FINAL YEAR PROJECT REPORT

BONGO VR: THE ARCHAEOLOGY OF BENGAL

BY

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Multimedia and Creative Technology.

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APPROVAL

This Project titled "**BONGO VR: THE ARCHAEOLOGY OF BENGAL",** submitted by Fahad Abbasy to the Department of Multimedia and Creative Technology, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Multimedia and Creative Technology and approved as to its style and contents. The presentation has been held on 8Sep, 2019.
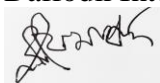
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DECLARATION

I hereby declare that, this project has been done by me under the supervision of Dr. Shaikh Muhammad Allayear, Associate Professor and Head, Department of MCT Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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I would like to express my heartiest gratitude to Arif Ahmed, Mr**.** Md**.**Samaun Hasan, Mr. Md. Salah Uddin and Head, Department of MCT, for his kind help to finish my project and also to other faculty member and the staff of MCT department of Daffodil International University.

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Finally, we must acknowledge with due respect the constant support and patience of our parents.

ABSTRACT

Virtual reality (VR) is computer generated stereo visuals which replace the actual world surroundings of a consumer around them. Both Augmented and Virtual reality may be supplied to consumers through headsets like HTC Vive, Oculus Rift, and Microsoft Hololens or through the camera of a mobile phone. Whereas augmented reality (AR) is the overlaying of digitally-created content such as computer-generated graphics, videos, texts and sounds are layered on top of a physical view. Augmented reality permits the users to have interaction with real and virtual elements or augmentation. In both practical and experimental implementations, augmented reality and virtual reality can replace or lessen the consumer's belief of truth. Augmented and Virtual reality has been adopted in various industries such as retail, healthcare, science & educational and Entertainment. Some agencies already made this modern technology and use several ways, from refreshing their print catalogs to interactive demonstrations at installation and on mobile screen. That is why I choose augmented reality and virtual reality in past visualization to give the clients more informative and visual proposal and for the agencies who cope with clients that have a clearer vision on a probable deal. I start Bongo VR: The Archaeology of Bengal VR from the masterplan AutoCAD layout, complete the model by using AutoCAD, Autodesk Maya, Adobe Illustrator, Adobe Photoshop, plays a role texturing whole project and Unity game engine for Virtual reality and Augmented reality.

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Introduction

1.1 Background

Virtual Reality is a fully immersive computer simulated environment that gives a user the feeling of being in that environment instead of the one they're actually in. A lot of video games have already developed the technology to put the user in an interactive world. You are simply a spectator overseeing the events that are happening in that world. In order for your brain to perceive a virtual environment, there are a few key factors that are vital for the creation of an immersive experience necessary for virtual reality .

The origins of VR as a technology system can be traced back to 1962 when filmmaker Mort Heilig created the Sensorama. It was an arcade style cabinet with a 3d display vibrating seat stereo sound fan and sense producer one of the experiences was riding a motorcycle down the streets of Brooklyn a viewer would have a 3d view of the streets while having the wind blow in their face while simultaneously feeling the vibration of the motorcycle seat and even experiencing the smells of the city although it was absolutely revolutionary for the time the idea largely didn't gain traction most people point to MIT computer scientist ivan sutherland as being the godfather of VR displays in 1968 hecreated the sword of damocles the first VI headset he and his colleagues at MIT started the first virtual headset experiments as a side point Sutherland was a low-key genius he also invented sketch pad in 1963 an advanced software for computer-aided design and a breakthrough in human-computer interaction. Heilig turned into now not able to find economic help of manufacturing, so the undertaking turned into deserted.

Virtual wind Tunnel developer in early Nineteen Nineties at NASA Ames application that allowed the remark and investigation of glide fields with the assist of Boom and Data Glove.

Last five years, virtual reality and augmented reality have attracted to technology market place, most of the people, specifically Mark Zuckerberg sold Oculus for 2 billion Dollar.

Currently, many other corporations, which include Samsung, Sony, HTC, and Google also huge investments in AR and VR. The examine of VR turned into initiated inside the laptop pix discipline and has been prolonged to numerous disciplines. Now videogames support VR equipment, this technology day by day greater famous and constitute valuables.

Benefits of virtual reality:

Virtual reality is an artificial environment or scene generated thru the usage of a computer's hardware and software. This artificial scene or atmosphere is described in any such way that it seems 3-D and looks, and we experience like a globe of 3-D. A consumer wishes a head-hooked up screen (HMD) and unique varieties of gloves to acquire feedback from the computer to experience a virtual reality scene or surroundings. By sending a brand new input video, an HMD keeps a track of ways eyes pass and reply. A user additionally desires the records gloves that discover the hand movement and interface a computer with that movement. The maximum massive element needed for virtual truth is the software to experience the actual world.

Virtual reality used in medical studies to assist the students recognize the shape of human body. Used in laboratories for scientific research a good way to make it case for the scientist to investigate on a selected topic. Used in leisure along with games and movies to present the experience in extra reality. Used in using colleges to give a actual appearance of roads and site visitors. Used in army training for the soldiers to get acquainted with unique regions inside the battlefield.

1.2 Motivation

According to various studies, Virtual Reality and Augmented Reality in historical place makes tourist more interested and involved. In general, Augmented Reality and Virtual Reality is quite fascinating and enchanting. Augmented and Virtual Reality visualization works so much better than photos and videos with text description.

Most of the tourists who wants to see the real environment, view the past of every historical places, before they make the final decision going to visit the historical places. Augmented reality and Virtual reality may lower the numbers of the visits and can save time and money.

I would like to create a Virtual reality and Augmented reality application for mobile devices by which travel agency or agency can show a virtual tour of the historical places

they can sell to the tourists. I wanted to create an application that tourists can see the past view of every historical places. Different types of softwares will be used to create the whole project.

For modeling the buildings I have used :- Autodesk Maya.

For Texturing the buildings I have used :- Adobe Photoshop.

For Creating Augmented and Virtual reality Application I have used :- Unity3d.

Virtually visiting to a particular place with more information and great graphics treats your trip more convenient and comfortable without investing much time while in physical tours.

Virtual tours are more entertaining and interesting through Virtual reality where a user can visualize a place more effectively and efficiently while interacting in a virtual world. Virtual Reality benefits the tourists making them more enthusiasts while interacting to a place virtually just because of better immersion.

I completing this project, it will give me more benefit to show and share what I have learned to now as a student of Multimedia & Creative Technology department of Daffodil International University. This will improve my confidence and skills for the job market as well.

1.3 Objectives

The objectives of the project are to:

Make the AutoCAD drawing plans into a 3D architectural visualization.

Develop 3D models of the AutoCAD plans with Exterior and Interior views.

Texturing the models to give a better look.

Making "BONGO VR: The ARCHAEOLOGY OF BENGAL", an application with Virtual Reality and Augmented Reality along.

Getting a better output for my final project.

The following chapter presents the literature of the project including various important information about the project. The methodology of the development of 3D models. This chapter includes the plans I have been working with to complete the project. Explanation of Virtual reality and Augmented reality works is presented in chapter 4. The developing

software's and plugins are discussed with reference in chapter 5. The outcomes and technology uses are discussed in chapter 6. Finally, an overview with the conclusion and further works is given in chapter 7.

CHAPTER 2
History of Lalbagh Fort

2.1 Historical Background

Lalbagh Fort is a fort-place. It was founded during the second half of the 17th century ace and was called Aurangabad which means the locality of Aurangzeb, the last powerful emperor of the great Mughal lineage. The history of the construction of the fort.

The construction was started by Prince Adam, the third son of Mughal emperor Aurangzeb when he laid the foundation of a planned grand fort in the new capital at the time he had just been appointed as the Viceroyalty of Bengal. Eventually he could not finish his supervision on the fort when he was called back by Adams up after only one year's tenure of office he was replaced by Nawab Shayesta khan the man who greatly expanded the construction of the fort. Sighs behind served as the new Mughal governor of Bengal a key figure during the rule of the emperor Aurangzeb entrusted him as the leading general in the fight against Marathas and after the battle he became the administrator of bengal his legendary fame was long cherished by people for his boundless kindness economic prosperity and is a great builder in the golden age of bengal. What is discovered as the remains of its incomplete structure today leads to several big questions. What was its original plan? Why was it left incomplete and. What was the real purpose of this fort.

The fort is rectangular in plan. It measures 327m (east-west) x 234m (north-south) and was enclosed on all sides by high wall. The watching towers at different point of its fortification wall. The watching tower at the south-western corner is more impressive and bigger than its fellows. In the same way, the present day south-western gate is the biggest and impressive then the other two of its kind. One of the smaller gates is situated near the eastern end of the northern wing. The third and the smallest one occupy a portion near the western end of the northern wing. At present the latter is providing Access into the fort inside the fort there are fore monument. They are the hammam (Turkish bath), Baribibi Mazar (Tomb of bibipori), Azam Shaher masjid (Mosque of Muhammad Azam) and surang. Three of them are still standing in an east-west longitudinal line and thus has divided the fort into two equal halves.

Figure 2.1: Lalbagh Fort From Buriganga River – 1840.

2.2 Audience Hall-cum-Hammam:

It is a two-storied residence used as a bathing hall- cum-resting apartment by the Mughal provincial administration. It accommodates a bathing complex alone with three waiting-cum-reception room in its ground in its ground floor. The upper storey also has three rooms; they might have been in use for refreshing. The architecture of the building is impressive because of its roof that represents the four segmented traditional Bengali shed called chauchala in brick masonry. It is supposed to have been built by shayesta khan. It is also supposed to be the building where the famous Christian representative, William hedges, met the local administrator in 1887-89.It is now being used for the museum display. There is a reservoir on the east of the hammam.

Figure 2.2: Audience Hall-cum-Hammam (Diwan-i-Aam).

2.3 Paribibir Mazar:

It occupies the central portion of the fort. It is a single domed multi-chambered tomb structure. It has a central hall encircled by eight smaller chambers on its four sides. The central hall contains the tomb of another princess. The rest of the chambers are lying still vacant. The building combines in itself the Muslim and Hindu style of architecture in a very refined mode.

Figure 2.3: Tomb of Paribibi.

2.4 Fort Mosque:

It stands on the western part of the fort. It is a typical three domed Mughal Mosque said to have been built by Muhammad azam and is the only example of its kind in Bangladesh in view of its artistic embellishment i.e. fresco.

Figure 2.4: Lalbagh Fort Mosque

2.5 Surang:

It stands on the south of paribibir mazar. It accommodates a brick-built reservoir along with several cells of different sizes inside.

Figure 2.5: Surang

2.6 Garden and Fountain :

Recent excavation has proved that there existed fountains alone with a typical garden and Subterranean Water Supplying terracotta channel at different point of the fort.

Figure 2.6: Garden and Fountain

CHAPTER 3

3D Model Development

3.1 Introduction

The fort was never completed judging from, what it is now we may never Know, what it was fully intended to look like. I was thinking about the whole Structure. To do this project, my big challenge was where can I take correct measurement. Then I go to my advisor sir & tell him that how can I take correct measurement. Then advisor sir advises me to go to architecture department and talk with them. After that, I go to architecture department & talk with teachers & understand that, I can take correct measurement from google maps.

Then I visit the whole area in several times to get a clear visual idea about the " Lalbagh Fort". I have also captured multiple pictures of each architecture and also record videos of these from various angles so that, I can get a clear reference while creating the layout, Model Development, Texturing, Camera animation VR and AR.

