

AUGMENTED REALITY IN EDUCATION
[Biology Model in class (9-10)]

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This Report Presented in Partial Fulfillment of the Requirements for the Degree
of Bachelor of Science in Computer Science and Engineering.

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APPROVAL

This Project/internship titled “**AUGMENTED REALITY IN EDUCATION [Biology Model in class (9-10)]**”, submitted by Name- **Tanzina Bithi**, ID No: **162-15-739**, Name- **Mohanondon Babu**, ID No: **161-15-7193**, to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 07-10-2020.

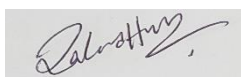
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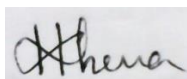
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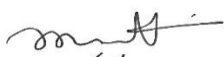
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We hereby declare that, this project has been done by us under the supervision of Mr. **Narayan Ranjan Chakraborty**, Assistant Professor, Department of CSE Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

Augmented Reality (AR) is an interactive experience or a mix of genuine real-world and computerized information and digital data. It simplifies and improves client information and user knowledge of interaction on collaboration with physical world by forcing virtual pictures on real ones. This is the better approach for manipulating how we collaborate with that world, replacing the real world. Augmented Reality has manifested in various fields to day like Education, Navigation, Games, Industry, Medical, Advertisements and Architecture. AR in training will before long influence the students learning measure. Our methodology can possibly accelerate the plan of 3D perspectives on and help understudies to learn and acknowledge ideas in a superior and intelligent manner and approach has the potential to speed up the design of 3D views of and help students to learn and realize concepts in a better and interactive way. The thought introduced in this report is to show how AR can be utilized to upgrade the learning experience of understudies for Biology. The AR based Biology application submitted here is a teaching aid supplementing the work of a teacher in the Biology. The AR based Biology application submitted here is a training help enhancing crafted by an educator in the Biology. It is processes which make Biology simple, intelligent, useful and genuine to the understudies. The AR based Biology application submitted here is a teaching aid supplementing the work of a teacher in the Biology. It is processes which make Biology easy, interactive, informative and authentic to the students.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Learning is an alternative behavior and ideas by gathering experiences and earning knowledge AR represents increased reality which is a way that you can get an aberrant perspective on a genuine situation. You can get an indirect view of a real life scenario condition in an enhanced manner by utilization of advanced innovation or environment in a supplemented way by use of digital technology. Due to covid-19, most schools, colleges and universities are now online based, so this app will be very useful for students. Augmented Reality (AR) app will be very useful for students and will make learning more accessible. Recently everyone is facing online in covid-19 pandemic situation so this app will be considered as a very useful app for students. Augmented Reality (AR) related Biology app has various futures including zoom in zoom out also can be seen by rotating and seeing videos.

1.2 Motivation

Importance of AR based Biology books and important role in AR Biology books apps science education is essential. It has been universally accepted that it can enhance the concept of science through reality experience. Several researchers have demanded its strong influence of the results of the students. Students may not be fully understood from the school teaching education. In recent years, using the information technology as AR apps alternative, the introduction of simulated student saw the transformation of AR Biology apps education. This paper provides ideas about biology in AR applications that can be used for home education in the home. Augmented reality is truth is a promising innovation technology that allows continuous user interaction between real and virtual objects. The purpose of this project is to improve science education and study of science by complementing biology apps using a simulated AR application in biology AR apps.

1.3 Objectives

We submitted an AR application in use Biology app with flowing objectives.

- To used AR app help students to actively interact in performing experiments to increase m their understanding.

- AR application makes them learn easily students.
- Open this AR app see this video they are easily understand student.
- Use these app students learn very well.
- To help students to test AR app's their knowledge by performing experiments.
- To help the remote areas students where there are no teachers and coaching center.
- To reduce coaching and privet tuition cost.

1.4 Expected Outcomes

Every project needs an output as a result. Result is the main concern of the project. At first we install some applications needed on a computer like unity 3D as an application to build a variety of 3D object visualization that will be made augmented reality (molecular structure), Google application sketch up making of unity molecules structure. After the installation this app, run Google sketch up to create 3D objects and video animation. To create AR application and necessary to log on to an official site of the VUFORIA developer, it acts as a key license that the AR camera is ready for use, and then the marker has been registered with the VUFORIA developer. After that, move the 3D object models and videos from Google sketch up and marker as the target image into the Unity 3D application. It is intended that 3D objects on markers can be displayed. The final step is to build APK extensions (android apps), this step requires Android Studio application to set the desired android version, so AR media can be used on android smart phone. In a primary level first of all we have worked on four books Biology, Chemistry ,Math and Physics implemented one of them .We have worked with four models in Biology books the four molecules name Nucleus, Golgi, Mitochondria and Neuron. Every project needs an output as a result. Result is the main concern of our project. At first step we install some applications needed on a computer like unity 3D as an application to build a variety of 3D object visualization that will be made augmented reality Google sketch up as an application that sketches the making of 3d biology model structure. After the installation, run Google sketch up to create 3D objects, models and videos. Create AR application, it is necessary to log on to an official site of the VUFORIA developer, it acts as a key license that the AR camera is ready for use, and then the marker has been registered with the VUFORIA developer. After that, move the 3D object from Google sketch up and make the target image into the Unity 3D application. It is intended that 3D objects can be displayed. The final step is to build APK extensions (android apps) , this app step requires Android Studio application to set the desired android version, so AR media can be used on android smart phone. In a

primary level we work at least four biology model named mitochondria-cell-organelles, Nucleolus, Neuron, Golgi. In this paper, we try to view their 3D models successfully showing 360 model and video. First we will install the mobile apps that are used for augmented reality on android mobile. Then when we open these apps we see the user interface (UI) Figure 3.7.5: Main UI Android screen [5]. What we see from physics, chemistry, biology, math. Then select our biology model that's like nucleus, Image target Nucleus model [1] Mitochondria. Neuron: Image target Neuron model [2] Golgi Image target Mitochondria model [3] model. Then scan mobile then we will scan our target image as soon as we will see our expected outcome model the animation and video will start. 3D Model and video [4]. In the end, we successfully create an app that can track an object in real life to show 3D model with Video animation Android screen output [6] when the model video starts, then we can zoom in and zoom out. Zoom in and zoom out from the model of our choice, see what's inside the model, and listen to the voice recording video.

1.5 Project Management and Finance

Project Management and Finance is a cycle which unites arranging, planning, bookkeeping, money related detailing, inner control, inspecting, obtainment, dispensing and the physical presentation of the undertaking with the point of overseeing venture assets appropriately and accomplishing the task's targets.

Research Questions

How can we show 3D models of a Biology object and how the with each other showing video model using AR and make a new model by using AR application?

1.6 Report Layout

We are organized the augmented reality our report as follows.

In Chapter 2, we introduce the augmented reality background overview of our AR project. In this part we also briefed about the Literature Review of the project including with different type of AR applications in the present day world and realize their activities or key role in our life.

In chapter 3, we specified the Requirement Specification. In this part we will show how easily we create an AR application by using Unity, VUFORIA and other tools in our project.

In chapter 4, we exhibited the Design Specification of the whole project, like coding part, 3D model view of the Biology and editing videos.

In chapter 5, we specified the Implementation and Testing of our project.

In chapter 6, we specified the Impact on Society, Environment and Sustainability of our project.

In chapter 7, we assigned about conclusion and the scope for future work of the undertaking. Finally of all, give some related reference to guarantee that the data in report are must be right.

CHAPTER 2

BACKGROUND

2.1 Preliminaries/Terminologies

Augmented reality (AR) Preliminaries/Terminologies is the continuous utilization of data as text, designs, sound, and other virtual upgrades incorporated with genuine items.

2.2 Related Works

Here we have just done augmented reality work on nine and ten board book only biology book, if we can complete the project very nicely; we want to publish all the classes and all the boards' books.

2.3 Comparative Analysis

We all know how to read from a book on a subject and look at it in a practical way and like at night. We remember something more than we look at a book in real life. It will be very beneficial for us and for the students. So we can say augmented reality and study by sight it's also Comparative Analysis.

2.4 Scope of the Problem

Most of the Students always facing some problems to understanding Biology, chemistry, Math and Physics subject and students have to go to the coaching center or privet tuition. Many students cannot be going coaching center or privet tuition because they have financial problems.

2.5 Challenges

Expanded Reality Industry Challenges, perhaps the most peculiar thing about Augmented Reality innovation is that notwithstanding encountering expansive selection and mass public acknowledgment - it isn't doing all that well business-wise. Allow me to clarify - the business is doing fine. There is a consistent progression of interests in the enlarged reality application market, and the overall foundation is more than positive. Nonetheless, every one of these speculations are yet to take care of no doubt. Some portion of the explanation is that nobody had calculated an unmistakable AR-related Business Model that will work long Of course, new companies are springing up like mushrooms after the downpour with an ever increasing

number of stunning ideas close by and numerous enormous organizations are evaluating different AR-related arrangements, yet there is one thing that ought to be noted - every one of these arrangements are incorporated into the plans of action that can be powerful with or without an AR arrangement.

The greatest AR result of ongoing occasions - Pokémon Go made back the initial investment simply because of the intensity of the brand. After the promotion subsided, the consistency standard followed. The equivalent goes for IKEA and Amazon AR applications - they are fun, yet you can live without them. Be that as it may, there is a beam of light as modern organizations. Why? They have enough money related assets to help improvement, and there are a lot of fields where AR innovation may come at convenient.

