

Augmented Reality App to Stimulate Learning of Children

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Abstract-*The aim of this paper is to describe the creation of an Augmented reality educational Android Application that kindles spatial reasoning among small children. The app is made using Unity 3D engine and Vuforia to foster learning, by providing a composite view of real world and computer generated image. It also incorporates gaming for mental repose. In order to develop imagination skills, it comprises of stories. To verify the results a small quiz has been incorporated.*

Keywords-Augmented Reality, educational application, android, Vuforia, Unity.

I. INTRODUCTION

In this age of technology, each field has gone through a major transformation because of the advancement in computer technology and research. So we have tried to bring a small change in current system of learning and education system.

Augmented Reality (AR) is established to be of a great value in many cases of educational learning process [1]. Recent studies signify that Augmented Reality provides a playful and interactive environment that contributes to the cognitive development of children. Therefore the scientific community is stressing on the use of this technology in the primary education field and is trying to find new ways and methodologies to incorporate this technology in the field of education [2]. Augmented Reality creates a computerized image and presents it in real world environment thereby providing a composite view of both [3].

Firstly, we have used the Blender software [4] for the creation of various 3d Models required. Then we saved our target images also referred to as marker in Vuforia [5] by creating various databases in Vuforia. And finally we integrated the 3d models and the target image in Unity 3D game engine [6] and created various scenes in Unity.

The first domain consists of the learning module, the second module consists of gaming, the third domain consists of stories, and final module for testing the expected results is quiz.

Our main objective is to create an interactive and captivating education software for kids. It comprises of four sub-sections learning, games, story and quiz. It is designed specially for kids between the age group of 2 to 8. It was developed with help of Unity 3d game engine, Vuforia, and Blender.

II. RELATED WORK

Lately, there has been great interest regarding the further development in AR to be used for learning and teaching process. For really long a process that improves the education through the use of multimedia like sound, video, and graphics to create a learning environment with fun. Various methods used have been discussed in this section.

In [7], students reaction were observed related to the scientific experiment clearly shown through the use of the technology which is sometimes difficult to demonstrate in a school science laboratories like the movement of molecules. The result and experiences of students were quite positive to it.

In [8], the authors have taken references from few studies on augmented reality based video modeling and have used it to tell a story to kids dealing with Autism Spectrum Disorder (ASD). These kids usually face difficulty in decoding others nonverbal emotion like facial expressions that aids in social interaction. This technology was used to help them in focusing on story .overall they showed a better response and better understanding of story compared to traditional methods.

In [9], the authors have established the use of augmented reality for e-learning. They have addressed the difficulty of learning 3D geometry in a 2D environment. So they have created 3d models on 3d geometric figures for a better understanding of the student. This helped students in self-study of the geometry subject.

III. THEORY

The use and implementation of AR technology has many advantages over the traditional education system. Normal teaching environment consists of a teacher and student in one way communication and student often end up as a

passive part of the system making it very dull and not so much fun. But AR is more interactive and cultivates learning among students also makes it very interesting compared to the traditional methods of learning.

When a student watches a 2D image of a fruit, for example, apple it's very difficult to imagine the 3D image and correlate with real world 3D object but with help of AR student can actually watch a 3D model that is very close to actual Apple that helps in learning. If a student is learning about some vehicles he or she get an opportunity to actual view the object through all direction, one can see the top view, the right-hand side view, the left-hand side view and also the front view.

Imagination is most important to develop the creative side of a child. Stories have been narrated for a long time to develop these skills. But if we incorporate the traditional storytelling with a 3d representation of the same this would make more interesting and also create a clear image of the story being told.

We have also incorporated a small gaming section so if a student wants to take a break from learning and relax one's mind this is the bestoption, as playing games in real world environment makes it more thrilling and engaging. Can also help new user to get used to the new technology.

IV. EXPERIMENTATION AND SYSTEM SETUP

A. Application Software Architecture

Figure 1 illustrates and describes the platform where the application of the software for learning and playing has been executed. The ubiquitous computing of Smart-Client type forms the base of the application architecture. Local storage of data allows performing operations and queries on the database on the mobile device. The created application was an APK (Android Application Package) which is compatible with the mobile devices working on Android Operating System. This application has been developed over the Unity 3D Game Engine platform with the aid of Visual Studio [10], which has Unity Tools for Unity support for developing scripts. The Vuforia SDK is employed in Unity, which enables efficient use of Vuforia functions in unity.

