International Journal of Future Generation Communication and Networking
Vol. 14, No. 1, (2021), pp. 1402-1406

Smart Classroom Using Augmented Reality Technology

ShielaDavid[1], Amrit Srivastava[2], C. Soumyadipta Ghosh[3], Pratibha Sarkar[4]

[1]Assistant Professor, Department of CSE,SRMIST Ramapuram,Chennai-89,India
[2,3,4]UG Scholars, Department of CSE,SRMIST Ramapuram, Chennai-89,India

Abstract

Education system is changing day by day and many technology were implemented for education like virtual reality, machine learning, mobile applications, neural network, IOT and many more, but if we want a virtual experience in real time frame then it was only a dream. But now this is possible with the help of augmented reality which is a new technology and it shows the world how it is so beneficial in every industry like education,healthcare, manufacturing and many more. So in this project we are going to implement it in a classroom so that to make education look more simple and practical. Augmented Reality is technology in which virtual image,video, audio, 3D objects are placed in the real environment. This technology will help us in creating a functional application which will help to build a smart classroom. The students will learn the entire bookish thing in more practical way using augmented objects. Augmented reality also can help medical as well as industrial sector to accomplish a new height.

Keywords: Augmented Reality, Vuforia, Software Development Kit.

1. INTRODUCTION

Our work is dedicated in building a application which will be implemented in classroom to make it better for practical learning. Augmented reality provides experience of real world environment where the virtual objects are building using computer and are implemented into real world. These virtual objects can be in the form of image,video, audio or 3D image, or animation. We are inspired by virtual reality model which was used for virtual training but the problem was it uses virtual asset as well as virtual environment and you have to wear head gear. Its implementation cost was high. In this project we are using unity, Vuforia, sdk, jdk for creating a application. It will reduce the stress level of students as well as faculty by showing all the augmented objects in real time frame. It should be used in education, healthcare, industry, manufacturing, robotics, and advance super computer, aerospace and there is lot of other sectors to explore. There are various examples of AR technology like Pokemongo, Snap chatfilters, Asian paints , and many more. Augmented Reality is the technology which got our imagination to new height. It is technology which was present before but due to lack of lots of platform which combine the entire tech together it was hard at that time. Now the mobile,tablets, and pc market grows it opened new door for augmented reality to grow. From science projects to corporate space it is spreading. According to experts the market of AR will grow upto 122 billion dollar by 2024 and this is just assumption. As we will grow in field of smart devices and different technology it will again make a huge hike in the field of AR.

2. RELATED WORK

The earlier systems for smart leaning are using different technology and therefore we are creating this work so that it can be implemented in real time frame. Previous system was using different technology some were using virtual reality, some were using mobile apps and some were using IOT technology and some machine learning but as the technology grows up we are able to create a smart learning environment using augmented reality technology. [1]. Intelligent Classroom Information system which uses mobile application for smart class (W. Lu, J. Han, L.Geng 2020) .[2]. Using Convolution Neural Network for Smart Classroom Observation (Muhammed S Khan , I Zualkernan 2020) . [3]. Smart Learning Enviourment using mobile appliation which was suitable for distance learning . (Xinxin Deng , Rong Zhang 2019). [4]. A smart Phone Integrated Smart Classroom where each student requires smart phone.(M.G., J Bijlani 2016). [5]. Virtual Smart Classroom which uses virtual reality technology and headgear in use .(Xiaodong,Weia Dong, dong Wengb,YueLiuc,YongtianWangd, 2017).[6]. A Virtual-Reality System Integrated with Neuro-Behavior Sensing for Attention-Deficit / Hyperactivity Disorder Intelligent Assessment .(Shih-ChingYeh, Sheng-Yang Lin, Eric Hsiao-Kuang Wu, Kai-Feng Zhang, XiuXu, Albert Rizzo, Chia-Ru Chung 2019) .[7]. Inverse Augmented Reality: A Virtual Agent's Perspective. (Zhen liang Zhang, DongDongweng 2018).

ISSN: 2233-7857IJFGCN

3. PROPOSED SYSTEM

The idea of this paper is to create a smart learning environment using virtual image which will be implemented in real time frame using augmented reality technology. We will be creating a fully functional application where virtual object in real time is captured. Vuforia cloud is used for training; it is augmented reality sdkwhich helps in creating augmented reality applications with the help of its feature. Using UNITY3D we will build 3d model and will be implemented using jdk and sdk. For creating different 3D models we use unity by taking a image file and convert it into a 3d object by using unity feature for this. We will write some java codes for its implementation in android or is devices. First the user's environment is constantly monitored by the system's sensors. The information from the sensors is fed to the context analyzer which looks for the conditions established by the AR designer. Once the conditions have been met the AR processor executed the scene utilizing media assets and external services as needed.