We should name a couple:

Verification of Concept for development ventures;

Error Checking;

Development Progress Monitoring;

Shrouded foundation representation;

Upkeep Instructions;

These sorts of uses can possibly set up an increased reality innovation not as a toy however as a suitable helping instrument that improves the general nature of the finished result. Absence of Augmented Reality App Design and Development Standards Guidelines are something of a general language for a product application. It is one of the approaches to tie down its similarity and commitment to the general improvement of the innovation. Right now, this is what is under development for Augmented Reality. The explanation is basic - it's too early. The innovation is excessively new, and it is as yet going to its own both in equipment and programming terms, so what's the issue? Without norms, each expanded reality-related venture is its very own thing scarcely viable with the others. That convolutes the way toward bringing together answers for the more noteworthy entire which makes the general advancement of the innovation much more slow than it might have been if everybody had been on the same wavelength. Notwithstanding, execution of specialized principles is an issue of time, and its appropriation will connote the last phase of building up the innovation as a genuine article Security and Privacy Issues with Augmented Reality Protection and Security additionally present huge difficulties that the AR business. Because of irregularities in increased reality programming, oversight, and carelessness, there is an authentic possibility of stumbling into difficulty without importance to do as such. The greatest issue is that no genuine guideline assigns what is permitted and what isn't in the enlarged reality condition.

Which implies the innovation can be utilized with pernicious goal similarly as it tends to be utilized for amusement. For instance, "attempt before you purchase" alternative for dress, yet as opposed to overlaying the fabric on your body somebody may overlay another bare body and spread to harm your notoriety or coercion. Or on the other hand AR can be utilized to capture accounts through observation and mining information yield by marginally controlling and overlaying AR content. A contributor to the issue is absence of mindfulness about these issues. Individuals don't see how touchy the subject is. The other contributor to the issue is the hesitance of the engineers to make a move before there is any warmth on the corner.

Literature Review

In this paper we recognized at any rate 8 Unique Classes of AR application state. These classes contain entrenched state like instruction, clinical, military, amusement and games, mechanical technology, promoting, route and engineering. In the course of recent many years, a ton of examination has been done in AR field. The new possibility of instruction and training given by AR has been progressively perceived by instructors Figure 2.6.3: AR application in training. To scholarly of virtual articles and functional conditions permit understudies to envision complex nearby connections and theoretical ideas[4], aptitude occasions that isn't plausible in reality [5], consolidate with two and three dimensional counterfeit items in the blended reality [6],develop significant practices that can't be applied and create different advances to create progressed environments[7].These instructive advantages have made AR one of the inventive advances for training throughout the following five years[8].AR application and its referenced frameworks are uncovered and utilized in various instructive fields. For instance Chemistry, Mathematics, Biology, Mechanical planning and others.



Figure 2.6.1: AR application in education [9]

Recent decade technological advances have genuine changed in medical services industry. Expanded reality in the clinical science makes a transformation in the current world. The enlarged the truth is applied to clinical instruction and preparing, careful recreation, neurological restoration, psychotherapy and telemedicine medication. Figure 2.6.2: AR application in clinical science Augmented reality can improve customary clinical consideration misfortunes, lessen clinical issues brought about by uninformed tasks, and decrease clinical instruction and preparing costs. Besides, the application has upgraded the productivity of clinical instruction and preparing, has expanded the degree of finding and treatment, improves' patient connections and builds the proficiency of the treatment cycle. Clinical expanded reality takes its unique inspiration from the need to imagine the patient between clinical data and a similar physical space [10]. An application for increased reality in clinical area is in ultrasound imaging [11]. Ultrasound experts utilizing an optical view through the presentation can see a voluminous delivered picture of fetal volts on the pregnant lady's belly. All the more as of late, Wen et al. coordinated by hand signals and offers a helpful careful framework upheld by an enlarged reality-based careful field [12]. Later on, there is a high likelihood of AR applications in medical services and medication. In nursing and clinical medical care administrations it can expand the adequacy and effectiveness.

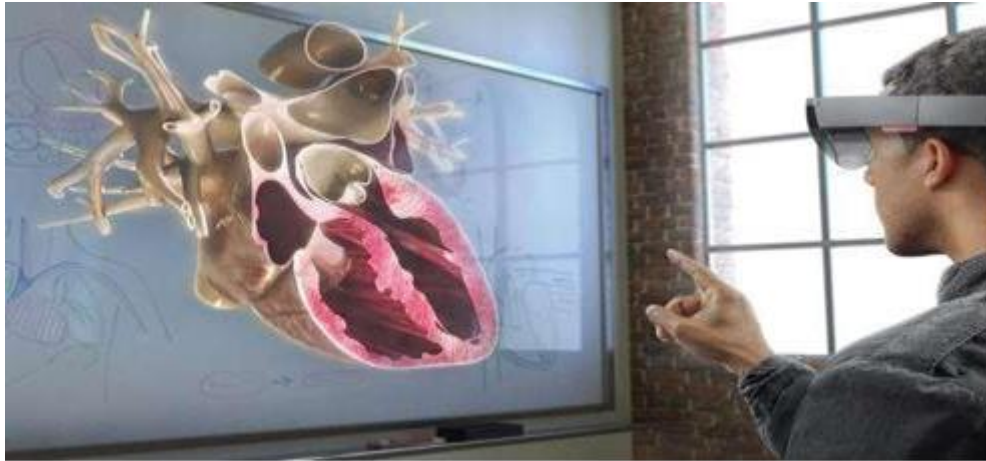


Figure 2.6.2: AR application in medical science [13]

The military part has consistently been propelling utilizing mechanical advances raised for preparing and improvement of war. Enlarged reality can be utilized to show genuine combat zone scenes and increment it with comment data [14]. Figure 2.6.3: AR application in military Hybrid Optical and Internal Tracker Using Small MMS (miniature electro-mechanical frameworks) Sensor, Cockpit was produced for cap following [15]. Unique benefits for military clients can be drilled continuously adversary activity like the truth of the preparation and wartime Augmented reality framework everywhere combat zones. Strategic expanded reality assists with diminishing the quantity of gadgets that the gadget should run, and may help decrease the effectiveness of our foes all the more successfully, to improve the front line consciousness of the warrior's soldiers.



Figure 2.6.3: AR application in military [16]

Augmented Reality has been used in video gaming and media entertainment for a long time to show a real picture interacting with one made from computer graphics. Figure 2.6.4: AR application in entertainment & game .Most fundamental ideas of Augmented Reality have been used in the film and science fiction like as Robot (1987) and Terminator (1984) [17]. AR can provide advertisers to show virtual advertisement and product placement. Augmented reality used to create games, model and videos in the entertainment industry. Augmented reality gaming is still now a new concept. The first popular AR games on mobile are Pokémon Go and Ingress. More than 25 AR games are released for IOS and Android (such as Army of Robots and Zombie GO, AR, Wall, Temple Treasure Hunt etc.) [18]. AR games are able to fight aliens, capturing fantastical animals, protecting the real world kingdom. Augmented Reality is additionally applied to life swim activity, Snooker ball directions, explain dashing vehicles and annotate racing cars etc.



Figure 2.6.4: AR application in entertainment & game [19]

Augmented Reality Tool for Operators Support, where people and robots share a shared millennium in the workplace. Provides system visualization, video and text based instructions, and visualization of production status. This tool enhances the safety of the operator and hybrid assembly environment through the immersion capabilities of AR technology. Augmented Reality is a norm stage for human-robot collaboration [20]. Figure 2.6.5: AR application in robotics has greatly helped the augmented reality. Microsoft was leading leader here in the implementation of AR technology to robotics. The cartographer was opened in 2016 and the standard path packages have become a distinguished 2nd and 3rd mapping solution for robots from Marble suppliers, lift Level 5 Lab Automatic Driving Car.



Figure 2.6.5: AR application in robotics [22]

Augmented Reality navigation features show to be worked for retailers from multiple points of view. Route is one of the most exciting pieces of retail where it very well may be effortlessly applied. AR is doubtlessly advanced in the business world and around the globe. One of the ways it is accessible its useful application is in route and guides. In the most recent year's I/O designer's gathering, Google has indicated another increased reality highlight for Google Maps, which will give continuous direction to individuals from our telephone camera [23]. Figure2.6.6: AR application in route [6]. The AR show at the gallery is one reason for the extension of navigational applications, because of the measure of gear it needs. Exploring through oceans of various highest point and gathering occasions is consistently a test. Nonetheless, a simple AR arrangement can reinforce homegrown route through a structure and it can stroll in a recreation center as opposed to going through the wilderness.



Figure 2.6.6: AR application in navigation [24]

The augmented reality of construction and architectural projects has established a 3D model of an existing space using a mobile device and 3D models. AR architecture and interior design are the way to support a decision. Before the construction begins, an architect can use the AR application to show its model to engineers and manufacturers, and they can point out potential problems when they are easy to fix and correct the mistakes. It was created to utilize AR frameworks to improve the structure, development and remodel of the design structure in Figure 2.6.7: AR application in engineering a model framework was made to utilize AR for compositional interest for expertise the executives and support. Instances of ongoing enlarged reality representation administration for structural models are AR .It joins AR innovation into stone work by furnishing 3D models with numerous balance of intelligence for both plan and introduction intentions. APK we can be utilized on any IOS/Android gadget [25].



Figure 2.6.7: AR application in architecture [26]

AR is straight from science fiction, it is one of the amazing technologies that highlights the world and receives the notice. The use of augmented reality within marketing is a new industry. It is used in advertising in automotive art. In 2018, the augmented reality of brand marketing is one of the hottest issues. All major technology companies, including Google, Apple and Facebook add new AR ability to their platforms. Now it is time to exhibit creative and marvelous AR marketing experience that roods our lives. By 2022 AR increased to\$35.22 billion Industry [27]. Figure 2.6.8: AR application in marketing, augmented reality is so versatile that it can find out the implementation of all kinds of industries. Restaurant

chains are no exclusion. Pizza Hut has found a very creative way to enhance the menu through AR technology Augmented reality. Make up "looking glass" has been a fixture of Sphere and other cosmetics retailers for different years.