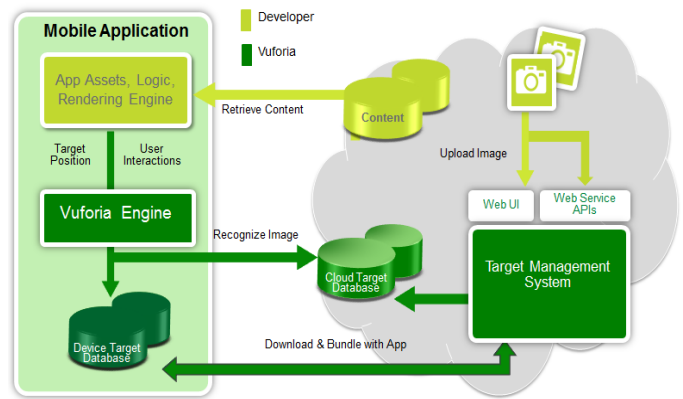


Figure 1. Augmented Reality Application Architecture [11]

B. Implementation Methodology

Login to Vuforia's Developer Portal and create a license key for the application. Then create a database and image targets and add the latter to the database. Download the database as a Unity package containing trackable information about this trackable database. In unity, import the Vuforia Unity package, 3d models, asset folders, etc. Add the AR Camera and Image target to the scene and place the models on the target and do the necessary coding. Coding is usually done in C#.

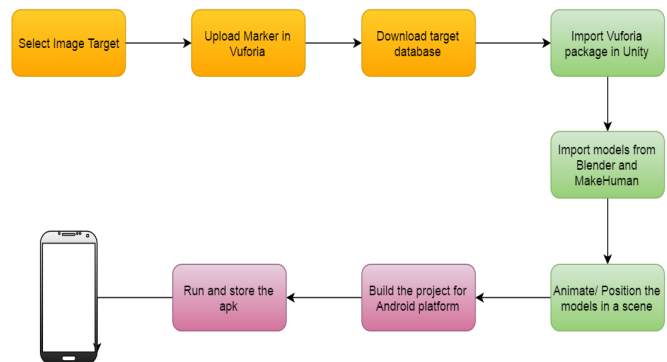


Figure 2. Basic Steps for Creating Augmented Reality Mobile Application.

The above steps are executed for all the modules in our application, that is, Learning, Quiz, Games and Story Time. The Learning module consists of various sub-modules like Alphabets, Animals, Vehicles, etc. which display 3D models of the respective sub-module. The Quiz module consists of questions of the type 'True and False' based on the Learning module. The Story module gives visual 3D display as well as audio effects for the stories. The Games module provides augmented 3D games which are coded with C#. After the scenes for all the different modules of the application software have been created, create a final interface where

options for choosing the required module are provided. The last step is to build the project for Android by using “Build and Run” option and creating an APK file which can be deployed on mobile devices running on the Android Operating System.

V. FUTURE SCOPE

Augmented Reality gaps the bridge between the digital and real world. The AR application for children would not only make the learning interactive but also fun and would be very helpful in making the child remember what he studies through the app easily. The quiz helps in determining how well the child has been learning and the stories help in developing the creative thought process of the child. The games not only serve the purpose of learning but also prove to be a form of entertainment. It can be further developed to be used in educational settings or to be used by educators during presentations which would allow the students to gain a deeper understanding of the topic at hand. Reading books with lengthy texts and black and white images many-a-times bore the children. If these are combined with AR technology, it will not only make the reading enhanced but the child will also be fully engaged making it easier for him to concentrate and remember the details. Incorporating augmented reality into regular lessons will make the children excited about learning. They will be thrilled by new ideas and think critically about the world around them. Introducing augmented reality to the children will enable them to discover unknown passions and inspire their future endeavors.

VI. CONCLUSION

In this paper, we have discussed making an application for improving alternative skills and techniques for the educational and all-round development of children. To perform this main objective, a software with Augmented Reality technology was implemented. The most fundamental final result has been 3D educational software containing the learning, the quiz, gaming and story watching using 3D and Augmented Reality to link the digital world with the real world.

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