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Review Paper on Augmented and Virtual Reality

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Abstract: Virtual reality (VR) is a technology which allows a user to interact with a computer-simulated environment, whether that environment is a simulation of the real world or an imaginary world. It is the key to experiencing, feeling and touching the past, present and the future. It is the medium of creating our own world, our own customized reality. It could range from creating a video game to having a virtual stroll around the universe, from walking through our own dream house to experiencing a walk on an alien planet. With virtual reality, we can experience the most intimidating and gruelling situations by playing safe and with a learning perspective. Very few people, however, really know what VR is, what its basic principles and its open problems are. In this paper a historical overview of virtual reality is presented, basic terminology and classes of VR systems are listed. An insightful study of typical VR systems is done and finds the challenges of Virtual Reality. Augmented reality, in which virtual substance is consistently coordinated with showcases of true scenes, is a developing zone of intuitive plan. With the ascent of individual cell phones equipped for creating intriguing enlarged reality conditions, the immense capability of AR has started to be investigated. This paper reviews the present cutting edge in increased reality. It depicts work performed in various application areas and clarifies the leaving issues experienced when building expanded reality applications considering the ergonomic furthermore, specialized confinements of cell phones.

Keywords: Virtual Reality, Augmented Reality, VR Devices, HMD, Robotics Etc.

I. INTRODUCTION

1. Virtual Reality:

Virtual Reality is an imaginative, illusionist world, which gives the sensation that you are inside the artificial world created through computer software's with simulations. VR works in 3D form where the subject can move in X, Y and Z direction. Images are created using depth to create the virtual experience. VR is on immersive medium which transports you in virtual medium. (3 Dimensional world) Virtual reality helps to create simulated environment which helped in the innovation of immersive films and the video games. The real implementation of virtual reality was done in 1989.but it was introduce Sutherland in 1965.there are four technology;

- The visual (and aural and haptic) displays that immerse the user in the virtual world and that block out contradictory sensory impressions from the real world.
- The graphics rendering system that generates, at 20 to 30 frames per second, the ever-changing images.
- The tracking system that continually reports the position and orientation of the user's head and limbs.
- The database construction and maintenance system for building and maintaining detailed and realistic models of the virtual world.

Fig. 1: Virtual Reality

VR Devices:

- HMD
- Tracing Devices
- VR Glasses

HMD: The most recognizable advances in HMDs have happened in determination, albeit shading immersion, splendor, and ergonomics have likewise enhanced extensively. In 1994, one had a decision of exorbitant and awkward CRT HMDs, which had fabulous determination and shading, or practical LCDs, which had coarse determination and poor immersion. Today sparing LCDs have adequate determination (640 × 480 tricolor pixels) and great shading immersion. HMDs utilize isolate shows mounted in a protective cap for each eye. New forms of HMDs, still under advancement, depend on the making of the picture straightforwardly on the retina, utilizing a light emission. With shade glasses the client wear a couple of glasses where every focal point is substituted with an electronic shade (a monochrome LCD). Taking a gander at a CRT demonstrating left and right pictures

synchronized with them, the shades are then again misty or straightforward.

Fig. 2. HMD

Tracing Device: Tracing device work with our position or we can say that if we change our position the output will change. In 1994, tracking the viewer's head motion was a major problem. Tracker ranges tethered the viewer to an effective radius of about four feet. Tracker accuracy suffered from severe field distortion caused by metal objects and magnetic fields. Tracing device also used in HMD as we change the position of our head the output will change. Unlike display technology and image-generation technology. Tracking technology has not had a substantial non-VR market to pull it along. The most important collateral market has been motion capture for entertainment applications, and that market has not pressed thetechnology on accuracy. So progress in tracking has not matched that of displays and image generation.

Fig. 3. Tracking Device

VR Glasses: Virtual reality glasses are the device called stereographic. When the user feel the VR world perception of depth and sense of space are enhanced. When we watch a 3d movie then we wear a glasses called VR glasses.

Fig. 4. VT Glasses

2. Augmented Reality:

The term Augmented Reality (AR) is used to describe a combination of technologies that enable real-time mixing of computer-generated content with live video display. AR is based on techniques developed in VR [1] and interacts not only with a virtual world but has a degree of interdependence with the real world. As stated in hugues11, "augmenting" reality is meaningless in itself. However, this term makes sense as soon as we refocus on the human being and on his perception of the world. Reality cannot be increased but itsperceptions can be. We will however keep the term of AugmentedReality even if we understand it as an "increased perception of reality".

The term "augmented reality" was first coined by researcher Tom Caudell, at Boeing in 1990, who was asked to improve the expensive diagrams and marking devices used to guide workers on the factory floor[4]. He proposed replacing the large plywood boards, which contained individually designed wiring instructions for each plane, with a head mounted apparatus that displays a plane's specific schematics through high-tech eye ware and project them onto multipurpose, reusable boards.

Fig. 5. Augmented Reality

II. VIRTUAL AND AUGMENTED REALITY

The term virtual the truth is ordinarily utilized by the famous media to portray conjured up universes that lone exist in PCs also, our brains. Notwithstanding, let us all the more correctly characterize the term. As per, virtual is characterized to be in embodiment or impact however not truth be told. The truth is characterized to be something that constitutes a genuine or real thing as recognized from something that is simply clear; something that exists freely of thoughts imagining it. Luckily has all the more

as of late characterized the full term virtual reality to be a simulated condition which is experienced through tactile jolts gave by a PC and in which one's activities mostly figure out what occurs in the earth. Additionally characterizes a virtual reality to be a PC created condition that can be communicated with as though that condition was genuine. A decent virtual reality framework will permit clients to physically stroll around items and touch those items as though they were genuine. Ivan Sutherland, the maker of one of the world's first virtual reality frameworks expressed "The extreme show would, obviously, be a room inside which the PC can control the presence of matter. A seat showed in such a room would be sufficient to sit in. Binds shown in such a room would limit, and a projectile shown in such a room would be lethal" sutherland68.