Figure 2.6.8: AR application in marketing [28]

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

Business process modeling is the graphical portrayal of an organization's business cycles or work processes, as methods for recognizing likely enhancements. This is typically done through various charting strategies, for example, the flowchart, information stream outline, and so forth. Business process modeling is used to map 2 different states of the process: As-is, the state of the process as it is right now, without making any changes or improvements, and To-be, the future state, after making the changes or improvements.

Business process modeling is usually used interchangeably with business process mapping – and they can be pretty much the same, depending on who you ask. They're both used to graphically represent processes as a means of identifying potential weaknesses or improvements.

3.2 Requirement Collection and Analysis

The technique we utilized in this investigation was Implementation-Based exploration. The objective of the conversation is to create a particular item and test the adequacy of the item. In this part we show how effectively we make an AR application by utilizing Unity and VUFORIA motor.

VUFORIA:

VUFORIA is a Software Development Kit (SDK) for making AR application. It uses Computer Visualization structure to follow a photos and 3D objects persistently. It grants putting virtual 3D objects is related to genuine things at the camera screen. Which was introduced on so it is the most state-of-the-art structure available by then.. We have worked with four models in Biology books the four atoms name Nucleus, Golgi, Mitochondria and Neuron. We make an Android application that perceive and show its 3Dmodel and video movement. For usage we use VUFORIA Engine in variant Unity3D rendition Unity 2018.4.23f1 (64-digit).

To make it we need

- Unity
- Android SDK

- 3D Max
- VUFORIA

3.3 Use Case Modeling and Description

Create project in Unity

At first we create a new 3D project in Unity 3D. Figure 3.3.1: Unity window open a Project, click on New and create a project [30]. Figure 3.3.2: Creating new project , Before creating this project there are some field to select and then apply.



Figure 3.3.1: Unity window

First set the project name, at that point set area where store the advantages, scenes and others record identified with this venture. From the start this defaults to New Unity Project, and change it any time. If we want to import any unity provided asset package go to asset and search expected asset package, then download and import this asset package into our project. Unity imports this asset automatically into project. Here we also import VUFORIA provided package to import and work. The Add Asset Package screen likewise contains any Assets that we have downloaded from the Unity Asset Store [29]

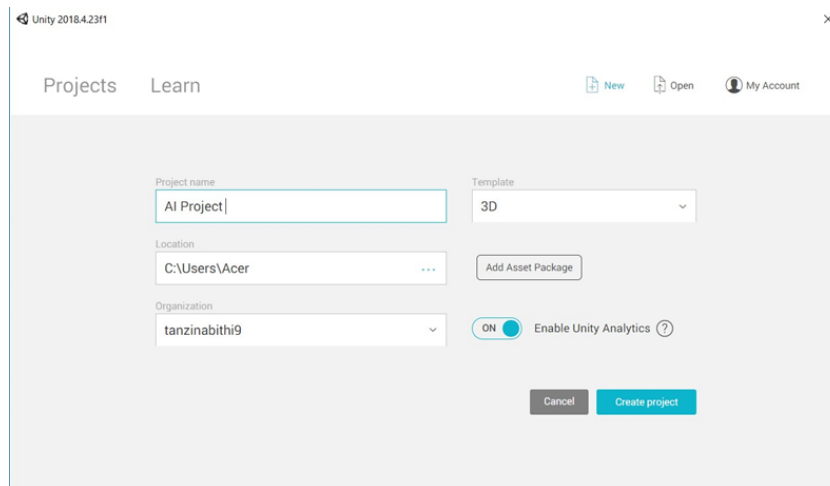


Figure 3.3.2: Creating new project

Then we have to set build configuration of Unity so that it has built for the Android platform. Go to File->Build Settings, Figure 3.3.3: Build setting choose Android and press Switch Platform. Figure 3.3.3 show how we control build setting.

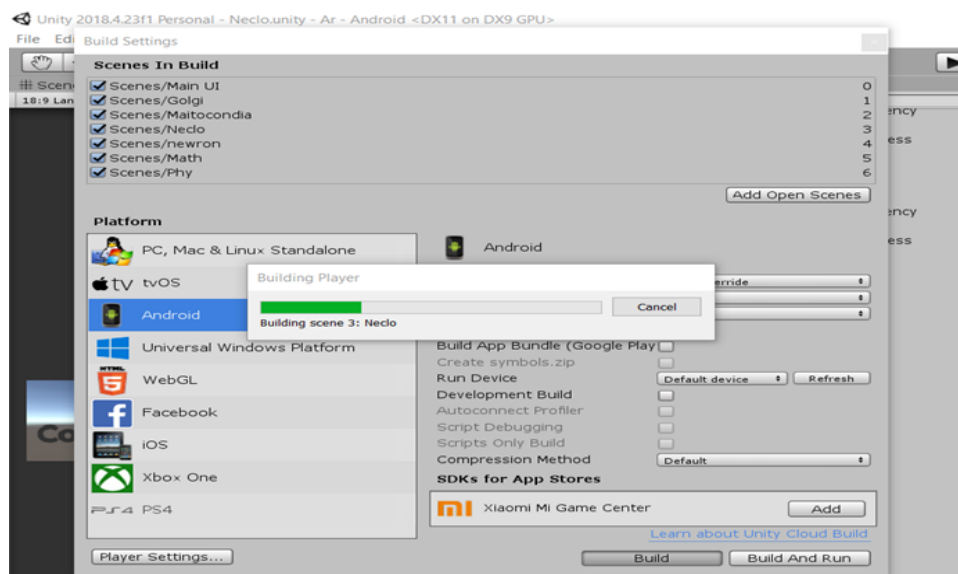


Figure 3.3.3: Build setting

Working with VUFORIA

Login for VUFORIA engineer stage by using Figure 3.3.4: VUFORIA Login VUFORIA user account & password.

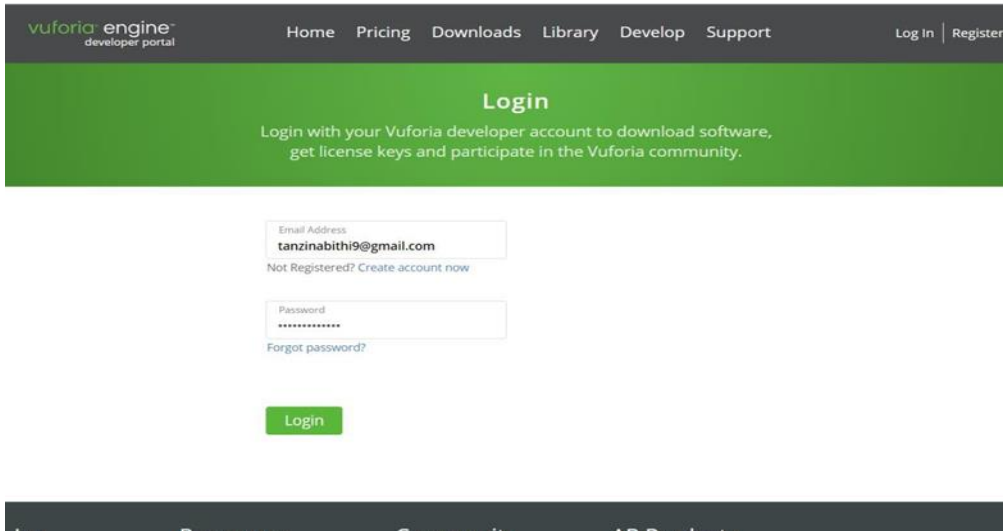


Figure 3.3.4: VUFORIA Login

Select Develop tab and press Get Development Key button. Create a new project and when it Appears on the list, go into project details. We have to copy the license key of the app. It is required by VUFORIA to work. Figure 3.4.2: VUFORIA License Manager Key.

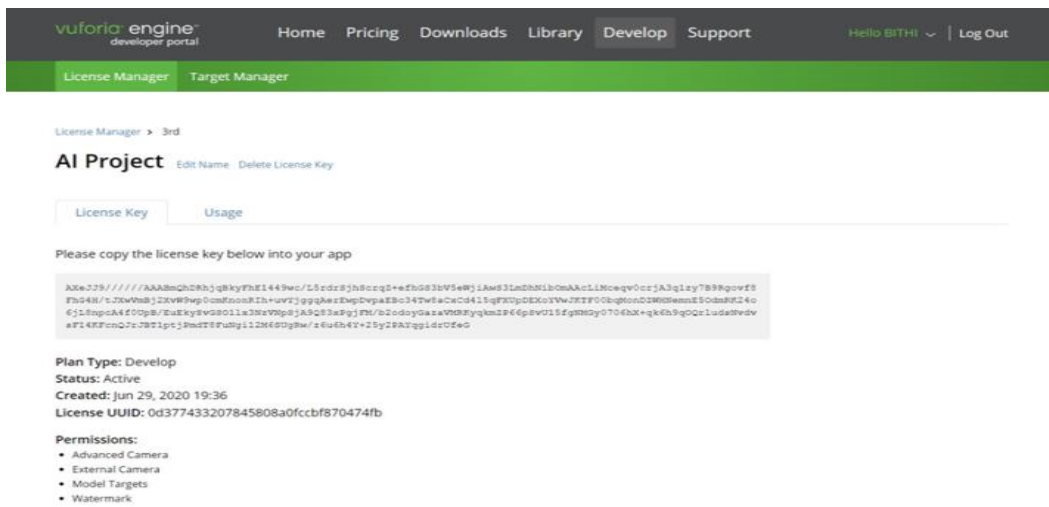


Figure 3.3.5: VUFORIA License Manager Key

Next, in the Develop tab, we select the Target Manager. There we make an information base Figure 3.3.5: Create Database [8] of items that VUFORIA ready to perceive. There are 3 kinds of information bases: Device, Cloud and VUMARK. We select the Device choice (it is the main conceivable alternative in the free form of VUFORIA) we download it and import it into Unity.

