

# A SCRUTINY ON AUGMENTED REALITY TECHNIQUES BASED ON THEIR COMPETENCY IN THE REAL WORLD

**Padmavathi.B**

*Assistant Professor*

*Department of Electronics and Communication Engineering  
Jeppiaar Maamallan Engineering College  
Jeppiaar Maamallan Nagar,  
Vadamangalam, Sriperumpudur-602 108.  
Chennai, India.*

**Ragini.R**

*Department of Electronics and Communication Engineering  
Jeppiaar Maamallan Engineering College  
Jeppiaar Maamallan Nagar,  
Vadamangalam, Sriperumpudur-602 108.  
Chennai, India*

**PavithraDevi.S**

*Department of Electronics and Communication Engineering  
Jeppiaar Maamallan Engineering College  
Jeppiaar Maamallan Nagar,  
Vadamangalam, Sriperumpudur-602 108.  
Chennai, India*

**RowshanShahana.H**

*Department of Electronics and Communication Engineering  
Jeppiaar Maamallan Engineering College  
Jeppiaar Maamallan Nagar,  
Vadamangalam, Sriperumpudur-602 108.  
Chennai, India*

## **Abstract**

Augmented Reality is a breakthrough technology that could practically develop the execution of complex mechanisms. Augmented Reality merges virtual and actual reality, making available for the new tools to ensure potency in the transfer of knowledge for many processes and in different environments..Augmented Reality can be seen through a extensive variety of experiences. The Augmented Reality tools consists of three categories. Firstly, Handheld AR is a common method that uses smart phones and tablets to show AR content, it scans a QR code using the phone's camera provides additional information i.e AR on your screen. At second, there is another which uses headsets that are classified as optical see-through (OST) and video see-through (VST). But AR is more than just smart phone. Where it includes the Google Glass and other head-up displays (HUD) like Vuzix Waveguide Lens put Augmented Reality directly into the glasses. And at third, the new technologies that are in development include spatial see-through displays which project content in 3D free space using plasma in the air.

**Keywords:** Augmented reality, Hand-held device, head mounted display, Spatial reality.

## **I. INTRODUCTION**

Augmented reality is an interrelation of information gathered in real world to outlook in a virtual environment. Augmented Reality change the environment around you into a digital coherence by placing virtual objects in the real world, in real-time. Augmented reality has an interesting way of portraying all the imaginative details or contents. Handheld AR is a common method in which Apps like Augments helpful for designers, that allows users to upload 3D model and visualize them in a physical space. For example, the various filters on Snap chat and Instagram.. Another is using headsets that are often termed as true AR at the moment[6]. In this, glasses could be used as reminders for patients undergoing medication. Real time battlefield data could be applicable to soldiers wearing these. In education, AR technology is emerging as a popular technology in forming a range of educational applications to help enrich and enhance the teaching and learning methodology at all educational levels

and was it exactly attains the student's attention perfectly. Spatial augmented reality enhance the real world objects and present without the need of certain displays, SAR compose use of digital projectors to display graphical data onto physical objects. In this retinal displays which projects directly on users' retina. We could mark at a building and analyze about its history, whether it's on sale and more.

## II. RELATED WORKS

### A. Handheld guides in inspection tasks: Augmented Reality vs. picture

Handheld AR (HAR) specifies AR displayed on handheld devices like sensible phones or pill PCs[10]. These devices give higher data input and sharing capabilities. hand-held devices facilitate high adjustability. These devices has oft been assessed in terms of out of doors navigation however has not been shown to offer ,benefit compared to standard navigation guides. hand-held AR (HAR) is a lot of possible and options higher data input and sharing capabilities [20]. during this paper HAR was compared with 2 hand-held guides, i.e. associate AR interface and a non-AR image interface. This paper centered on scrutiny tasks that involve higher data density and additionally needs the user to be in motion, further on perform many viewpoint alignments [10]. In this, AR interface shows 3D registered annotations, that is, annotations having a fixed 3D position within the AR surroundings. From this, physical manipulation that sometimes includes observing the standard second data, like text and charts, or sharing data with different employees square measure a lot of simply accomplished employing a hand-held device. Here analysis is formed to grasp the effectiveness of victimisation 2 different hand-held guides in scrutiny tasks victimisation 2 different hand-held guides in scrutiny tasks. they're synchronous localization and mapping (SLAM)- based AR guide and a

