as if they were face-to-face. As long as users feel immersed in the environment, they have a better sense of presence

and their responses are more genuine. This was particularly popular during the COVID-19 pandemic, when social distancing and travel restrictions made it much more difficult for people to see and converse.

4. Limitations And Side-Effect:

Even though virtual reality is a very strong and adaptable tool, there are some clear limitations and disadvantages to current VR technology, such as the technological boundaries of what VR can accomplish, the general public's accessibility to VR, and some of the negative effects of using VR devices.

4.1 Technical Limitations:

Though it is still in its early phases of development, virtual reality has advanced significantly. However, further significant advancements need to be made before VR can be fully employed for all potential uses and objectives. VR technology and presentation are still not widely standardized at this time; each developer may have unique interface requirements and features for their technology, and apps are difficult to move between devices. As of right now, the only instances of standardization are seen in well-known games that are made to work on many VR platforms. Because of the absence of standards, it is also challenging to troubleshoot errors and get the right support for any concerns. It is hoped that as VR technology advances over time, it will become more With additional time and advancement in VR development, the technology can become more efficient and provide users improved usability and device portability. Although there are now initiatives to standardize virtual reality, the process is still in its early stages and these attempts are fresh.

Additional concerns include the gear and software needed for professional VR creation, since the majority of VR development tools tends to be power-hungry and take up a lot of computer space. Additionally, VR headsets are sometimes very heavy and can strain users physically, leading to headaches and pain, particularly in the shoulders and neck. Although the exact negative consequences of VR use on users' eyesight are still

unknown, it is known that it can lead to strain, particularly after extended use.

4.2 Accessibility:

VR technology is becoming more widely available as it develops, particularly in comparison to its early iterations. Although the price of VR headsets is currently comparable to that of most gaming consoles, they are still more expensive than the majority of people can afford. One of the most affordable headsets available is the Oculus Quest 2, which costs around \$300 for the base model and can be used entirely without a computer. The majority of alternative headsets necessitate the use of a computer that is "VR-ready," or a high-end system with a potent graphics card capable of handling VR apps. The majority of people cannot afford this kind of VR gear since VR-ready machines are often more expensive than regular computers.

Augmented reality (AR) and mixed reality (XR), which are less immersive types of virtual experiences where users still interact with the actual world, are also included in the field of virtual reality (VR). using a virtual overlay. People may now access AR and XR applications more easily because its creation for mobile devices, which are far more prevalent with the majority of those who possess or have access to one. A typical illustration of this kind of application is Pokémon Go, a well-known AR game that mixes utilizing a smartphone with a physical investigation of the actual environment to find nearby "Pokémon" that can only be seen through their mobile devices. For those who are interested in virtual reality but do not have the money to purchase an immersive headset and computer setup, comparable smartphone games and applications may be a more affordable entry point.

5. Conclusion:

This analysis of the literature has demonstrated how virtual reality technology has the potential to be a very useful tool in a wide range of subjects and applications. Applications today are found in a variety of fields, including engineering, education, healthcare, and entertainment. More VR applications can be used in the future to enhance

existing use cases and broaden their scope as VR technology continues to gain acceptance and appeal. It is hoped that when VR technology advances further, the present constraints and problems will be resolved, increasing the viability and accessibility of long-term VR use. Although virtual reality (VR) is still in its infancy as a technology, more people are showing interest in it and are hopeful about the potential improvements it can bring about in their daily lives. More specialized applications and development are made possible by the increasing number of application scenarios being developed by specialists from many fields. Given how quickly society has adapted to smartphones and personal computers, virtual reality (VR) has the potential to be the next major technology revolution that eventually permeates most homes.

6. References:

- [1] Riva, G.; Botella, C.; Baños, R.; Mantovani, F.; García-Palacios, A.; Quero, S.; Serino, S.; Triberti, S.; Repetto, C.; Dakanalis, A.; et al. Presence-Inducing Media for Mental Health Applications. In *Immersed in Media*; Springer: Cham, Switzerland, 2015; pp. 283–332. [CrossRef]
- [2] Wohlgenannt, I.; Simons, A.; Stieglitz, S. Virtual Reality. *Bus. Inf. Syst. Eng.* 2020, 62, 455–461. [CrossRef]
- [3] Rahouti, A.; Lovreglio, R.; Datoussaid, S.; Descamps, T. Prototyping and Validating a Non-immersive Virtual Reality Serious Game for Healthcare Fire Safety Training. *Fire Technol.* 2021, 57, 3041–3078. [CrossRef]
- [4] Slater, M.; Sanchez-Vives, M.V. Transcending the Self in Immersive Virtual Reality. *Computer* 2014, 47, 24–30. [CrossRef]
- [5] Bown, J.; White, E.; Boopalan, A. Looking for the ultimate display: A brief history of virtual reality. In *Boundaries of Self and Reality Online*; Academic Press: Cambridge, MA, USA, 2017; pp. 239–259. [CrossRef]
- [6] Sutherland, I.E. The Ultimate Display. Proceeding of IFIB Congress. 1965. Available online: https://www.researchgate.net/publication/30875394_The_Ulisplay (accessed on 5 March 2022).

[7] Steinicke, F. The Science and Fiction of the Ultimate Display. In *Being Really Virtual*; Springer: Cham, Switzerland, 2016; pp. 19–32. [CrossRef]

[8] Velev, D.; Zlateva, P. Virtual Reality Challenges in Education and Training. *Int. J. Learn. Teach.* 2017, 3, 33–37. [CrossRef]

[9] Harley, D. Palmer Luckey and the rise of contemporary virtual reality. *Convergence* 2019, 26, 1144–1158. [CrossRef]