3.2 Layout:

The Visual Layout apparatus unites detailing components so they can be organized on a page and yield in a report by means of the Render device. The Visual Layout instrument support non-gathered components as it were. Utilize the Visual Layout device to choose a report type, mastermind report components on the page, and imagine how the report will look. The Visual Layout instrument acknowledges numerous sources of info, gives a review of report components, offers different yield types and page sizes, and takes into account both a flat and vertical layout.
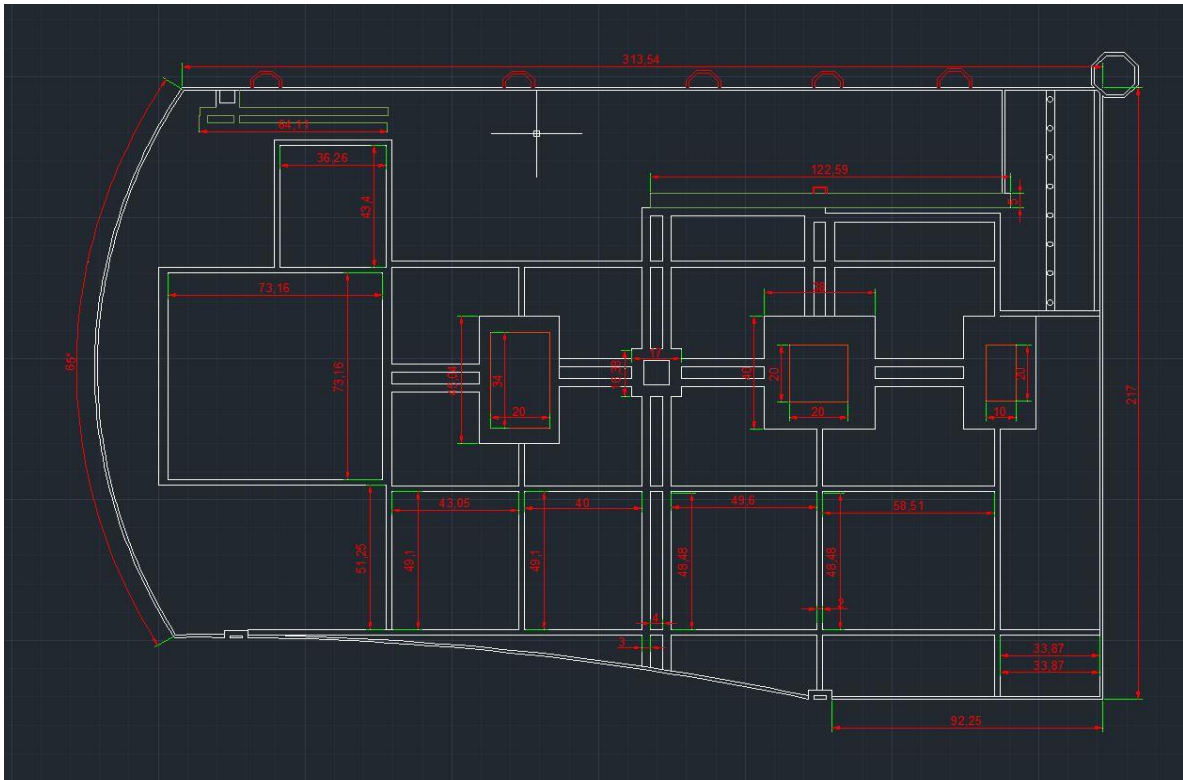
Figure 3.1: This is a reference AutoCAD architecture layout

3.3 Layout of our project:

I have pre-visualized our final project and drawn the following layout so that the model measurement can act as a reference in AR and VR.

Diwan-i-Aam:

The base structure of Audience Hall-cum-Hammam (Diwan-i-Aam)

The Diwan-i-Aam consists of a central hall was decided by two chambers this Hall is accessible through three arched entrances located at the centre of the building this is the east entrance of the which leads to the ground floor which is a perfect place for the governor and his family.
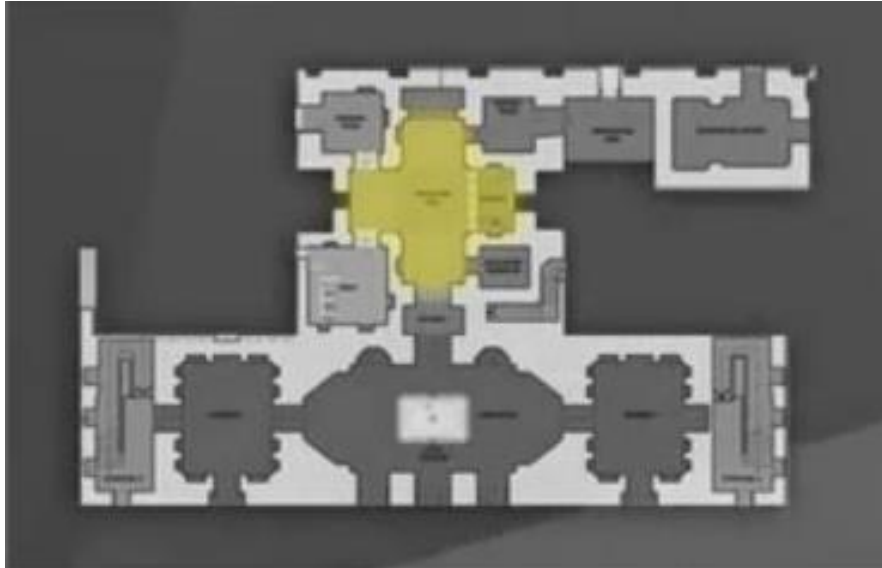
Figure 3.2: The base structure of Audience Hall-cum-Hammam

Tomb of bibipori :

The tomb of Bibi Pari Shaista Khan's daughter is in the middle of the complex. There is a middle square room. It is the remains of a Bibi pari covered with a false octagonal dome and covered with a brass plate. The entire interior wall is covered with white marble. The eight rooms are encomplesed by center pieces. There is another small mausoleum in the southeast corner.
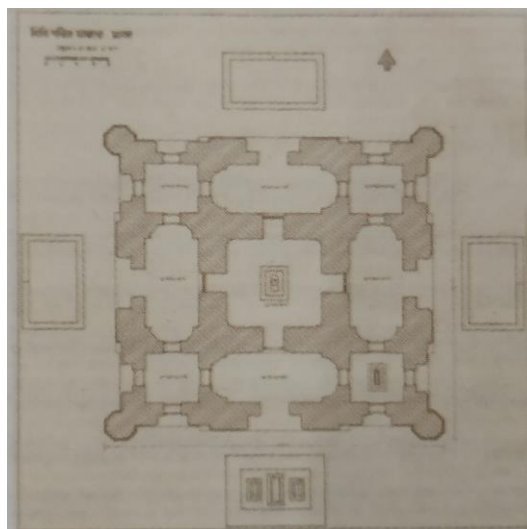
Figure 3.3: Base structure The tomb of Bibi Pari

Fort Mosque :

The mosque has three domes, port mosque have been decorated with various recessed panels some rectangular and some of flowers in vases there are northern and thousand doorways in the plan and three entrances at the eastern wall of the plan once you enter the mosque three lateral arches divid the space into three bays under the three dome the Qibla.

Figure 3.4: Base structure Lalbagh Fort Mosque

CHAPTER 4

Workflow

4.1 Modelling workflow:

Model processing: 3D model to Autodesk Maya software then imported file from AutoCAD file. Select line from splines to draw line. Then convert the line into editable poly. Then select the faces and extrude the face maintaining the height 3meter.

```
┌──────────────────┐
│   3D Modeling    │
└──────────────────┘
         │
         ▼
   ┌──────────────────┐
   │  Open Maya 2016  │
   └──────────────────┘
            │
            ▼
      ┌─────────────────────┐
      │ Import AutoCAD File │
      └─────────────────────┘
                 │
                 ▼
         ┌───────────────────────────────┐
         │ Select Line tool & draw the line │
         └───────────────────────────────┘
                        │
                        ▼
               ┌────────────────────┐
               │  Extrude the line  │
               └────────────────────┘
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            └────────────────────┘
                   │
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        │ Select the face & extrude │
        └─────────────────────────┘
              │
              ▼
   ┌──────────────────────────┐
   │ Select the object Booliens │
   └──────────────────────────┘
```

Figure 4.1: This is the workflow of modeling.

Diwan-i-Aam:

The Dewani arm consists of a central hall was decided by two chambers this Hall is accessible through three arched entrances located at the center of the building this is the east entrance of the d11 which leads to the ground floor which is a perfect place for the governor and his family the central hall contains a lotus fountain attached to the west of the Diwaniyah is the hammam was the north and south of the hall . The building exterrior measurements is 32.47m x 8.18m (107' x 29').
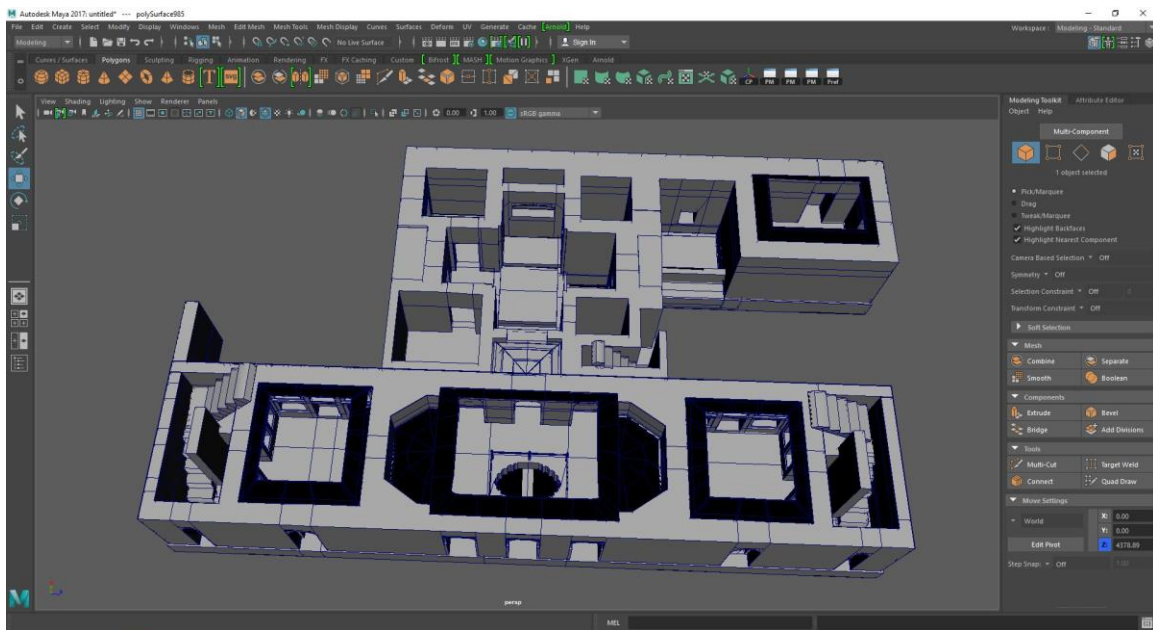
Figure 4.2: Diwan-i-Aam model in Maya.

