

**3D VIRTUAL PRESERVATION OF CONVENTIONAL BANGLADESHI
HERITAGE**

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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 “3d virtual preservation of conventional Bangladeshi heritage”, submitted by Md Shafikul Islam 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 4th March ,2023.

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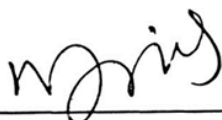
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ABSTRACT

With a long history that dates back to ancient times, Bangladesh has a rich and diverse culture and tradition. Which has been shaped by a variety of factors including its geographic location and historical experiences. To protect and preserve these historical sites and artifacts that are vulnerable to deterioration or destruction, a method known as 3D virtual preservation can be employed. This technology uses 3D modeling and visualization to create accurate and detailed digital replicas of historical buildings, monuments, artifacts, and other cultural heritage sites. The resulting digital models have multiple applications, including research, education, and public outreach. One of the most significant benefits of 3D virtual preservation is its ability to provide access to heritage sites and objects to people all around the world, without the need for physical visits. This can be used to protect and preserve historical sites and artifacts that are in danger of deterioration or destruction as a result of various factors like natural disasters, human interference, or the passage of time. This technology also helps to conserve and protect these heritage sites and objects by creating a record of their current state, which can be used for future restoration and conservation efforts. Overall, 3D virtual preservation is a valuable tool for preserving and promoting the cultural heritage of Bangladesh and other countries worldwide.

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ABBREVIATIONS

PBR	Physically based rendering
Ao	Ambient occlusion
AR	Augmented reality
VR	Virtual reality
UV	UV mapping
.obj	Geometry definition file format / Wavefront .obj file
.fbx	Autodesk (Filmbox) proprietary file format
GHz	Gigahertz
. glTF	GL Transmission Format
. glb	GL Transmission Format Binary file
. USDZ	Universal Scene Description

CHAPTER 1

INTRODUCTION

1.1 Introduction

The cultural heritage of Bangladesh is a rich and diverse tapestry, reflecting the country's long and varied history and the many influences that have shaped its society and culture. Among the most important aspects of this heritage are the conventional, or traditional, elements that reflect the customs, practices, and beliefs of Bangladesh's people. From ancient temples and palaces to traditional crafts and techniques, these elements are a vital part of the country's cultural identity and provide a connection to its past. As with any cultural heritage, it is important to preserve and protect these traditional elements for future generations. One way to do this is using 3D virtual preservation, which allows for the creation of digital models and interactive experiences that allow people to explore and learn about these heritage sites and artifacts without having to physically visit them. In order to preserve our cultural heritage virtually and educate future generations about it, as part of this project I will recreate a few traditional heritage items and host them on Sketchfab. We can anticipate that as soon as Bangladesh gets 5G, we will be ready for applications that use the metaverse. The metaverse has a wide range of potential uses, including socializing, entertainment, education, and business, so it might one day act as a hub for a variety of activities. Because Sketchfab integrates with AR/VR, we can easily create a virtual museum.

1.2 Motivation

The culture and traditions of Bangladesh are a fusion of many different cultures. Bangladesh's culture is distinct as a result of these mixtures. It is the age of technology now. As technology advances daily, some outdated items are becoming obsolete. For instance, the bioscope was well-known in rural Bangladesh between 1960 and 1990. The bioscope technology then advances. A light was used at the time to project the image onto a larger surface from behind the painted canvas. After a short while, televisions became more widely

available, and nowadays, most modern people are unaware of what a bioscope was. another example is Dheki. Dheki is a traditional tool used in Bangladesh for husking, or removing the outer husk, from rice grains. Dheki was typically used in rural areas of Bangladesh, where it was a common sight in rice-processing centers and village homes. In addition to husking rice, dheki was also sometimes used to crush other grains, such as wheat and maize, and to grind spices and other materials. Although dheki is a traditional tool that has been used in Bangladesh for centuries, it has become less common in recent years due to the availability of more modern, mechanized husking methods. As a child of the 1990s, I witnessed these changes and came to understand how our tradition is losing value. In order to educate the new generation about our history and cultural heritage, it is important to incorporate modern technology into the learning process. 3D virtual preservation of Bangladeshi heritage objects can be a useful tool in this regard. By creating virtual models of traditional tools and objects like the bioscope and dheki, new generation can learn about their significance and usage in an interactive and engaging manner. Furthermore, by making these virtual models accessible online, anyone, anywhere in the world can access and learn about our cultural heritage. This can help to promote and preserve Bangladeshi culture on a global level. It is crucial to remember that our cultural heritage is a valuable asset, and it is our responsibility to ensure its preservation for future generations. By educating our children about our history and cultural traditions through modern technological tools like 3D virtual preservation, we can create a sense of cultural identity and pride among them. This, in turn, can inspire them to become ambassadors of our rich cultural heritage and help to preserve it for future generations. Therefore, I believe that my effort will be the first step in preserving our tradition and culture for future generations.

1.3 Objective

Main objective of my project is:

- i. Sharing information and knowledge:** By creating this project, I can share valuable information and knowledge about the cultural heritage of Bangladesh and the importance of preserve it. This can help to educate

people about the country's rich cultural history and can encourage a greater appreciation and understanding of these important cultural elements.

- ii. Providing a reference for future research:** By creating a comprehensive report on 3D virtual preservation in Bangladesh, we can provide a useful resource for future researchers and those interested in this topic. This can help to build on the knowledge and understanding of these efforts and can support ongoing efforts to preserve and share traditional Bangladeshi heritage.
- iii. Documenting the state of current preservation efforts:** By creating a report on 3D virtual preservation, we can provide a comprehensive overview of the current state of these efforts in Bangladesh. This can help to identify any gaps or areas where more work is needed and can serve as a useful reference for future efforts.
- iv. Highlighting the benefits of 3D virtual preservation:** We can showcase the many benefits of 3D virtual preservation as a tool for preserving and sharing traditional Bangladeshi heritage. This can help to promote the use of this approach and encourage more people to get involved in these efforts.

1.4 Expected Outcome

Some potential expected outcomes for this project are:

- i. A 3D library of Bangladeshi traditional objects.
- ii. Increased knowledge and understanding of the cultural heritage of Bangladesh and the importance of preserving it.
- iii. Increased awareness and appreciation of the benefits of 3D virtual preservation as a tool for preserving and sharing traditional Bangladeshi heritage.
- iv. A more accurate and thorough description of Bangladesh's traditional objects' current situation.

