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IMPLEMENTATION OF VR AND AR TECHNOLOGIES IN PRODUCTION = ВНЕДРЕНИЕ VR И AR ТЕХНОЛОГИЙ В ПРОИЗВОДСТВЕ

This article is dedicated to the initiative "VR and AR technologies". In this work we will analyze how these technologies work, the pros and cons, as well as their practical application in various industries.

Modern technologies are developing rapidly. VR&AR technologies are gradually being introduced into various spheres. Virtual reality (VR) is a simulated 3D environment that enables users to explore and interact with a virtual surrounding in a way that approximates reality, as it is perceived through the users' senses. Virtual reality hardware comprises VR headsets and motion controllers.

VR headsets are head-mounted wearables that track information generated by human senses. Components of a VR headset include screens, cameras, motion sensors, and infrared LEDs. VR headset works in sync with input trackers like sensing gloves, full body suits, treadmills, joysticks, and motion trackers to produce output.

VR headsets have embedded stereoscopic lenses positioned between a built-in LED screen and eyes, distorting the image so it looks 3-D and real.

The headset passes two images through these lenses, one for each eye, similar to our vision. Additionally, infrared cameras adjust the light to the user's power of accommodation. The content displayed on the screen also shifts as we move our heads to navigate.

VR motion controllers are a type of virtual reality hardware component that allows users to take action in a virtual environment through handheld devices. With its help, users can navigate between spaces, pick things up and put them down, climb or descend a hill, and perform other interactive activities.

Augmented Reality (AR) combines the digital world with real elements. It is a technology that is equally good for mobile devices and desktops. What makes it

special is the fact that it offers the possibility of reflecting digital components in the real world.

Augmented reality starts with a camera-equipped device such as a smartphone, a tablet, or smart glasses loaded with AR software. When a user points the device and looks at an object, the software recognizes it through computer vision technology, which analyzes the video stream.

There are types of augmented reality such as: Marker-based, Markerless, Location-based, Superimposition, Projection-based AR.

Each technology has its advantages and disadvantages:

VR advantages:

Virtual reality refers to the imaginary environment made with the help of technology with an essence of reality. It helps therefore to explore various places without even going to that place. This has made the life of people much easier and more entertaining. The fact that one has not got enough money to explore everything has made possible the entrance of virtual reality [2].

A lot of people who are not skilled in different fields of work can get training in the virtual environment. E.g., engineering requires practical knowledge therefore for the application of knowledge virtual reality technology can be used.

Virtual reality is an imaginary world created by the developer to study or make people experience different realities of life. Therefore, the risk involved in experiencing the knowledge gathered through books is almost low. Low risk does not imply that total risk is zero but its consequences can be different for different people depending on their mental ability [2].

Virtual Reality is a platform to undergo the situation that a person has studied in their textbooks. Practical knowledge is more interesting and exciting as compared to monotonous book reading therefore a lot of engagement towards the subject has been seen in the case of virtual reality or Virtual Reality training.

Only at the time of installation of Virtual Reality technology do expenses occur but after that, the maintenance and cost per person become almost low thus it is cost-effective.

VR disadvantages:

Implementation of Virtual Reality is an expensive procedure. The technology and equipment used in Virtual Reality are costly and therefore only a few could afford such technology. The initial installation of such a kind of machinery, therefore, is costly.

Virtual Reality technology has to be learned to gain skills and it is not easy for everyone to understand the technology for how to use therefore training is required to learn the complex technology [2].

Many a time it has been seen that teenagers and a few adults become addicted to Virtual Reality and get affected physiologically. The addiction, therefore, leads to various issues and teenagers also will not study their regular studies and would always be interested in playing games.

As people become addicted to Virtual Reality they also get impacted psychologically and therefore humans are recommended to avoid using Virtual Reality for long period.

AR advantages

As AR becomes more sophisticated and accessible, its applications are growing wider, from gaming and entertainment to industrial and medical uses. AR has moved away from its old stereotypical use only for video games

A regular tourist map can come alive with AR technology allowing guests to see places of interest, restaurants, bars and more [2].

Among its other benefits is that its applications are really easy to use as AR systems are usually less affected by device limitations. AR provides more freedom for smartphone users and more opportunities for AR developers and marketers since there is no need for a head-mounted display.

AR disadvantages

Augmented Reality can cause privacy or security concerns. This is rooted in AR making it difficult to discern between what's real and what's not, thus leading to a fear of being "tricked" by an attack [2].

AR blurs the line between the real world and the digital world. Hence, another drawback or disadvantage of augmented reality centers on possible dangers that come from reality modification.

Overlaying digital elements on the natural environment masks real-world dangers and make users less cautious.

VR AND AR IN PRACTICE

In medicine using VR allows medical students to practice surgeries and other procedures, and allows them to make mistakes without actually harming a real patient. AR technology is an efficient time-saver that allows doctors to project the details in their area of vision, while attending a patient.

An amazing study was done by Duke University that used VR and brain computer interfaces to help treat paraplegic patients. The 12-month study with 8 patients showed that VR can help aid in restoring ability with patients who suffer from a chronic spinal cord injury. They used a brain machine interface and a VR headset to simulate neurological functions that allowed them to move their lower limbs. 100% of the patients experienced some level of recovery in terms of increased muscle control and sensation in their legs [1].

In business companies are new starting to use VR to conduct interviews, give tours, hold meetings, and reduce costs overall. VR is also used to test safety and proper functionality of products without putting anyone at risk. Virtual reality is also used to train employees and is used for role playing scenarios. Some companies are using VR for data visualization; this allows employees to interact with the data, as well as collaborate with each other.

In construction since virtual reality is in three dimensions, architects can use it to design buildings instead of hand-drawn diagrams and computer-generated im-

ages. VR is much more cost effective and efficient than traditional methods of planning for construction. AR can layer certain details and elements onto a building plan so stakeholders can get a better understanding of the project [1].

In military Virtual reality training is a common use case for VR technology. It helps for training exercises that are too rare, too expensive, or too dangerous to be done in real life. Training simulation in the military field fosters the combat skills of small-scale units or single soldiers by simulating actual vehicles, soldiers, and combat environment. With the AR technology, users can gain more operational and situational awareness and better judge their situations.

In conclusion, VR and AR technologies are rapidly advancing and transforming various industries. These technologies provide unique experiences and benefits, such as enhanced immersion and improved training and simulation. However, there are also drawbacks to these technologies, such as high costs and potential negative effects on social interaction and physical health. Overall, as these technologies continue to evolve and become more accessible, it will be interesting to see their continued impact on society and how they will shape the future of various industries. It encourages individuals to pursue language learning with a more serious and career-minded approach.

LIST OF REFERENCES

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КОНСТРУКТИВНЫЕ И ХУДОЖЕСТВЕННЫЕ ОСОБЕННОСТИ ПРОЕКТИРОВАНИЯ СООРУЖЕНИЙ ПАВИЛЬОННОГО ТИПА

Рассмотрена сущность и значение павильонов, представлены их конструктивные и художественные особенности, а также основные способы возведения. В заключении выявлены принципы по выбору объемно-планировочного решения павильонов и типы конструктивно-художественных решений.