The Tomb of bibi pori:

The tomb of Bibi Pari Shaista Khan's daughter is in the middle of the complex. There is a middle square room. It is the remains of a Bibi pari covered with a false octagonal dome and covered with a brass plate. The entire interior wall is covered with white marble. The eight rooms are encomplesed by center pieces. There is another small mausoleum in the southeast corner.
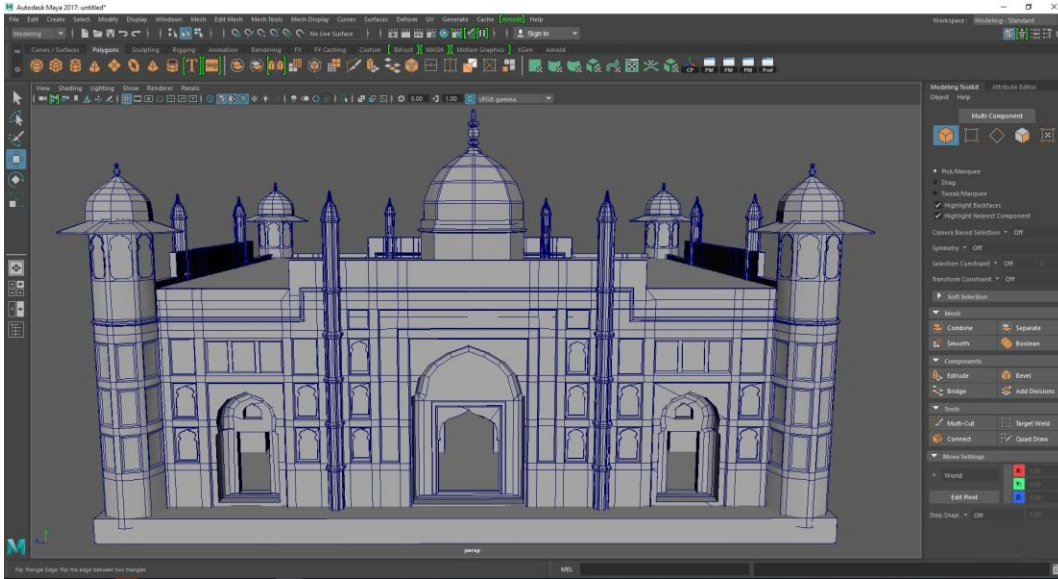
Figure 4.3: The Tomb of bibi pori 3D model in Maya

Fort Mosque :

The mosque has three domes, and is proportion small for a large site. there are northern and thousand doorways in the plan and three entrances at the eastern wall of the plan once you enter the mosque three lateral arches divide the space into three bays under the three dome the Qibla or prayer direction.
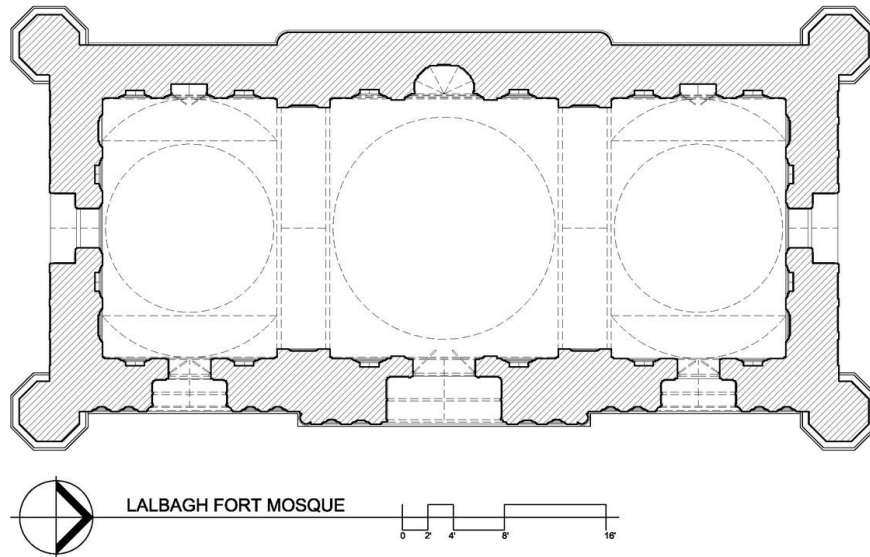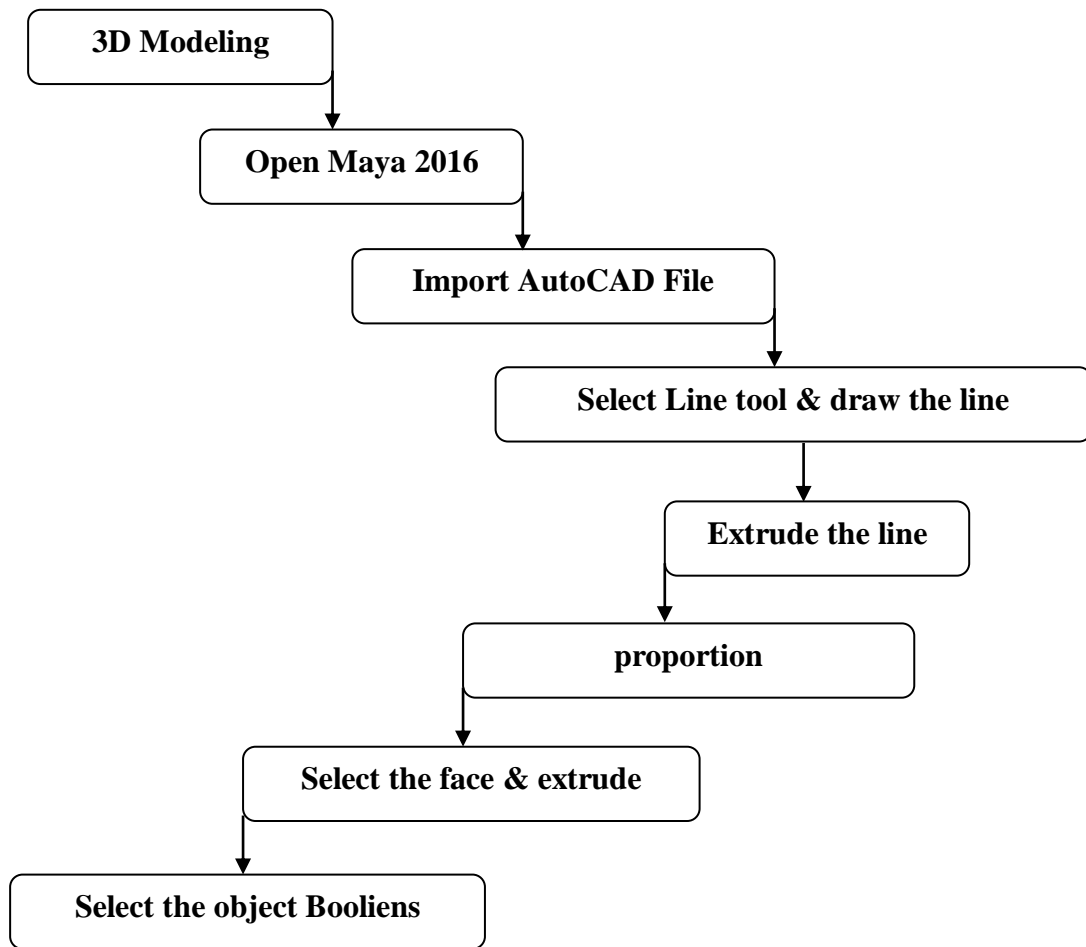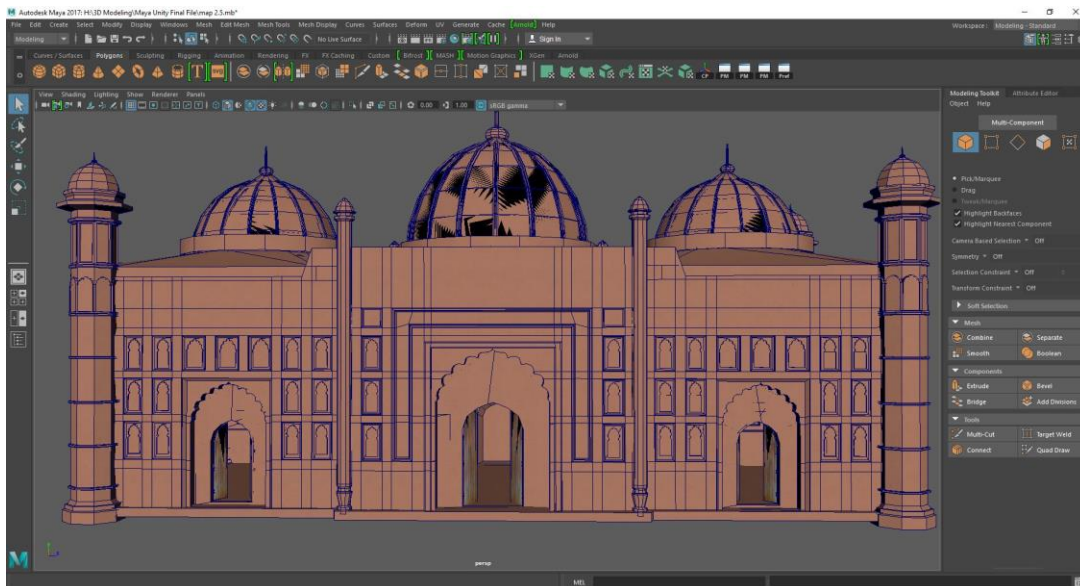

Figure 4.4: Lalbagh Fort Mosque 3D model in Maya.

Props Modeling:

