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Virtual Reality: History, Application and Future

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Abstract: *Virtual Reality has become very popular in last few years. The interest in Virtual Reality is growing rapidly. Very few people know about the VR there various uses and its problems related to it. In this study of VR it includes history, types of VR, and applications in new technologies in science work and entertainment fields. Components of VR & issues related to VR are discussed. Positive and negative influence of virtual reality on life of average people. And lastly, the future of the Virtual Reality.*

Keyword: *Internet, Virtual Reality. HMD's. Stereoscopic*

I. INTRODUCTION

Virtual Reality is the use of computer technology to create a stimulated environment. Unlike traditional user interfaces, VR places the user inside an experience. VR helps users to interact with 3D worlds. By introducing as much sense as possible, such as vision, hearing, touch, even smell, the computer is transformed to the artificial world.

Virtual Reality refers to a computer-generated simulation in which a person can interact within an artificial 3D environment using electronic devices, such as special goggles with a screen or gloves fitted with sensors.

II. HISTORY

Nowadays the computer graphic is used in many domains in our life. It is difficult to imagine an architect, engineer or interior designer working without a 3D environment. It allows to see the surrounding world in different dimensions and to experience the things that are not accessible in real life. This technology is very popular in the current decade i.e. Virtual Reality.

The first VR technical development was introduced in **1830s**. In 1838 Charles Wheatstone's introduced The Stereoscope. Later in 1935 Stanley Weinbaum released Pygmalion's Spectacles which contains the idea of pair of goggles the user can experience the graphics, smell, taste and touch.

A cinematographer Morton Heilig invented the Sensorama in 1957, which offered users an interactive experience by audio speakers, screen, oscillating fans for touch, and emitted smells. In 1960s Comeau and Bryan, created the head-mounted display (HMD). It was a first motion tracking device and used to move a remote camera allowing a user to look around and environment without being present physically.

Later in 1966 Thomas Furness developed a 'flight simulator' for the Air Force. In 1968 Harvard professor Ivan Sutherland invented the first VR / AR head-mounted display named as 'The Sword of Damocles'.

Later in 70s and 80s the major advanced VR hardware were made. In 1978 MIT developed the Aspen movie map were viewers called as 'Surrogate Travel'. In 1982 the movie Tron introduced the concept of VR to the masses. Gamers characters were introduced in fully virtual environment with creative video game. In 1986 Furness worked on his Air Force project and developed the Visually Coupled Airborne System Simulator (VCASS) which gives the pilot a virtual view that made more effective to barrage the information which they use to get every moment. In 1987 John Lanier the scientist and researcher founded the Visual Programming Lab (VPL) and developed a range VR gear, including the Data gloves and the Eye Phone HMD making VPL first company to sell Goggles.

In 90s – 2000s introduced various series of games and arcade machines to bring the VR to the normal people around the year 1991. In addition, the Sega Company released the Sega VR headset accessory, which were too realistic. In 1995 Nintendo Virtual Boy developed and launched the first portable console that displayed 3D graphics and Later in 1997 matrix came to bigger theaters and had massive buzz for normal users. In 2001 SAS cube was introduced as the first Pc based cubic Room and the library had VR tools VR pack.

In 2007 the Google announced Street View with Immersive Media. The technology launched with imagery for five mapped cities. Images were captured from a patented camera mounted on moving car used to show the users roads, buildings.

III. TYPES OF VIRTUAL REALITY

A. Fully-Immersive

Fully-Immersive virtual reality is a digital technology that allows user to experience artificial environments as the real world. It gives the users the most realistic and creative experience, with full sight and sounds. To interact with the fully-immersive virtual reality the user needs the VR Glasses or a Head Mounted Display i.e. HMD. In this virtual reality the users feels completely away from the reality. Headset provides high-resolution content with a wide field of view.

B. Non-Immersive

Non-Immersive virtual reality is a type of virtual reality in which you interact with a virtual environment through computer where you can control the activities and the virtual environment is not directly interacted with the user. 3D environment can be directly manipulated with a graphics using monitor, keyboard, and mouse. Video game is an example of non-immersive VR experience.

C. Semi-Immersive

Semi-Immersive virtual reality is a type of virtual reality where virtual experience provide users with partially virtual environment. The users focus on the digital image also allows users to remain connected to their physical surroundings. Semi-Immersive technology provides reality through 3D graphics, a term known as vertical reality depth. Often used for educational or training purposes. Depend on high-resolution displays, powerful computers, projectors, etc. that replicate design partially.

D. Collaborative

A collaborative virtual environment is a space in which several people interact with each other, over several locations. Benefits of collaborative virtual environment are news forms of communication. This provides the user to develop new ways of using data which are used in real world. A collaborative virtual environment can be entirely digital or a mixture of the virtual and real world. It provide a potentially infinite, graphics and digital landscape where multiple users can interact with each other.

E. Augmented Reality

Augmented reality is a highly visual interactive method that is achieved through the use of digital visual elements, sounds or sensors. It provides new approaches to key business challenges. It's all about connecting real world to the virtual world of information that created on the web. In past decades various labs and companies have built a device that gives us augmented reality. In 2016, the AR game "Pokémon Go" achieved great public interest worldwide. The game allowed users to see Pokémon characters bouncing around in their own towns. The goal was to capture those Pokémon's then use them in the battle with others locally.