1.5 Report Layout

My project is described in detail in the report, which is divided into six chapters. In Chapter One, I provided an introduction to my project, including my motivation for undertaking this work, the expected outcomes, and the significance of the project.

Chapter Two covers related work, including a comparative study of similar projects, the scope of the problems that I aimed to address, and the challenges that I faced during the project.

In Chapter Three, I discussed the software and tools that I used throughout the project. This included a detailed description of the 3D modeling software and other applications that were necessary for completing the work.

Chapter Four covers my workflow in detail. I discussed my approach to creating the 3D models, including the techniques and methods that I used. I also described the various stages of the project, including the planning, execution, and finalization of the 3D models.

In Chapter Five, I compared my work to previous projects and evaluated my own project's strengths and weaknesses. I also discussed how my project differed from previous work, and the ways in which it represents an improvement in terms of accuracy, detail, and quality.

Finally, in Chapter Six, I concluded my report by summarizing my key findings and the significance of my project. I also discussed future scope for this type of work, including areas where more research is needed and potential avenues for further exploration.

1.6 Project Timeline



Figure 1.6.1: Project Timeline Gantt chart

CHAPTER 2

BACKGROUND STUDY

2.1 Introduction

3D virtual preservation is a process that involves creating digital 3d models of physical heritage sites and objects, with the aim of preserving and sharing these cultural elements for future generations. This can be done using a variety of techniques, such as 3D scanning, computer-generated graphics, and virtual reality technology. This can be especially useful if the physical site is not easily accessible or has been damaged or destroyed. In addition, 3D virtual preservation can be a valuable tool for education, allowing people to learn about the history and cultural significance of these sites and artifacts in an interactive and immersive way. Overall, 3D virtual preservation can be a useful way to preserve and share cultural heritage, helping to ensure that these important cultural elements are not lost or forgotten. It can also provide a way for people to experience and learn about these cultural sites and artifacts in new and innovative ways.

2.2 Related Work and Research

In many countries, 3D virtual preservation is a well-known concept. Several museums have created complete 3D recreations of their catalogs. Top-rated 3D museums are:

1. **Virtual Museums of Malopolska:** An accessible website operated by the Regional Digitalization Lab, a unit of the Maopolska Institute of Culture, situated in Kraków, Poland. [9] They create 1202 of their pieces in 3d.
2. **The Virtual Curation Lab:** The Virtual Curation Laboratory was established in Richmond, Virginia in August 2011 with the goal of using 3D scanning and printing to digitally conserve and share the world's cultural history. 3157 models are available in the 3D collection. [10]
3. **The Harvard Museum of the Ancient Near East:** The collections, formerly known as the Harvard Semitic Museum, are utilized for instruction, study, publication, and exhibition of the archaeology, history, and languages of the

ancient Near East. There are 1097 models in the 3D collection. [11]

4. **The British Museum:** Recently, the British Museum has begun to preserve its collection of masterpieces. The 3D museum catalog contains 277 models. [12]
5. **Quixel megascans:** Megascan has a big assets collection that is constantly expanding. The powerful 3D scanning technology used to develop Quixel assets allows for extremely accurate and realistic designs that can be used to create photorealistic 3D visuals and visual effects. [14]

There is some project which was build keeping Bangladesh on focus.

6. **Virtual museum Bangladesh:** This was created by Ahamed Jaman Sonjib and two other people. The project, which may be among the first of its sort in the nation, was recognized by the government as one of the top three inventions at the 2017 trade show [1] [2]. Additionally, as part of their project plan, virtual museum stations will be set up in the National Museum and at well-known tourist destinations like Ahsan Manjil, Lalbagh Fort, and Saat Gambuj Mosque.
7. **Bangladesh national museum virtual tour:** The Bangladesh National Museum was first founded on March 20, 1913; however, it was initially known as the Dhaka Museum. It was publicly launched on August 7, 1913, and on November 17, 1983, it was given the title of national museum of Bangladesh. The Bangladesh National Museum opened a 360-degree virtual gallery on April 25, 2017, allowing anybody to take a virtual tour of the museum and view the exhibits online.[6] [8]
8. **Preserving Heritage Sites of Dhaka City Using 3D Modeling and Virtual Reality Technology:** BRAC University's Department of Computer Science and Engineering published a thesis paper in 2018 with the goal of preserving Dhaka's historical landmarks. The website displays 3D animations of the historical buildings of Lalbagh Fort, including The Tomb of Pori Bibi, The Diwan-i-Aam and the Mosque, The Shahid Minar's structure, and The Greek Memorial's model. [5]

2.3 Competitive Analysis

Therefore, at least three initiatives were known to have been done to protect Bangladesh's historical sites. The "Virtual Museum Bangladesh" initiative was innovative. However, that website has not received any updates in the past few years. Six virtual reality locales are included in this project: Kantajew Temple, Boro Sordar Bari, Choto Shona Mosque, Panam City, Sixty Dome Mosque, and Eleven Shiva Temple. [24] The project's biggest issue is that almost every brick's texture is the same, and there are serious tiling problems. Compared to modern standards, they are of extremely poor quality. And several of their scenes have lighting-related problems. They are really dark in comparison to the surroundings. For their web user interface, they are utilizing 3d vista player 1466. User controls for this player are limited.

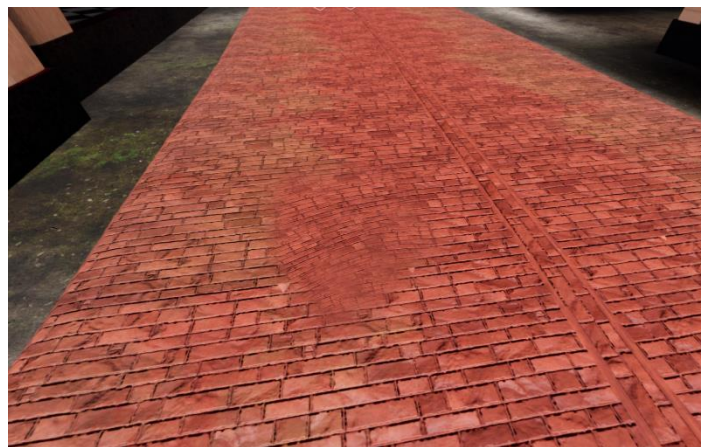


Figure 2.3.1: Texture problem in Virtual Museum Bangladesh



Figure 2.3.2: Lighting issue in Virtual Museum Bangladesh

Since the Bangladesh National Museum has access to all the country's historical objects, more projects of this nature might be undertaken. There should not be a problem with that since it is a government project. However, it is disappointing that the virtual tour of the Bangladesh National Museums is not visually striking. There is a design flaw in their website, <https://vt.bnm.org.bd>. The documentation page for the museum leads to a blank page. On the homepage, there is an educational video where we can see how users can click on items to learn more about their specifics. On the website, however, that is not integrated. The website appears to be a 360-degree photo tour of the museum; however, everything appears distorted, and the photos are hazy and of very poor quality. There is really no user control. Only an arrow is used to guide the user. [8]