I make some props for this environment. There have canon, shield, sword, wood, jar book ship.
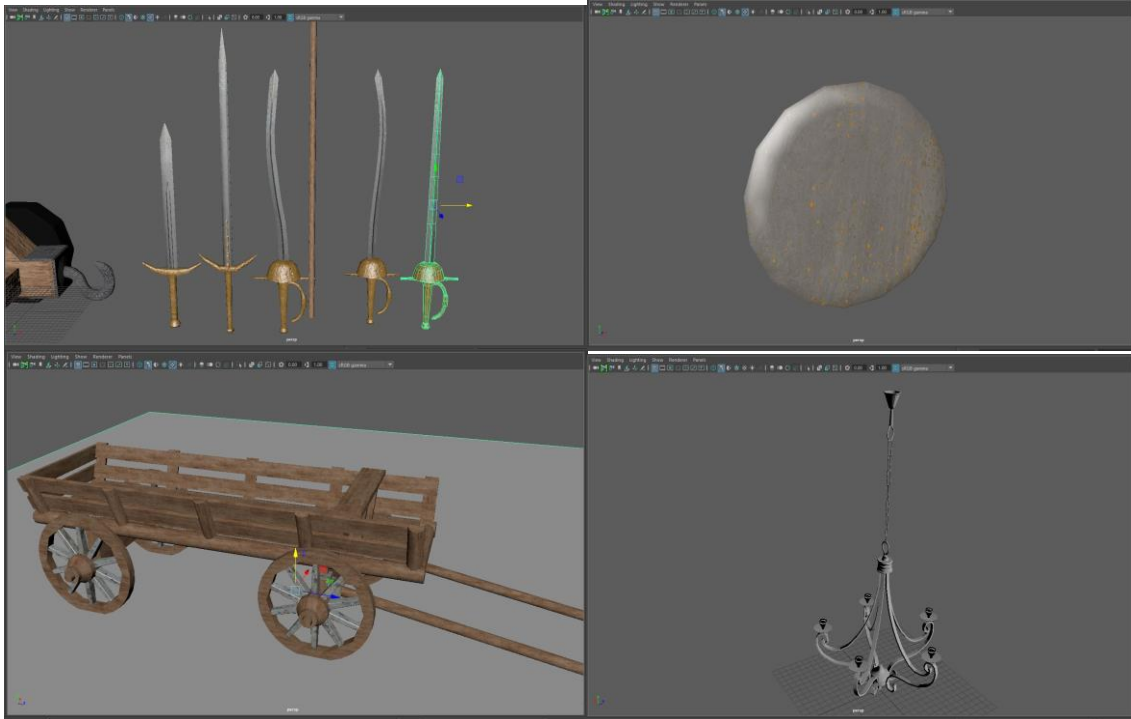
Figure 4.5: Props Modealing in maya.
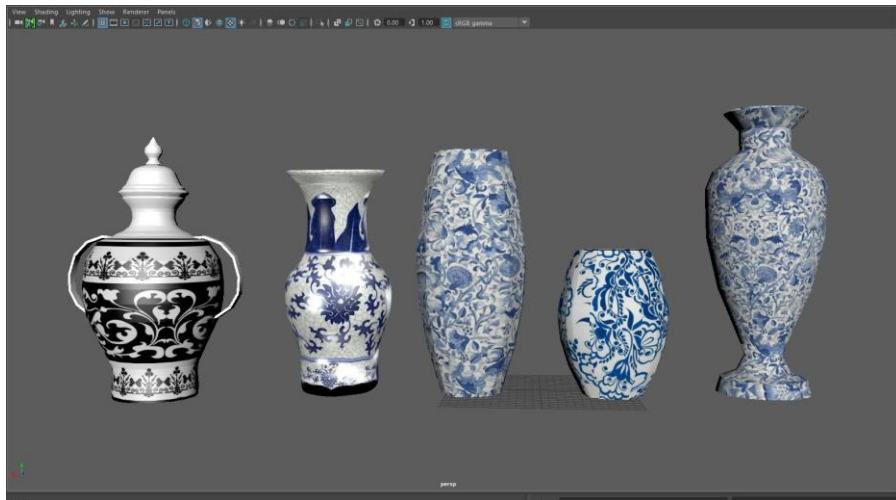
Figure 4.6: Mugol Jar.
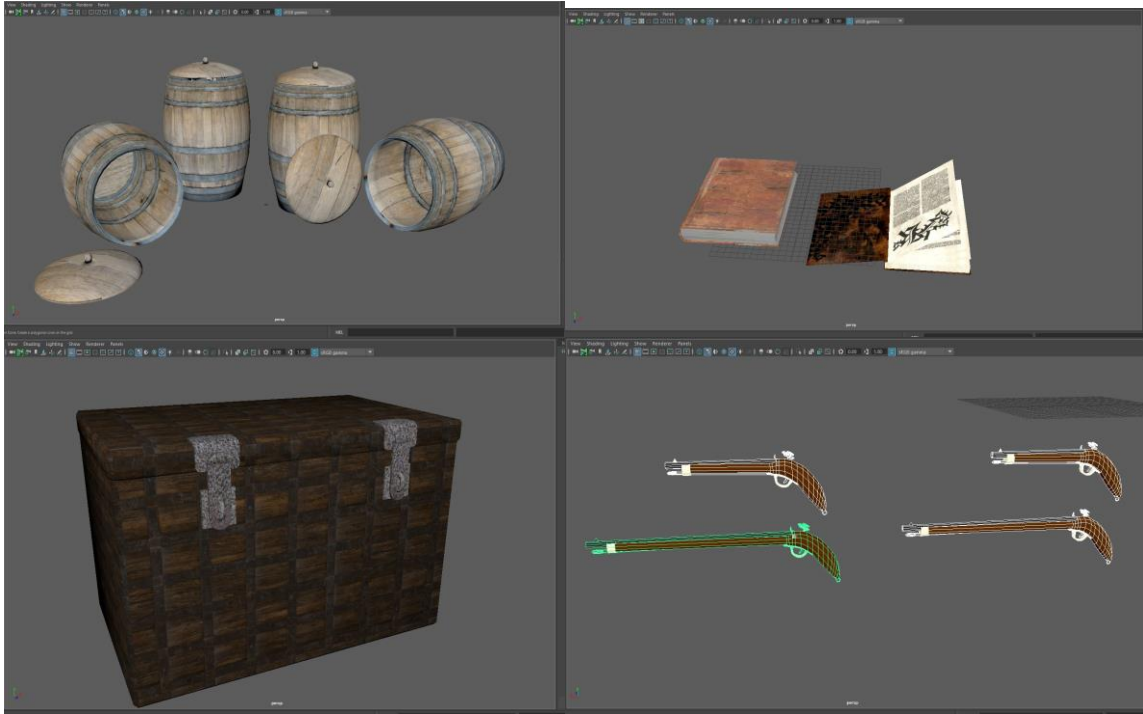
Figure 4.7: There have Barrel, Gun, Book & Box.
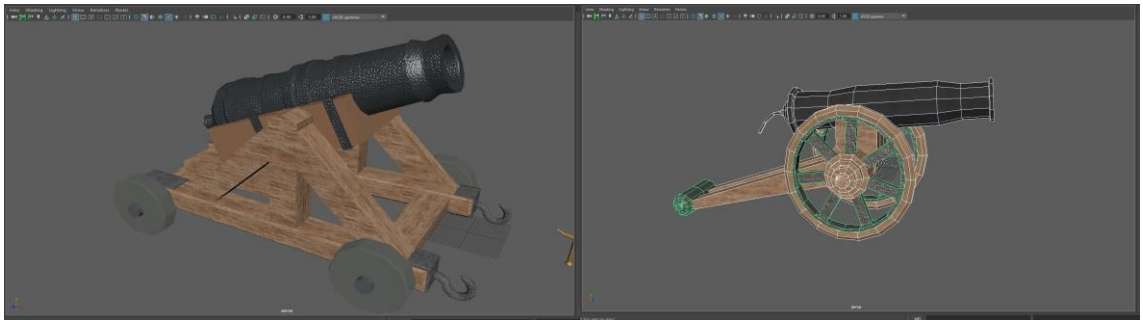
Figure 4.8: Mugol Canon .

Figure 4.9: Mugol Ship.

4.2 Texturing workflow:

Select the model then open Hypershade Select lambart then Go to material properties select colour then file And Assign texture . Then open UV editor, select a object and show object polygons , then go to polygons unfold object , select object edge and cut uv edge. Now object shell mood select face and move where your texture placement .This tool is very powerful when u can see more realistic object in Maya.
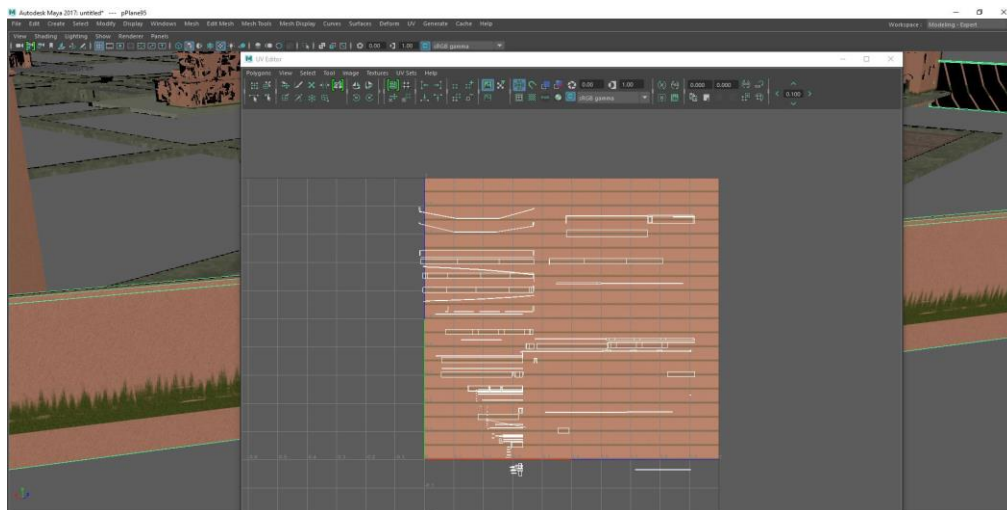
Figure 4.10: Use Maya UV Map.
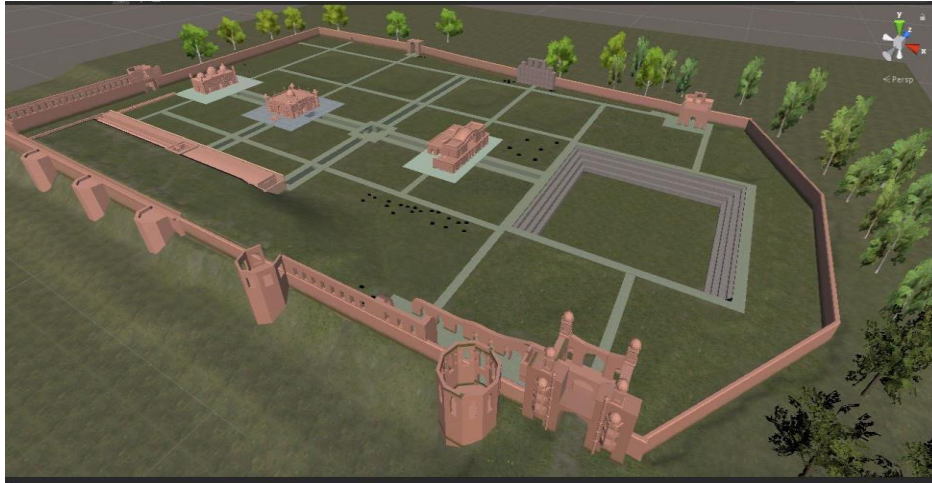
Figure 4.11 : complete texture maya export to Unity.

