M-LABS AR Application In Education

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Abstract- *Augmented Reality (AR) is a view of the physical, real world environment that is augmented by synthetic, computer-generated elements. Augmented reality is a technology that has come into the limelight very recently. From Motion pictures, to magazines, to an- droid or web based applications to gaming and so on it is used. The usage of AR in movies has been prominent. The driving force be-hind us choosing this domain and this particular topic is simple, Augmented reality is the future.A reality that is better than reality. The foundation of the society are children, and to augment children's interest it is important to provide them with tech-aided tools. To show them how technology can be made available at their disposal and in return make them think and foster their ideas.*

Keywords- Augmented reality, education

I. INTRODUCTION

M-LABS is our vision of making a children friendly app that can be used in their science labs to make their experience more remember- able and in turn increase their interest. Quality education isn't avail- able in all the schools across our country. And due to this and lack of apparatus ,safety measures and an unsafe environment these basic experiments that form the basis of science aren't as clear as they should be. In M-LABS we are going to take a set of 11-16 experiments and demonstrate them using augmented reality how do they actually work through the help of animations and instructions so that the students can see how these experiments are done and what is their results along with all the safety measures taken into consideration so that a student can perform it in his/her house or can teach a fellow student. In rural areas where one teacher teaches and can not provide the apparatus to each student due to low finances under these conditions this app will prove to be extremely handy that too with just the usage of an internet connected mobile phone.

II. AUGMENTED REALITY: AN OVERVIEW

Augmented reality (AR) can be defined as able to deal with the new information immediately direct or indirect therefore influence the physical real-world environment has been enhanced/augmented were by adding virtual computer-generated information to it [2,3].

Also, the AR is defined by Azuma in 1997 [4]. He indicates that the AR is not only restricted to the technical hardware whereas it brings the real and virtual items together in a real environment. In addition, it records the real and virtual objects together and then runs jointly in real time in three dimensions.

Milgram and Kishino [1] defined the continuum of reality-virtuality where AR is considered a portion of the overall subject area of mixed reality. Both virtual environments and augmented virtuality where the real items are sub-joined to the virtual ones can substitute the adjacent environment by a virtual one. On the contrary, the local virtuality is submitter by the augmented reality.

The goal of the AR is to make the life of the user easier through providing the virtual information to his adjacent environment as well as to any indirect view of the real-world environment like the live-video stream. An- other goal of AR is to develop the user's insight into and communications with the real world. The virtual reality or the virtual environment as named by Milgram engages users totally in an artificial world without seeing the real one. On the other hand, the augmented reality boosts the sense of reality through laying virtual items over the real world in real time. AR not only adds items in real word but also represents useful digital information in real world [2,3].

Augmented Reality throughout History

The term augmented reality appears for the first time in 1950s when Morton Heilig, a motion-picture cameraman, believed that cinema as an art should be capable of drawing the watcher into the on screen activity. In 1962, Heilig developed a model of his idea, that he termed in 1955 as "The Cinema of the Future", known as Sensorama, which exist before digital computing [2]. Then, Ivan Sutherland devised the head mounted in 1966 [1,2]. While in 1968, he developed a working prototype of the first AR system [1]. After that Myron Krueger in 1975 established an artificial reality laboratory called video place. It is an area which enables users to easily deal with the virtual elements for the first time [2,3].
At the beginning of 1990s, AR became a field of study. In 1997, Ronald Azuma conducted the first survey in AR whereas he introduced a broadly accepted definition of AR.

He defined it as assembling real and virtual environment together while both of them is being recorded in 3D and interactive in real time [2,4]. In 2000, Bruce Thomas invented the first mobile AR game and dis- played it during the International Symposium on Wear- able Computers [2,3]. In 2007 new medical applications were developed. After that, more AR applications are designed particularly with mobile applications e.g. Wikitude AR Travel Guide was created in 2008 [2]. In 2008, Gartner Inc. expected that AR would be among the first 10 troublemaking technologies in the period from 2008 to 2012 [1]. In addition, it is clear that the number of AR accessible apps have been augmented suddenly and expanded to include not only the location-based search apps but also social networking, games, instructive, life- style and individual healthcare apps [4]. Figure 2 shows the evolution of augmented reality throughout the his- tory.