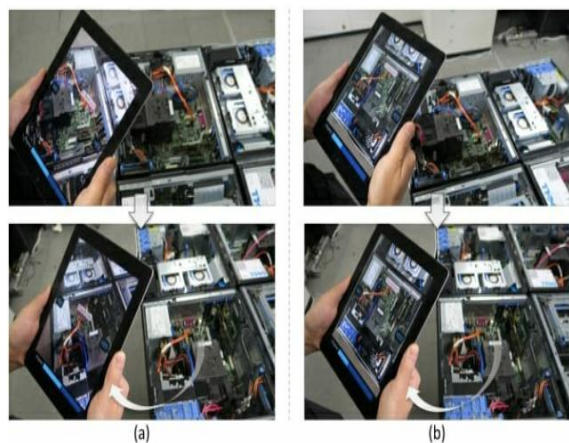


Fig. 1. Comparison of the effectiveness of a handheld AR (a) handheld picture (b) interface.

non-AR image guide[10]. Their analysis concerned 2 hardware review tasks that painted the world review of advanced environments[21]. The results of these comparative evaluations showed in fig1[10] that the utilization of AR interface resulted in lower task completion times, fewer errors, fewer gaze shifts, and a lower subjective work. In general, A 3D virtual model-based guide will be thought-about associate intermediate approach between the AR and therefore the non-AR image interface [16]. But, the development of a 3D model isn't much doable. Hence, In distinction to the 3D virtual model-based interface, SLAM-based AR and non-AR image interfaces area unit wont to update the contents of the atmosphere. most often, data matching needs someone to mentally or physically rotate the displayed data to align it properly. In distinction to tasks victimisation HAR that area unit conducted from a fixed position this study needed users to maneuver and to alter their viewing angle [17]. There was 3 objective measurements taken and area unit thought-about for future functions. they're task time, error rate, and therefore the variety of gaze shifts, zoom perform. Zooming in on the read was doable solely by moving the device nearer to the article.

### 1. Drawbacks

AR has been shown to extend work efficiency in varied tasks, however the effectiveness of AR displayed on a hand-held device for facultative efficient scrutiny has not been studied full. several existing HAR guides aren't thought-about effective in task support. Hand-held AR (HAR) isn't as effective as HMD-AR in terms of mobility.

### B. Interactive Holographic Application using Augmented Reality EduCard and 3D Holographic Pyramid for Interactive and Immersive Learning

The growth of increased reality (AR) and holographic show technologies have a good potential to support and enhance teaching and learning method, as a result of the 3D pictures offer new views to the scholars to be told bound topic simply [15]. In current state of affairs there square measure some problems and challenges. the current AR application, the knowledge square measure displayed in an exceedingly little screen of Smartphone, wherever few info will solely show that produce some issue for the user to look at the knowledge on the screen and users got to carry the sensible phones so as to look at the virtual object on the screen [15]. These AR technologies square measure solely usable for one user to vision the AR object at a time. This technique is enforced mistreatment the AR pursuit technique and mix with 3D holographic pyramid show .This makes the holographic impact a lot of interactive and realistic and therefore the virtual objects will show in nullity like real object [6]. User will read

and move many 3D objects in mere one holographic pyramid by employing a specially designed AR image target – the EduCard.

### 1. System overview

The Interactive Holographic show offers a result to show the educational content within the type of pic in Associate in Nursing interactive approach, consists of 3D animation and also the audio clarification of a subject. By mistreatment the Vuforia computer code development toolkit (SDK), the AR following technique is verify what content to be displayed within the holographic pyramid. the output for the system to show the holographic 3D pictures from the multi-view projection is holographic pyramid wherever the users will see the photographs from totally different views, like front, back, left and right[14]. the target of this methodology is to develop the educational method of the scholar further as offers an efficient sharing of digital content. among the webcam's vary of read the users got to place the EduCard. The AR following technique is employed to work out that Associate in Nursingd wherever the virtual object ought to show within the virtual world consistent with the EduCard once an input marker is detected. The four cameras area unit setup among the virtual world that represent the front read, right view, left read and back read of the displayed virtual object.