Figure 2.3.3: Bangladesh national museum virtual tour



Figure 2.3.4: Bangladesh national museum virtual gallery

Although the initiative from BRAC University to preserve heritage sites in Dhaka City using 3D modeling and virtual reality technology appears promising, no more work is being done on it. Since their website is inaccessible. [5]

2.4 Challenges

There are a number of challenges that can arise when it comes to 3D virtual preservation of cultural heritage. Some of the key challenges include:

- 1. Lack of reference:** One of the challenges that can arise when it comes to 3D virtual preservation is the lack of reference images or documentation for the heritage site or artifact being preserved. In order to create an accurate 3D virtual model, it is important to have access to high-quality, detailed images or other documentation that can be used as a reference. Without sufficient reference images or documentation, it can be difficult to accurately recreate the appearance and details of the site or artifact. This can result in an incomplete or inaccurate 3D model, which may not accurately represent the original site or artifact.
- 2. Accuracy:** It can be challenging to create 3D virtual models that are completely accurate and true to the original site or objects. Factors such as lighting, shadows, and perspective can all affect the appearance of the model, and it can be difficult to recreate these elements perfectly.
- 3. Technical challenges:** There can be technical challenges involved in creating 3D virtual models, such as the need for specialized equipment and software, and the need to ensure that the models are compatible with different devices and platforms.
- 4. Limited immersion:** While 3D virtual models can provide an immersive experience, they are still limited compared to physically visiting a site or interacting with an artifact in person. This can make it difficult to fully convey the experience of visiting a heritage site or handling an artifact.
- 5. Cost:** Creating 3D virtual models of heritage sites and artifacts can be a time-consuming and expensive process, especially if the site is large or the artifacts are numerous. This can make it difficult for organizations or individual to invest in these efforts, especially if funding is limited.

6. Internet speed limitations: Another challenge that can arise with 3D virtual preservation is limited internet speed, which can affect the ability of people to access and view virtual models and exhibits. In areas with slow or unreliable internet connections, it may be difficult for people to access 3D virtual models and experience them in a satisfactory way. To overcome this challenge, it may be necessary to optimize the virtual models and exhibits for low-bandwidth environments, or to provide alternative methods for accessing the content, such as downloading the models or exhibits to view offline. It may also be helpful to work with local internet service providers to try to improve internet speeds and connectivity in the area. Overall, addressing the challenge of limited internet speed is important for ensuring that as many people as possible can access and enjoy 3D virtual models and exhibits.

Chapter 3

REQUIREMENT SPECIFICATION

I required some specific software and materials for my project. In addition, I need to use a few custom scripts and plugins to finish this project successfully. These are the programs, plugins, and scripts I use.

3.1 Autodesk 3ds Max 2023

Autodesk 3ds Max is a professional 3D graphics and animation software used by artists and designers in a variety of industries, including film, television, gaming, and architecture. It is known for its powerful modeling, texturing, and rendering capabilities, and is widely used by professionals around the world. It is designed to be more user-friendly and easier to use, while still providing the powerful features and capabilities that professionals need to create high-quality 3D graphics and animations. Overall, 3ds Max 2023 is a powerful and flexible tool that is widely used by professionals in a variety of industries. It is well-suited for creating high-quality 3D graphics and animations and is a popular choice among artists and designers around the world. [15]



Figure 3.1.1: Logo of 3ds max

3.2 Boa Ref

BOA Ref is a 3ds Max plugin that is used to create and manage reference planes within a 3D scene. It is designed to make it easier to align and position objects in the scene, and to make it easier to work with reference planes in general.

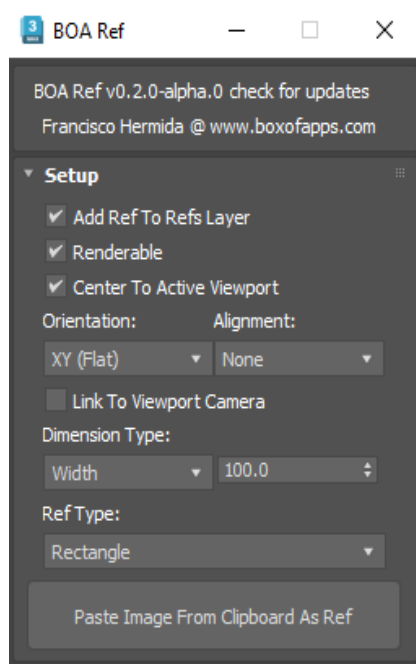


Figure 3.2.1: Interface of Boa Ref

3.3 Poly cloth V2

Poly Cloth V2 is a 3ds Max plugin that is used to create realistic cloth simulations within a 3D scene. It is designed to be easy to use and to provide a high level of realism, and is suitable for a wide range of applications, including character animation, visual effects, and game development.

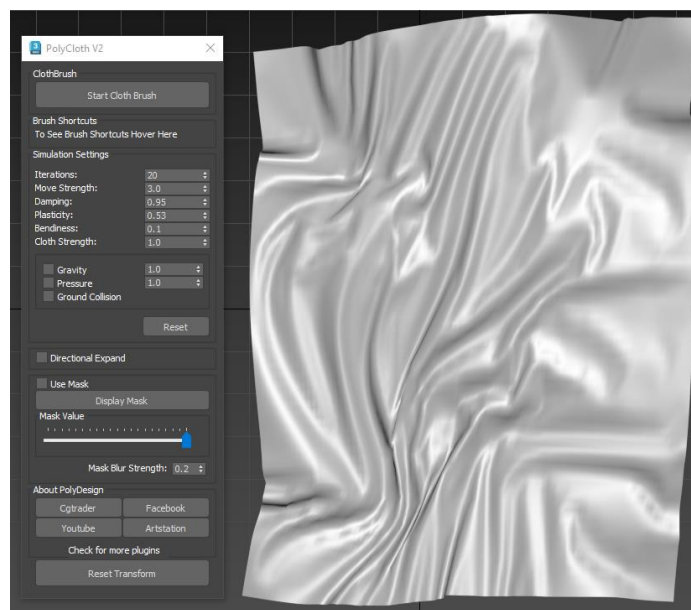


Figure 3.3.1: Poly cloth interface

3.4 Sini tools

Sini Tools is a 3ds Max plugin that is used to automate various tasks and processes within the 3D software. It is designed to make it easier to work with 3ds Max, and to save time and improve productivity. Some of the features of Sini Tools include:

