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A Grip on Virtual Reality

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ABSTRACT

The popularity of augmented reality (AR) and virtual reality (VR) is growing. Virtual reality (VR) is a cutting-edge interface that creates a lifelike environment in the user's head. In the virtual world, the participants can move about. They can look at it from various perspectives, reach within it, grab it, and modify it. The ultimate virtual reality setting is cyber space. Virtual reality (VR)is a computer-generated alternate universe in which data exists. To enter cyberspace and travel its data highway, information professionals need a specialized VR device. The paper explores virtual reality's different characteristics and uses in numerous fields. Many academics and scientists are devising new ways for developing present domains in accordance with people's demands and interests, not just in the near term –but as a model for future development.

Keywords: cutting-edge, VR, AR, characteristics, cyberspace –

I. INTRODUCTION

Virtual reality (VR) is a four-dimensional recreation of the real world that includes 3D space, 1D time, and an immersive or semi immersive interaction interface. It can be divided into two categories: 1) hardware-based and 2) computer-based. A hardware-based VR system requires specialized VR hardware, such as a head-mounted display, VR gloves, and so on. Any personal computer can be used to run a PC-based VR system (PC). As I/O devices, it makes use of conventional PC components. A hardware-based VR system can now be considered an immersive virtual arena, whilst a PC-based VR system can be termed Semi-immersive. For many purposes, dedicated VR accessories are frequently prohibitively expensive, because PC-based internet technologies are rapidly evolving, offering a viable alternative to VR.

Fig.1 –VR–The technology of the future

II. ADVANTAGES OF USING VIRTUAL REALITY

1. In classroom: Boosts quality of education and provides excellent visualization which are not

possible in the traditional classroom and provides a realistic experience.

2. In manufacturing industries: ensures that activities such as design, planning, machining etc are carried out virtually, to find out the actual resources required and whether it'll be useful and to prevent wastage.
3. In Tourism: VR Applications in various heritage centers and to explore places.
4. In Software Industries: In checking the use of the product in a simulated environment and in project meetings.
5. It's not only used in gaming and entertainment but also for training for competition at NBA, NFLAND also USOLYMPICSKITEAM
6. BMW AND VOLKSWAGEN are using it not only to reinvent the car buying experience but how they design the car in the first place and the list goes on. As the great former Professional Basketball player, Richard Brunson has said, "You don't learn to walk by following rules, you learn by doing and falling over", there are obstacles, no doubt, but finding ways to get over it and achieve something out of nothing, is what there search community is trying to do. Let's draw our focus now, towards the cons of the subject and the problem statement.

III. DISADVANTAGES OF USING VIRTUAL REALITY

1. It is really expensive and people who cannot afford it are left out of this evolving technological world.
2. VR Training may not give the same results expected in real life situations as compared to the results given in virtual reality.
3. The users may feel useless as they may feel that they are trying to escape from reality.

IV. COMPONENTS OF VIRTUAL REALITY SYSTEMS

A virtual reality system is made up of two basic subsystems: hardware and software. As indicated below, the hardware is divided into computer (or VR engine) and I/O devices, while the software is divided into application software and database.

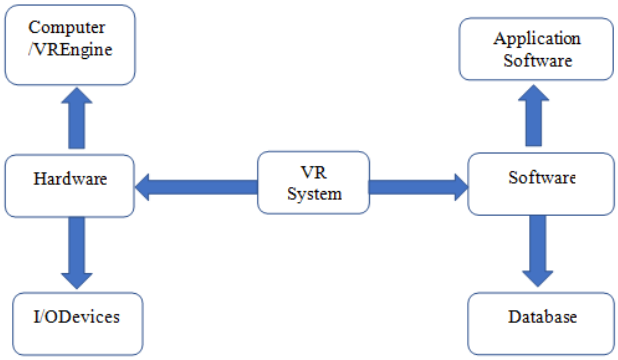

Fig.2–VR's components

Input Devices: These are the tools that a user uses to interact with the virtual environment. They send signals to the system about the user's activities so that the system may respond appropriately in real time through the output devices. Tracking devices, point-input devices, voice devices, and bio-controllers are the different types. Ultrasonic, optical, mechanical, electromagnetic, and gyroscopic sensors, data gloves, neural, and bio or muscle controllers are examples of tracking devices, sometimes known as position sensors that are used to track the user's position. Force or space ball, as well as a 6DOF mouse, is examples of point-input devices. This technology is a 3D version of a standard mouse with additional functions. Voice communication is one of the most common forms of human interaction. As a result, including it into a

VR system is acceptable. This can be done with the help of processing software or voice recognition.