3.4 Logical Data Model

After this new folder named —Resources‖ will appear in our project. This contain —VUFORIA Configuration‖ file.

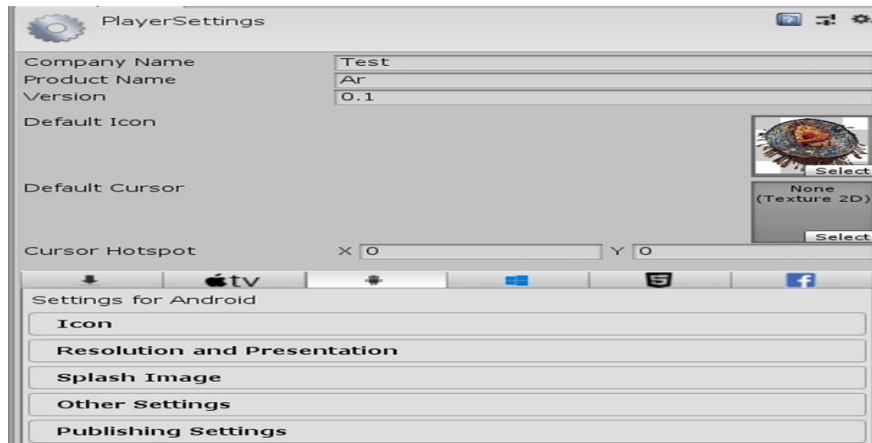


Figure 3.4.1: player setting

Next, we need to set other form settings required by Android applications, for instance, the bundle name, symbol, least SDK adaptation, and so on. . In the new area in Unity examiner we set 4 boundaries: Figure 3.4.1: player setting. To do this, press Player Setting button in the Build Settings window. In the new area in Unity examiner we set 4 boundaries: Figure 3.3.4: player setting.



Figure: 3.4.2 XR setting

Additionally, in XR Setting Figure: 3.4.2 XR setting Augmented Reality Supported option.

- Company Name — AR World
- Product Name —AR project
- Package Name—project1.unitypackage
- Minimum API Level — Android .This version of Android that VUFORIA can handle.

After, all with respect to arranging Unity venture. We can deal with VUFORIA properly .

3.5 Design Requirement

Inside co-plan meetings including fashioners and non-planners, the sort and qualities of the plan portrayals utilized is known to affect the exhibition of such meetings regarding thought

age, thought assessment and correspondence. This examination catches the difficulties professionals face in making and utilizing plan portrayals for co-plan meetings and proceeds to research the capability of Spatial Augmented Reality (SAR) to defeat those difficulties. The upsides of SAR in this application are that, different ideas can be spoken to utilizing one physical model, ideas can be changed live during the meeting, and extra gear, (for example, head mounted presentations or handheld gadgets) isn't needed, accordingly wiping out any conceivable obstruction with the regular associations between members. Meetings with plan specialists and preliminaries with a model SAR framework are utilized to recognize the key difficulties looked by professionals in their present utilization of plan portrayals, and to catch the innovation prerequisites for a SAR framework for use in co-plan meetings. These discoveries can educate the work regarding innovation engineers and analysts dealing with frameworks to help co-plan meetings.

For design requirement we have used several types of apps, there are

- Windows Operating System (minimum update windows10)
- For any browser
- Unity3D version Unity 2018.4.23f1 (64-bit)
- Android
- IOS
- Universal Windows Platform and
- Unity Editor.
- 3DS MAX

CHAPTER 4

DESIGN SPECIFICATION

4.1 Front-end Design

The front end design is the design that we see on the screen in front of the computer. Here the mitochondria-cell-organelles, Figure 4.1.3: Mitochondria Nucleolus, Figure 4.1.1: Nucleus, Neuron, Figure 4.1.2: Neuron Golgi Figure 4.1.4: Golgi that can be seen are all seen through the 3ds max design in front of the computer.

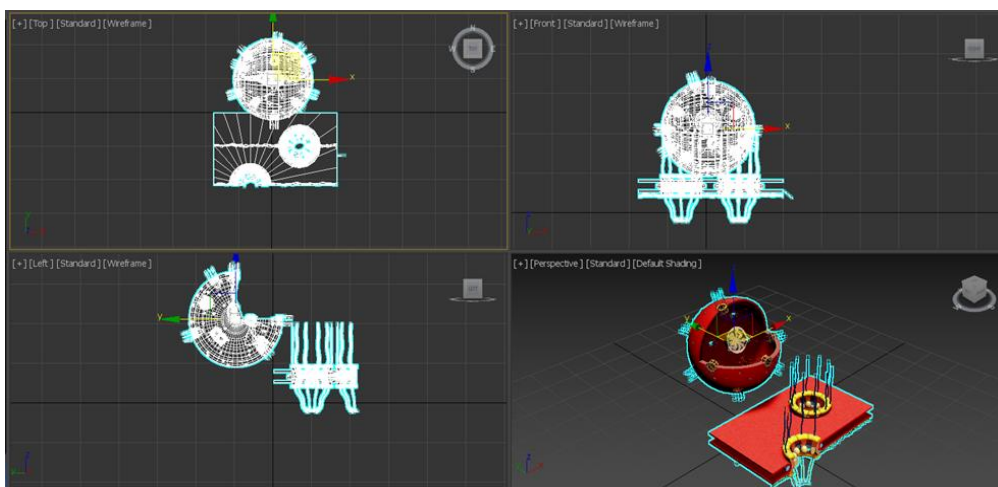


Figure 4.1.1: Nucleus

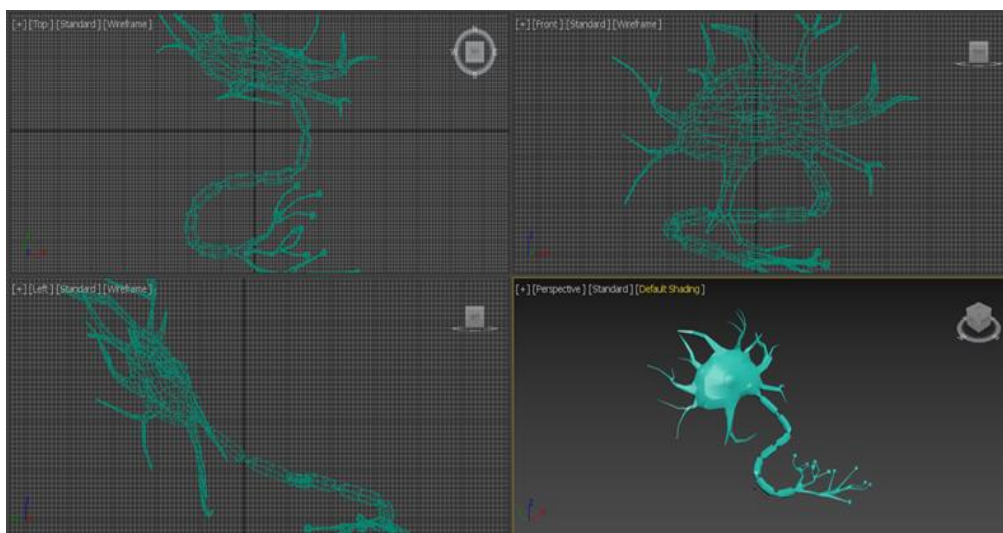


Figure 4.1.2: Neuron

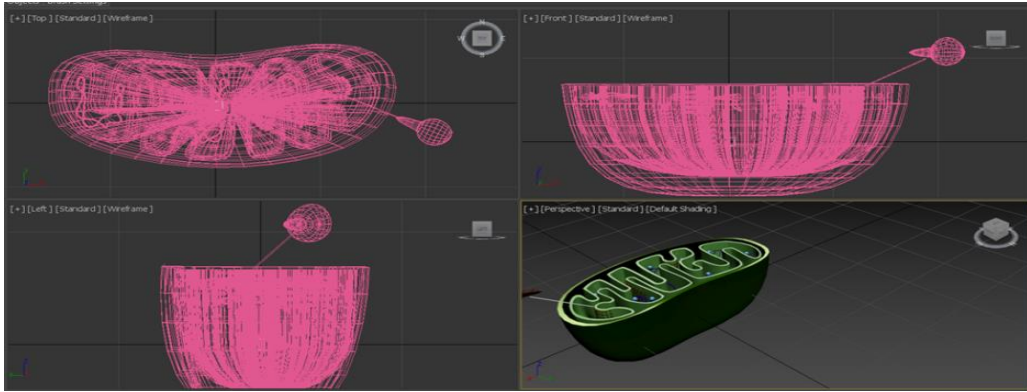


Figure 4.1.3: Mitochondria

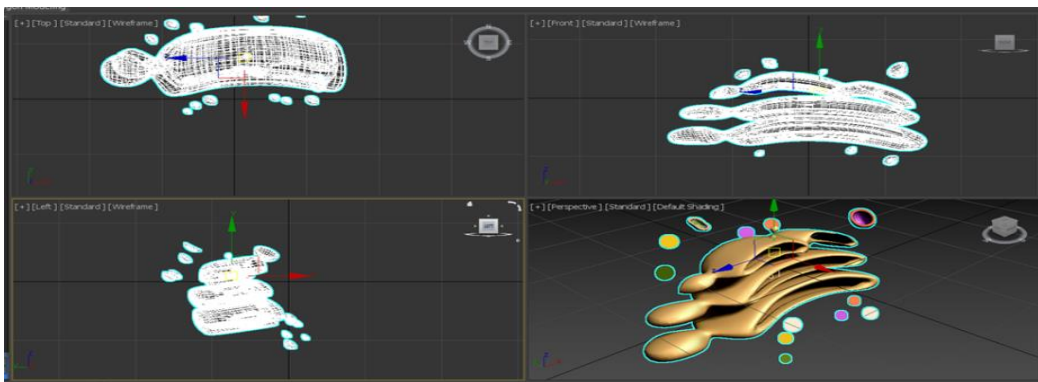


Figure 4.1.4: Golgi

Here mitochondria-cell-organelles, Nucleolus, Neuron, Golgi is the front end design

4.2 Back-end Design

The Back-end Design is the design that we cannot see on the screen in front of the computer. It is also programmable system. Figure 4.2.1: Import setting, the back and design is how to sort the models using the programmable language inside the computer and how to work correctly. Here the models are beautifully sorted by importing settings. Then we can see that model. All this has been done through design. So we can say that through design we cannot see the programs but to see the output.

