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REVIEW PAPER ON ANDROID APPLICATION FOR AUGMENTED REALITY IN EDUCATION

VRUSHALI SURESH JOSHI [1], ASST.PROF. V. S. KARWANDE[2]

ME Student, Department of CSE, EESGOI, Aurangabad, Maharashtra[1],

Assistant Professor, Department of CSE, EESGOI, Aurangabad, Maharashtra[2],

vrushalisjoshi02@gmail.com[1], Vijay.Karwande@Yahoo.Co.in[2]

Abstract: Augmented reality (AR) uses computer aided graphics to add an additional layer of information to aid understanding and interaction with real world around us. Augmented reality was first introduced in 1990's. Now the technology has evolved AR to begin to start its potential especially in mobile context. Goal of this paper is overview of basic aspects of Augmented Reality (AR) and main concepts of this technology. It describes its main fields. Augmented Reality enhances the real world by overlapping computer generated data on top of it. The paper evaluates the research and application done in education stream using augmented reality. This describes the characteristics of augmented reality systems and can be used as starting point of anyone who is wishing to enhance the technology by considering future aspects and demand in any stream.

Keywords: Virtual Reality, Augmented reality, Unity, Vuforia, personal digital assistance.

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I INTRODUCTION

Augmented Reality (AR) is a new technology that involves the superimposing of computer graphics on the real world. In AR, the environment is real, but extended with information and imaginary from the system. In other words, AR bridges the gap between the real and the virtual in seam less way. One of the best overviews of the technology is, that it defined the field, described many problems, and summarized the developments up to that point [1]. AR, the technology has been evolving since from last few years in form of mobile devices. The range of applications has begun to spread into many areas including education. AR is within a more general context termed Mixed reality (MR), which is multi axis spectrum of areas consists of Virtual reality (VR), AR and Tele presence and other related technologies.

The basic concept of AR or Augmented reality is placing of virtual objects onto the video stream view of the real physical world. This technology provides an interactive interface in which user can interact with the real world and Virtual objects in a natural way. Nowadays AR technology has been getting researchers and educators attention as an interesting alternative and exciting ways of creating teaching and learning tools. In late 1960's AR has started worked in educational line. AR is believed as very streamlined approach for learning and training and has wider user adoption than ever before due to evolution in information technology. Augmented reality in learning and training can be applied through mobile devices such as smart phones, tablet, PCs and other electronic innovations.

AR can generally be split onto two broad categories: Marker Based and Marker less.

1.1 Marker Based: This technology uses physical world symbols as reference point for computer graphics to be overlaid. For example, 2-dimensional printed marker is placed in front of webcam. The computer then interprets this symbol overlay an on-screen graphics as it were directly on top of the marker in the physical world. This have been several notable uses. Educational applications are based on of Marker-based AR. These include 3-D modeling of geographic data [3].

1.2 Marker less Systems: This method uses combination of an electronic devices accelerometer, compass and location data such as Global Positioning system – GPS to determine the position of physical world, which it is pointing and on which axis the device is operating. The location data is can be

compared to database to determine what device is looking at and thus computer graphics to be displayed on screen. The recent application using this is Pokémon Go game. Educational uses of this technology is central approach of researchers.

Figure 1: Marker based AR

1.3 Augmented Reality In Stream Of Education:

Augmented Reality in education field will set a game changer in classrooms. It will show major changes. Educators believe bringing AR in education will stimulate learning and student engagement, it will Simplify classroom material, Foster creativity, and Support self-paced learning. AR is highly likely to make educational environment more productive. Pleasurable and interactive. It can increase student centered learning approach. Augmented Reality enhances a user's perception of and interaction with the real world. AR is a specific tool of intelligence amplification (IA) using computer as a tool to make task easier for human to perform. There are people with incapacities/uncommon need for learning, and unable to think, talk, read and spell. Compose or to do numerical estimations. People with learning disability cannot visualize the objects.