4. SYSTEM ARCHITECTURE

The overall working of the system architecture is represented in diagrammatic form in Fig 1.1

4.1 Input frame

First we will use a image file for creating it to 3d image using unity or adding some extra feature using unity and after that we will put that into xyz frame in the unity.

4.2 Vuforia

Vuforia is augmented reality sdk which helps in building AR projects by providing recognition of images into vertical horizontal and planer surface. When the image is registered into the Vuforia it helps developers to position 3D and other media files into them .Vuforia helps in creating databases into which the real and virtual image would take place. There are lots of features of Vuforia like model targeting, image targeting, object targeting, cylinder targeting and multi targeting. These features help developer to make the project according to the need.

4.3 Cloud Combined view

For creating a cloud combined view we will use Vuforia feature in which database are build and can be saved into more formats. If we want to import it to our system its ok but if we want to make further changes or introduce new model then we use Vuforia cloud feature . The all the data are saved now into cloud and if we want to insert more file we can easily save. If we will save data into system then it will be difficult for us to put it again into unity for use. But if we are saving into cloud then it is easier and also Vuforia feature of multi targeting will work to make it settle according to the size .

4.4 Augmented Objects

Augmented objects are implemented in the real time frame where augmented objects can be seen within the real objects . This will be done only for those objects whose 3D images are build and will represent in the form of AR objects.

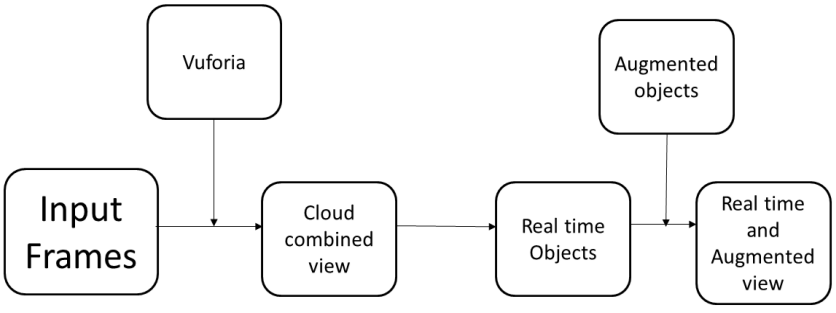


Figure 1.1 System Architecture Design

5. MODULE DESCRIPTION

5.1 Unity 3D

Unity is a multi-platform, integrated IDL for scripting game , and working with 3D virtual worlds including Game engine, 3D terrain editor, 3D object animation manager , GUI system, Unity 3D has custom resources

ISSN: 2233-7857IJFGCN

and in built packages for augmented reality creations.Using this platform we create 3D models that is required for our Augmented Reality. It is best suited for developing mobile augmented reality applications in the unity software.

5.2 Vuforia

Vuforia is an augmented reality software development kit that helps in building the Augmented Reality projects .Vuforia package helps in demonstrating the 3D model and recognizing them with the help of their feature . It provides the database where we can choose our type and then import our file. It uses a technology called computer vision to recognize and track the image and 3D objects in real time. It provides API (application programming interface) in java,and then it acts as extension for unity. Vufoia helps us to recognize the image and then implement the virtual image or 3D image file onto it .It has different features like model targeting , image targeting , object targeting , cylinder targeting and multi targeting . This feature helps our project in reaching the multi targeting feature.

5.3 SDK

SDK or software development kit is used into Augmented Reality for developing specific platform which will help all the assets to combine together. SDK tools which include various libraries help in combining all the processes together and then execute to build a functional product. Our Vuforia cloud platform is also asdk which stores the databases and can be used into the unity software with the help of the license key when put into unity. It is an engine to power the creation of AR projects. AR SDK helps in rendering, tracking and recognizing the scene. It helps in scale estimation like vertical and horizontal plane estimation with basic boundary. It tracks the motion as it is very important in our project to get rid of blur and error.