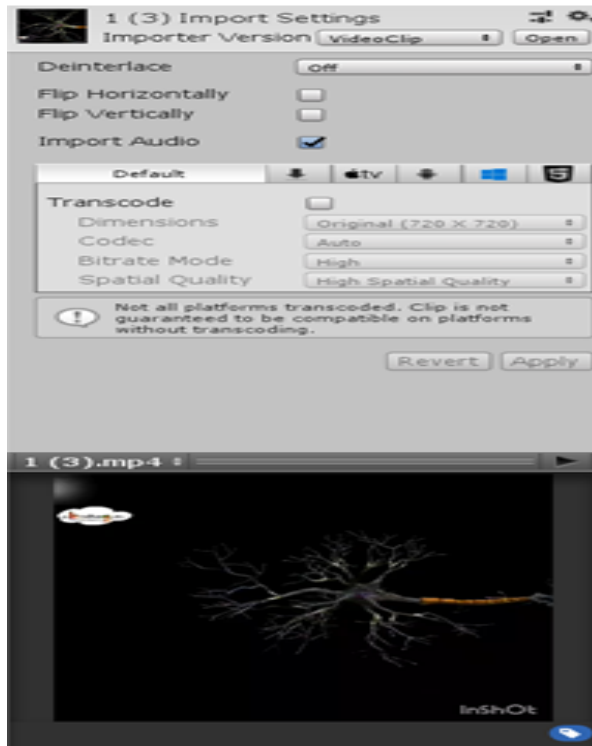


Figure 4.2.1: Import setting

Figure 4.2.2 VUFORIA editor scripts with VUFORIA editor script we write C programming languages and after scanning how the models will work, that is what is written through the program.

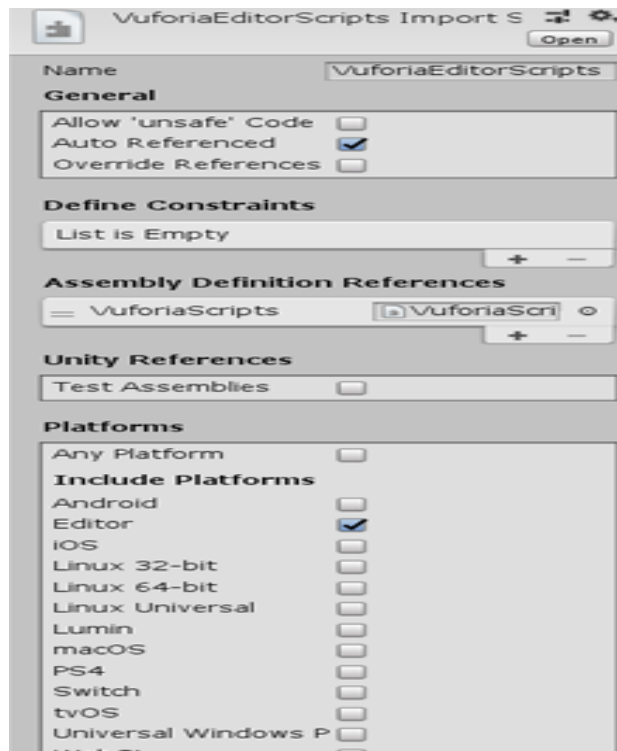


Figure 4.2.2 VUFORIA editor scripts

Figure 4.2.3.video step forward with video step forward we write C programming languages and after scanning how the models video will work, that is what is written through the program.

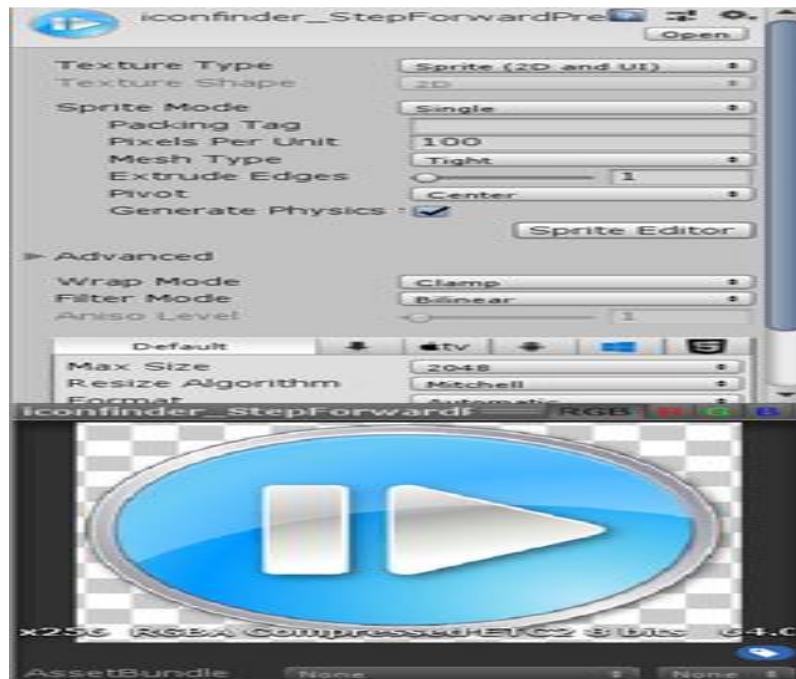


Figure 4.2.3.video step forward

Figure 4.2.4 Canvas variant with the canvas variant we will show the moving movement of the models from one place to another.

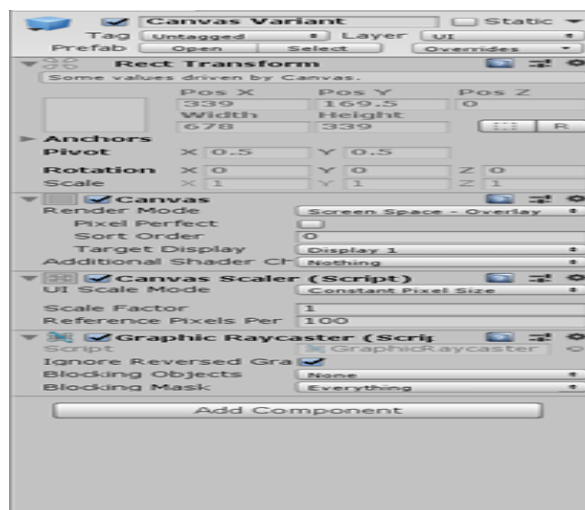


Figure 4.2.4 Canvas variant

4.3 Interaction Design and User Experience (UX)

The augmented reality (AR) innovation has come to remain and changing the way how we interface with the condition that incorporates us. Adding carefully made items to the genuine condition through the savvy gadgets can conceivably changing each industry, from training, route, showcasing and medical services to diversion and gaming[2]. At the period of current science the term Augmented Reality (AR) is utilized to portray a mix of innovations that empower continuous blending of PC produced content with live video show. Expanded Reality improves a client's inclination and communication with this present reality. The virtual items show data that the client can't legitimately recognize with his own faculties. The data passed on by the virtual items enables a client to perform genuine undertakings. AR is a septic case of what Fred Brooks called Intelligence Application (IA): utilizing the PC as a device to make an assignment simpler for a human to perform [3].

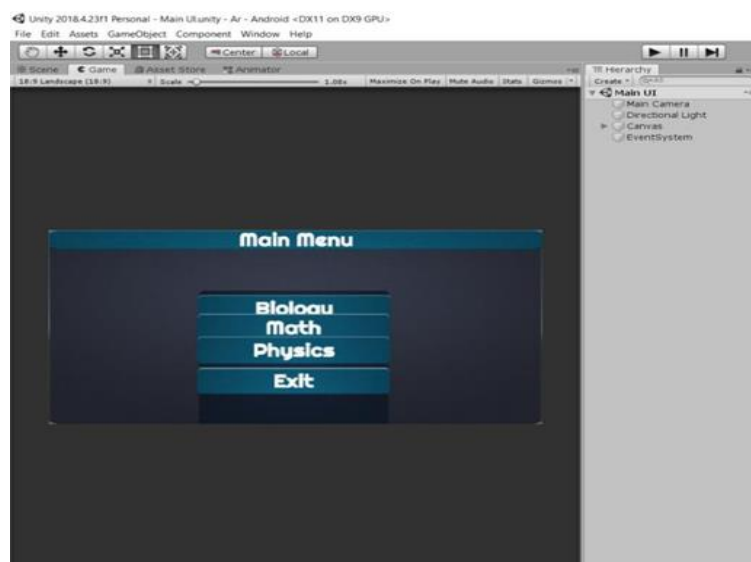


Figure 4.3.1: Main UI Android screen

4.4 Implementation Requirements

The method utilized in this investigation in the study was Implementation-Based exploration. To implement of our application we use two kinds of requirements. The requirements are

- Hardware requirement.
- Software requirement.