1. A set of tools for creating, modifying, and manipulating 3D models, including tools for creating curves, lofting surfaces, and extruding shapes.
2. A set of tools for working with materials, textures, and shading, including tools for creating and editing materials, applying textures, and controlling the appearance of objects.
3. A set of tools for animating and simulating objects and characters, including tools for creating and editing animations, setting up dynamic simulations, and working with particle systems.
4. A set of tools for rendering and compositing, including tools for setting up and rendering scenes, and for compositing rendered images and other elements together.

It is well-suited for professionals working with the software and can help to save time and improve productivity. [25]

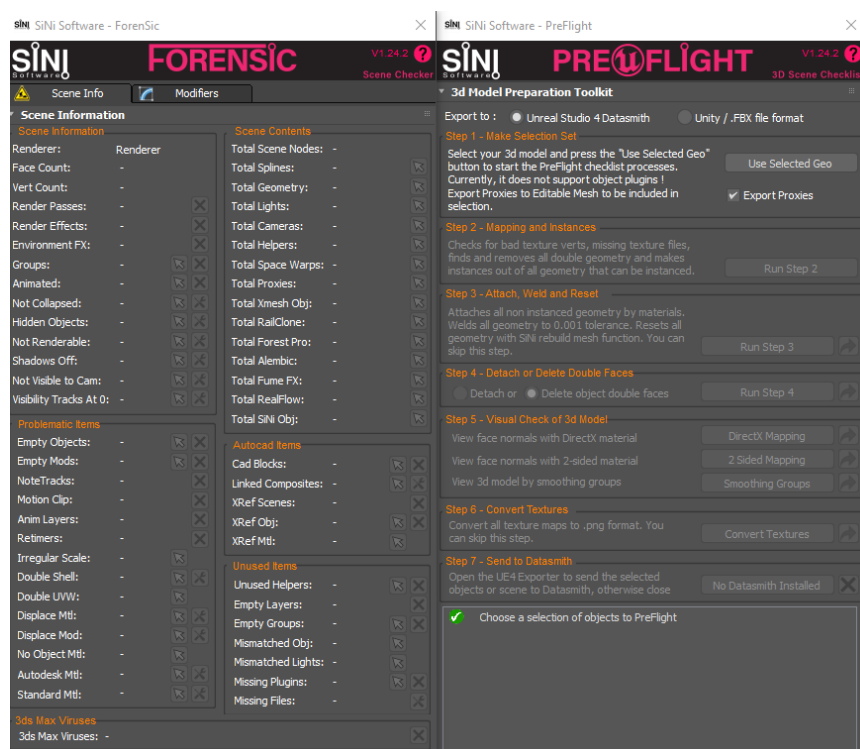


Figure 3.4.1: Sini tools interface

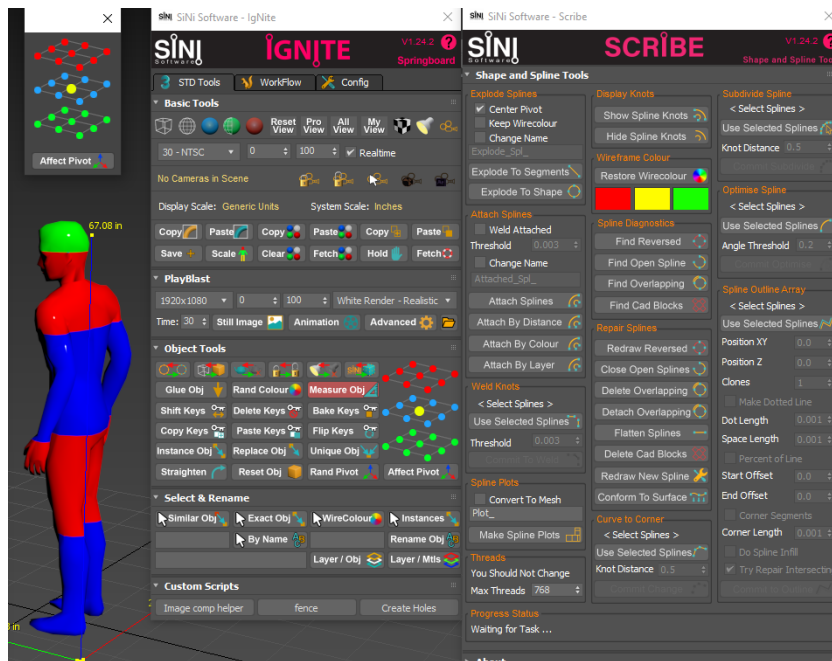


Figure 3.4.2: Sini tools interface

3.5 Quad remesher 1.2

Quad remesher is a 3ds Max plugin that is used to automatically generate quad-based mesh models. It has the ability to generate quad-based mesh models from any type of mesh, including triangles, quads, and n-gons. The ability to preserve the topology of the original mesh, including the edge flow and the distribution of vertices.