5.4 JDK

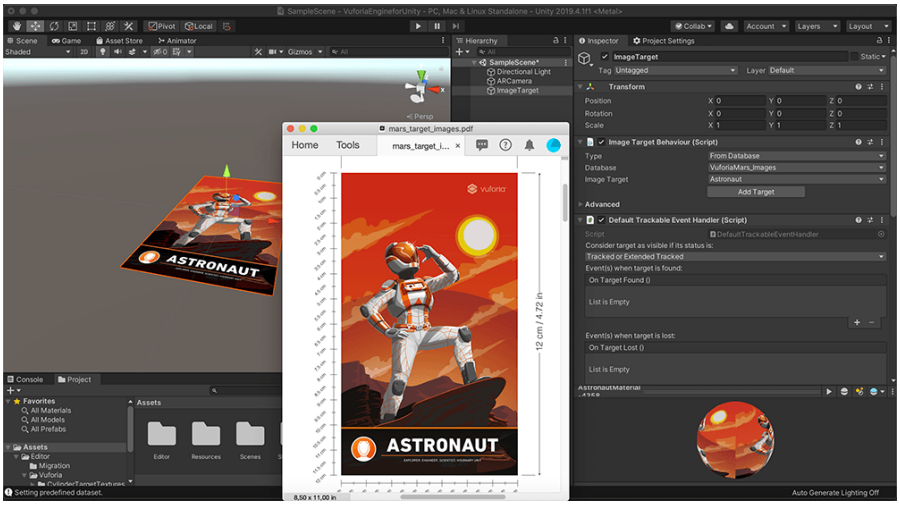
Augmented reality is nearly connected to artificial intelligence area. AR JDK or Augmented Reality java development kit helps in building the AR project and will support all the necessary algorithms and structures needed to implement inside the project. The JDK supports the entire necessary platform like Solaris, Linux and windows. We need JDK into windows which will further be implemented into the unity platform and we have written codes which control the working of the frame in unity. Our program will be executed into three steps first we write code into JRE,and then the program compiled into java program and then finally executed into JVM where it will run. In our project after completing these task the unity will help in creating the apk file.

6. WORKING AND ANALYSIS

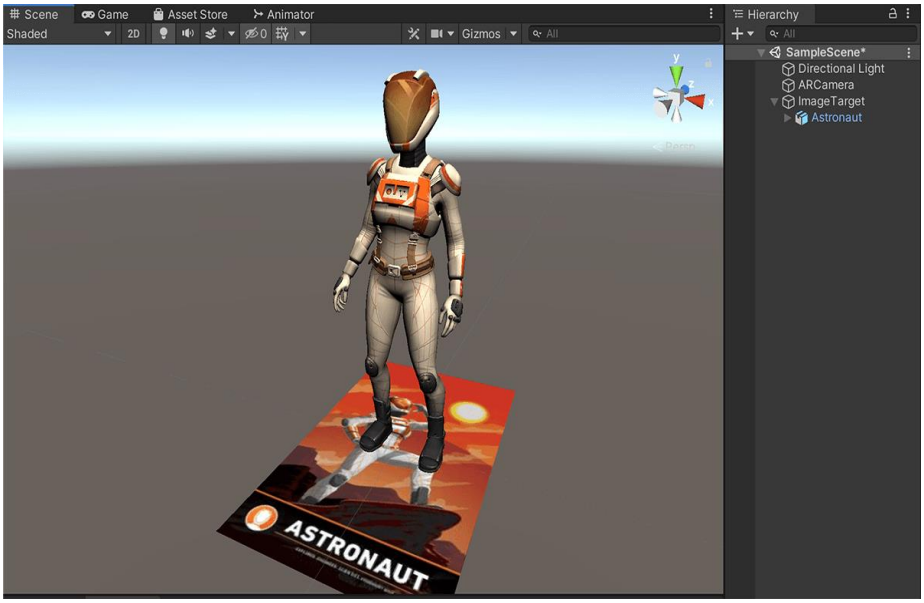
The application which we are building will provide virtual image,video, animation, audio overplayed on the object. Using our augmented reality application we can implement these using any of the device like mobile phone,tablets,laptops , PC . All we need a camera inbuild in these devices to recognize the real object to impose our virtual asset into them. The difference to recognize which is real using our application is nearly impossible. So main software we have used here is unity. First download the unity and set up it. Enable Vuforia augmented reality toolkit. Create new project name smart classroom. Now using gameobjectchoosing Vuforia AR-camera. Now implementing the image or video file into the unity form your pc. Now chose image or add target. Now get the key file form Vuforia. Now open app license in unity and paste the key. Now create database on the Vuforia platform and add the image and video into the database. Vuforia provide different platform like image, 3D and 2D etc. Now Vuforia will recognize the image using the image registration. Now chose the size and download database into unity editor . Now use file smart classroom database shown in unity. Now choose the quad file into the asset store. Now drag and drop the file which will be mounted into the image. Now go to AR camera and choose the file and superimpose the file. After saving the project we have implemented it on the supported platform like android. Now choosing player setting and enable .NET framework .By using sdk and jdk we can modify our application and we can also implement UI designs to them .Now we are good to go , click build button and it will be save as .apk file . This apk file will run on any platform like mobile , tablet , pc etc . Now using figure 6.1 and 6.2 it is shown.