Hardware requirement:

- Pc
- AR camera devices

Software requirement:

- Windows Operating System (minimum update windows10)
- Any browser
- Unity3D version Unity 2018.4.23f1 (64-bit)
- VUFORIA engine
- Android

VUFORIA Platforms:

- IOS
- Universal Windows Platform and
- Unity Editor.

Implementation means a set of idea, plan, practices and informed-policies in real-world services. Implementation of interaction is common task for all development projects. Now-a-day's technology has leading in an amazing way and the tendency is to occur faster. Now technology offering many advanced product and services, which makes our day to day life easier and comfortable. In this paper our aim is to develop an application for Biology and other book by using Augmented Reality (AR).

Working Procedure:

For implantation our project at first we install unity3D editor. At next we create an account in unity. Then we create a new project here we insert project name, location, select model & then create project. After that go to file> build settings and then select android platform & then click player settings, XR settings, & click VUFORIA Augmented Reality supported then build and save this scene. Then we go to Asset tools, VUFORIA, AR camera & insert this & delete main camera. In AR Camera, inspector (Open VUFORIA configuration, VUFORIA, app license key).For app license key & unity package we login VUFORIA engine (for login we have an VUFORIA account).After login go to Develop tools > license manager create a license & name this project1.Then go to target manager & create database for unity package. To create database, name this database Project1 & type to device and click on create button. Then type Single target image, insert file, Width (300) & name click on Add button. If we show this database, target manager > click > Project1 (Show features for camera detection point on image) & for download this database > select Unity Editor > click on Download. Now we again open Unity3D > AR camera > Inspector > Open VUFORIA configuration>VUFORIA,

app license key (paste the license key provided by VUFORIA).Asset >VUFORIA> Image Asset >VUFORIA> 3D object > sphere Project > Asset >VUFORIA> Script > click right button > create C# > name >Coalition Detector. Double click on Coalition Detector> open Visual Studio > Write C# code for 3D object physical movements of selected molecules & save. Finally, we use this code for our selected 3D object/ molecules just drag & drop C# code on 3D object Inspector. At next we click file > Build setting > Android/IOS/others > select scene > build > name the APK> Save.

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation of Database

Create Database

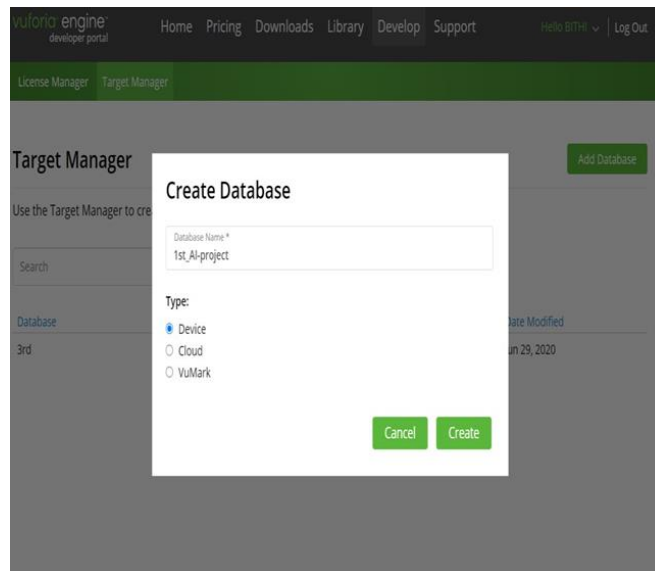


Figure 5.1.1: Create Database

After setting our information and database, we need to go into its subtleties. We include another objective add a new target. An objective is an article that perceived by VUFORIA and work with.

There are 4 kinds of targets:

- Single Image (that is our target image)
- Cuboids
- Cylinder
- 3D Object

At the following, we transfer a picture document, input its width and name it.

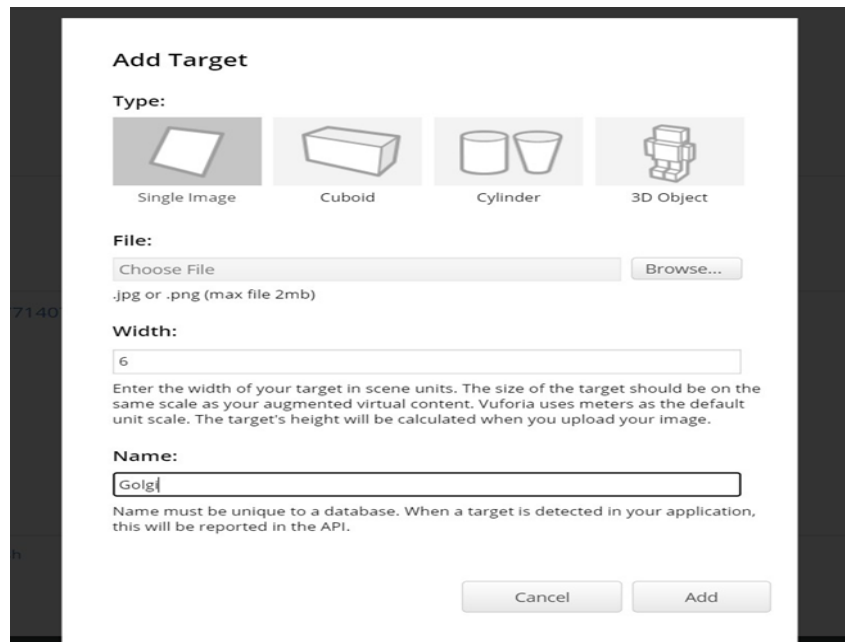


Figure 5.1.2: Add Target

After adding the target, Figure 5.1.2: Add Target it take place on the objective rundown. It is worth to focus on the positioning of targets. This are higher and the better. It implies that a picture or item with higher positioning has more explicit focuses for VUFORIA to remember it. For our situation, the picture has the most elevated conceivable positioning.

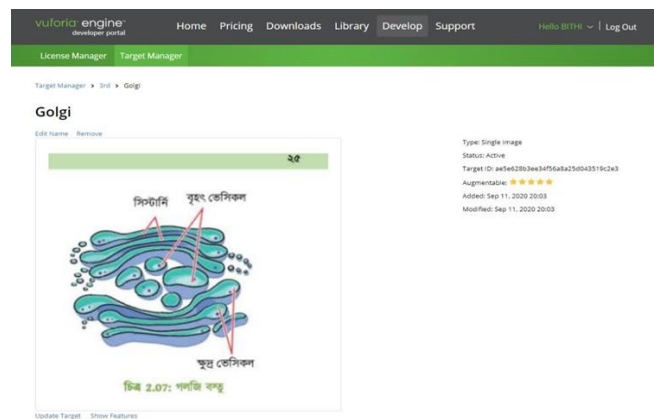


Figure 5.1.3: Target Manage

When we added all targets, Figure 5.1.3: Target Manage We chooses which ones we need to have in our Unity package. After this, Figure 5.1.4: Download Database [11] we press the Download Database button. We should choose Unity Editor as a development platform.

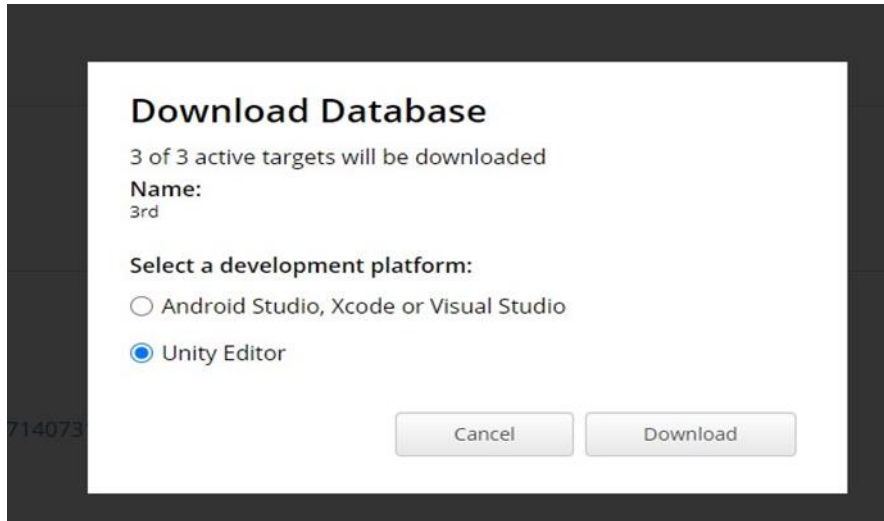


Figure 5.1.4: Download Database

5.2 Implementation of Front-end Design

Now, we import our information base to the Unity venture. We can do this by picking Assets->Import bundle >Custom bundle and picking our document. To work VUFORIA we utilize an extraordinary camera object called AR Camera Figure 5.2.1: AR Camera .We needs to erase the standard Unity camera and afterward, from our benefits, we should pick AR Camera and spot it on the scene. In the scene progressive system, click a correct catch of the mouse and from the menu bar that is show up, from the start select VUFORIA and after AR Camera.

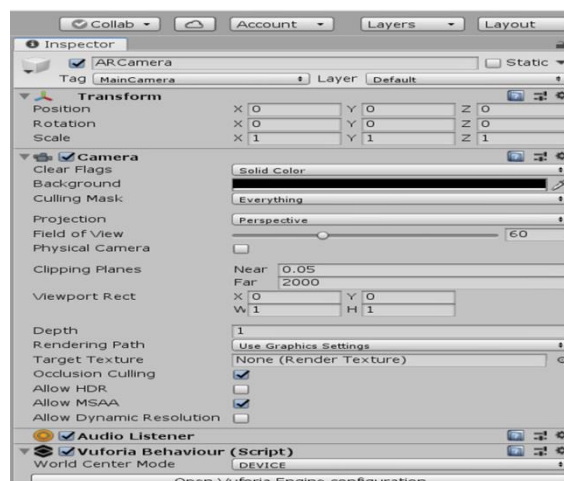


Figure 5.2.1: AR Camera

Now, we add the license key in VUFORIA configuration. Figure 5.2.2: VUFORIA Configuration.

