

The Synergy of Augmented Reality in Education

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Abstract

Though augmented reality has been present for several years, it was not popular until the arrival of smartphones with android and iPhone operating systems. The functional Global Positioning System (GPS) with Augmented Reality (AR) capabilities has a great significance. This project has been designed for creating a mobile application to implement augmented reality into the sector of education, using the tools that are Unity3d, Blender, Android studio, thereby enhancing teaching methods to enable better learning and understanding. AR is often experienced through wired or wireless headsets that folks are wearing and through the smartphone displays. AR technology can manifest objects that are difficult to imagine or conceive. AR can metamorphose them into three-dimensional models, thus making it effortless to understand the abstruse and laborious content. Usually this is notably good for ocular learners and essential for anyone to render vague material into important concepts.

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1. Introduction

The classic approach of education has been reduced or it is getting changed now. They are progressively being digitized very swiftly, and are being steered by the technological vicissitude. As a matter of fact, the EdTech, the education technology industry, is predicted to rack up \$252 billion by the close of 2020, expanding 17% annually [1]. Augmented reality is currently the leading trend in EdTech. With up to a billion users expected hitch the trend by 2020. It'll open a pool of contingency for the tutorial institutions and also businesses.

In education, AR can serve multiple purposes. It help the scholars to easily acquire, clarify, process and memorize the fundamental and necessary information [2]. Adding to the above, AR will make education itself more and more fascinating and fun. It is not constrained by any age bracket or level of education and may be enforced in every level of tutoring; from elementary education to university, or maybe at work [3].

In educational system, AR can affect the typical learning process effortlessly. AR will be having the capacity to switch the location, the time of study and duration so painlessly, to insinuate novel and supplementary ways of learning. The capability of AR

technology include creating captivating classes and increasing the grasping capability of user.

Thus AR can transform any difficult technique into a 3D model and make it easy for a user, thus allowing comfortable assimilation of abstruse content. This is principally beneficial for visual learners [4].

Education systems will demand that the erudition process should be all about inventiveness and synergy. AR helps teachers to get their students interested in subjects of various domains. These days 80% of young age people own a smartphone. The majority of them will utilize their smartphones frequently and using these gadgets to ingress social platforms, the gaming options and increases the continual contact with friends and relatives [5].

In the interregnum, a much lesser part of school children to youngsters and grownups uses mobiles for studying, to do the homework and unearth information about a subject. Scholars can acquire bonus digital information on any subject due to AR which therefore makes complex information much easier to understand.

2. Literature Survey

The complex concepts and way of learning any spatial concept can be converting with the help of AR. As an

example the teachers can teach solar system using AR. The research that explores the potential of AR to advance visualization tools in education for the design and development of learning method is highly progressing [6]. Augmented reality will help in delivery mechanism and also to understand the content through a unique combination of visual and sensory information. This results in powerful cognitive experience of learning. It is clear about the acceptance of technology with the engagement and reaction of students and from the survey of parents and teachers. Studies found that AR can be very helpful for developing countries [7].

AR has defended the mixed reality concept in the sense of a Virtual Continuum which shows, at one side, the real environment in which humans live objectively, and on the other end with VR. The participant will be mesmerised into world of a simulation with all sort of physical interactions [8]. It helped in the simulation of the sensorial organs which the user can vary the properties of real world and make them in an imaginary space, thereby bypassing or hiding the reality of natural space [9]. Therefore, in augmented reality there exists different kinds of technologies flowing in two different sides, the flow from the real environment to virtual environment, the objects will show the visualization in different levels. In the future scenario, AR will be included, and it's going to be major goal in the studies presented in the article.

Developing technologies argue that there are some technological development stages that exist, the product will be renewed based on the self-appropriation and interaction [10]. The users who are facing the challenges according to the objectives the initial stage is linked to a hobby. It creates the enthusiasts with primitive artifacts with a purpose and explores the basic abilities of systems. They also challenge the technological difficulties, and the target is always the technology itself [11]. In the second phase the Ivan Sutherland identified quickly started the Head-Mounted Display (HMD) prototypes it's a combination of virtual objects with real-world view with an extra information layer. The most of the products will use in the early stage, the technologies used, is so basic and costly that no popularity appeared. The next phase is focused on professionals, where the technology is used in the manage platform to act a specific task. So, the way of studying has to be quick and easy [12].

Combining real and virtual environments is the main aim of AR projects. To fulfill this, it is really required to combine many and technological processes led by different fields of study such as computer graphics and computer vision [13]. The calibration, enrollment, inferencing, apprehension are the frequently faced challenges in AR systems. Combining virtual object with real object can change this situation. This summary can give the appearance of a real-time and geographical presence or the illusion of a continuous reality. It works through establishing location coordinates for overlapping virtual objects. It is essential to be consistent, with temporal and spatial synchronization [14-15]

3. Methodology

The hardware requirements for the system include 4 GB RAM and software requirements include Unity3D, Blender, and Android Studio. User requirements include smartphone and Android (7.0 or other higher version) or IOS (10 or other higher version). Figure 1 represents the methodology of the system.

