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Education with Augmented reality

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Abstract

Augmented reality can be described as a technology which allows the computer-generated virtual image to overlay a live direct or indirect real-world environment in real-time. In recent years Augmented reality has been developed and increased on a large scale in various application. One of them is the use of Augmented reality in education. In this paper, we will discuss the basics of augmented reality and one of its application in the education field. There are many different ways to educate and train someone regardless of their skills and talent. One of the ways is by using augmented reality which will be shown in their paper as very valuable and quick to learn technology. It creates a new and learning environment for people and leads them towards better understanding and the effectiveness and attractive of teaching and learning in a student's life.

***Index Terms-* Augmented reality, Education, technologies in AR, History of AR, chemistry with AR, geography with AR, mathematics with AR, mechanics with AR**

I. Introduction

Augmented reality is a technology which has proven itself very useful in our daily lives helping in regular tasks making them easy and convenient for us.

In Augmented reality graphics, sound and tactile feedback are added into our natural world to create a superimposed user-experience. Augmented reality uses an existing natural environment and simply overlays layer of virtual information on top of it.[12]

In simple words Augmented reality is a technology with which we can see, hear, feel, touch and even smell or taste sometimes more than others. It is a technology which brings elements and objects to the real world for viewer's.[9]

From social media filters to surgical procedures Augmented reality is growing in popularity as it brings out the virtual elements aspect into our real world superimposing everything we see or feel. One of the applications of augmented reality is education. The Traditional method of education for students has its own advantage but augmented reality in education have been proven to be very efficient and interesting. It proved to be very innovative and engage students in their courses and maintains their interest throughout the study[8]. With Augmented reality, education can be easy and fun for students.

II. History of Augmented Reality

The term augmented reality was first introduced in the 1990s. This term was used by Boeing researcher Tom Caudell when he and his colleague David Mizell while they were proposing the workers about configuring the airplane wiring wear HMD's. In the upcoming decade, AR becomes more famous and started getting used in more applications. One of the earliest functioning AR systems is "Virtual fixtures" which was developed by Louis Rosenberg in 1992 built for the training of pilots in US air force. In the same year team of Columbia University built an HMD with attached trackers which was named KARMA - Knowledge-based augmented reality maintenance application. In 1994 first AR theatre production "dancing in cyberspace" was created on physical stage with acrobats dancing around with virtual objects. It was created by

Julie Marin. In 1998 during a live NFL game TV broadcasts, first time showed yellow markers for first down without which today we will get so confused in watching NFL matches. Augmented reality overlay map data which provided boosted visual navigation during flight tests which were used by NASA X-38 spacecraft which flown using hybrid synthetic vision system in 1999. A year later ARToolkit was created by Hirozaku Kato. It is an open source software library that combines the real world with virtual graphics using video tracking to overlap computer graphics on video camera. Later in 2009 AR was brought to web browsers with the help of ARToolkit. In 2009 print media came live for the first time by Esquire magazine which showed their readers after scanning its cover page Robert Downey Jr. came live on that page. AR gained most of its popularity recently after 2013. Google started working on glass and released its product. Car manufacturers like Audi and Volkswagen started showing their instruction manual and car design using AR to attract their customers. There are various applications nowadays in which AR is used.[11]

III. Technologies for Augmented reality systems

Augmented reality and virtual reality almost use the same hardware and have many common factors like generated virtual scenes, 3D objects, and interactivity with user-environment. The only difference between these technologies are virtual reality replaces the real-world but Augmented reality brings the elements to real-world.[13]

Few of the Augmented technologies are-

III.I. Head mounted displays

It is a type of device which is worn on the head as a helmet. It has small cameras either for both eyes or sometimes even for a single eye. Semi translated mirror is used for this technology. The mirror allows views of the physical world to pass

through the lens and then overlays a layer of graphical information on the user's eyes.



fig.1.1 Head mounted devices

III.II. Pinch Gloves

This technology is used for gestures. It touches the virtual object and grab it and can make reliable changes to the virtual object when necessary and make it according to their own requirements.



fig.1.2 Pinch gloves

III.III. Handheld devices

These are the computing devices which can be carried anywhere they want and can use them whenever they want. They are very light to carry and can be used with a display in hand.



fig.1.3.Handheld device

IV. AR in various education fields

AR in education is not something new. It is already being used by many institutes training places everywhere but still it's not yet used everywhere. This technology can be used in various fields. Few of them are[6] -

IV.I. AR in Mathematical

In mathematics, AR is generally used for or is make geometry more easy to learn and understands. This generally enables 3D geometry for the student which helps them to draw, measure, visualize and understand more closely. Geometry leads to the world of architecture, design and many other fields which can be made very easy and accurate with the help of Augmented reality. When a building is built its geometry is kept in mind and can be re-drawn according to the requirement with very ease.

IV.II. AR in chemistry

It is proven that study with Augmented reality i.e by bringing virtual objects coming live is better than physical way. In simple meaning, augmented models are way easy to understand and learn then the physical models for chemistry.

IV.II. AR in surgical

In a medical study, AR is made a lot of discoveries. Augmented reality has enabled reducing medicines costs, faster recovery, and reduction in a stay at hospital duration. AR systems provide training, lessons, complications and overcoming complications in surgery.

IV.III. AR in Geography

In geography, AR can be used for undergraduates to understand the relationship between sun and earth or with a solar system. Even maps can be seen with the AR and help in locating various places according to the demand. For graduates or even in research point of view or traveling alone purpose map locator with the use of AR is very capable and attractive for users.

IV.IV. AR in Mechanics

Mechanics i.e kinematics consists of topics like motions, laws, velocity, speed etc. Augmented reality can be fully used in this field during the representation of the problem and then their solutions. AR can explain mechanics with a lot of relaxation and even can be used in real-life applications.

V. Conclusion

Augmented reality has become a great part of our life and is used in various applications nowadays. One of them is also an education which is a very important source in each one's life. We have studied about augmented reality, its definition, Technology used in AR, History of AR, and few education fields in which AR can be used. We reach the conclusion that education has been made a lot easier for everyone with the use of Augmented reality.

It keeps the students engaged in the topic and attract them. AR made learning fun and easy.

VI. Future Scope

Augmented reality is one of the top 5 trending technologies in the world. This means that there is still a lot of sign of progress which has to make in this field. There are a lot of technologies which are yet to discover. Augmented reality would be very popular. Almost everybody is using it

but they are not yet fully aware of this technology. It is going to increase, its demand, its need and its requirements. Augmented reality has started to be used in education and training purposes but there are yet to be reached to every corner to every student and make their learning easy and fun.

VII. LITERATURE REVIEW

1. Augmented reality in education: current technologies and the potential for education by M Kesim, Y Ozarslan which stated that with augmented reality nothing is impossible and its potential in education is still a long way to go. The authors believed that Augmented reality has powers to change how we use computers. With augmented reality, learners interact with the 3D information, events, and objects in a natural way. They recommended to design and coordinate multidisciplinary research projects to enhance environments and content. Researchers and educators must work together to develop augmented reality interfaces. The combination of educational content with AR technology creates a unique type of automated applications that act to enhance the attractiveness and effectiveness of learning and teaching in student's real-life scenarios.
2. Applications of augmented reality systems in education by G Chang, P Morreale, P Medicherla examines the various applications of augmented reality in different education fields. In recent years, AR systems in all sectors of information technology had increased at a high rate. Many AR research learning systems have been

developed in the field of education. Many previous pieces of research in this field which have shown that they hold potential for enhancing learning and teaching in the educational field. There are still many technologies that are yet to be discovered in augmented reality with education.

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