Turning such people into a capable independent citizen it is crucial for conforming to grown-up their life. An AR has come up with blessings and has capability to handle such issues. AR could be the best solution in developing country like India. Learn with fun concept can achieve through AR. AR brings dimensions to learning. Students are able to access model on their own devices via Augment's app. There by students can gain better understanding of concepts they are studying. The physical model , human body etc. concepts student can gain from augmented app from their home or from classrooms. It will turn boring subjects into interesting one and students will retain knowledge for longer time. They will excited by new ideas and think critically about the world around them. This experience creates complete learning cycle.

Introducing Augmented Reality to students will enable them to discover unknown passions and inspire their future endeavors.

II LITERATURE SURVEY

Literature review is an important chapter in this project as it is a research study of system that is going to be developed. Through this study, the developer would be able to gain more knowledge and understanding in developing new software. As a result, the developer would be able to improve the weaknesses and integrates the existing strengths with the new features in order to improve functionality of existing software.

Darsheeka Bipin Singh, Karan Shah, Sally Annice Peter, SnigdhaSahu, MuditKapoor [1] discussed the basics of augmented reality, its functionality, its working and its application in the field of education for children with learning disabilities or special needs. Augmented reality provides a very interactive, vibrant and insightful aspect to traditional learning. It allows combining a myriad multimedia objects; such as, images, videos, audio files and three dimensional object models. To further understand its objective, we have also explained the multiple learning disabilities and how this education tool serves as a better education tool. Depending on the type of learning disability, different kids have different educational requirements.

Some disabilities cause them to have a range of emotional responses based on application components like colors and the interaction interface, etc. Therefore, special consideration has to be given to the design and interface of educational tools targeted at these children. Special focus is laid on its performance ability and current status of technology oriented education tool in India. We have verified this by creating a prototype education tool as per the needs of two educational organizations in Mumbai and testing the tool in an experimental class to analyze the impact and limitations. Our education tool comprehensively addresses the diverse range of factors that need to be kept in mind while designing educational applications for children with the specific learning disabilities. In this paper, we explain the specific components of our application using which we have achieved the totality required for an education tool that deals with an especially sensitive class of students[1].

Anderson (2001)[2] explains that the assessment of student learning outcomes should be able to enhance creativity and critical thinking of students, with media mobile augmented reality can improve the creativity of students.

Shelton's (2004) study describes the Sun and earth relationship through virtual images. The sun and earth are manipulated on platform that changes orientation with the

viewing perspective of the student. Student can control angle of viewing for their understanding purpose[3].

In 2006, Kerawalla, et al. stated that AR has potential to have learners more engaged and motivated in discoving resources and applying them into real world from many different ways that have never been implemented in real world[4].

In 2008, Freitas & Campos developed A system with name SMART i.e. system of Augmented Reality for teaching. This System uses AR for teaching 2nd Grade level concepts such as means of transportation and types of animals. This system superimposes three dimensional models and prototypes on real time video[5].

Trimensions is a software development firm providing services on augmented reality. Trimensions is into developing educational and learning systems using Augmented Reality, on the 3D Web as well as on popular virtual worlds like Second Life and platforms like OpenSim and Unity.

The history of AR goes back to the 1960s and the first system was used for both Augmented Reality and Virtual Reality as well, according to Johnson, Levine, Smith, & Stone (2010). It used an optical see-through head mounted display that was tracked by one of two different method :A mechanical tracker and Ultrasonic Trackers.

In 2010 Chang, Morreale, and Medicherla made statement that several researchers have suggested that students can strengthen their impulse for learning and enhance their educational practices with virtual and augmented reality.Based on the validation of Expert Judgment of the Revised 'Character Building Learning Model Using Mobile Augmented Reality that claims that the learning model' and its components are proper to be being prototyped on more widely school area. Results shows that teachers and students are able to score on Revised Character Building Learning Model Using Mobile Augmented Reality.