VR Engine: In VR systems, the engine must be chosen based on the application's requirements. Image production and graphic presentation are two of the most important parts of a VR system, as well as a time-consuming operation. Because the work of the VR engine is the calculation and generation of graphical models, mapping, texturing, object rendering, lighting, simulation, and display in real-time, the choice of the VR engine is dependent on the application field, I/O devices, user, level of immersion, and the output required. The computer is also in charge of user communication and acts as an interface for I/O devices. The computer processing capacity, as well as the number of senses (graphical, auditory, haptic, and so on) that can be represented in a given timeframe, is important factors to consider when choosing an engine. The VR engine must update the virtual environment every 33 milliseconds and provide real-time simulations at a rate of more than 24 frames per second, as well as the visual engine, the number of sectors is growing. able to generate stereoscopic vision This engine could be a typical PC with multiple processing cores and a strong graphics accelerator, or it could be a collection of dispersed systems connected by a high-speed communication network.

Devices for generating output. To stimulate the senses, the output devices get feedback from the VR engine and send it on to the users through the output devices that correspond to it. Graphics (visual), audio (aural), haptic (touch or force), smell, and taste are some of the various classifications of output devices based on the senses. The first three are widely used in virtual reality systems, where as smell and taste are still un common.

V. THE THREE TYPES OF VIRTUAL REALITY

1) Non-Immersive Virtual Reality: Because it is so widely utilised, this category is generally referred to as VR. It has a computer-generated virtual environment in which the user is both aware of and controlled by their physical surroundings. Take, for example, video games.
2) Semi-Immersive Virtual Reality: This type of VR delivers an experience in a partially virtual environment. It uses graphical computing and huge projection systems for educational and training applications, such as flight simulators for pilot trainees.
3) Fully Immersive Virtual Reality: At the moment, there are no fully immersive VR technologies available, but technological advancements are so rapid that they could be only around the corner. From sight to sound tool factory sensations, this sort of VR delivers the most realistic simulation experience. Motor racing games are a good example of games that provide the user the sensation of driving while also keeping track of their speed. Originally designed for gaming and other forms of entertainment, virtual reality is currently being used in variety of ways

VI. DIFFERENCE WRT AUGMENTED REALITY

Despite the fact that Virtual Reality is a technology that has been around for a long time, many people are still unfamiliar with it. It's also not uncommon for people to mix up the terms Virtual Reality and Augmented Reality.

The key distinction between the two is that virtual reality (VR) indicates a complete immersion experience that conceals the physical world, whereas augmented reality (AR)creates a world in

which we immerse ourselves by wearing a specialised headset. It's entirely immersive, and everything we see is part of an artificially manufactured environment made up of visuals, sounds, and other elements. In augmented reality (AR), on the other hand, our own world becomes the framework inside which objects, images, and other media are inserted. Everything we see is in a real environment, therefore wearing a headset may not be strictly necessary. Pokémon Go is the clearest and most well-known example of this principle.

There's also mixed reality, which is a hybrid of the two realities. This technology, for example, allows users to perceive virtual things in the real world and create an experience in which the physical and digital worlds are blurred.

VII. TECHNOLOGY BEHIND VIRTUAL REALITY (VR)

Virtual reality (VR) is a technology that replicates vision to create a three-dimensional world in which a user appears to be immersed while surfing or experiencing it. The user who isimmersed in the 3D environment is in charge of it. On the oneside, the user creates 3D virtual surroundings, and on the other, he experiences them through devices such as virtual reality headsets.

The process of generating data begins with an understanding of computer vision, a technology that allows phones and computers to process still images and moving images/videos in the same way that a human visual system does.

Additionally, devices that use this technology will evaluate photographs and videos based on the location, background, and appearance of the images. This necessitates the usage of a camera, as well as other components such as AI, large data, and a visual processing unit.

To recognize things in the surroundings, AI and ML may rely on pre-processed image and video data (huge volumes of data, or big data). Not only does the camera use scale space, but it also uses template matching and blob detection, or a mix of the three.

VIII. HOW DOES VIRTUAL REALITY WORK?

Despite the fact that we discuss a few historical early prototypes of virtual reality elsewhere in our paper, virtual reality is now widely constructed using computer technology. A variety of solutions, such as headsets, are used for this purpose.

Omni directional treadmills and VR-specific gloves are available. They are useful for simultaneously activating our senses in order to generate the illusion of reality.

Our senses and minds have developed to present us with a finely synchronized and mediated experience, so it's more complicated than it appears. We can typically tell if anything is a little off if it is a little drifting. This is when terms like immersiveness and realism start to appear in the debate. These concerns, which distinguish comfortable or "easy to use" VR experiences from strange or irritating ones, are both technical and mental in nature. Our physiology must be taken into account when developing VR technology.

