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## Augmented Reality in Context to India

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**ABSTRACT:** Augmented Reality is that leading technology in which increases there al-time environment by overlaying computer-generated information like graphical, textual, or audio content, as well as objects over a display screen. AR is used in different applications over different countries. There are many areas in which augmented reality is being used such as Navigation, Military, Medical, Gaming, Entertainment , library management etc. In India augmented reality is being used as mobile android based applications, marker based library applications. In an emerging time augmented reality can be used as teaching and learning tool in electronics engineering which displays the electronic devices into 3D.

**KEYWORDS:** Image processing, Graphics, Markers, Real, Virtuality

### I. INTRODUCTION

#### Augmented Reality

The word Augmented states that make something greater by adding to it and reality means which is true or real. So, collectively Augmented Reality defined as a combination of a real scene viewed by a user and a virtual scene generated by a computer that augments the scene with additional information. Augmented Reality (AR) was first revealed in the 1960, but only lately technologies can be used to easily organize augmented reality applications to numerous users.[1] Enrichment of real world through computation based information is known as Augmented Reality, which is one of the major research topics at present [2]. This particular direction of computer science encompasses image analysis, visualization through computation and computer graphics techniques to accommodate data generated digitally to the real-time surrounding. It allows the interaction in a real time manner between the user, virtual components and real components. Videos may incorporate 3D graphics through augmented reality once the virtual elements are considered as part of the real environment. In the present study we have represented an overview of the Augmented Reality along with most popular theories and their respective applications [3][6].



Figure 1: Indicates Augmented Reality Technology

There are three key characteristics of AR systems:

- (1) Virtual images mixing with the real world
- (2) Three-dimensional registration of digital data
- (3) Interactivity in real time.[3]

**Categories of Augmented Reality:** There are two major categories of AR in visualization Technologies: Marker-less and Marker-based

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A marker is a 2D graphical symbol printed on a sheet of paper to which a piece of information (e.g., video, audio, text, diagram, or graphics) is assigned. [2]

## A. Marker-less

In this particular technique, the condition of the virtual object displaying is generally provided by the respective user, no particular marker is used for this purpose. For instance, the specification of the displaying of the virtual object in an AR display with respect to certain 2D coordinate can be specified by the users [4][5].

## B. Marker-based

In marker-based AR, a virtual object is displayed only if it fits corresponding marker pattern. Marker based augmented reality combines the virtual image and marker and displaying image in 3D. [4][5]

## II. DEVELOPMENT OF AUGMENTED REALITY

In India with the development of video games Augmented reality came into existence but today, its growth is being motivated further by smart phones and tablets. It likely to provide the related uprising as driven by the touch phones in mobile world. This concept is continuously try to incorporate in the businesses world and at 19 Studios this thought is previously assimilated by assessing client necessities and increasing the most practical augmented reality solutions. Augmented features use subject device features to build up the mobile applications. Augmented reality developers improve the usability of augmented applications by extending their idea till their limits allow. [8]

## III. USAGE OF AUGMENTED REALITY

Augmented Reality changes the visualization into a reality. In field of medicine, education, games, sports, education and engineering has driven range for limitless possibilities. Now it's becoming easier for developers to create immersive, wealthy augmented reality experiences due to presence of resourceful hardware technology. Applications are more attractive and Games are more rational. Many areas where these applications are found like industrial maintenance, training, location based services and much more. It boosts up the conversion rates by stimulating emotion in customer-business relationships. [9]

## IV. THEORIES OF AUGMENTED REALITY

Tom Caudell provided the initial theory of Augmented Reality. According to him, this theory was derived in 1992 by Boeing. He converted the theory into practical through a gigantic digital display related to the company workers assembling work of huge bundle of wires for aircrafts [7]. Later on, these early definitions of AR were merged with the real world phenomena to raise the understanding and effectiveness of the users.

Figure 1 shows Caudell's head-mounted augmented reality system.

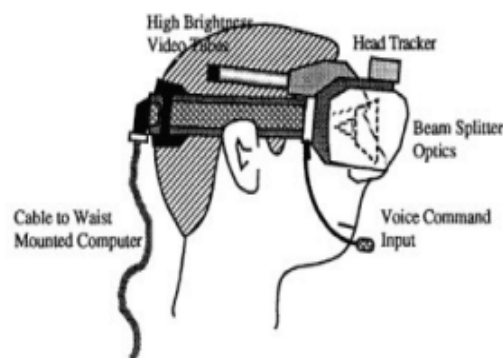


Figure 2: Caudell's head-mounted augmented reality system

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In 1994, Paul Milgram demonstrated the reality-virtuality [8] and that gained popularity commonly as mixed reality continuum. Each continuum consists of two segments, one the real environment and the other the virtual ambience. Therefore, all the components remain in between the virtual and reality ambience (Figure 2). Creation of an intermediate world is done through Mixed Reality (MR) where the particular system combines thereal and the virtual environment and both the ambience remains in a co-existing manner and interacts with each other.

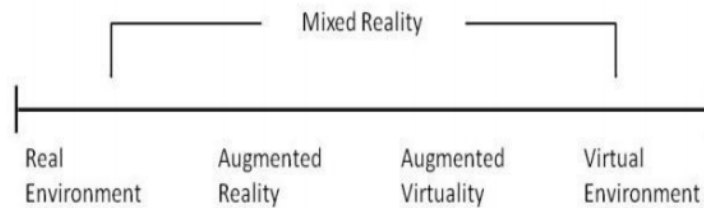


Figure 3: Milgram's reality-virtuality continuum

Further, Theory of Ronald Azuma published a comprehensive survey on augmented reality in 1997 [9]. He defines augmented reality by three individualities:

- It provide a presence of the real world and the virtual world
- In real time situation it is interactive in real time
- The final registration of the virtual details is done in 3D.