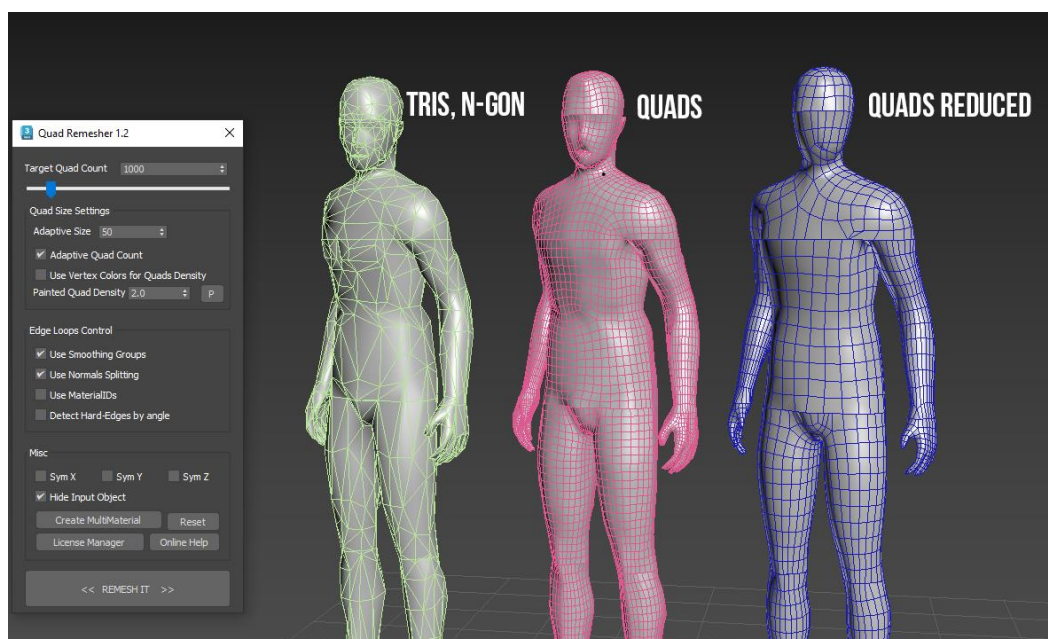


Figure 3.5.1: Quad remesher demo

3.6 Rizom Uv 2022

Rizom UV is a software that is used to create and edit UV maps for 3D models. UV maps are used to map the surface of a 3D model to a 2D texture, and are an essential part of the texturing process in 3D graphics. Some of the features of Rizom UV include [16]:

1. The ability to automatically unwrap UVs for a 3D model, using algorithms that minimize distortion and maximize the use of texture space.
2. The ability to edit and manipulate UVs manually, including tools for scaling, rotating, and moving UV islands.
3. The ability to check the quality of UVs, including tools for identifying and fixing UV errors and distortions.
4. The ability to work with multiple UV sets at once, and to transfer UVs between different 3D models.
5. The ability to export UVs in a variety of formats, including OBJ and FBX.

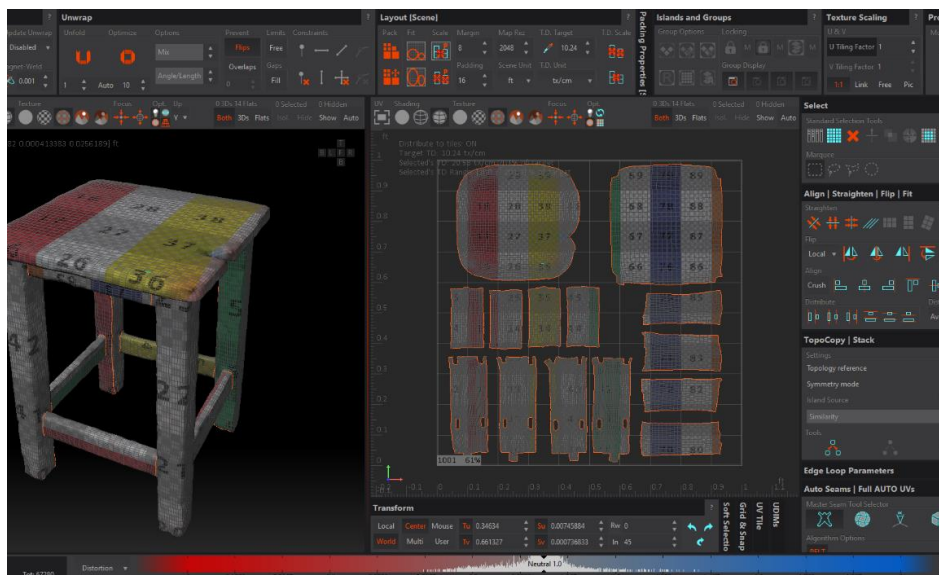


Figure 3.6.1: Rizom Uv interface

Rizom UV Bridge is a 3ds Max plugin that allows you to use the Rizom UV software directly within 3ds Max

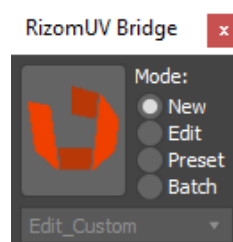


Figure 3.6.2: Rizom Bridge interface

3.7 Substance Painter

Substance Painter is a professional software that is used to create and edit textures for 3D models. It is designed to be easy to use and to provide a high level of realism, and is suitable for a wide range of applications, including character modeling, sculpting, and texturing. [17]



Figure 3.7.1: Substance Painter interface

3.8 Adobe photoshop 2023

Adobe Photoshop is a software which is extensively used for raster image editing, graphic design and digital art. It makes use of layering to allow for depth and flexibility in the design and editing process, as well as provide powerful editing tools, that when combined, are capable of just about anything. [18]



Figure 3.8.1: Adobe photoshop logo

3.9 Keyshot 11

KeyShot 11 is a 3D rendering and animation software developed by Luxion. It allows users to create high-quality, photorealistic images and animations of 3D models with ease. KeyShot 11 offers a wide range of features, including real-time rendering, advanced lighting and material editing tools, HDRI lighting, animation capabilities, and more.

Some of the new features in KeyShot 11 include:

1. **Keyframe Animation:** Allows users to create complex animations using keyframe control over geometry, cameras, and lighting.
2. **Environment Library:** Provides a library of pre-built HDRI environments that can be used to quickly set up lighting for a scene.
3. **Light Manager:** Enables users to quickly adjust lighting settings for individual lights in a scene, making it easier to fine-tune the look of a rendering.
4. **Intuitive UI:** KeyShot 11 features a redesigned user interface that makes it easier to navigate and use all of the software's features. [26]



Figure 3.9.1 Keyshot1 Logo

3.10 Sketchfab

Sketchfab is an online platform which is used to share, publish, and discover 3D models and other 3D content. It is designed to be easy to use and to provide a wide range of features and tools for working with 3D content.

Some of the features of Sketchfab include:

1. The ability to upload and publish 3D models and other 3D content, including support for a wide range of file formats, such as OBJ, FBX, and GLTF.

2. The ability to view 3D models and other 3D content using a variety of viewing options, including support for VR (virtual reality) and AR (augmented reality).
3. The ability to share 3D models and other 3D content with others, including the ability to embed 3D content on other websites.
4. The ability to interact with other users and creators on the platform, including the ability to leave comments and feedback on 3D content.