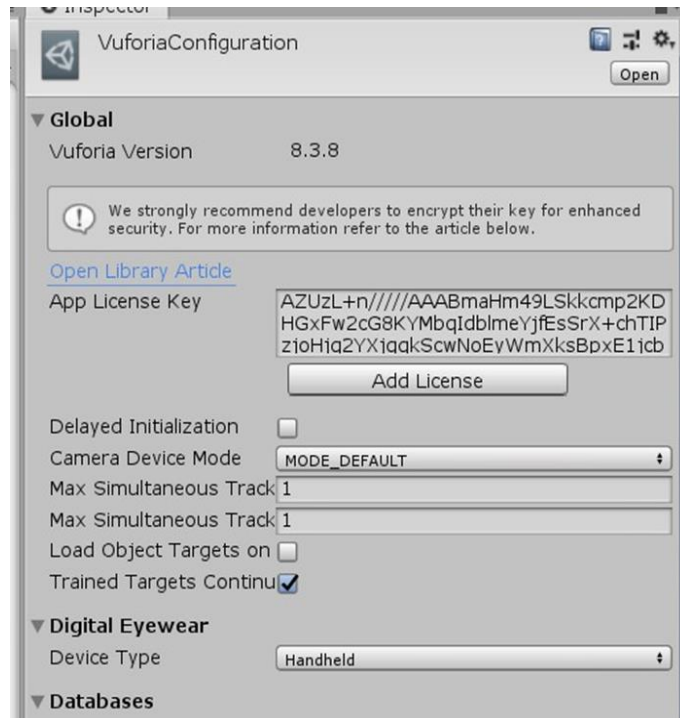


Figure 5.2.2: VUFORIA Configuration

In the event that our application needs to perceive the items in reality, we need to add these items to the scene. An article that speaks to a Single Image is called basically an Image. We can discover Images in a similar menu as AR Camera. In the wake of adding it to the scene set its situation to 0, 0, 3 and in the Image Target Behavior content of this item set an information base and picture focus to the relating component. Starting now and into the foreseeable future VUFORIA is perceives our picture in reality.

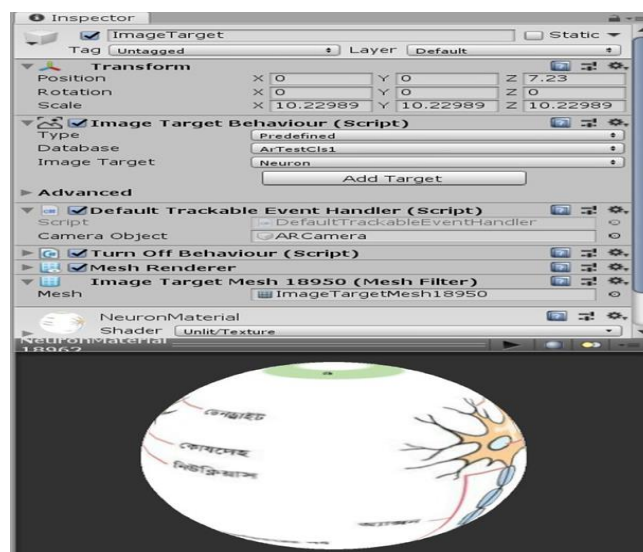


Figure 5.2.3: Image target

The last thing to include a 3D model as a kid object of the Image Figure 5.2.3: Image target[14] and set its situation to 0, 0, 0 Now return to VUFORIA Configuration, set Dataset for our information base and actuate it. Presently we need to just incorporate an undertaking with APK record and introduce it on an Android gadget. To do these go to File->Build Settings and press Build button. In the application we should simply direct our camera toward the picked picture and our model will show up.

5.3 Testing Implementation

First we will introduce the portable applications that are utilized for enlarged reality on android versatile. At that point when we open these applications we see the (UI) Figure 5.3.5: Main UI Android screen. What we see from material science, science, science, math. At that point select our science model that resembles core, Figure 5.3.1: Image target Nucleus model Mitochondria. Neuron, Figure 5.3.2: Image target Neuron model Golgi Figure 5.3.3: Image target Mitochondria model. Than filter versatile then we will examine our objective picture when we will see our normal result model the movement and video will begin. Figure 5.3.4: 3D Model and video.



Figure 5.3.1: Image target Nucleus model

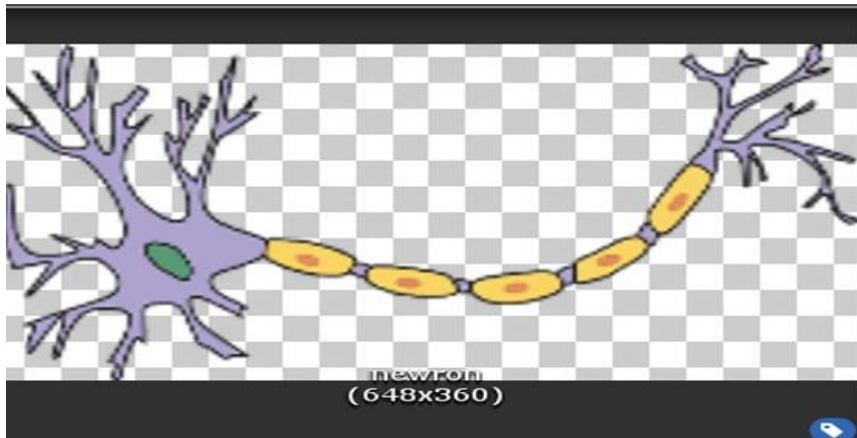


Figure 5.3.2: Image target Neuron model



Figure 5.3.3: Image target Mitochondria model

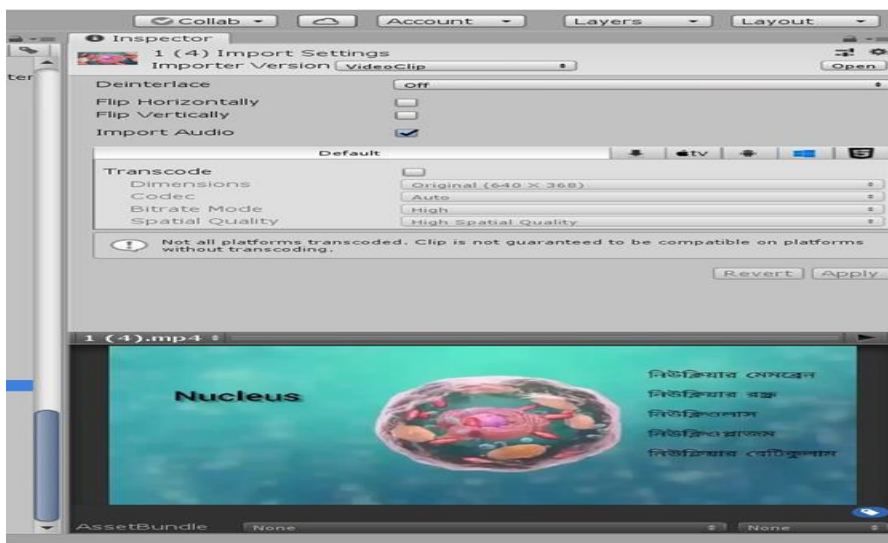


Figure 5.3.4: 3D Model and video

5.4 Test Results and Reports

Every project needs an output as a result. Result is the main concern of the project. At first we install some applications needed on a computer like unity 3D as an application to build a variety of 3D object visualization that will be made augmented reality (molecular structure), Google application sketch up making of unity molecules structure. After the installation this app, run Google sketch up to create 3D objects and video animation. To create AR application and necessary to log on to an official site of the VUFORIA developer, it acts as a key license that the AR camera is ready for use, and then the marker has been registered with the VUFORIA developer. After that, move the 3D object models and videos from Google sketch up and marker as the target image into the Unity 3D application. It is intended that 3D objects on markers can be displayed. The final step is to build APK extensions (android apps) , this step requires Android Studio application to set the desired android version, so AR media can be used on android smart phone. In a primary level first of all we have worked on four books Biology, Chemistry ,Math and Physics implemented one of them .We have worked with four models in Biology books the four molecules name Nucleus, Golgi, Mitochondria and Neuron. Every project needs an output as a result. Result is the main concern of our project. At first step we install some applications needed on a computer like unity 3D as an application to build a variety of 3D object visualization that will be made augmented reality Google sketch up as an application that sketches the making of 3d biology model structure. After the installation, run Google sketch up to create 3D objects, models and videos. Create AR application, it is necessary to log on to an official site of the VUFORIA developer, it acts as a key license that the AR camera is ready for use, and then the marker has been registered with the VUFORIA developer. After that, move the 3D object from Google sketch up and make the target image into the Unity 3D application. It is intended that 3D objects can be displayed. The final step is to build APK extensions (android apps), this app step requires Android Studio application to set the desired android version, so AR media can be used on android smart phone. In primary level we work at least four biology model named mitochondria-cell-organelles, Nucleolus, Neuron, Golgi. In this paper, we try to view their 3D models successfully showing 360 model and video.