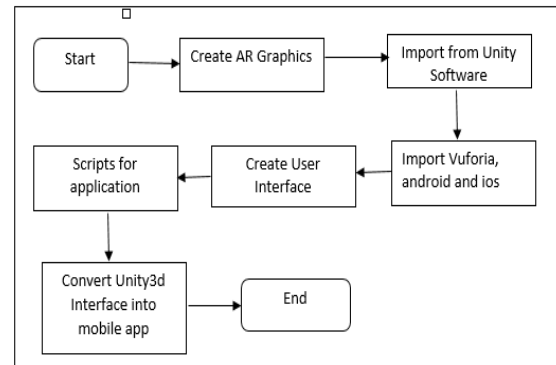


Figure 1: The methodology of the system

First task is to decide on a topic that the user wants to implement augmented reality. The architecture selected is Open System Interconnection (OSI) model. Then analyze the topic chosen, for ideal areas where the AR graphics can be implemented. The chosen areas need to be clear and distinctive so that they can be easily and distinctly identified by the camera to implement the AR graphics either as images or distinct symbols.

These areas are then scanned and then used as AR markers for the AR graphics. The AR markers are then uploaded into the Vuforia database. Figure 2 indicates this. This database of AR markers is then imported into a 'Unity' project.

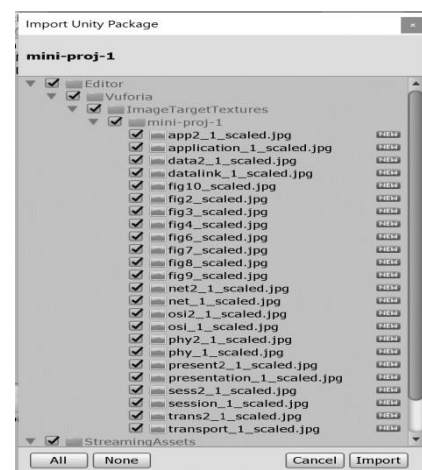


Figure 2: Importing graphics

Select the graphic that the user needs to display when the AR application identifies an image marker.

These graphics can be images, videos and 3d models. Here, we decide to display tutorial videos as the AR graphics. These graphics are also imported into the same Unity project as assets. Next, the graphics are assigned to their corresponding image targets. Later write code in c-sharp to dictate the behaviour of the assets.

The system need to be tested by pressing the play button which uses the computer webcam as the AR camera. Figure 3 represent this. Finally, if the developer is satisfied with the tested project, build an android application from the project with the help of android studio.

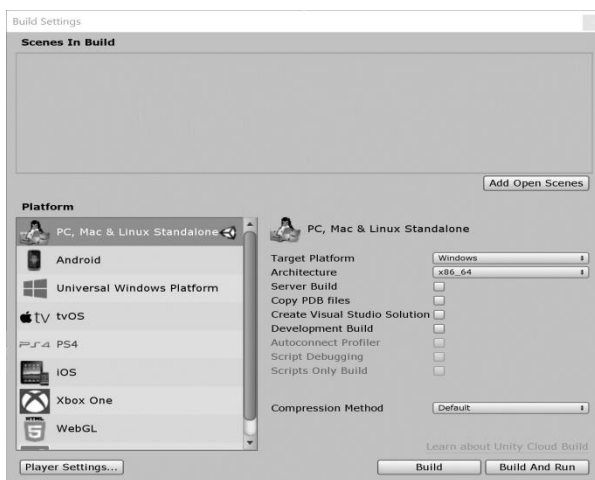


Figure 3: Build process

4. Applications

Applications of AR include it can help students can understand easily the complicated concepts, as well as motivate them to study. AR applications helps medical student to learn and understand more deeply. It also help the public to visualize things where their entry is restricted. AR can be used in the museums and zoo parks, so that visitors can feel as they are touching the objects. Virtual practise can be implemented with AR features. This can be made realistic with augmented educational training, digital designs, simulations and obtain experience and knowledge at the end.

The future applications include the AR headsets by Microsoft's HoloLens or Oculus VR headset of Facebook. Similar to most augmented reality headsets, this also work when connected to PC. The future may see smart glasses or smart contact lens be all the rage. In medical field, students use AR technology for practicing surgery in any controlled environment. The visualizations aid helps them by demonstrating the complex medical conditions of patients. With this patients can understand how complex a condition is. AR reduces the endanger present in an operation by facilitating the surgeon an enhanced sensory perception. MRI or X-ray systems when combined with AR technology brings the whole sum into a single screen for the surgeon.

5. Conclusion

The created mobile application is very helpful to students of various branches as it will help them understand a particular topic better with the help of visually appealing 3Dmodels. They can interact with these models thereby taking part in a more fun learning experience. Augmented reality will also make the task of teaching easier, hence allowing teachers to impart vast amount of knowledge in a short time.

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