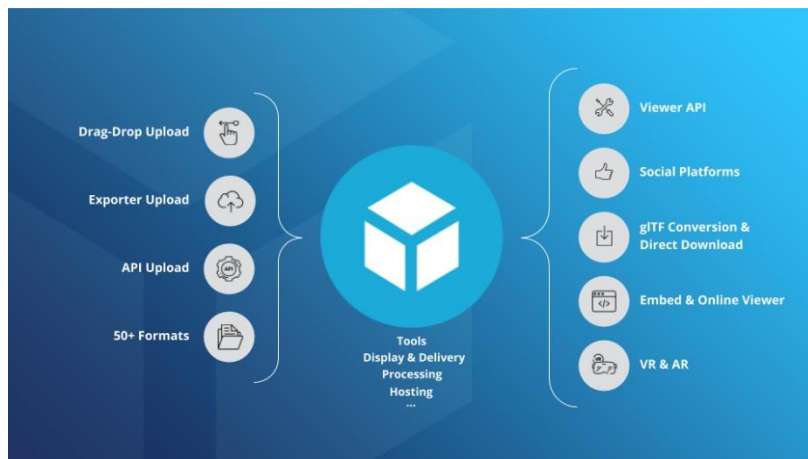


Figure 3.10.1: Sketchfab

Sketchfab has an exporter plugin for 3ds Max that allows you to export 3D models and other 3D content from 3ds Max and upload it to the Sketchfab platform. It is designed to be easy to use and to provide a wide range of features and tools for working with 3D content on Sketchfab.

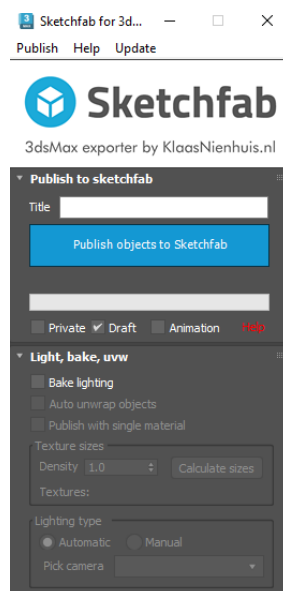


Figure 3.10.2: Sketchfab exporter for 3ds max

3.11 Hardware specification

When it comes to 3D modeling, I know that having a powerful computer is essential. Not only does it make the work faster and more efficient, but it also allows for more complex and detailed models. That's why I've put together a hardware setup that I believe will be ideal for my 3D project. First, I chose the Ryzen 5 3600 CPU. This is the brain of my computer, and it is responsible for running all of my software and applications. I knew I needed a CPU that was fast and efficient, and that could handle complex calculations and processes. The Ryzen 5 3600 has six cores and 12 threads, and a base clock speed of 3.6 GHz. It can boost up to 4.2 GHz when needed, making it a smart choice for 3D modeling. Next, I looked at the RAM. For 3D modeling, I knew I needed a lot of Ram to handle the large files and complex calculations. I opted for 32 GB of DDR4 RAM, which I think is a good amount for most 3D projects. With this much RAM, I can work with multiple programs and applications at once without slowing down. Finally, I chose the GPU. This is the component that is responsible for rendering images and videos, and for handling the visual aspects of my 3D project. I went with the 1660 Super OC edition GPU, which I think is a great choice for my needs. It has high clock speeds and dedicated video memory, with 6 GB of GDDR6 memory. It can handle complex 3D models and graphics with ease, which is exactly what I need for my project.

CHAPTER 4

WORK PROCESS

4.1 Thought process.

My entire workflow for the 3D virtual preservation of traditional Bangladeshi heritage will be described in this chapter. Prior to beginning the project, I conducted research on Bangladeshi heritage artefacts, including why they are disappearing day by day, and I made a survey to find out what the general public thought about the issue. Additionally, I watched certain documentaries and movies to learn more about our rural culture. I also spoke with a few older people about their childhood.

I divided my workflow in three parts:

1. Pre-production
2. Production
3. Post-production

4.2 Pre-production

4.2.1 Organize a survey: After collecting some basic information and historical artefacts list, I created an online survey that people could easily access and complete. The survey was designed to be user-friendly and intuitive, so that participants would find it easy to complete. I gathered some basic information and a list of historical artifacts the survey, people were given a list of historical artefacts and asked to select the item they missed the most. I included a variety of artefacts, ranging from traditional instruments to cultural instruments. Participants were also asked to provide some basic demographic information, such as their age, gender, and occupation. To reach a wider audience, I shared the survey on social media and through various online communities. I also encouraged people to share the survey with their friends and family, to help spread the word and gather as many responses as possible. After the survey period was over, I compiled and analyzed the data. The results were very interesting and provided some valuable insights into people's perspectives on historical artefacts and cultural preservation.

আপনার বয়স? (Your Age?)

181 responses

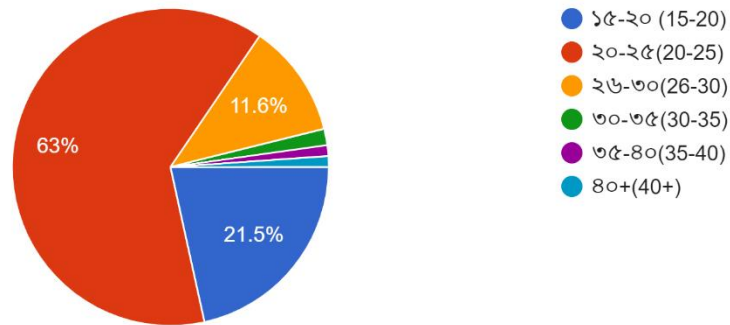


Figure 4.2.1.1: Survey results for age

আপনার লিঙ্গ? (What is your gender?)

181 responses

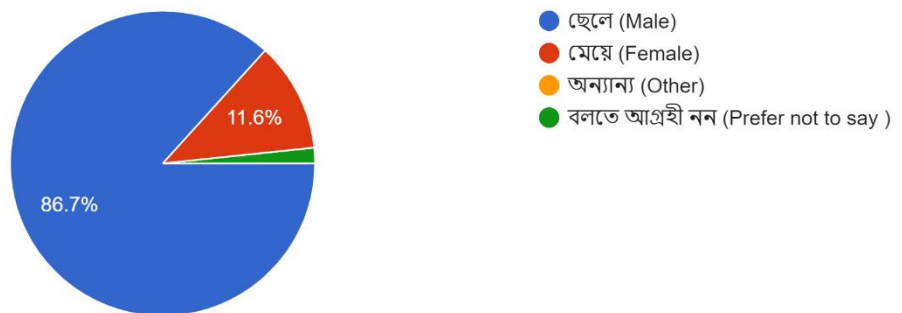


Figure 4.2.1.2: Survey results for gender

আপনার পেশা কি? What is your Occupation?)