IV. VR EQUIPMENTS

A. Head-Mounted Displays (HMDs)



Head-Mounted Displays (HMDs) are small displays or projection technology integrated in to eyeglasses or mounted on a helmet or hat. Some HMDs incorporate motion sensors to determine direction and movement or as the interface to an immersive virtual reality application. HMDs are not only used in virtual reality gaming, they are also used in military, medical and engineering. This devices is used to create augmented reality, which overlays digital information through an HMD filter on to the real world. To allow best possible experience with HMD a number of technologies need to be incorporated such as Display Technology, Pixels and displays, Retinal projection, Refresh rate, Latency, Optics, Head Tracking, Eye Tracking, Audio Hardware, Computer Hardware, Input devices,

B. Data Gloves



Motion sensors track hand movement.

Data is sent wirelessly to open source software.

All fingers are tracked by integrated flex sensors.

A data glove is an input device like hand gloves worn in hand that contains various electronic sensors. This device has the capability of recording hand movements which measures the position of the hand and its finger movements. It's a gesture recognition and tracking of 3D hand orientation. Data glove may also contain control buttons or act as output device. Some data gloves enable tactile sensing which allows user to feel virtual object. These motions of user hand and fingers can be used by a virtual hand or a robotic hand for example gaming.

V. APPLICATION

A. Health Care

Health Care is an important application of Virtual Reality which have robotic surgery, phobia treatment, surgery simulation and skills training etc. Most of the health care organization has started use of VR in their operations and it was beneficial for them. VR has even been used as pain relief for burn injuries. VR can also be used a treatment for mental health issues.

B. Medical Training

Virtual Reality is used in medical education and training. VR based companies are developing products with combine 360 degree video and 3D interactive content to develop the best possible learning programs for physicians and students. VR technology in the medical industry is an effective way to improve the quality of students training and also presents great opportunities to optimize costs.

C. Law Enforcement

Virtual Reality also plays an important role in law enforcement with military and police forces. These VR tools used to train with the complete visual scenarios, audio and physical stimuli. Using headset replicas of weapons and series of sensors used in training scenarios. Can also test the skills learned throughout the training. VR improves the training of officers and have a positive effect on the hiring process.

D. Sports

Sports are one of the domains where the technology is being put to use in the most effective way. Virtual reality can be used by coaches and players to train more effectively. Used as training aid to help measure the performance and analyze the techniques of the player. It allows them to experience game play scenarios virtually. Sports were Virtual reality is used are football, soccer, basketball etc.

E. Architecture

VR is used in architecture field as virtual architecture which is used as electronic representation of architectural designs. VR used by architects for making 3D models using immersive tools to see what a building or space will look like virtually. For owners it helps to experience the space physically and also make a real time changes which saves customers and architects time and money.

F. Education

VR is also used by education field such as in schools and colleges for teaching and learning situations. Students are able to interact with each other within a 3D environment. VR is accessible to every student and can easily monitored by teachers. Can also be taken on virtual fields trips examples museums, solar system and going in different eras.

VI. PROBLEM STATEMENT AND SOLUTION

Virtual reality is still a testing ground of game design, and one area in which there are few standards when it comes to control schemes and design choices. The homogeneity of traditional open-world titles, role-playing games, and first-person shooters does not exist, and where pressing a trigger to shoot or a face button to crouch is ubiquitous on console, VR games are still testing the best ways to make games fun and players comfortable. While using an odd button to crouch or attack may be cumbersome on consoles, the wrong decision in VR can make players physically ill.

The most common problem of Virtual Reality is “VR Sickness” This is the term adopted by the developers and users to describe the various harm caused by playing VR games. Nausea, Dizziness, Disorientation and number of other motion sickness related symptoms are most common with many VR users and this is exacerbated by the nature of virtual reality: The player’s eyes tell their brain they are walking, while their body tells them they are still at one place.

“You can experience this in everyday life, such as when you read a book in the back of a car — your vision is fixed on a stationary object, but your peripheral vision and inner ear are detecting movement,” said Matt Dickman, technical program manager for health & safety at Oculus, the company that led the VR charge and was subsequently bought by Facebook in 2014

VR sickness is the reason some users fall over or get sick with more traditional, smooth movement systems. Pixel velocity is an example of one of the many issues that cause VR sickness. The speed of pixels moving across your field of vision is different to the speed of the player. While similar to the feeling of seeing movement while standing still, pixel velocity accounts for when the world rushes around the player, or provides a sense of falling or movement even when the player is represented as still in the game.

The solution for VR sickness is “Teleportation” it is the act or a process of moving an object or person without crossing the intervening space that helps to break the illusion and keeps player moving through the world without tricking their mind. Many VR games are “experiences”, rail-shooter and puzzle games that keeps player on one spot and it becomes easy to avoid the pitfalls of motion sickness.

While development they implemented simple tricks such as making a static artwork or controlling where the user had focused their attention, this helped to decrease the severe nausea. In “VR Sports Challenge” the developer Sanzaru noticed a decrease in motion sickness when the player tries to focus on something specific.

VII. CONCLUSION

Virtual Reality is one of the technologies with the highest projected potential for growth. Today the virtual reality has made improvements mostly from the tech like Amazon, Apple, Facebook, Google, Microsoft, Sony and Samsung all these had build VR divisions. Various big companies are working to develop headsets that do not need cables and allow images to be seen in HD. VR mainly seen in gaming and also used in various fields. The potential of Virtual Reality will be seen in future applications up to the imaginations. The possibilities of VR usage are endless.

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