Every human has a 180-degree field of vision, more or less, and even if you aren't constantly consciously aware of it, you would notice if it wasn't there. Similarly, when your eyes and the vestibular system in your ears detect a conflict, it can create motion sickness, which is what some individuals experience while on boats or while reading a book or looking at their phone while driving.

A sense of presence is produced when a VR implementation is able to get the right combination of hardware, software, and sensory input at the same time.

IX. WHO CAN USE VIRTUAL REALITY?

It is dependent on the requirements. Anyone can use it for enjoyment purposes, such as playing virtual reality games, for training, for virtual company meetings or hangout gatherings, for events, and soon. The first thought that comes to mind for a VR user is which virtual reality headset to purchase.

Is it possible to use it on a phone or any other device? Is it possible to view the content online via social media sites, or should it be downloaded for offline use?

Other aspects to consider for a corporation, group, business, or institution hoping using virtual reality for advertising, training, or other purposes included developing your own VR application and content.

In this situation, you'll want to create good VR content that has an impact on your audience and can be viewed on as many VR headsets as possible.

You might also create a virtual reality (VR) application for your company that works on Android and many other VR mobile, PC, and non-PC platforms that hosts a lot of your VR content and adverts for people to locate and watch. You might create a VR headgear that is branded in conjunction with your VR content.

As a developer, you may be interested in purchasing headsets that support SDK and other tools; however, you must first understand the standards and platforms utilized in the process.

X. APPLICATIONS OF VIRTUAL REALITY

1. Virtual Reality in the Military

The militaries of the United Kingdom and the United States have used virtual reality in their training because technology allows them to simulate a wide range of scenarios. VR is used by various branches of the military, including the navy, army, air force, and marines, for military objectives such as flying simulations, vehicle simulations, warfare simulations, medical training, and the creation of a virtual boot camp, among others.

2. Virtual Reality in Education

VR is also used in education to provide content for teaching and learning. It encourages pupils to converse with one another in a 3D environment. Students can also go on virtual field trips to museums, take tours of the solar system, and travel back in time to other eras.

3. VR in Sports

VR has been steadily making its way in the sports field. VR is not only used by players for training effectively but as well as coaches across various sports, in which they can view as well as experience particular scenarios repeatedly and enhancing their performance every time.

Similarly, technology is also being enhanced to improve the experience of the user while watching the sporting events. Various broadcasters have begun streaming live games through VR and are starting to sell virtual tickets for live events which will allow people located anywhere in the world to be a part of it. This also allows the people who may not be able to afford to attend live sports games and feel included as they enjoy a similar experience from their own homes, at no cost or for a reduced expense.

4. Virtual Reality in Mental Health

As previously stated, virtual reality technology is being used to treat PTSD. By pursuing VR therapy, a person is immersed in a 3D replica of a traumatic incident with the goal of assisting the person in overcoming the trauma associated with the event and beginning the recovery process.

It's also used to treat stress, mental anxiety, severe depression, and phobias, among other things. When people with anxiety use virtual reality to deal with stress and enhance coping strategies, they feel calmer. It provides a safe setting for patients to confront the components that they are afraid of while remaining safe and secure.

5. Virtual Reality in Medical Education

VRisalsobeingusedinsurgeryandtherulesthatmedical students must follow, making it more interestingto learn because of its interactive features, allowing for asafeandsecureenvironmentfreeofanybizarreconseq uences,reducingtheriskofanymishapsorblunderswhi lepracticingonrealpatients.

6. Virtual Reality in the Fashion Industry

The usage of virtual reality in the fashion business is onesuch topic that is rarely discussed. Additionally, virtualreplicas ofstore environments canbe quite usefulformerchants to practice building product displays withouthaving tocommittotheactualbuild.

7. Virtual Reality in Marketing

Marketingisaprocessthatrequirescontinuousimprove ment in order to keep up with and develop itsinteractive features, with the primary goal of persuadingcustomers. The approaches used previously are quicklybecoming obsolete, with virtual reality (VR)becomingthenextbigthing. Customized VR improves marketing performance, whichiswhymanycontentdevelopmentcompaniesan dorganizationshaveusedthetechnology.

8. Virtual Reality in Architecture

Virtual reality apps have given architects an advantage inpresenting their ideas and plans to their clients on a 1:1scale,allowingclientstoexploretheprojectinmored etailbeforeadoptingthedesignsandbeginningconstru ction.