181 responses

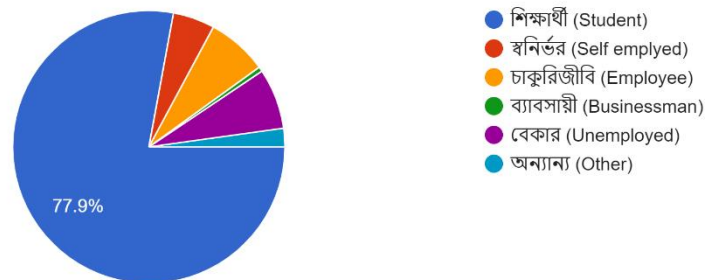


Figure 4.2.2.3: Survey results of Occupation

আপনি কি শৈশবের হারিয়ে যাওয়া ঐতিহ্যবাহী জিনিসগুলোকে স্বরণ করেন? (যেমনঃ হাতপাখা , তালপাতার সেপাই, লাটিম ইত্যাদি)- (Do you miss lost childhood t...itions? (eg Hatapakha, Talpatar Sepai, Latim etc.)
181 responses

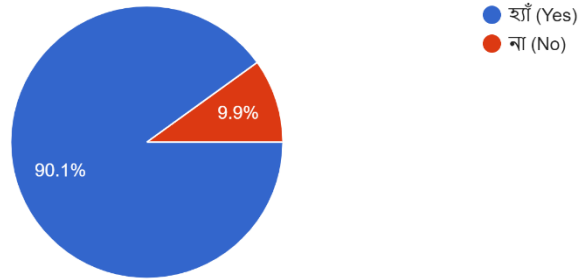


Figure 4.2.2.4: Survey results about childhood memories.

হারিয়ে যাওয়া শৈশবের ঐতিহ্যবাহী জিনিসগুলোকে নতুন প্রজন্মের কাছে তুলে ধরাকে যৌক্তিক বলে মনে করেন কিনা?(Do you believe it makes sense to teach...unger generation the lost customs of childhood?)
181 responses

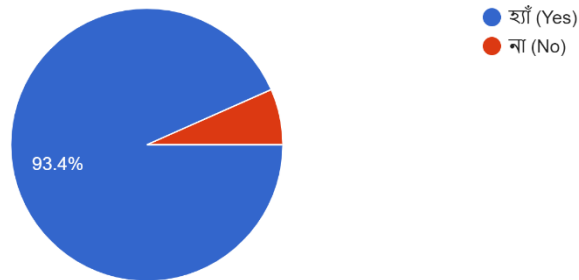


Figure 4.2.2.5: Survey results about thoughts

শৈশবের হারিয়ে যাওয়া কোন কোন জিনিসগুলোকে আপনি সবচেয়ে বেশি স্বরণ করেন? (What childhood memories do you miss the most?)
181 responses

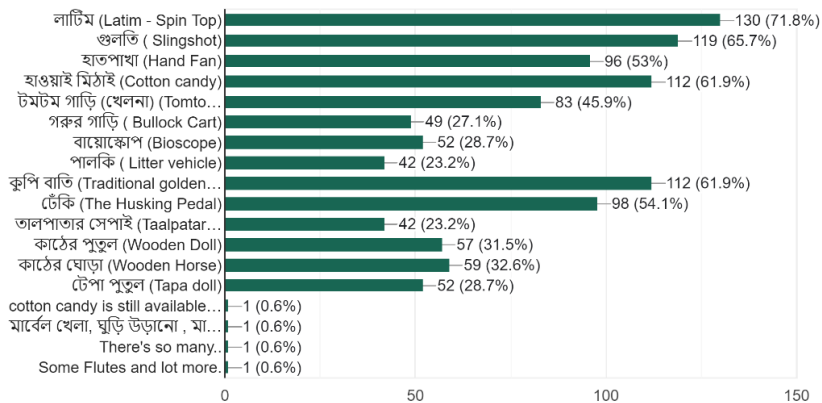


Figure 4.2.2.6: Survey results of object list

আপনি কি ভার্চুয়াল জাদুঘর সম্পর্কে জানেন?(Do you know about virtual museums?)

181 responses

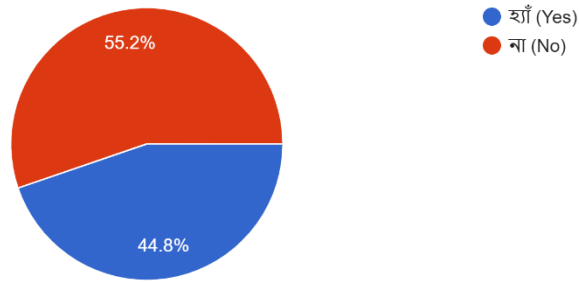


Figure 4.2.2.7: Survey results about virtual museum

যদি জেনে থাকেন, তাহলে ভার্চুয়াল জাদুঘরের ধারণাটি আপনার কাছে কেমন মনে হয়েছে? (If so, how do you feel about the idea of a virtual museum?)

118 responses

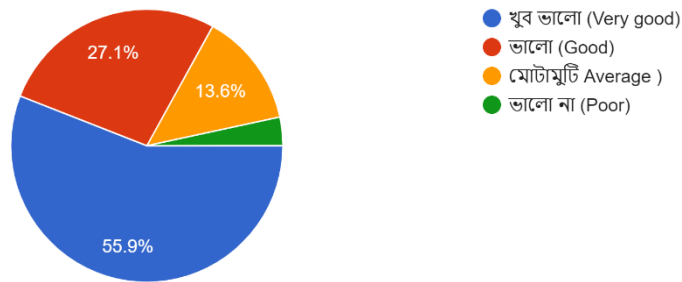


Figure 4.2.2.8: Survey results about virtual museum idea

বাংলাদেশের হারিয়ে যাওয়া ঐতিহ্যবাহী জিনিসগুলোকে ৩ডি'র মাধ্যমে ভার্চুয়ালি সংরক্ষণ করা জরুরী (It is important to preserve the lost traditional things of Bangladesh virtually through 3D)