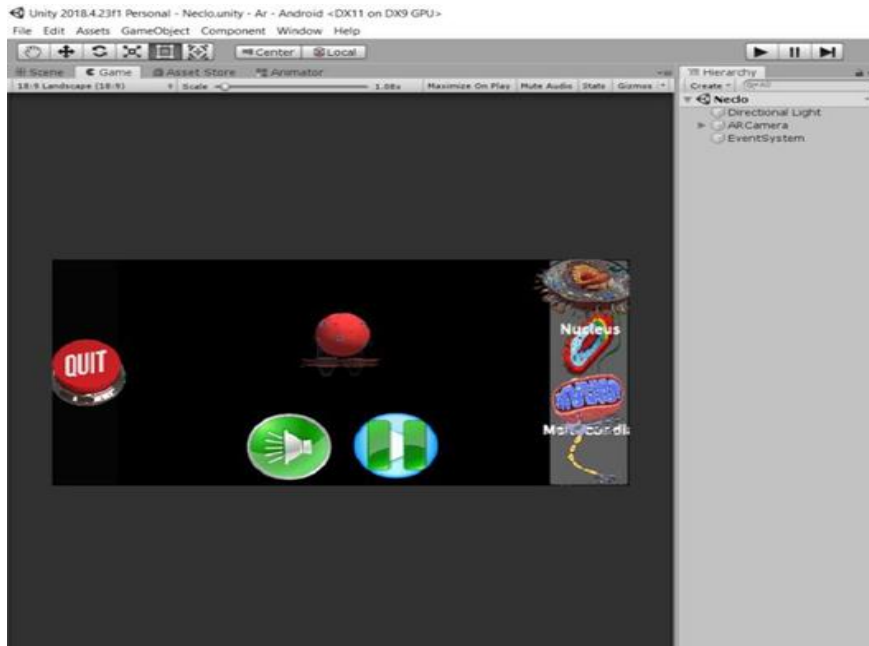


Figure 5.4.1: Android screen output

In the end, we successfully create an app that can track an object in real life to show 3D model with Video animation. Figure 5.4.1: Android screen output [6] when the model video starts, Then we can zoom in and zoom out. Zoom in and zoom out from the model of our choice, see what's inside the model, and listen to the voice recording video

CHAPTER 6

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

6.1 Impact on Society

Expanded reality will likewise strongly affect society. The promoting and commercial fields will detonate with increased reality gadgets. The portable applications that are being created will offer facial acknowledgment programming that will standard rapidly. AR makes the current reality more significant in light of the fact that it permits to collaborate with it. Expanded reality has an extraordinary potential to be utilized in the homeroom since it changes the manner in which understudies communicate with this present reality, upgrades understudy commitment, and makes the learning of their subject substance a good times.

6.2 Impact on Environment

Augmented Reality (AR) empowers advanced data to be superimposed and coordinated into physical condition. With huge numbers of us currently at home during a worldwide pandemic, AR is an apparatus that can assist us with changing our prompt environmental factors into learning, work and amusement spaces. Before a huge venture is done, it is hard to realize the subsequent perspective on the task precisely and everything being equal. Despite the fact that you welcome pros to look into blue prints or information, the outcomes acquired can't be seen legitimately through this sense. Additionally, an enormous task influences conditions extraordinarily, it is important to build up another ground-breaking perception apparatus that surveys ecological effect precisely from the style and nature perspectives before designing is built. Unmistakably, this is critical for shirking of negative impacts on condition. As of late, the augmented simulation (VR) has been fairly famous for venture arranging. It furnishes us with another method for visual evaluation. As known, augmented experience needs to utilize three-dimensional (3D) PC illustrations to demonstrate and deliver virtual conditions progressively. This methodology ordinarily requires arduous demonstrating and costly 3D realistic quickening agent for quick delivering of more convoluted scenes. The delivering quality and scene unpredictability are regularly restricted on account of the continuous limitation. Thusly, it is hard to acquire an acceptable arrangement. Nonetheless,

expanded reality [1, 2] technique can defeat the above constraints. Increased Reality (AR) is an innovation that consolidates the rich data accessible in reality into the augmented experience. The AR can be acknowledged by overlaying 3D graphical articles with picture without camera boundaries pre-aligned. On account of being a video-picture approach, less virtual articles that will be melded into genuine condition should be drawn, thus the expense of delivering is autonomous of the scene unpredictability. Accordingly, the AR framework doesn't need particular illustrations quickening agents. Then again, the measure of authenticity in the AR framework relies upon the nature of the information pictures. It is anything but difficult to make the AR frameworks more sensible than numerous VR frameworks. In the accompanying, the principle thought of the AR dependent on vision for ecological arranging is introduced

6.3 Ethical Aspects

6.3.1. The commandeering of public spaces

Public spaces have a place with us all of us, firms could undoubtedly resentful people in general in the event that they utilize reckless growth to embellish treasured neighborhood landmarks or much-adored vistas. Regardless of whether your AR situation isn't unmistakably questionable it could be portrayed as virtual spray painting on the off chance that it isn't suitable and deferential. In spite of the fact that AR is just open through a gadget, we may see a future where general society can veto specific kinds of expansion to safeguard the poise of their neighborhood environs. This will be particularly relevant if all AR winds up sharing a solitary stage.

6.3.2. Stopping up on private land

A business wouldn't hurl yard sign on a family's private garden without asking, so for what reason should AR be any extraordinary? Despite the fact that the law may require a long time to make sense of its position on AR, there are aware moral worries that shouldn't be disregarded. Should a burger tie have the option to expand a house where the inhabitants are Hindu? Is it alright to translate freely accessible statistics data onto private houses? It appears like private proprietors could have rights over the virtual space that encompasses their property.

6.3.3. Valuable obscurity

The allowed to-download Blip par application as of now flaunts how it can tackle "ground-breaking expanded reality, facial acknowledgment, man-made reasoning and visual hunt advances", permitting us to utilize our telephone cameras to open data about our general surroundings. At present, they urge us to look-into tattle about well-known countenances spotted on TV or in pictures, yet there is obviously the genuine possibility of AR innovation distinguishing people in the road. On the off chance that this data can be cross-referred to with other accessible records, at that point AR could blow openings through close to home namelessness in broad daylight places.

6.3.4 Driving clients by the nose

The Pokémon GO game has prompted various prominent episodes, including the demise of players. To such an extent, that there is a Pokémon GO Death Tracker which logs the subtleties of every mishap. In spite of the fact that it may be a stretch to consider game designers liable for reckless people and avoidable misfortunes, how much should organizations utilizing AR be constrained to comprehend the conditions they are enlarging. Would it be advisable for them to know whether they're driving clients into risky neighborhoods, onto occupied streets, or to places where the landscape is some way or another hazardous?

6.4 Sustainability Plan

A sustainability plan is a guide for accomplishing long haul objectives and reports methodologies to proceed with the program, exercises, and organizations. The term supportability is comprehensively used to show projects, activities and activities focused on the protection of a specific asset. In any case, it really alludes to four particular regions: human, social, monetary and natural - known as the four mainstays of maintainability six significant points of interest for rehearsing supportability are:

- Improved brand picture and upper hand
- Increment profitability and lessen costs.
- Increment business capacity to consent to guideline.
- Pull in representatives and financial specialists.
- Diminish squander.
- Satisfy investors.

CHAPTER 7

CONCLUSION AND FUTURE WORK

7.1 Conclusion

Finally we can say that Augmented Reality (AR) app will be very useful for students and will make learning more accessible. Recently everyone is facing online in covid-19 pandemic situation so this app will be considered as a very useful app for students. Augmented Reality (AR) related Biology app has various futures including zoom in zoom out also can be seen by rotating and seeing videos. Due to covid-19, most schools, colleges and universities are now online based, so this app will be very useful for students. In recent, efforts have been made to use augmented reality as a device for studying about 3D biology education. We are tried to implement an algorithm which suggest the user to simulate an experiments virtually of analytical biology using AR application platform. The virtual experiments conducted through the AR biology books apps can be used android mobile in home as a means to test ideas not testable within the time, cost and safety constraints of the usual home. Due to limited or costly resources, they can also be used to prepare a student before doing the actual study own home. Other advantage is it allows students do not run way to other coaching center and others teacher home. We are doing experiment 3d biology models and videos. Smartphone implementation of the algorithm allows individual performance to learner this AR app, which results in a positive attitude of learning the subject. This proposed algorithm has a potential opportunity to build up a smart educational environment and growing the learning usefulness of AR biology book in future. Conclusion In recent, efforts have been made to use augmented reality as a device for studying about 3D biology education AR app. We are trying to implement an algorithm which suggest the user to simulate an experiment virtually of analytical biology using AR application platform. The virtual experiments conducted through the AR biology books apps can be used android mobile in home as a means to test ideas not testable within the time, cost and safety constraints of the usual home. Due to limited or costly resources, they can also be used to prepare a student before doing the actual study own home. Other advantage is it allows students do not run way to other coaching center and others teacher home. This proposed algorithm has a potential opportunity to build up a smart educational environment and growing the learning usefulness of AR biology book in future.

7.2 Scope for Future Work

Augmented reality made our life a lot easier. Augmented reality (AR) can create different types apps and different types of games. We have created an app for biology books using AR, which is very helpful for their study, with the development of the world, now the use of AR is increasing day by day growing and using different types of games and different types of apps which help us a lot in our daily work. One of them is Biology Book App. Using the Biology Book app will make it much easier for them to study and make their studies easier to understand. So we want to increase its use in the future and development it more so that students can study more easily at home. We want to increase its use in the future and we want to cover the book into augmented reality (AR) app. So that our next generation can easily understand their reading with the help of this Augmented reality (AR) app. Augmented reality gives us to show how biology model by using a virtual model understood And for easily student . In future we will try to make an AR-based application for student AR biology book with all apparatus. So that we show how the biology 3d model doing AR apps and how to make a video as a 3D visualization as well as showing the dynamic behavior of the whole reacting system and provide interactive facilities are needed to help constructing models from biology books. In this paper we show at a single biology model 3D visualization and how they interacts with each other and produce a new product. In future we will try to show how multiple model and added video interact with each other at the same time.

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Title :- AUGMENTED REALITY IN EDUCATION [Biology Model in class (9-10)]

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