4.4 Unity workflow:

Table 1: Unity workflow

Unity workflow
Open Unity
↓
Open build settings
↓
Set the platform to Android to Pc, mac & Linux standalone
↓
Open player settings
↓
Go to Resolution & Presentation
↓
Change the orientation to Landscape Left
↓
Go to Other Settings
↓
Change the package name & Set Minimum API level to Android 5.0 (Lollipop)
↓
Go to XR Settings
↓
Check the Virtual Reality Supported checkbox & Set Vuforia
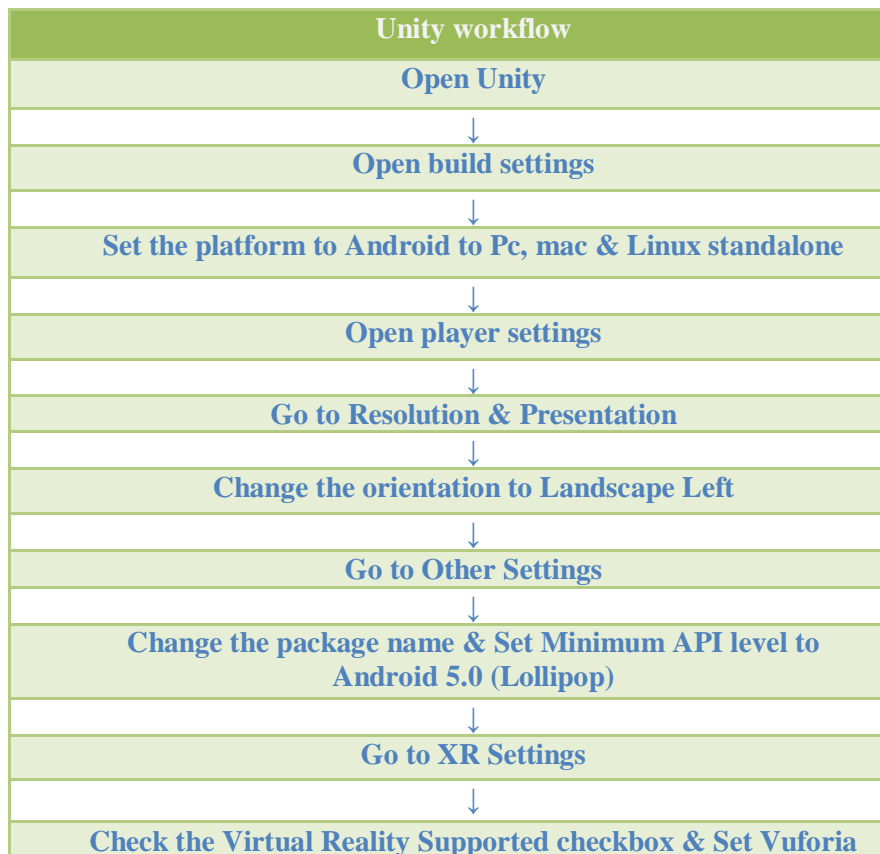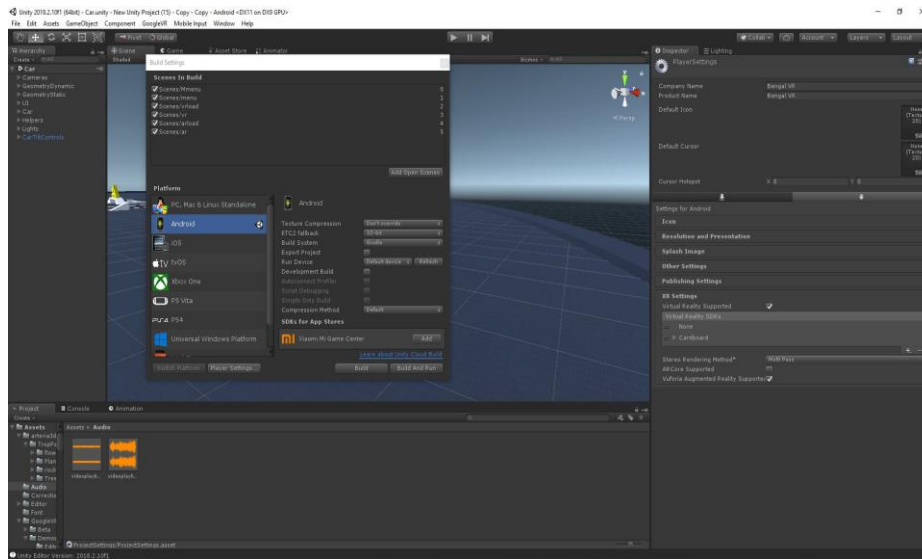
Figure 4.12: Setup Android Build Settings.
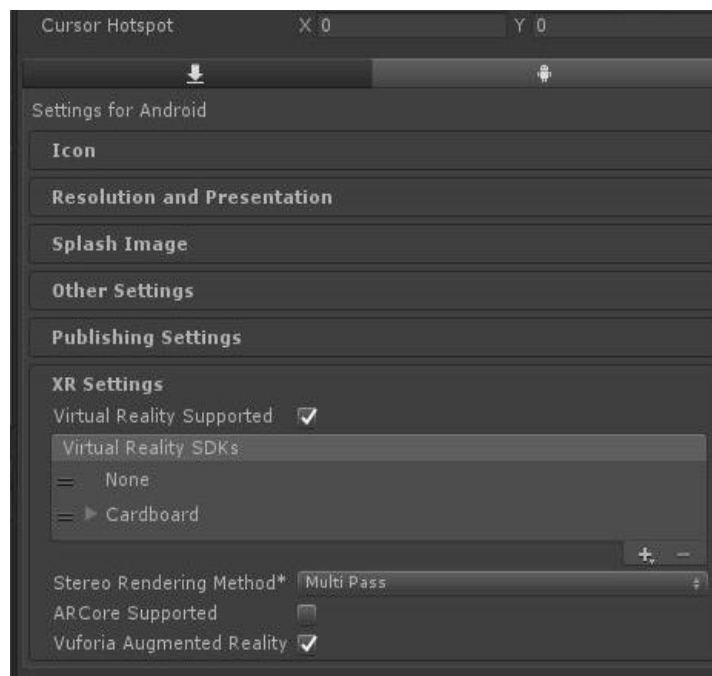
Figure 4.13: Unity XR Settings.

After Exporting from Autodesk Maya
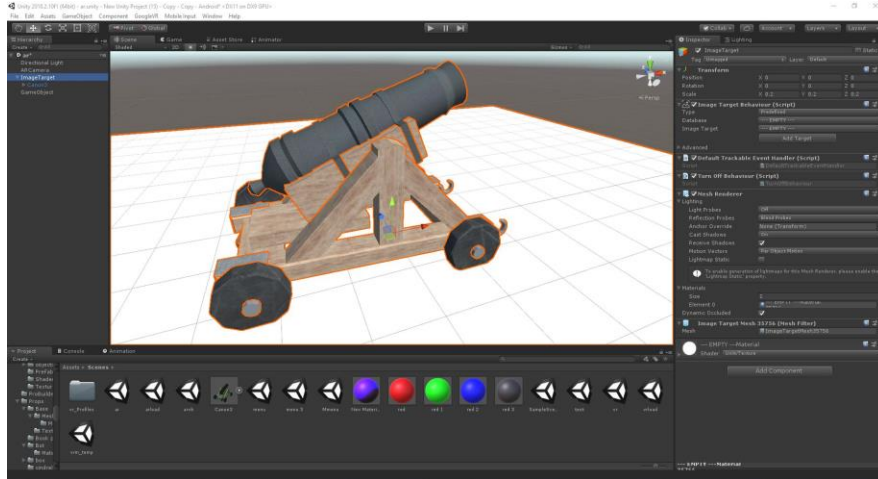
Figure 4.14 : Importing fbx files into unity.

4.5 AR workflow:

Table 2 : AR workflow

AR workflow
In AR project, firstly I create 2 images using chessboard background with building images
↓
Creating a new database in Vuforia
↓
Upload the images in target manager
↓
Download the Database from vuforia in Unity package format
↓
Import the database into Unity
↓
From the menu select Game Object > Vufoira > AR Camera
↓
Again Game object > Vuforia > Image target
↓
Select the image of building
↓
Put the model prefab of the building on top of the image target

Figure 4.15 : BONGO VR Vuforia License.
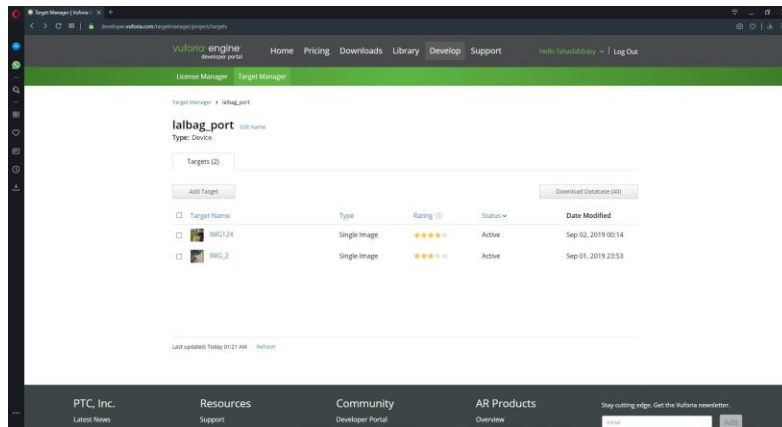
Figure 4.16 : BONGO VR Image Target Manager.
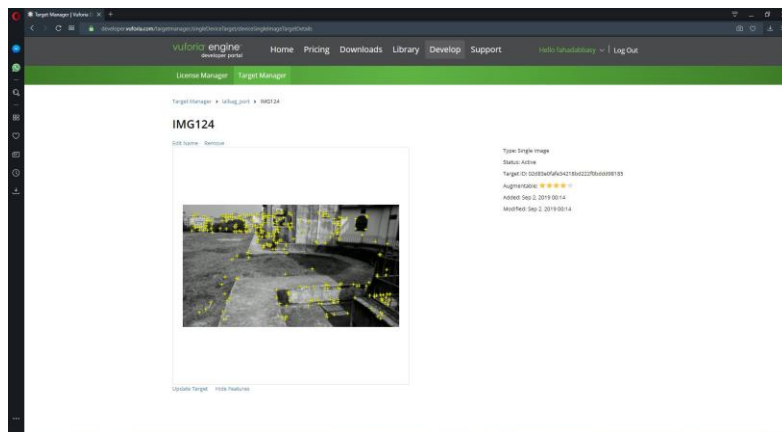
Figure 4.17 : Vufoira Image target for BONGO VR.

4.7 VR workflow:

Build settings to android.

XR settings to google cardboard to make VR support.

Import the whole model, select each model to "Inspector" to collider support.

Select main camera Drag and drop GvrEditorEmulator.

Then child main camera to CreateEmpty Add VR Script in Empty object.

Add pointer and select GvrPointerPhysicsRaycaster

Add pointer on VR camera.

To make grass used mesh to "terrain plugin".

Select terrain for making grass, tress etc

I add some features in this project, this VR environment have old sound and more interactive information you can see.

Figure 4.18: past look in BONGO VR.

Build setting- make the platform for Android. From player settings make company name, product name and logo.

Other setting- API minimum kitkat(4.4), Pakage anme change XR settings change.

VR to VR (Cardboard)

AR to AR (Vuforia)

Build "API" for android application.

In VR we use this FPS control.

CHAPTER 5

Software's & Plugins

5.1 AutoCAD Software

Figure 5.1: Autodesk AutoCAD Logo.

AutoCAD is a PC supported plan program utilized for 2D and 3D structure and drafting. AutoCAD is evolved and advertised by way of Autodesk Inc. And changed into one of the first AutoCAD programs that would be performed on personal computers.

Figure 5.2: This is the AutoCAD interface.

PC helped plan programming gives you a chance to structure 2-D and 3-D illustrations and models, supplanting customary pencil-and-paper drafting to make diagrams with effectively adjusted electronic records. In the "AutoCAD 2009 and AutoCAD LT 2009 Bible," Ellen Finkelstein composes that the product's discharge in 1982 denoted the first run through a CAD program was intended for use on PCs rather than centralized servers.

History:

AutoCAD was gotten from a program that started in 1977, and after that discharged in 1979[4] called Interact CAD, additionally alluded to in early Autodesk records as a Micro CAD, which was composed preceding Autodesk's arrangement via Autodesk fellow benefactor Michael Riddle. Autodesk is the maker of AutoCAD and in addition AutoCAD LT programming, a less expensive form with fewer capacities discharged in 1993. At first accessible for Windows-based PCs just, AutoCAD wound up perfect with Apple items when AutoCAD for Mac hit store retires in 2010.

AutoCAD Uses:

Geographic data frameworks utilize AutoCAD programming to archive the forms of the land and situation of milestones. Transferring AutoCAD 3-D documents into Autodesk Simulation programming enables specialists to make mechanical reenactments of plans for pressure examination and testing for obstruction between parts. AutoCAD illustrations likewise can progress toward becoming movements that give virtual voyages through an arranged building or deliver showings of how an item shows up when gathered. You can even fare AutoCAD documents to 3-D printing administrations that utilization printers containing tar to make plastic parts or models of bigger plans.[7]

Version history:

The local record arrangement of AutoCAD is .dwg. This and, to a lesser degree, its trade record design DXF, have progressed toward becoming true, if restrictive, norms for CAD information interoperability, especially for 2D drawing exchange.[citation needed] AutoCAD has included help for .dwf, an organization created and advanced via Autodesk, for distributing CAD information. Autodesk's logo and, individually, AutoCAD symbols have changed for a few forms as the years progressed.

Student versions:

AutoCAD is authorized, for nothing, to understudies, teachers, and instructive foundations, with a three-year sustainable permit accessible. The understudy variant of AutoCAD is practically indistinguishable to the full business adaptation, with one special case: DWG records made or altered by an understudy rendition have an interior piece signal set At the point when such a DWG document is printed by any form of AutoCAD

more established than AutoCAD 2014 SP1, the yield incorporates a plot stamp/standard on every one of the four sides. Items made in the Student Version can't be utilized for business utilize. Understudy Version objects "taint" a business adaptation DWG document on the off chance that they are foreign made in renditions more seasoned than AutoCAD 2015.