### 2. Methodology

The digital camera can capture the video frame to permit the Vuforia SDK to go looking for the input imagetargets[7]. If AN input marker is known the SDK discover the marker options that square measure found within the image itself and so comparison these caterpillar-tracked options with a best-known targetresource info. Once the image target is known, the SDK can perform the viewport calculation to position and orient the virtual object and show that virtual object on the output screen [19]. By implementing the Pepper's Ghost technique the holographic show was created. These techniques would like a mix of 2 main hardware, that square measure the holographic pyramid with four reflective sides at all-time low and a monitor that's placed on prime of the holographic pyramid. The monitor shows the feel aspect rendered within the Unity scene and also the image within the scene is mirrored on the reflective surface at AN angle of forty five degrees. It show natural on the holographic show once users square measure viewing through the Pyramid Prism in single viewpoint. The frame work of projected system square measure showed in fig2[6]. To develop the code, Unity 3D has provided several vital functions. The Unity affords the camera quality that's accustomed capture and show the virtual world to the output device.

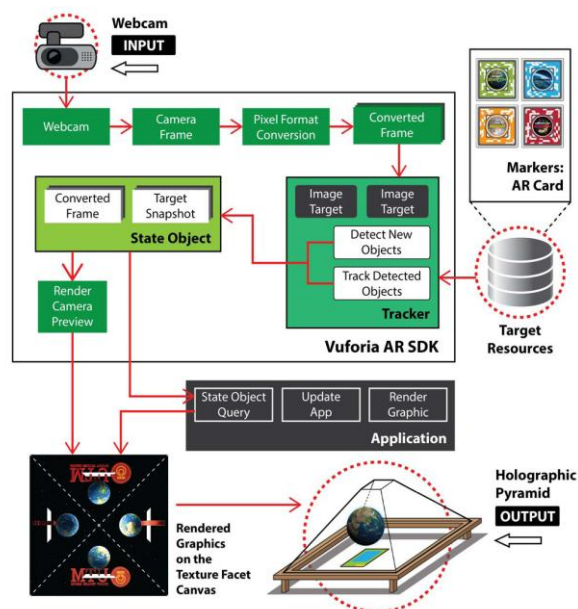


Fig. 2.The framework of proposed system.

### 3. Drawbacks

The Augmented reality which can be viewed in naked eye leads to the next generation technology. It offers many advantages and applications beyond our expectations. But unfortunately, it cannot be implemented in real time. The researchers are still in process related to this issue and soon it will make a difference in our real world. Where anything is possible according to science and technology.

### C. [POSTER] Hybrid Video/Optical See-Through HMD

Horn Storage System (HMD) is designed for users who focus on themselves only with or without reduced parallax. Standard stereoscopic HMDs provide binoculars with parallax and parallax, most of which fall into two categories according to visual paradigms, such as HMD-VST and optical HMD (1). In OST HMD, a direct view of a real user usually increases with the goal of virtual integrated parts and increases with the user's view. Otherwise, the virtual information in the VST HMD is combined with the image from the camera and captured by one or two external cameras attached to the viewfinder frame (Fig. 4) [12]. By adjusting several lenses between the beam and the display connection, you can focus on a virtual 2D display that allows you to display the visibility of translucent surfaces at a convenient distance

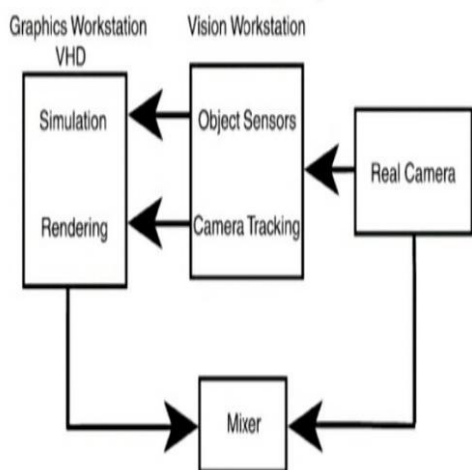


Fig 3. AR system in general.

For AR applications, the biggest challenge is to provide the highest level of reality when integrating computer-generated elements with a direct overview of the surgical scene [9]. Unfortunately, the shortcomings of the previous approach are twofold: the difficulties associated with the classification of three colors using uncontrolled and / or incompatible lighting conditions and standard critical methods [4] Cannot be ignored during surgery. The proposed actions will overcome the drawbacks of the previous method. In CRS, the three-dimensional position of the marker is calculated using the stereo-triangulation method applied to pairs of images taken with two external cameras.