The application will be used for learning into classroom and it will provide more practicle and memorizable way of study . These types of models are also modified and can be use for the purpose of use in the healthcare , industry and manufacturing .

ISSN: 2233-7857IJFGCN



6.1 Implementing the image file into the frame in Unity



6.2 Playing the scene into Unity

7. CONCLUSION

The proposed system enhances the way of learning as AR technology in classroom will allows student to interact with real world offering infinite new possibility and make it more interesting for students .It also will enhance the learning and memorization power of students. There is huge market for augmented reality in future and this technology will be implemented not only in education sector but also medical,healthcare,manufacturing, and many more. Its implementation cost is low and it can be deployed to any device like mobile, tablets and computers. Augmented reality technology can also be using in tourism industry as Google is planning to build google lens, while apple is planning to build apple glass which not only will help us to surf internet but also help us in various ways like in travel by showing each street name and shop name, what that shop is for and many more.

REFERENCE

[1] .W. Lu, J. Han and L. Geng, "Intelligent Classroom Information System," 2019 International Conference on Smart Grid and Electrical Automation (ICSGEA), Xiangtan, China, 2019, pp. 259-262, doi: 10.1109/ICSGEA.2019.00067.

ISSN: 2233-7857IJFGCN

[2] M. S. Khan and I. Zualkernan, "Using Convolutional Neural Networks for Smart Classroom Observation," 2020 International Conference on Artificial Intelligence in Information and Communication (ICAIIC), Fukuoka, Japan, 2020, pp. 608-612, doi: 10.1109/ICAIIC48513.2020.9065260.
[3] X. Deng and R. Zhang, "Smart Learning Environment: A Case on the Construction of Smart Classrooms in Colleges and Universities in Guangzhou," 2019 International Symposium on Educational Technology (ISET), Hradec Kralove, Czech Republic, 2019, pp. 262-264, doi: 10.1109/ISET.2019.00062.
[4] G., J. K.R. and K. Bijlani, "A Smart Phone Integrated Smart Classroom," 2016 10th International Conference on Next Generation Mobile Applications, Security and Technologies (NGMAST), Cardiff, UK, 2016, pp. 88-93, doi: 10.1109/NGMAST.2016.31.
[5] T. Rajesh Kumar, G.R. Suresh, S. Kanaga Suba Raja, Karthikeyan C ,2020 'Taylor-AMS features and deep convolutional neural network for converting nonaudible murmur to normal speech ', International Journal of Computational Intelligence, ISSN: 1467-8640, Volume 36, Issue- 3, pp. 940- 963 https://doi.org/10.1111/coin.12281
[6]. A Virtual-Reality System Integrated with Neuro-Behavior Sensing for Attention-Deficit / Hyperactivity Disorder Intelligent Assessment.---- By Shih-ChingYeh, Sheng-Yang Lin, Eric Hsiao-Kuang Wu, Kai-Feng Zhang, XiuXu, Albert Rizzo, Chia-Ru Chung. (IEEE 2019) .
[7]. Inverse Augmented Reality: A Virtual Agent's Perspective Zhenliang Zhang, DongdongWeng*, Haiyan Jiang, Yue Liu, Yongtian Wang Beijing Engineering Research Center of Mixed Reality and Advanced Display School of Optics and Photonics Beijing Institute of Technology Beijing, China .(2018 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)).
[8] Rahim, Robbi, S. Murugan, Reham R. Mostafa, Anil Kumar Dubey, R. Regin, Vikram Kulkarni, and K. S. Dhanalakshmi. "Detecting the Phishing Attack Using Collaborative Approach and Secure Login through Dynamic Virtual Passwords." *Webology* 17, no. 2 (2020).

ISSN: 2233-7857IJFGCN