5.2 Autodesk Maya Software

Figure 5.3: Autodesk Maya Logo.

Autodesk Maya:

Maya is a powerful design tool for architects. Maya allows for embedded intelligence and performative criteria to define complex parametric relationships and behaviors (Tang, 2014). Its script editor supports Python programming language in tandem with the native Maya Embedded Language (MEL), both which are fully integrated within the interface. This allows the designer to take advantage of the software by programming repetitive, complicated, or highly specific command that help time and additionally provide a method of sharing with others, allowing total control over any inputs. Fulvio Wirz, lead architect at Zaha Hadid Architects (ZHA), describes Maya as "a form synthesizer, a generator of ideas that goes beyond any classification if compared to other traditional 3D tools for architects" (Tang, 2014). Its simulation engines are capable of virtually reproducing physical behaviors existing in nature/ the environment which makes it a powerful tool for architectural.

Version:

Autodesk Maya has lots of versions. But we are knowing this kind of version:

Table 3: Auto desk maya Version

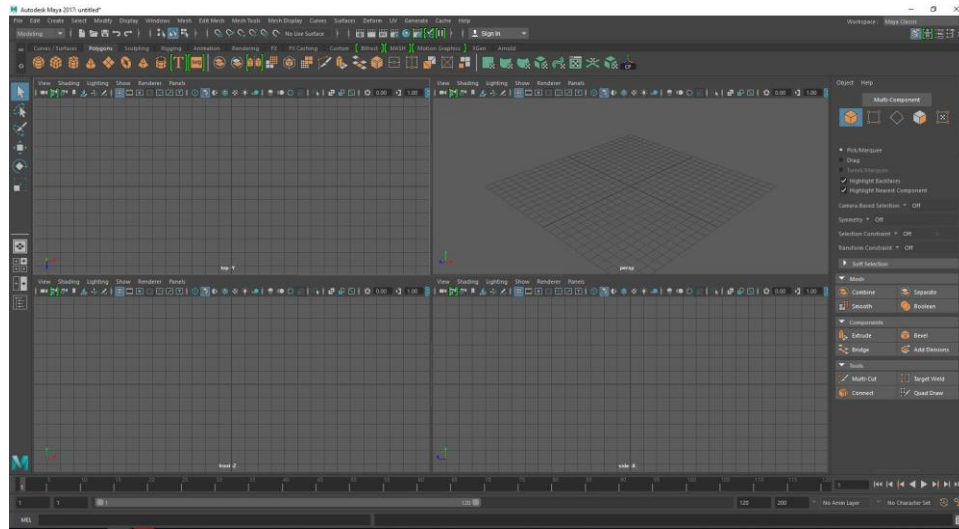| Version	Codename	Year	Operating system	Hardware platform
Autodesk Maya	Tekken	2013	Windows 7	x64
Autodesk Maya 2015	Elwood	2014	Windows 7 and Windows 8	
Autodesk Maya 2016	Phoenix	2015	Windows 7, Windows 8 and Windows 8.1	
Autodesk Maya 2017	Kirin	2016		
Autodesk Maya 2018	Imoogi	2017	Windows 7, Windows 8, Windows 8.1 and Windows 10	
Autodesk Maya 2019	Neptune	2018		

Figure 5.4: The is the Autodesk Maya interface

Modeling Techniques:

organic modeling where some level of asymmetry is actually expected and as realism asymmetry in hard surface modeling is the last thing you want things have to be very

precise and that's why knowing certain workflows or certain tools are so important and actually a bit more important knowing certain tools versus being a good artist because at a certain level you're gonna be capped off if you don't know certain workflows and Maya for hard surfaces month and this list of my top ten mottling hacks are definitely going to help you speed up your workflow but really just get that precision that so important in a hard surface model .3D fashions which might be normally used in interactive games, movie, and the net. Open Subdiv guide Developed with the aid of Pixar, this open-supply technique of subdivision helps you to paintings with your model with more pace and accuracy.

UV Editor Workflow:

I remember when I first started modelling, I used to hate UV I didn't get them the tools that I used it made my uv look like crap, so I actually became a better model cuz I would actually try to model all the details versus having some detail actually textured in but at some point I hit the wall and I did have to learn how to lay IUDs and then get better at texturing. So what makes a good UV layout versus a poor one well it really depends on your pipeline so maybe if you're working on a personal project or a project from film or video you have less stringent texture size requirements that will allow for maybe a sloppier or UV layout or UV layout that you're actually not packing as tight and you are wasting some pixels versus something that maybe you're gonna take into unreal unity a game engine where those texture sizes are gonna be small and you really can't waste any pixels regardless of which way your final assets gonna be rendered on having a UV set that's well laid out well waste less pixels and be more efficient

3D Animation

3D animation can add much-needed life to otherwise static game assets maya seek is animated some of the strongest character and prop animation tools available. Create believable animations by hand using the key frame based timeline observe and tweak it using the powerful graph editor or import motion capture data. Then clean it up using the graph editor as well as tools like the 3d emotional trail editor which can be used to tweak motions in the 3d viewport animations can also be customized using animation layers providing an easy way to create new animations that share similar motions and with the time editor entire compositions can be created out of multiple animation Clips Maya lt's animation tools provide everything a game artist needs to create realistic movements bringing their assets to life you.

5.3 UNITY SOFTWARE

Figure 5.5 : Unity3d Logo

Figure 5.6 : This area is your vital component to the beginning with Unity3d.

Unity (game engine) As of 2018, the engine has been extended to support 27 platforms. The motor can be utilized to make both three-dimensional and two-dimensional amusements and additionally reenactments for its numerous stages.

Unity is a cross-stage diversion motor created by Unity Technologies, previously reported and discharged in June 2005 at Apple Inc.'s. Worldwide Developers Conference as an OS X-elite amusement motor. Starting in 2018, the motor has been reached out to help 27 platforms. The motor can be utilized to make both three-dimensional and two-dimensional amusements and also reenactments for its numerous stages. A few noteworthy adaptations of Unity have been discharged since its dispatch, with the most recent stable variant being Unity 2018.2.16, discharged on November 15, 2018.[11]

Overview:

The Unity3d interface is easy. The core of the interface consists of five main panels. The Scene View, the Hierarchy, the Game View, the Project panel and the Inspector panel. The Scene View is where you'll visually construct your game, manipulating objects in 2D and 3D. The Game View is where you will preview your game, and this becomes active

when you hit the play button, allowing you to play test at any time inside the editor. The Hierarchy lists all objects in the scene in alphabet ical order and in hierarchical order in order to show parenting, a way of grouping objects. The Project panel shows all assets that you are currently working with, in one place. Giving you quick access to everything you are building your game with from scripts to textures, 3D models, video and audio. The Inspector is a context sensitive panel that shows the properties of what ever object, asset or setting panel you've selected. Click on something new and the Inspector immediately switches to show properties of that thing. The play controls allow you to play test the game, pause and progress frame by frame for more detailed testing. The tools in the top left allow you to navigate the Scene View and also manipulate objects visually. There are also toggles to allow for switching between local and world space and centre or pivot point based rotation. The Layers dropdown allows you to quickly show and hide layers of content in your game. The Layout dropdown allows you to switch between differing layouts of the Unity interface. In the top right of the interface are the layers and layout dropdowns. This concludes the interface overview.

VR overview:

Solidarity VR gives you a chance to target computer-generated reality gadgets straightforwardly from Unity, with no outer modules in undertakings. It gives a base API and list of capabilities with similarity for different gadgets. It has been intended to give forward similarity to future gadgets and programming.

Solidarity XR API has been invigorated to reflect the broader umbrella term "XR" yet a critical piece of the documentation right currently still uses the articulation "VR". The XR API surface is irrelevant by design, anyway will reach out as XR continues creating.

By utilizing the local VR bolster in Unity, you gain:

• Stable variants of each VR gadget

• A single API interface to communicate with various VR gadgets

• A clean venture organizer with no outer module

for every gadget

• The capacity to incorporate and switch between various gadgets in your applications

• Increased execution (Lower-level Unity motor improvements are workable for local gadgets).[12]

Empowering Unity VR Support:

To empower local VR to bolster for your diversion assembles and the Editor, open the Player Settings

(Menu: Edit > Project Settings > Player)

Select XR Settings and check the Virtual Reality Supported checkbox. Set this for each frame target. Enabling PC created reality to reinforce in an autonomous frame does not moreover engage the assistance for Android (and the different way).

Utilize the Virtual Reality SDKs list showed underneath the checkbox to include and expel VR gadgets for each forming target. The request of the rundown is the request that Unity attempts to empower VR gadgets at runtime. The main gadget that instates legitimately is the one empowered. This rundown arrange is the equivalent in the constructed player.
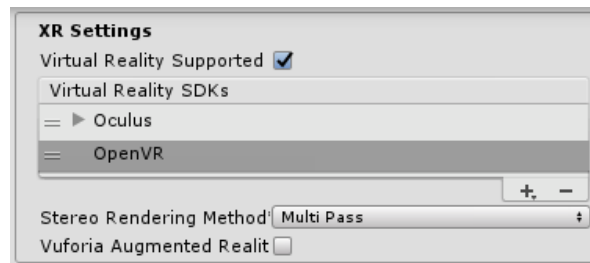

Figure 5.7: XR settings.

Built applications: Choosing a startup device:

we created application in states and engages contraptions in indistinct demand from the Virtual Reality SDKs list in XR Settings (see Enabling VR Support, above). Contraptions not present in the once-over at develop time are not open in the last shape. Contraption None is proportionate to a non-VR application (that is, a common Unity application) and can be changed to in the midst of runtime without fusing it in the summary; the uncommon case to this is None.

Counting None as a gadget in the rundown enables you to default to a non-VR application before endeavoring a VR gadget's introduction. On the off chance that you put None at the highest priority on the rundown, the application begins with VR debilitated. At that point, you would then be able to empower and incapacitate VR gadgets that are available in your rundown through content utilizing XR.XR Settings. Load Device By Name. In the event that introduction of the gadget you endeavor to

change to falls flat, Unity handicaps VR with that gadget still set as the dynamic VR gadget. When you switch gadgets or empower XR, the constructed application endeavors to instate once more.

The order line contention used to dispatch a particular gadget is - vrmode DEVICETYPE where DEVICETYPE is one of the names from the upheld XR bolstered gadgets list.

What happens when VR is Enabled:

VR is empowered in Unity; a couple of things happen consequently:

Automatic rendering to a head-mounted display:

All Cameras in your Scene can render specifically to the head-mounted showcase (HMD). View and Projection grids are naturally changed in accordance with record for head following, positional following and field of view. It is conceivable to handicap rendering to the HMD utilizing the Camera part's stereo Target Eye property. On the other hand, you can set the Camera to render to a Render Texture utilizing the Target Texture property.

Head mounted display and what this is basically a pair of glasses or a glasses with only a single lens, that projects light onto the eye allowing you to see either your phone or your computer or a screen of some sorts, you can wear them sometimes they' rebuilt into helmets sometimes they' rebuilt off onto glasses sometimes you can detach them from glasses but essentially what this device does is allow you to overlay text or a content or your phone screen onto the environment in front of you.

Understanding the camera:

The Camera Transform is superseded with the head-followed present. To move or pivot the Camera, join it as an offspring of another Game Object. This influences it with the goal that all To change changes to the parent of the Camera influence the Camera itself. This likewise applies to move or pivoting the camera utilizing a content.
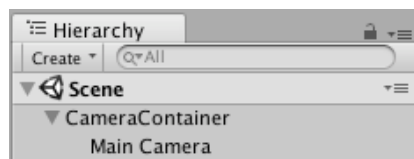

Figure 5.8: Hierarchy.