Depending on the analysis output received by Milgram and Azuma, additional content related to reality or virtual component is appended regularly.

Moreover, possibility of the content removing or masking is always there under the control of the system.

To further include the forms associated to modification Mann [11] appended another axis to the Milgram's virtuality-reality continuum in 2002. This 2D version of the continuum provides proper explanation for mediated reality and mediated-virtuality respectively.

The theory of Mediated Reality suggests that depending on the circumstance and components awareness of a user towards reality can be customized in different ways. The system can also modulate the reality in diverse ways. Through appending augmented reality or removing reality or masking some information it can modulate the information. Such relations could be easily explained through a Venn diagram Fig [3]. In the case of reduced reality, available real time components can be removed. Therefore, suggesting the difference of diminished reality with respect to augmented reality.

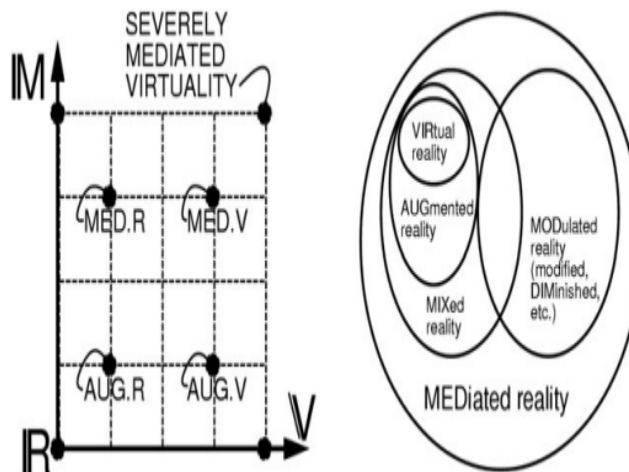


Figure 4: Mann's reality-Virtuality-Mediality continuum from [11]

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The major assumptions and definition of these topics such as augmented reality and mixed reality are dependent on the initial concepts provided by Milgram, Azuma and Mann.

Although the differentiation between these two is quite cumbersome and the difference is blurred in many aspects, in certain times, it even becomes opposing to each other.

For an instance, Mann considers virtual reality as a companion region of mixed reality, whereas Azuma isolates total virtuality from mixed reality.

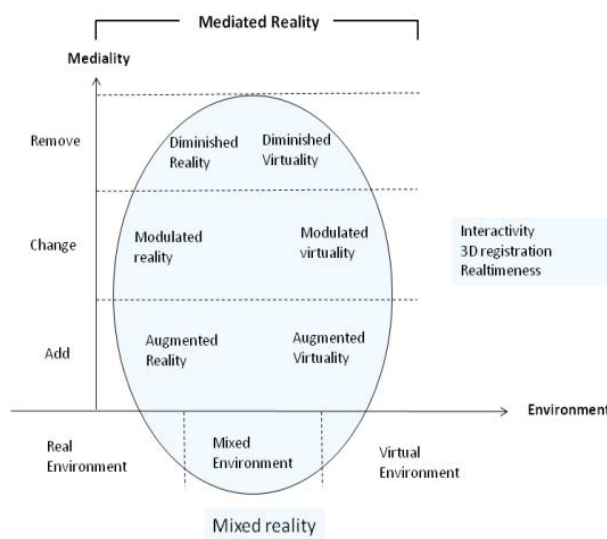


Figure 5: Mediated – mixed reality

## V. PROCESSING OF AR

### A. Augmented Reality on Maps

The most helpful and prominent uses for augmented reality are Geo location and geo spatial mapping. In maps pictures and twitter information facilities can be shown in the point of interest. Also from the navigation points, maps can have augmented information about nearby parking spots, pictures that have been taken around the place, nearby parking spots.



Figure 6: The images from left to right Starbucks coffee, Ikari coffee, and Working House, respectively

### B. AR using Image Recognition

Internet users can access information much quicker and practice a much more eye-catching presentation when augmented reality is joined with image recognition. QR codes images can turn on printed materials, like magazines, newspapers and other printed products to provide necessary information simply by screening it through a supporting device.

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Figure 7: QR-code based AR advertising application.

### C. Games based on Augmented Reality

Games are strictly adhering to this thought that technical illusions lead to appealing ingenuity in games. Accumulation of Augmented reality into gaming has taken the explanation of gaming itself to one more level. Many games shake over a stroke of reality by augmenting certain elements like modified sound, 3D add-ons, haptic feedback and much more to create that supernatural information which augmented reality is defined. 19Studios is an offshore Augmented Reality extension company in India.

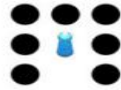


Figure 8: AR Defender game augments a plate in addition to the actual object over the marker

### D. Hosted Augmented Reality

Hosted augmented reality for images and objects that are scanned real time, any correlated information needs to be first presented at some place.

### E. Augmented Reality Apps Features

Augmented reality projects can be converted into creative workshops at 19studios. Indians have focused in generating a diversity of augmented reality features. They add augmented 2D or 3D effects, videos in number of apps like in 3, custom AR effects, 3-D space, map navigation, , social sharing, mobile integration, branding creativity animation AR hosting and also E-commerce integration for popular iOS and Android platforms.



Figure 9: Shows effect in 3D



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## VI. CONCLUSION

The overview of the theory and applications of augmented reality used over India is explained. There are many areas in which augmented reality is being used such as Navigation, Military, Medical, Gaming, Entertainment, library management etc. but there is lack of practical work in education field using augmented reality. In India augmented reality is only used in android based applications, marker based library applications. In emerging time augmented reality application will be designed which used as teaching and learning tool in electronics engineering which displays the electronic devices into 3D in real time.

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