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AUGMENTED REALITY: REAL WORLD WITH VIRTUAL LAYER

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ABSTRACT

Augmented Reality is innovative technology which has made momentous progress and crossed many borders of different arena in this modern era of technology. The objects that endures in the real-world are offered an interactive experience of real-world environment by using this technology on the basis of computer generated perceptual information. Augment reality combines virtual and actual reality using new tools. Numerous solutions have been also provided for solving complex problems in research sector. This paper intends to elucidate numerous dimensions of augment reality, its utility and future perspective with latest tools and techniques in modern era.

Keywords*: Augmented Reality, Virtual Reality, Real world, Virtual layer*

I. INTRODUCTION

Augmented reality (AR) is a digitized way of imposing text, images, video, graphics and animations on physical objects or written content. Augmented reality is combines digital data with the user's environment in real time. Augmented Reality utilizes the current environment and additionally overlays fresh information while Virtual Reality generates a completely artificial environment. Augmented Reality means: enhanced or improved i.e. Augmented Reality = Real World with Virtual Layer. Real World means we want to do many things, see many places and enjoy many things. But we have our own limitations and constraints like time, money, social commitments, biological constraints and technological constraints. But Imaginary World is limited to oneself. No one else can see or come and join with you in imaginary world. Special 3D programs are used to design these augmented reality applications that permit the developer to mix animation or digital information in the computer program to an augmented reality "marker" in the real world. When Augmented Reality browsers or add on device gets digital data from a recognized marker, the code of the marker and the right picture or picture layer begin to be executed.

Global Positioning system is one of the major applications for smart phones to locate the user and its compass for the orientation of device detection. Training programmes for the military also uses AR programs may include gesture recognition technologies and vision machine.

AR vs. VR i.e. Augmented Reality vs. Virtual Reality: AR adds value to reality, projecting information on top of what you're already seeing. And Virtual Reality replaces reality, taking you somewhere else. A virtual reality system's unique characteristic is head attached screen (HMD). That screen blocks the outside world and presents to a wearer a perspective that is fully controlled by the computer. In Augmented Reality, the user must still be aware that he or she is present in the "real world".

Components of Augmented Reality (AR)

1. **Head-Mounted Displays :** Just as monitors enables us to see computer generated text and graphics Head-mounted displays enables the user to view text, graphics and animation designed by augmented reality technologies. Types of HMDs are : -
   - Video see-through
   - Optical see-through
2. **Tracking and Orientation:** Tracking and Orientation is needed in order to find the user compared to the environment and is also used to track the user's precise eye and head motions. Augmented Reality

technology plays three main roles such as monitoring the user's head and eye place and motion, and setting the graphics to be presented with utmost caution.

3. **Portable Computer:** Augmented Reality technology needs high speed processors pcs. Even now, the computers used for this purpose are not up to the mark. System configuration must be high end for 3D graphics.
4. **Mixed Reality (Continuum):** Paul Milgram and Fumio Kishino defined a mixed reality in1994 as the predominantly virtual spaces where real world objects or people are dynamically integrated into virtual worlds to create new environments and visualizations wherever physical and digital objects interact in real time.

   This range (i.e. Mixed Reality Continuum) includes all actual and virtual objects variants. On the range, the natural world where nothing is computer produced starting from far left. On the spectrum, the most-right is the virtual environment wherever the computer generates everything.

II. WORKING AND CONTROLLING OF AUGMENTED REALITY

Some data like text, images, animations, videos and models can be used for Augmented Reality and people can produce both natural and artificial light. Devices can display Augmented Reality includes mobile phones, handheld devices, screens, glasses and head-mounted displays. It includes techniques such as S.L.A.M. (simultaneous localization and mapping), depth monitoring (shortly, sensor information calculating the distance to the objects), and the following elements:

i. Cameras and sensors: - Collecting and sending information on user interactions for processing. Device cameras scan the environment and device locates physical items with this info and produces 3D models. Taking pictures/videos can be unique duty cameras such as in Microsoft Hololens, or popular smartphone cameras.
ii. Processing: - Eventually Augmented Reality devices should behave like small pcs, something already done by contemporary smartphones. Similarly, a CPU, a GPU, flash memory, RAM, Bluetooth/Wi-Fi, a GPS etc. are required to be able to measure speed, angle, direction, space orientation etc.
iii. Projection: - This relates to a small projector on AR headsets, that takes digital content (processing result) information from sensors and projects to a viewing surface. To use it in commercial business products or services, this technology is not fully developed.
iv. Reflection: - Some AR devices have mirrors to help view virtual images from human eyes. Some have a "small curved mirrors array" and some have a double-sided mirror to reflect camera's light and the eye of a user. The objective of such paths of reflection is to perform a proper alignment of image.