Equipment and programming proposals for VR advancement in Unity:

Accomplishing an edge rate like your objective HMD is fundamental for a decent VR encounter. This must match the revive rate of the showcase utilized in the HMD. On the off chance that the casing rate dips under the HMD's invigorate rate, it is especially perceptible and frequently prompts queasiness for the player.

Programming:

Windows: Windows 7, 8, 8.1, and Windows 10 are largely good.

Android: Android OS Lollipop 5.1 or higher.

Graphics card drivers: Make beyond any doubt your drivers are up and coming. Each gadget is staying aware of the most up to date drivers, so more established drivers may not be upheld.

Device runtime requirements:

Each VR gadget necessitates that you have suitable runtime introduced on your machine. For instance, to create and run Oculus inside Unity, you need the Oculus runtime (otherwise called Oculus Home) introduced on your machine. For Vive, you need Steam and SteamVR introduced. Contingent upon what variant of Unity you are utilizing, the runtime adaptations for every particular gadget that is bolstered by Unity may vary. You can discover runtime forms in the discharge notes of each major and minor Unity discharge. With some form refreshes, past runtime renditions are never again bolstered. This implies local Unity VR bolster does not work with prior runtime variants, but rather keeps on working with new runtime renditions.

Solidarity local VR bolster does not peruse modules from inside your task's envelope, so including prior variants of the module with local help will come up short on the off chance that you have VR bolster empowered. On the off chance that you wish to utilize a prior rendition with an arrival of Unity that never again underpins that form, incapacitate Native VR Support (go to XR Settings and uncheck Virtual Reality Supported). You would then be able to get to the module like some other outsider module. See the area above on Enabling Unity VR Support for more subtle elements.

Vuforia:

Vuforia is a cross-stage Augmented Reality (AR) and Mixed Reality application advancement stage, with hearty following and execution on an assortment of equipment. Solidarity's joining of Vuforia enables you to make vision applications and diversions for Android and iOS utilizing an intuitive creating work process. A Vuforia AR+VR tests bundle is accessible on the Unity Asset Store., with a few helpful models exhibiting the most imperative highlights of the stage. [13]

Marker-based tracking:

In AR or MR, markers are pictures or protests enrolled with the application which go about as data triggers in your application. At the point when your gadget's camera perceives these markers, in reality, this triggers the showcase of virtual substance over the world location of the marker in the camera sees. The marker based following can utilize a wide range of marker types, include QR codes, intelligent markers, Image tracking, and 2D labels. The least difficult and most basic sort of marker in diversion applications is an Image Target.
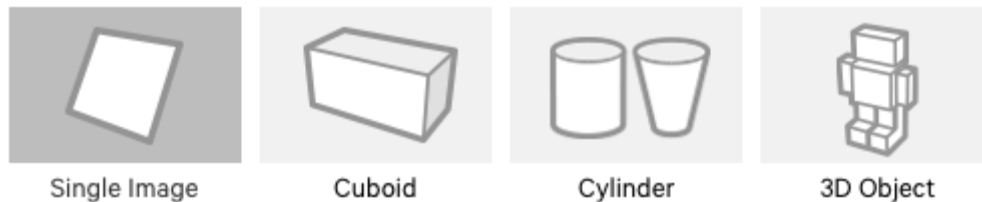

Figure 5.9: Marker based tracking.

Image Targets:

Image Targets are a particular kind of marker utilized in the Marker-based following. They are pictures you physically enroll with the application and go about as triggers that show virtual substance. For Image Targets, utilize pictures containing particular shapes with complex blueprints. This makes it simpler for picture acknowledgment and following calculations to remember them.

Markerless following:

Applications utilizing Marker less following are all the more general area based or position-based Augmented or Mixed Reality. This type of following depends on advancements, for example, GPS, accelerometer, spinner and more unpredictable picture handling calculations, to put virtual items or data in the earth. The VR equipment and programming at that point regards these articles as though they are tied down or associated with particular true areas or items.
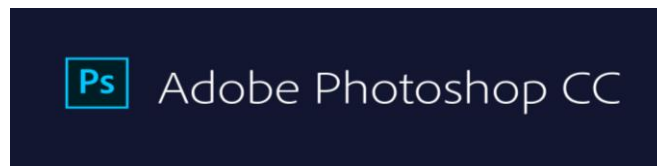
5.4 Adobe Photoshop:

Figure 5.10: Adobe Photoshop .

Photoshop was created in 1987 by the American siblings Thomas and John Knoll, who sold the dispersion permit to Adobe Systems Incorporated in 1988. It can alter and create raster pictures in numerous layers and backings covers, alpha compositing and a few shading models including RGB, CMYK, CIELAB, spot shading, and duotone. Notwithstanding raster illustrations, it has restricted capacities to alter or render content, vector designs (particularly through cut-out way), 3D designs and video.

Figure 5.11: The is the adobe Photoshop interface.

We are working Photoshop CC 2015 was developed on June 15, 2015,In this version was lots of function and very user-friendly, some new feature was -

Artboards

Adobe Stock marketplace

Design websites and mobile apps designers

Camera Raw as a filter

Some Layer styles can now be added up to 10 instances

Redesign export feature

Adobe Camera Raw 9.1

Linked files in CC Libraries

File Format:

Photoshop records have default document augmentation as.PSD, which remains for "Photoshop Document." A PSD record stores a picture with help for most imaging choices accessible in Photoshop. These incorporate layers with veils, straightforwardness, content, alpha channels and spot hues, cutting ways, and duotone settings. This is rather than numerous other record groups (e.g., .JPG or .GIF) that confine substance to give streamlined, unsurprising usefulness. A PSD document has a most extreme tallness and width of 30,000 pixels, and a length point of confinement of two gigabytes.

As far as possible was obviously picked subjectively by Adobe, not founded on PC math imperatives (it isn't near an intensity of two, as is 30,000) however for simplicity of programming testing. PSD and PSB groups are recorded. Due to Photoshop's fame, PSD documents are broadly utilized and upheld to some degree by most contending programming. The .PSD record configuration can be sent out to and from Adobe's different applications like Illustrator, Premiere Pro, and After Effects.

Photoshop tools:

After stacking Photoshop, a sidebar with an assortment of devices with numerous picture altering capacities appears to one side of the screen. These devices normally fall under

the classes of illustration; painting; estimating and route; determination; composting; and retouching.

5.5 Adobe Illustrator Software:

Figure 5.12: Adobe Illustrator .

Illustrator is a vector designs proofreader created and promoted by Adobe Systems. Initially intended for Apple Macintosh.
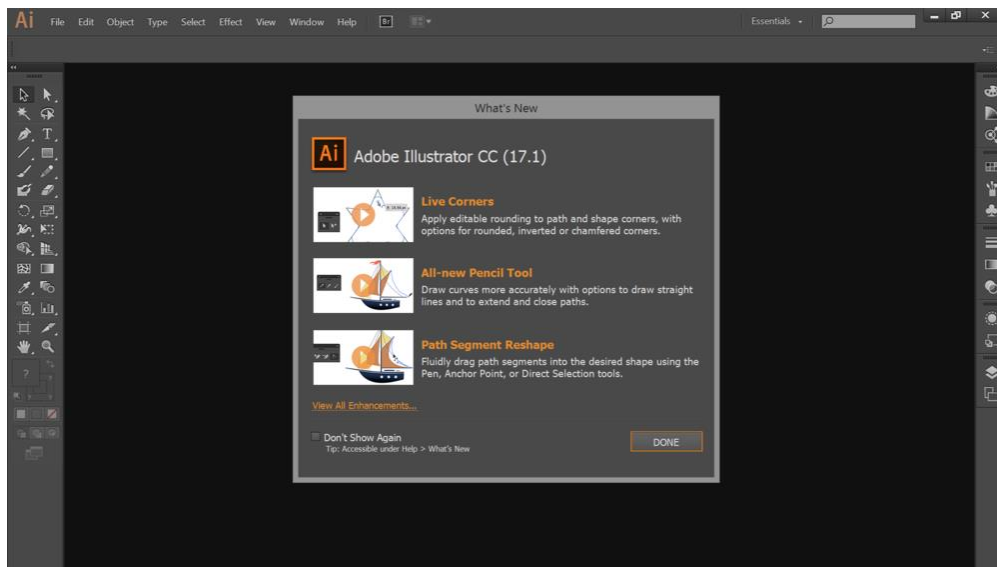

Figure 5.13: The is the adobe illustrator interface.

Version CC:

Alongside Creative Cloud, Illustrator CC was discharged. This form was the first to be just sold in a membership-based administration demonstrate, in accordance with the other

programming in the once called Creative Suite. As a component of Creative Cloud, this rendition acquired upgrades that subject, for example, shading, text style and program settings matching up, sparing records to the cloud, and reconciliation with Balance and different highlights, for example, another touch-perfect sort device, pictures in brushes, CSS extraction, and documents bundling.

The most current test for - Illustrator is additionally one of Rob's most loved applications. Like many Photoshop users, when first learning it- he was frustrated with the tools and the different way of working! However, when a fashioner figures out how mind-boggling Illustrator is that you get to really fabricate interminably scale-capable pictures without any preparation you'll be snared.

Tools:

A sidebar that shows up at the left of the screen with an assortment of instruments to choose, make, and control items or fine arts in Illustrator. These apparatuses can be chosen as following: drawing, composing, painting, reshaping, cutting and cutting, imagery, moving and zooming, and graph. Some instruments have a little triangle at the base right of the tool stash symbol. A little triangle has the choice to see or grow some shrouded instruments by hold down the mouse catch on the triangle.

A few models of fundamental apparatuses in artist are determination devices, paintbrush instruments, pen devices, pencil devices e.g. Determination instruments are utilized to the format, change, and sort out the work of art by choosing, situating, and stacking object precisely. In addition, choice apparatuses can gathering, bolt or cover up, and measure objects. Paintbrush devices can be utilized to adjust the presence of the fine art. There are distinctive kinds of brushes: calligraphic, dissipate, workmanship, design, and bristle. Pen devices make straight and bent lines for the fine art and they can add grapple focuses to ways and erase from ways. Pencil devices enable the client to draw and alter freehand lines.

5.6 Visual Studio:

Figure 5.14: Visual Studio.

Microsoft Visual Studio is an incorporated improvement condition (IDE) from Microsoft. It is utilized to create PC programs, just as sites, web applications, web administrations and portable applications. Visual Studio utilizes Microsoft programming improvement stages, for example, Windows API, Windows Forms, Windows Presentation Foundation, Windows Store and Microsoft Silverlight. It can deliver both local code and oversaw code.

Console is a text telling interface it's a Kanaka command prompt window or a Dodge windows text only and that's it the GUI is a graphical user interface it's things like buttons menus other visuals it's pretty much every program that you'd use a component or control are the items within a GUI like button menus that kind of thing cross-platform just means that it's like an application or code that works on windows mac and linux system the framework is just a set of tools that a programming language can work with so it's a dotnet framework.

Visual Studio bolsters 36 diverse programming dialects and permits the code manager and debugger to help (to differing degrees) almost any programming language, gave a language-explicit administration exists. Worked in dialects incorporate C, C++, C++/CLI, Visual Basic .NET, C#, F#, JavaScript, TypeScript, XML, XSLT, HTML, and CSS. Backing for different dialects, for example, Python, Ruby, Node.js, and M among others is accessible by means of modules. Java (and J#) were bolstered previously.