Virtualrealityapplicationswillbenefitresidentialbuil dings,commercialbuildings,andanyotherconstructio nprojectbecausetheywillallowtheseprojectstobevisu alizedinavirtualenvironmenttointerpreteachaspecto ftheproject,suchassafetyprecautionsorreducinganydi screpanciesfromthefinalized design.

Customerscanvirtuallywalkthroughseveralinteriord esigns for their business or personal building, replacingtheconventionalblueprintsfordesigns,than kstotechnology.

XI. WHAT ARE THE DIFFICULTIES IN VR?

1) Health issues: As mentioned above, VR system Virtual to the human brain. The environment is real. However, when you move in , you can get a virtual environment while your body is still disorientation which causes nausea, headache, and drowsiness. This is called motion sickness. Treadmill with VR. Technology can be the solution to motion sickness that simulates walking.
2) High cost: VR headset and computer required The specs can be quite expensive. Also, VR development can be quite expensive as it is required companies/organizations that hire professional developers in a VR application. However, VR can be cheap in long term.

XII.THE FUTURE OF VIRTUAL REALITY

According to studies, virtual reality is one of the technologieswiththegreatestgrowthpotential.Accordingtothemostrecent projections from IDC Research (2018), investment invirtual reality and mixed reality will continue to grow. Overthe next four years, AR will multiply 21-fold. By 2022, it willhave grown to 15 and a half billion euros. Furthermore, bothtechnologieswillbethemostimportantcomponentofacompany's success. Their investment in digital transformationwillincrease.By2019,wewillhaveoutperformedtheconsumer industry. As a result, it is anticipated that by 2020,morethanhalfoftheworld'spopulationwillbewomen.CompaniesinEuropewillhavea VRandARstrategy.

For the time being, the market is in need of apps that gobeyondleisure,tourism,ormarketingandaremoreconsumer-friendly.Toavoidissueslikeclipping,whichcauses certain objects to appear as though they can be passedthrough, virtual interfaces must be improved. Or to reduce thenegativeimpacts that VR has onhumans,such as motionsickness, which is a dizziness caused by a mismatch betweenour body'smovement andwhatweseeinthevirtualworld.

The toptechgiants are alreadyworkingon headsets thatdon'trequireconnectionsandcandisplayvisualsin highdefinition. They're working on VR headsets with substantiallyfasterprocessors. There's even discussionthat they'll be ableto integrateAIinthenext severalyears.

Thenewer 5Gstandard may alsoopen up newpossibilitiesfor the future of virtual reality. More devices and vast usercommunitieswillbeabletoconnectasaresultofthis .Furthermore,thenearlyunnoticeablelatencywillallowcustomers to get visuals in real time, almost as if they wereseeingthemwiththeirowneyes.

Thismeansthatvirtualrealityisnolongerafantasyorfictitious. It is a part of our daily lives, and it will lead toadvancementsthatwilldefinethefutureinthenextyears.

XIII. CONCLUSION

Despite the fact that we discuss a few historical earlyprototypesofvirtualrealityelsewhereinourpaper,virtualrealityisnowwidelyconstructedusingcomputertechnology. For this reason, a variety of technologies areused,includingheadsets.VREmploysavarietyoftechnologiestoaccomplishthispurpose,anditisatechnically difficult task that must take into account ourvisionandbrain.VRhasbothentertainmentandnon-entertainmentapplications.Eventually,thistechnology will become less expensive and more widelyavailable. In the future, we may expect to see many moreinventive and new aspects of the technology, as well as afundamental shift in how we engage and work with VR'scapabilities.Virtualrealityhasthepotentialtobeneficial.

XIV. REFERENCES

[1]. T.H.DaniandG. Rajit,Virtual Reality-ANewTechnology for the Mechanical Engineer In: MechanicalEngineers'Handbook,2nded.,ed.MeyerKutz.JohnWiley &Sons,Inc.,NewYork, 1998,pp.319-327

[2]. A.BCraig,R.SWilliamandD.WJeffrey,Developing Virtual Reality Applications: Foundations

ofEffectiveDesign,MorganKaufmannPublishers, Burlington,2009

[3]. G.CBurdeaandC.Philippe,VirtualRealityTechnology, 2nd ed. John Wiley & Sons, Inc. New York,2003.

[4]. GlobalBusinessandManagementResearch:AnInternationalJournalVol.2,Pg235-245.

[5]. A Brief Introduction of VR and AR Applications inManufacturing, Pg1-6.

[6]. https://elearningindustry.com/pros-cons-using-virtual-reality-in-the-classroom

[7]. https://www.statista.com/statistics/300087/global-eyewear-market-value/

[8]. https://learn.g2.com/hubfs/virtual-reality.jpg