Augmented systems are often controlled by either pressing a pad or voice commands. The touch pads are often easily accessible on the device. They work by identifying the stress changes that occur when a user touches or swipes a specific location. Voice commands operate as our smartphones do. A small device microphone will pick up your voice and then the commands will be interpreted by a microprocessor. Voice commands, like those on the augmented reality phone of Google Glass are pre-programed from a list of instructions that you can use. Almost all of them begin with "OK, Glass," on a Google Glass which warns your glasses that a command will follow shortly. For instance, "OK, Glass, take a picture" will send a microprocessor command to the snap a photo of anything you're looking at.

III. AUGMENTED REALITY UTILITY AND FUTURE PERSPECTIVE

Augment reality is proving to be useful tool and has been explored for number of applications which are enlisted in as below: -

Sr. No.	Arena	Description about utility of Augment Reality in particular arena
1.	Education	Augmented Reality brings unlimited ways for education process. It provides additional reality in learning. So everyone can learn as fast as possible without becoming boring. It makes learning easy with the way which it presents the content. And it can really help the tutors to explain the subject which these 3D data and they can easily convey what they are trying to say with the thing.
2.	Medical	AR technology used by the medical students for training purpose under controlled environment. Visualization helps patients to explain complicated medical situations. So it drastically reduces the risk of failure in their fields. This technology is using with high tech instruments to provide the surgeon with a single perspective of everything. Neurosurgery is one of the major applications of augmented reality. Augmented Reality provides the precise placement of body parts needed to work with.
3.	Industry	Industries can get very detailed information in the assembly and disassembly of tools and machines. By just scanning a machine we will get the 3D view of the machines and we see the entire parts and specifications and how it works by using AR.
4.	Maintenance / Repairing	Augmented Reality can be used in maintenance and repairing work by using a head-worn display, so that superimposed imagery and information can be seen in his actual line of sight. The method could be submitted in a box in the corner, and the precise movement the mechanic needs to execute can be illustrated by a picture of the required instrument. All the important parts can be labelled by augmented reality system. It is possible to break down complex procedural repairs into a sequence of easy steps. Engineers can be trained by simulations which decrease the cost of training.
5.	Entertainment	Games: Number of games and toys can be merged in different forms augmented devices. One popular example is Snap chat, which allows to superimpose fun masks and designs on the face before sending a message. Vuzix M2000AR displays content from a linked device over real-world content video stream that may be ideal for executives or staff who need to access technical information or repair processes on the spot.
6.	Real Estate	In real estate with a touch of a button clients can get a 3D 360 degree view of the property. Clients can visualize changes to a property by modifying the color of a wall. Even clients can go inside the property virtually and get a clear idea of the place without visiting there using augmented reality.
7.	Navigation	Navigation apps with our everyday life may the most natural fit of augmented reality. Using Augmented reality, enhanced GPS systems create it simpler to get from point one point to another. By using GPS system, it is possible to find the route of the desired place.
8.	Heads-Up Display	Augmented Reality applications are widely accepted by military purposes by using HUD. It provides a transparent display that is viewed straight to the view of pilot and every critical information presented to pilot. In “heads-up" Display, the pilot doesn't need to look down to get the information he required. The Head-Mounted Display (HMD) system is used by Ground soldiers. Within their line of sight, Critical information such as enemy place may be provided to the soldiers. This technique is also used for training simulations. Innovega has developed contact lenses capable of projecting augmented reality content, eliminating the need of pesky headwear.
9.	Advertising/ Promotions	Augmented Reality plays a very important role in advertising and promotion. The “Layar” is the master of augmented reality. It is a free android based application using GPS system to show nearby places by showing time information on top of your mobile's camera

10.	Sightseeing	Augmented Reality provides number of options for sightseeing and tourism industries. The natural use of technology is the capacity to increase a natural view of exhibits. Sightseeing experience has been improved using augmented reality. Tourist can walk through historic sites using a camera-equipped smartphone and see facts and figures on their live screen as an overlay. To search information from an internet database, these apps use GPS and image recognition technology. Besides this, there are features that provide the ancient look of the sites like 50, 100 or even 500 years back.
11.	IBM's Shopping Assistant	IBM published the Augmented Reality Shopping Assistant, a retail- focused smartphone app. Essentially, the app scans shelves in retail shops and provides data to demonstrate where products are positioned, as well as links to additional information on prices or health.

With mobile technologies, many of the augmented technologies are being developed. Augment reality has also became a land mark in field of computer games. Medicine, Fine Art, Military, Industries and Education are the major broader sector in which augment reality will make remarkable progress to prove its existence.

IV. CONCLUSION

It is an attempt to presented concise overview about the augment reality and its approaches in various areas. In the 21st century, augmented reality is likely to make its way into our daily lives more and more. Also soon it is going to set the next stage of visualization for offering perceptually enriched experiences. There will be remarkable contribution to provide the solution for complex and obsolete problems by improving graphics interface elements and user interactions due to technological advancement.

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