III PROPOSED SYSTEM

3.1 Applications/Tools for AR: Education related application using augmented reality is mainly uses Maker Based System and it required following Tools to integrate and develop

3.1.1 Unity:

It is a cross-platform game engine developed by Unity Technologies and used to develop video games for PC, mobile devices and websites. Unity is notable for its ability to target games to multiple platforms. The Game Object is one of the types of object in Unity. It is very important to understand what a Game Object is, and how it can be used. Unity contains multiple components like Canvas, Containers, and Components. Unity is more than an engine. It also brings a range of integrated services to engage, retain and increases

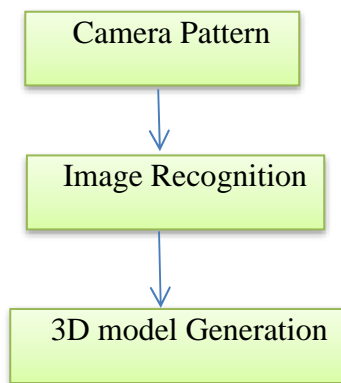audiences. Unity provides a growing range of services to help developers make games.

Figure 2: Block Diagram of flow of process.

3.1.2. Vuforia :

It is Software Development Kit (SDK) that enables the creation of Augmented Reality applications in mobile devices. Vuforia uses Computer Vision technology to recognize and track planar images i.e Image Targets and simple 3D objects, such as boxes, in real-time. A image registration capability of Vuforia enables developers to position and orient the objects with respect to real images, when virtual objects such as 3D models and other media are viewed through the camera of mobile device.

3.2. Android Application of AR:

Figure 3 Shows Development of application phases such as 3-D Model Creation, Creating Tracker Image, Embed in Unity and Generation of .APK.
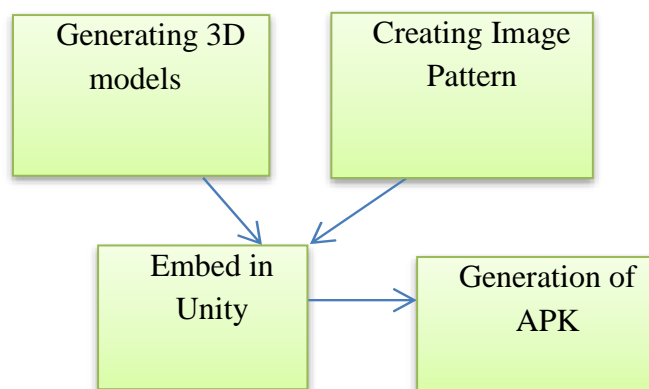

Figure 3: Development of application.

3.2.1. 3-D Model Creation :

This step is creating virtual and interactive 3D Model with effects, animation, simulation and graphics. The main objective of creating 3D model is recognize and track 2D image which are target object, so that augmented virtual model can see from broader perspective.

3.2.2. Creating Tracker Image:

This is specific image that AR app can recognize, which constantly tracks the position of pattern in real world. Tracking is a looping process which starts as soon as the object target is recognized. There are many tools available for creating tracker image such as Vuforia SDK.

3.2.3. Embed in Unity:

Tracker images needs to add tp the database of Vuforia. These are the images our augmented reality models will be based on For embedding 3 D models/ mages into Unity we need to integrate Unity with Vuforia SDK by selecting Unity package within Vuforia. Once it is integrated, 3D models can be easily add to Unity platform . There are tools available which allows embed 3-D model and Tracker image to into Unity package. Unity allows to modify and orient the 3D models/Objects as per the scaling required with respect to X,Y and Z axis.

3.2.4. Generation of .APK:

Unity scripting needs to done in Object-Oriented languages. Later with the help of JAVA SDK and android studio we are able to generate android file that will execute in mobiles.

IV CONCLUSION

We proposed enlighten the Augmented Reality, the evolving technology. Paper describes the characteristics, features of AR and demonstrated its importance in educational stream. Paper presents the development and evaluation of an augmented reality for learning field. Results show that AR applications are able to support creative, non-linear learning. The finding also shows that AR is a very flexible tool which can be used in many educational environments and for very different purposes if it is applied thoroughly. AR is able to provide Interactive education system with contextual information. The mobile friendly application of AR has developed and shows the future scope in the AR.

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