Fig 4. Commercial optical and video see-through head-mounted display

### 1. Augmented reality using glasses in real world:

In recent years, AR has been used in many environment and in many fields. The direction of the pedestrian in the field plays a major role in the AR treatment [18]. where the doctor help to enter the patient's personal medical record information. AP is also used to renovate old houses and historical monuments, and we can see today. At this stage, the AR storage system provides the most effective solution for medical tasks performed

manually in the surgeon's field of vision [8]. This reduces the emerging mental effort required for a person.

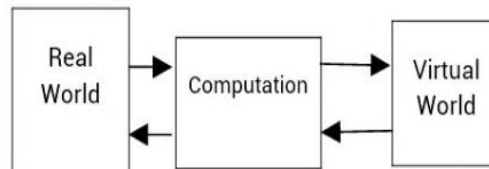


Fig 5. Human Virtual Interaction

### 2. Camera Placement and Image warping

The purpose of the hybrid VST / OST HMD - for tasks performed in bulk. For this understanding, the camera is flexible up to 50 cm of visibility / movement [3]. Since the glass pair has an angle of 15°- 16°, the optical axes of both cameras intersect at a given working distance. The correct function of the Augmented operation are as given. The mounted camera captures the moving pictorial bits in the frame of the incident. After aligning the radial distortion compensation process with the visual display, the video frame is displayed as a background. Virtual frames combine radiation scenes sequentially to create an extended scene that looks offline. Optical systems typically use lenses made up of lenses so that users can see the world using virtual algorithms developed on real lenses [9]. Visible lenses allow users to see the real world in different ways. Therefore, the user views the real world as a virtual overlay world. Video-related systems use video cameras that draw consumer attention to the real world. Video from this camera combines a virtual image and creates a scene that unites the real world and the virtual world. The result will be a perfect outcome on a head mounted display that can be viewed close by.

### 3. 2d Graphics

The 2D linear transformations can be represented by a 2x2 matrix. The most common transformations such as rotation, scaling, shearing, and reflection and linear transformations can be represented in a 2x2 matrix. Other transformations can be represented in a 3x3 matrix.

### 4. 3d Graphics

3D objects can be converted with the matrix of transformation as well as in 2D, the 3D matrix used is 3x3, while the transformation is a 4x4.

## 5. Advantages

AR gives us superpowers. With the support of a computing accessory and the augmented reality technology, our senses can now be enhanced[13]. Augmented reality glasses are used in many fields such as in medical, education, industries and so on. In industries and medical it offers significant advantages, such as optimizing design, maintenance and restraint of industrial facilities, guidance in algorithms and sustain learning for users, as well as technical assistance for troubleshooting and providing solutions for complex tasks. It is an efficient and impressive device from the others respectively[4]. In learning, the AR glasses provide much understanding for the students by the virtual perceptions in real view. AR glasses are simultaneous and error free technology, which can be used in any flexible environment.

## III. FUTURE WORK

Artificial Intelligent technology give rise to the terminology augmented reality which is popularly known as the next generation technology. Till now, its approaches has been used in so many functions and in many algorithms in our daily life. In our paper, we discussed and focussed about the 3 major and important techniques of the Augmented reality. Aside from the handheld and spacial classification, the HMDs one is increasingly used in our day to day life. From the existing system, we propose that, the method of Augmented reality using glasses will be the most reflective, efficient and accurate method in the field of medical and industries than the other two techniques. By implementing certain simulations/algorithms it reduces the time consumption of the user and able the users to use it effectively .

## IV. CONCLUSION

Augmented reality aims to cover its simulated elements over the real-world. The most targeted techniques of Augmented reality is being discussed in this paper. Impressively, these simulated elements can only be seen through by a smart phone camera or with duo AR glasses. Inclusive of these, spatial augmented reality has been paid for its digital contents in media art and also among humans. As in our day today life, all the devices adapt to the new technologies emerging. Hence, the growth of Augmented Reality is exponentially huge among them. AR has already reached its destination, yet it still has some distance to cover in few applications like the industries, and the military. Thus, after the expected major outcome, the people may soon adapt it as a familiar user interface. With social acceptance, it would likely be possible for wide-range use of AR systems in our everyday life. According to our survey, we come to a conclusion that

Augmented Reality will be one of the greatest source to our technological development in the future.

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