

# Augmented Reality

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**Abstract:** -- In this paper, we will discuss about the Augmented Reality technology. Augmented reality is an interactive virtual experience of things in real world. Augmented reality technology creates an environment around the user through which it could interact as well as stimulate things accordingly, Augmented Reality has many application for example it's been used in field of video games, architecture, astrology, education. It can be used in medical field as well and in this paper we will be majorly covering area of augmented reality used in the field of medical. Also mentioning some design for the augmented glasses and safe use of those glasses.

**Index Terms:**—Augmented reality, Holographic image, camera and sensors, 3D Projectors.

## I. INTRODUCTION

Augmented Reality is a technology which abstract the digital information and creates an environment around the user through which user is able to interact with environment and to be mentioned the environment created around user is not artificial. Device used in augmented reality looks exactly like an eye gear or sunglass on which a small camera known as eye tap and a holographic projectors known as virtual retinal display placed on the rim of glass where the camera takes the input from the real world and projectors project a holographic 3D image in-front of user and user is able to interact with the projection made in-front and most importantly the holographic projection could only be viewed by the person who is wearing those glasses as the lenses used in the eye glass enable the user to see the projection, user not only see the projection but could also manipulate and interact with projected holographic projection. There are many application of augmented reality like its being used in gaming, designing and making blueprint for constructing building etc. Augmented Reality is not limited to these application augmented reality is playing a very important role in the field of medical, helping doctor to analyze the body very deeply and finding the disease inside body which cannot be finded from normal scan but in augmented scan doctors can analyze with holographic image and find the problem easily.

## II. CONSTRUCTION

Augmented Reality glasses are like big sunglasses having following components that work on S.L.A.M (simultaneous localization and mapping) technology. Components consisting in glasses are as follow:-

A.) Cameras and Sensors: collecting data about user's interactions and sending it for processing. Cameras on devices are scanning the surroundings and with this info a device locates physical objects and generates 3D models. It may be special duty cameras.

B.) Processor: The image captured by camera is processed by the CPU/GPU in the RAM to analyze the image and project a holographic 3D image through it.

C.) Projection: A holographic projectors known as virtual retinal display placed on the rim of glass where the camera takes the input from the real world and projectors project a holographic 3D image in-front of user and user is able to interact with the projection made in-front and most importantly the holographic projection could only be viewed by the person who is wearing those glasses as the lenses used in the eye glass.

D.) Reflection: Some AR devices have mirrors to assist human eyes to view virtual images. Some have an "array of small curved mirrors" and some have a double-sided mirror to reflect light to a camera and to a user's eye. The goal of such reflection paths is to perform a proper image alignment.

## III. WORKING

Working of Augmented Reality glasses is simple working of camera and sensor analyses. The glasses consist of two device setup on its rim. One device is camera and sensor which scan the image and give the input to the small micro controller chip connected on the glass rim which is not visible easily the micro controller processes the image and form a holographic projection of it and send back the signals to the second device projector which through the projection rays in front of user the rays colliding with surrounding environment and forming the 3D holographic image which can only be viewed through the glasses as they are made of x-ray enable material and a coating upon it to protect user eye.

## IV. HARDWARE AND SOFTWARE

### A.) HARDWARE:

In case of hardware the most important components are two cameras which enables the calculation of stereoscopic depth more easily, what it is really doing, is triangulating points in three dimensional space, plus time, because the user is typically moving. The second major component that is

projector it's very small in size but it through multiple rays at a time to form a 3D holographic image and both of these components are able to work only because of CPU or micro controller it's a small chip which process the real time images captured by camera at sudden point of time, the micro controller is in form of Nano PCB (printed circuited board).All these components are placed on the rim of glass.

**B) SOFTWARE:**

The coding done in the micro controller is done with help of python3 or R language. Micro controller it's a small chip which process the real time images captured by camera at sudden point of time, the micro controller is in form of Nano PCB (printed circuited board).All these components are placed on the rim of glass.