III. APPLICATIONS OF AUGMENTED REALITY

The number of applications utilising augmented reality is increasing continuously and the outcomes are clear in many domains e.g. health care, business, education and amusement. This section concerns with summarising the prior researches that exploit the augmented reality applications

- **Medical Learning**

It is well known that AR has presented new ways of submitting information. The health care world would be re-organised to be represented in a mobile AR way. Such health related information can be submitted by AR in its extreme visual. The AR became widespread by virtue of the smartphones that are supplied with sensors and cam- era. Such sensors permit the provision of precise context information to the environment aware situations, the matter that permits doctors to gather information, illustrate and identify the measures and procedures. Also, doctors can easily have control over the sick persons needing constant intensive care, e.g. measuring the temperature and heartbeats, etc. This information can be submitted through the AR. As indicated in Figure 5 of apps utilising AR in medical school .This is one example among other applications[5]

- **Military**

AR can be used to display the real battlefield scene and augment it with annotation information [6]. Some HMD's were researched and built by company Liteye for military usage. In [7] hybrid optical and inertial tracker that used miniature MEMS (micro electro-mechanical systems) sen-sors was developed for cockpit helmet tracking. In [8] 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 pi- lots' ability to navigate in degraded visual conditions [9]. HMD was developed to a display that can be coupled with a portable information system in military [10].

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

- **Education**

New possibilities for teaching and learning provided by AR have been increasingly recognised by educational re-searchers. The coexistence of virtual objects and real environments allows learners to visualise complex spatial relationships and abstract concepts [11], experience phenomena that is not possible in the real world [12], interact with two and three dimensional synthetic objects in the mixed reality [13], and develop important practices that can not be developed and enacted in other technology-enhanced learning environments [14]. These educational benefits have made AR one of the key emerging technologies for education over the next five years [16].

- **Robotics**

AR is an ideal platform for human-robot collaboration [17]. Medical robotics and image guided surgery based AR was discussed in [18]. Predictive displays for tele-robotics were designed based on AR [19]. Remote manipulation of us- ing AR for robot was researched in [20]. Robots can present complex information by using AR technique for communicating information to humans [21]. AR technique was described for robot development and experimentation in [22]. In [23], authors describe the way to combine AR technique with surgical robot system for head-surgery. An AR approach was proposed to visualising robot input, output and state information [24]. Using AR tools for the teleoperation of robotic systems was described in [25]. It was developed how to improve robotic operator performance using AR in [26]. It was explored for AR technique to improve immersive robot programming in unknown environments in [27]. Robot gaming and learning based AR

were approached in [28]. 3D AR display during robot assisted Laparoscopic Partial Nephrectomy (LPN) was studied in [29].

Figure 3: Applications of AR in(a) guided surgery

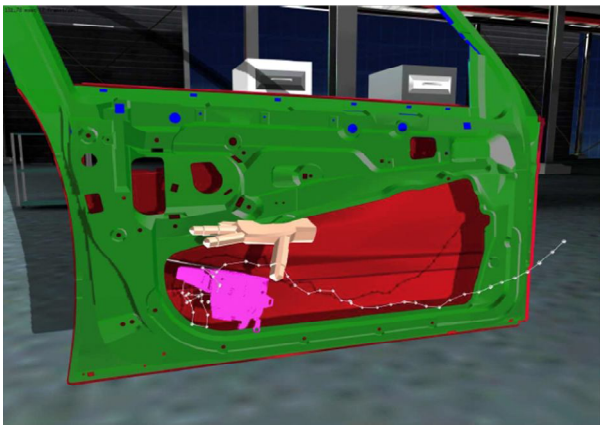

Figure 3: Applications of AR in (b) product assembly;

IV. CONCLUSION

Augmented reality is considered a competence that has been around for years. Augmented reality is still in its initial phases; and thus the upcoming possible apps are endless. A lot of AR products have been presented in several kinds and spread around the world. The layering of information over 3D space creates completely new experiences of the world, and supports the broader transition of computing from the desktop to the mobile devices, and at the same time raising new outlook concerning reaching information and new chances for learn- ing. In spite of the fact that AR is utilised broadly in the customers sector, for example it is used in social engagement, entertainment and marketing, new forms of usage appear every day. It can be easily utilised as a tool for developing new apps. In addition, AR will be more accessible in the recently future and it will be a complementary part in our lives.

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