Fig. 5.

III. APPLICATIONS OF AR

1. Medical:

Medical augmented reality takes its main motivation from the need of visualizing medical data and the patient within the same physical space. This would require real-time in-situ visualization of co-registered heterogeneous data, and was probably the goal of many medical augmented reality solutions.

Another application for augmented reality in the medical domain is in ultrasound imaging. Using an optical see-through display the ultrasound technician can view a volumetric rendered image of the foetus overlaid on the abdomen of the pregnant woman. The image appears as if it was inside of the abdomen and is correctly rendered as the user moves sielhorst2008. Moreover, Blum et al. describe the first steps towards a Superman-like X-ray vision where a brain-computer interface (BCI) device and a gaze tracker are used to allow the user controlling the AR visualization.

2. Military AR:

Military AR can be used to display the real battlefield scene and augment it with annotation information. Some HMD's were researched and built by company Lit eye for military usage. In hybrid optical and inertial tracker that used miniature MEMS (micro electro-mechanical systems) sensors was developed for cockpit helmet tracking. In it was described how to use AR technique for planning of military training in urban terrain. Using AR technique to display an animated terrain, which could be used for military intervention planning, was developed by company Arcane. The helicopter night vision system was developed by Canada's Institute for Aerospace Research (NRC-IAR) using AR to expand the operational envelope of rotor craft and enhance pilots' ability to navigate in degraded visual conditions. HMD was developed to a display that can be coupled with a portable information system in military. Extra benefits specific for military users may be training in large-scale combat scenarios and simulating real-time enemy action, as in the Battlefield Augmented Reality System.

3. Robotics AR:

Robotics AR is an ideal platform for human-robot collaboration. Medical robotics and image guided surgery based AR. Predictive displays for telerobotics were designed based on AR. Remote manipulation of using AR for robot. Robots can present complex information by using AR technique for communicating information to humans. In, authors describe the way to combine AR technique with surgical robot system for head-surgery. An AR approach waspropose to visualizing robot input, output and state information. Using AR tools for the teleoperation of robotic systems. It was developed how to improve robotic operator performance using AR. It was explored for AR technique to improve immersive robot programming in unknown environments. Robot gaming and learning based AR. 3D AR display during robot assisted Laparoscopic Partial Nephrectomy (LPN).

4. Urban Planning and Civil Engineering AR:

Urban Planning and Civil Engineering AR is a decision support way of in architecture and interior design. A system was presented for constructing collaborative design applications based on distributed AR. AR technique was developed to explore relationships between perceived architectural space and the structural systems. It was developed for using AR systems to improve methods for the construction, inspection, and renovation of architectural structures in an approach is using AR to visualize architecture designs in an outdoor environment in. A prototype system was developed to use AR for an architectural application in facility management and maintenance. In calibration-free AR based affine representation was described for urban planning. It was approached for using a tangible interface and a projection-based AR table top interface to research urban simulation and the luminous planning table. A System based on AR with a tangible interface was demonstrated for city planning in. AR user interaction techniques were

developed to support the capture and creation of 3D geometry of large outdoor construction structures in. A co-operative AR design system, A4D, for AEC (architectural, engineering and construction) was approached in. It was presented that a system with human computer interaction, AR visualization and building simulation can interact with buildings. AR as tool was approached to be used in architecture, building performance visualization, retrieving information of building equipment and construction management in respectively. In one system based AR was designed to support complex design and planning decisions for architects. 3D animation of simulated construction operations based AR was. The research spatially AR design environment can be used in urban design.

IV. USES OF VIRTUAL REALITY

It is not easy to define all the uses of VR because now it's enough develop in many fields. Here, some uses of VR are explained. EDS Jack is an example of a commercially available virtual reality software package. It is mainly used for visibility and ergonomics study. These are two of the areas that using Virtual Reality really benefits. For example when designing a large mechanical device such as a bulldozer or even a car, visibility and ergonomics are very important to the operators. Would you buy a car that was uncomfortable to drive or had poor visibility, probably not? Many companies spend a large amount of money making their products interface better with the operators. The cost of building prototypes is very expensive, upwards of a few million dollars for one machine using the bulldozer example. By using virtual reality the company could check out the viability and ergonomics of their machine quickly and make changes to it without ever spending money on building hardware. Another area that Virtual Reality is heavily used in is driving or flying simulations. These provide the users a chance to gain expertise operating a vehicle without the real world consequences of making a mistake. MPI Vega Prime is an example of a software package that supports any type of driving simulation. The user builds the virtual environment within the software package. It biggest advantage is its realistic physics engine which supports collision detection. Flight simulators are the most common type of machine simulation. Some other examples would be the US Army's use of simulators to train tank solders with virtual tank wars. NASA also trains its astronauts on how to land the space shuttle with a virtual reality simulator.

V. CONCLUSION

Virtual Reality is now involved everywhere. You can't imagine your life without the use of VR Technology. In this paper we define the Virtual Reality and its history. We also define some important development which gives the birth of this new technology. Augmented reality focuses on learning and innovation of existing world rather than creating new ones. Its fundamental idea is to mix the real environment to the virtual environment through projection technique by gathering information and ensuring the virtual content is aligned and readjusted to the real world objects.

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