**V. APPLICATION OF AR****A. MEDICAL**

Doctors use AR technology to practice surgery in a controlled environment. Visualizing the complex medical condition in a simpler way it help doctors, to know the problem in the body that is not detectable. Doctors scan the patient body and the micro controller in the AR device processes the scan and projects a projection of body and it help the doctor to interact with projection and could easily find the disease inside the body. The above application could be explained by an example, suppose a patient is suffering from heart disease and the problem is inside heart which is not a simple operation for any doctor so before operating on the patient directly and analyzing the situation at that moment of time increases the risk percentage to 87% but if the doctor analyze and study situation before the operation in his AR device then it decreases the risk percentage by almost 50% and increases the chance to save the patient.

**B. EDUCATION**

Augmented Reality helping student to study and increase their knowledge very deeply. The potential of combining smartphones and Augmented Reality for education is big, though it still has to be fully discovered. AR, in various ways, could grant students extra digital information about any subject, and make complex information easier to understand.

AR enabled classroom will project 3D structure of models which are difficult for student to understand but with the help of AR student could interact with the models and will be able to interact with it and learning the subject very deeply. Augmented Reality is not helping the student in their subjects also its helping student in achieving their dreams like having interest in space, deep sea etc,AR creates an environment where students could experience how it feels to be in space or deep sea.

**C. MILITARY**

Heads-up display (HUD) is the typical example of augmented reality when it comes to military applications of technology. A transparent display is positioned directly in the view of the fighter pilot. The data that is typically displayed to the pilot includes altitude, air velocity, and the horizon line, along with other critical data. The term "heads-up" name applies because the pilot does not have to look down on the instrumentation of the aircraft to get the data it needs. The head Mounted display (HMD) is used by ground troops. Critical data such as the enemy location can be presented to the soldier in his line of Sight. This technology is also used for simulations for training Purposes.

**D. ARCHITECTURE**

In architecture Augmented Reality plays a very important role as it help the designer to visualize its work before constructing, it projects the holographic 3D model of work and designer could make changes accordingly in its work through the 3D model being projected. An example to understand its application in field of architecture is a man constructing a building on unlevelled land and there is risk that the building may fall if there is a natural disaster so with help of augmented technology the architect could design and make changes accordingly in the holographic 3D projection and simulate the building and decreasing the risk factor and making building so strong that it will stay strong in every disaster.

**E. AUTOMOBILE**

Augmented Reality has an application in designing car and airplanes. Using augmented reality technology during the design stage of car-making allows manufacturers to be creative and design concept models with minimum cost. This means many variants can be shown, modified and assessed during the early phases thus reducing the time and cost required for the overall process. For example, Volkswagen uses spatial augmented reality to project virtual data on to real vehicle design models thus allowing the analyses of components straight away. This saves time and costs required in product development because designs can be accepted or Rejected without having to produce a physical prototype.

**F. AGRICULTURE**

Augmented Reality application in agriculture is not very much developed now and not very popular though but in agriculture AR plays a very fruitful role. The increasing global warming is decreasing very precious plant species from earth which could be saved by augmented reality by studying the gene and plant of plant species and finding the way to combine their gene with other plant species to increase their existence. As doing experiment with the rare plant species could have a

chance of failure which will extinct the plant species so it help the scientist to study and do the experiment visually with help of Augmented Reality technology.

## VI. COMBINATION OF AR AND AI

The combination of Artificial Intelligence with Augmented Reality is going to change the face of Augmented Reality. Augmented Reality is just making the user observation more easy and interaction more efficient but with a combination of Artificial Intelligence it will become more user friendly and the interaction is more efficient. The application of AR will change and will be more efficient with combination of AI like in the field of medical if doctor is able to interact with 3D holographic image formed and find the problem inside the body but with combination of AI the AI assistant will help the doctor in finding the exact problem and giving suggestion about operation.

## VII. CONCLUSION

The net conclusion of AR technology is that Augmented Reality is a technology which abstract the digital information and creates an environment around the user through which user is able to interact with environment and to be mentioned the environment created around user is not artificial. Working of Augmented Reality glasses is simple working of camera and sensor analyses. Augmented Reality glasses are like big sunglasses having following components that work on S.L.A.M (simultaneous localization and mapping) technology

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