The most essential release of Visual Studio, the Community version, is accessible for nothing out of pocket.
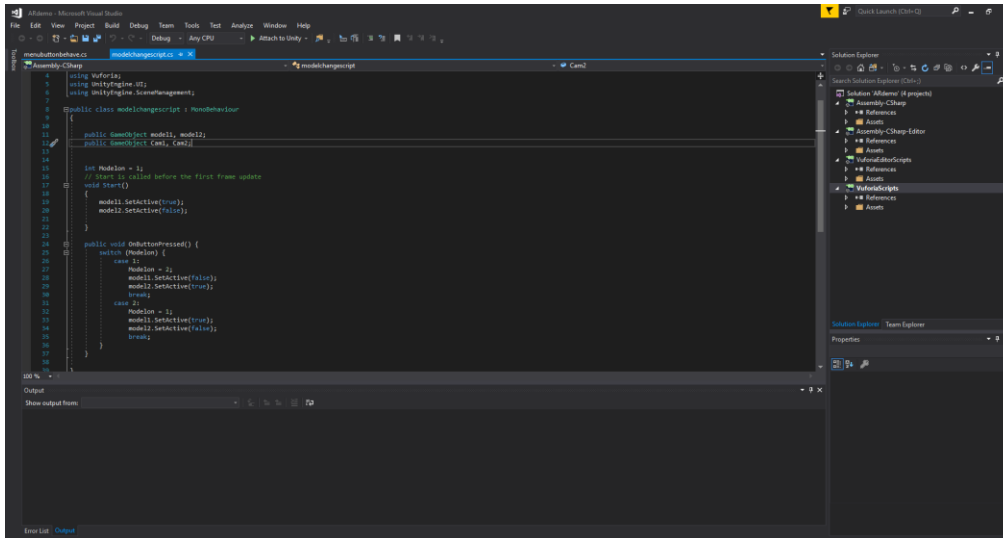
Figure 5.15: Visual Studio Interface.

History:

The first version of visual studio was visual studio 97, Before that Visual Basic, Visual C++, Visual FoxPro and Visual SourceSafe was sold separately.

Product name	Codename	Version number	Supported .NET Framework versions	Supported .NET Core versions	Release date
Visual Studio 2019[60]	Unknown	16.0	3.5 - 4.8[61]	To be announced	April 2, 2019 [62]
Visual Studio 2017[63]	Dev15 [citation needed]	15.0	3.5 – 4.7[64]	1.0-1.1,[65] 2.0[66]	March 7, 2017
Visual Studio 2015	Dev14 [citation needed]	14.0	2.0 – 4.6	1.0	July 20, 2015
Visual Studio 2013	Dev12 [citation needed]	12.0	2.0 – 4.5.2	N/A	October 17, 2013
Visual Studio 2012	Dev11 [citation needed]	11.0	2.0 – 4.5.2	N/A	September 12, 2012
Visual Studio 2010	Dev10,[67] Rosario[68]	10.0	2.0 – 4.0	N/A	April 12, 2010
Visual Studio 2008	Orcas[69]	9.0	2.0, 3.0, 3.5	N/A	November 19, 2007
Visual Studio 2005	Whidbey[70]	8.0	2.0, 3.0	N/A	November 7, 2005
Visual Studio .NET 2003	Everett[71]	7.1	1.1	N/A	April 24, 2003
Visual Studio .NET (2002)	Rainier[72]	7.0	1.0	N/A	February 13, 2002
Visual Studio 6.0	Aspen[73]	6.0	N/A	N/A	June 1998
Visual Studio 97	Boston[74]	5.0	N/A	N/A	February 1997

Figure 5.16: Visual Studio version history.

For my project I have use Visual Studio Community edition 2017. Unity supports Visual Studio since Unity 2017.01 Version deprecating Monodeveloper as its Primary IDE. But Now Visual Studio is the primary IDE of Unity3D.

CHAPTER 6

Model Output

Gathering all the output from this project, describing all of them below:

Choose location

Main Menu

Virtual Reality View

Augmented Reality View

6.1 Main Menu:

When the application starts, first there will be the logo of unity then choose the location. Then started popup screen show, Welcome to Lalbagh Fort (The Red Garden). After that the main menu will take place. In the main menu screen user can choose VR or AR. By clicking VR or AR then Started loading Screen users into VR Scene or AR scene where the camera will be start working.
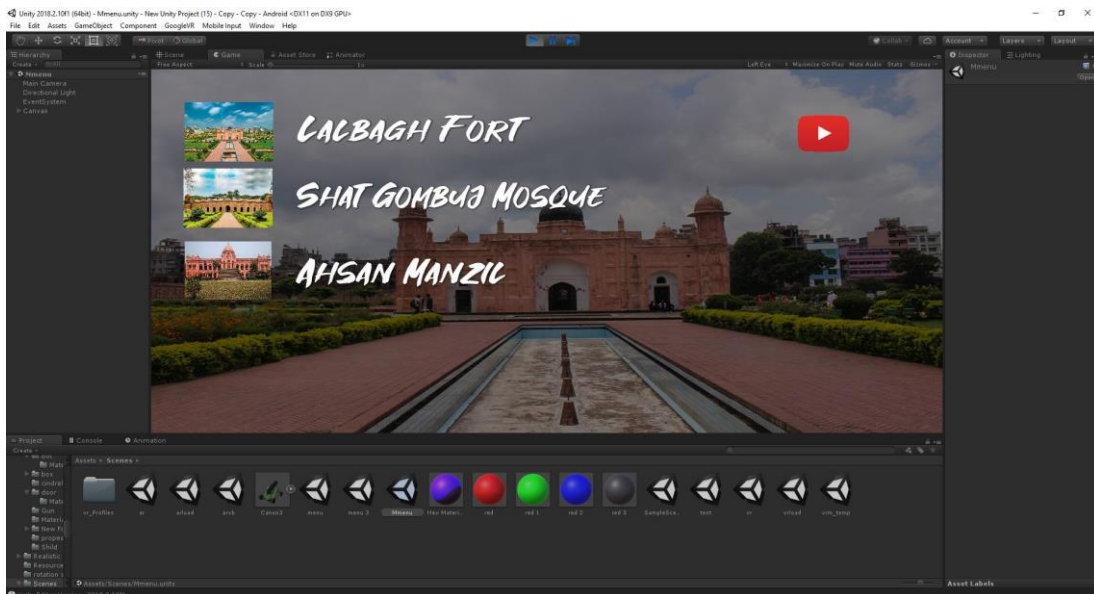

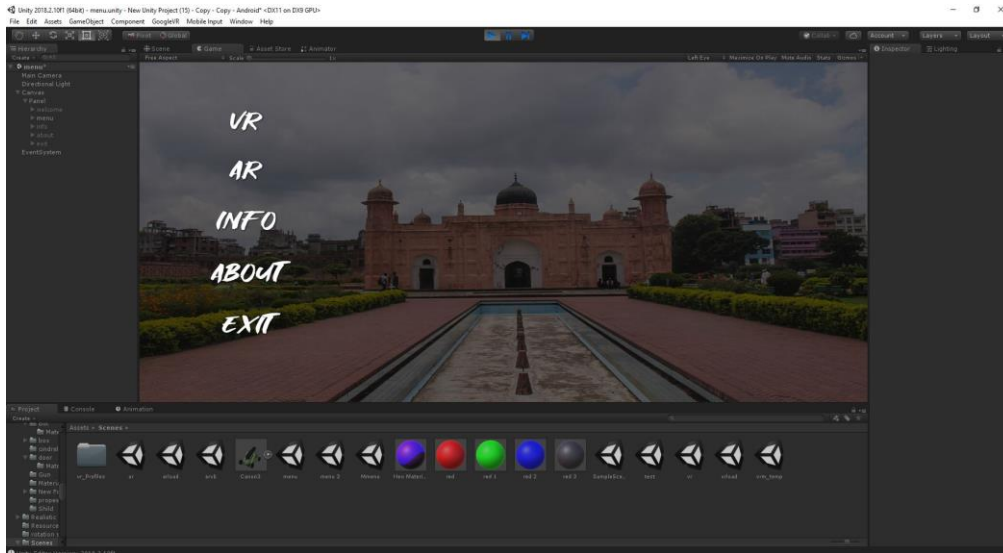Figure 6.1: Bongo VR Choose Location .

Figure 6.2: Bongo VR Main Menu.

6.4 Virtual Reality View:

If any users obtain a Virtual reality device and they want to experience the full virtual walkthrough then there is an option for them is called VR view. By clicking that the user will be taken to the virtual reality mode of the program in Lalbagh Fort.
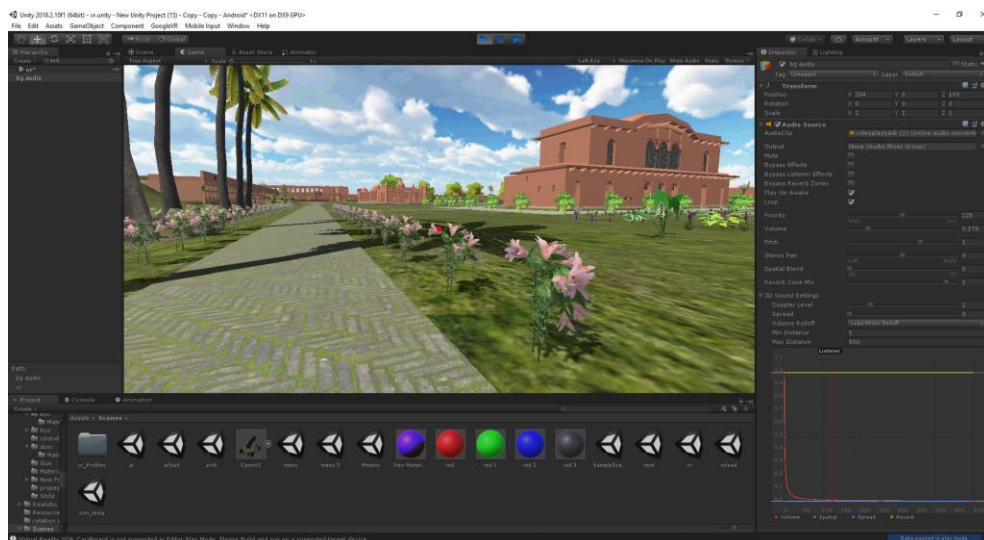

Figure 6.3: VR in lalbagh Fort.

6.2 Augmented Reality View:

From the main menu after clicking AR Scene will be launched. After that the device camera will start working. When the user will place the camera on the Historical place, Exterior of the selected building will be shown on the screen. User can rotate the camera.

Figure 6.4: AR on the spot tracking.

CHAPTER 7

Conclusion

Technology Evaluation as the project turned around Autodesk Maya and Unity3D it was essential to learn. This created a big stress on the project initially which push it slightly behind schedule. This is to be expected with any new technology; however, talking on the BONGO VR project increased the risk with huge aria modeling in Maya. Creating models in Autodesk Maya and exporting them was a good lesson experience.

Representation of various cameras, edges, surfaces and lighting makes a moment reaction environment; this decreases the time required to design key components however increases the requirement for experimentation. It ought to likewise be noticed that the 3d field is exceptionally great for engineers with no past involvement in such an amazing situation.

Creating curved, rectangle, square model, Max look at a little out of depth. While it giving a coding environment to create animation it sometimes look at too heavy to handle even slightly complicated tasks specially making a model.

What i have acquired of this project:

This project has enabled me to utilize new environments. Both environments are cutting edge and used in with my passion level, so it was nice to get a taste, what i could enter into when I graduate. It would be good if more modules used newer technologies as It might be a good if more modules use new technology as it creating new challenges and all the output to look a lot best. I am truly proud of what I have completed in both modules. The Augmented Reality and Virtual Reality was something totally new to me. I have done a short course about Augmented Reality and Virtual Reality and its need expandable enough so that, I could challenge myself and produce a really good-looking mobile application with the combination of Augmented Reality and Virtual Reality along with interactive object on the spot & information on that location.

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