181 responses

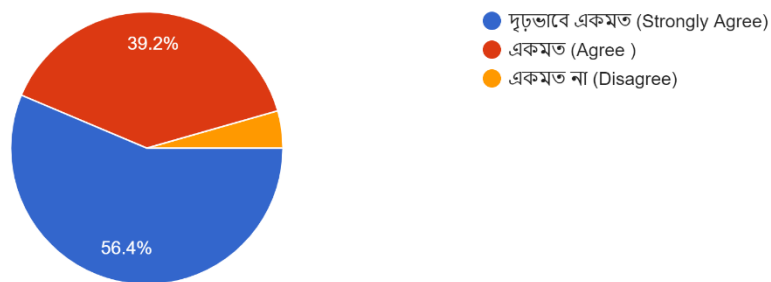


Figure 4.2.2.9: Survey results about virtual museum

4.2.3 Collect Reference: Collecting references is a crucial step in any research or documentation process, including in the context of virtual preservation of conventional Bangladeshi heritage. References provide a way to verify and validate the information that you have gathered about a heritage site or object, as well as to learn more about it from other sources. It is important to collect a range of references when documenting a heritage site or object, including primary sources such as archival documents and photographs, as well as secondary sources such as academic articles, books, and websites. I mainly used Wikipedia and Wikimedia for resource collection. Beside that I used:

1. Pinterest: Pinterest is a social media platform and image-sharing platform developed in the United States to help users save and find information online using images, videos, and, to a lesser extent, animated GIFs.
2. The British Museum online archive: The British Museum online archive is a digital collection of resources related to the collections and research of the British Museum in London. It includes a wide range of materials, including photographs, manuscripts, correspondence, drawings, prints, and other documents.
3. Facebook public database.
4. Documentaries.
5. Films.
6. Reddit.

4.2.3 Understanding My Limits: Knowing my capabilities and selecting a project with plenty of room for skill development were my top priorities throughout the pre-production phase. Avoiding models that do not fit my need and abilities is absolutely essential. It would have been disastrous if I had accepted to model a huge number of objects that were well beyond what I could manage. I therefore had great awareness of my ability sets. And the survey helped me to short down my list and now I can plan my production pipeline .

4.3 Production

As now I have people's data and references, now I can start my production. I will describe them one by one.

4.3.1 Bioscope: Urban life no longer resembles the scene of viewing photographs in a wooden box while listening to music. To the rhythm of the tambourine and the music, the image inside the box changes. A bioscope cannot currently be found anywhere, not even to be stored in a museum, as they are so uncommon in rural Bengal. In reality, bioscope was like a cinema hall in rural Bangladesh. Like a cinema hall, a show would start with three or four people in the bioscope. This folk medium of entertainment in Bengal has been lost in the evolution of time. Bioscope has automatically taken off due to the availability of TV and sky culture satellites and smart mobiles. [19] [35]



Figure 4.3.1.1: Bioscope reference form bapjaner bioscope movie [35]



Figure 4.3.1.2: Bioscope reference form bapjaner bioscope movie [35]



Figure 4.3.1.3: Bioscope reference form bapjaner bioscope movie [35]

4.3.1.1 Bioscope modeling and texturing: After viewing all the references and reading articles on bioscope, I started to model it. I took basic shapes and created the outer shell of bioscope. After that took a cylinder similar sized to viewer hole of the bioscope. After that I used boolean. Boolean means creating objects by intersection or uniting of objects as well as subtracting objects from each other's.

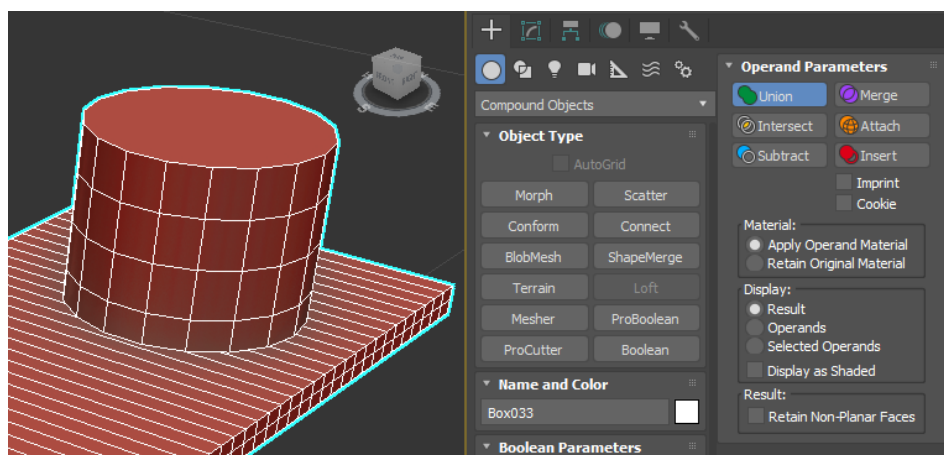


Figure 4.3.1.1.1: Boolean

After creating holes, I created quad topology for my objects. So, it will be easier for me to do unwarp of these objects. After that I completed all necessary parts for my bioscope.

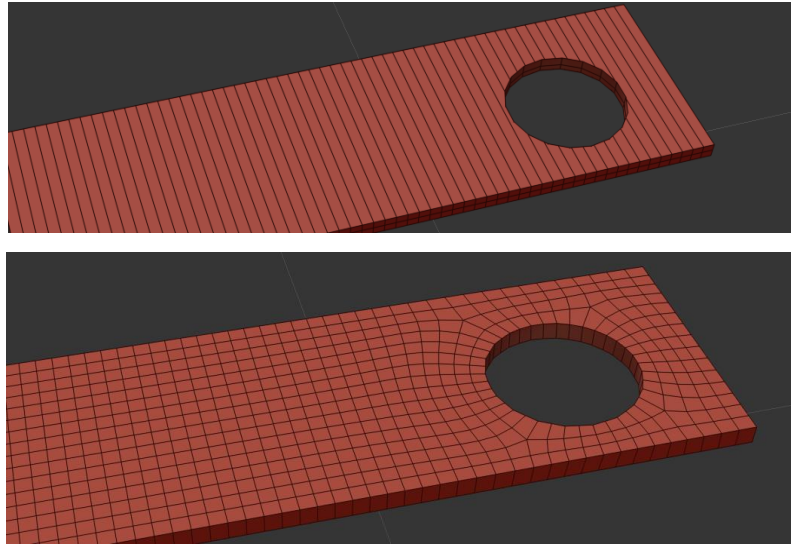


Figure 4.3.1.1.2: Solving Booleans

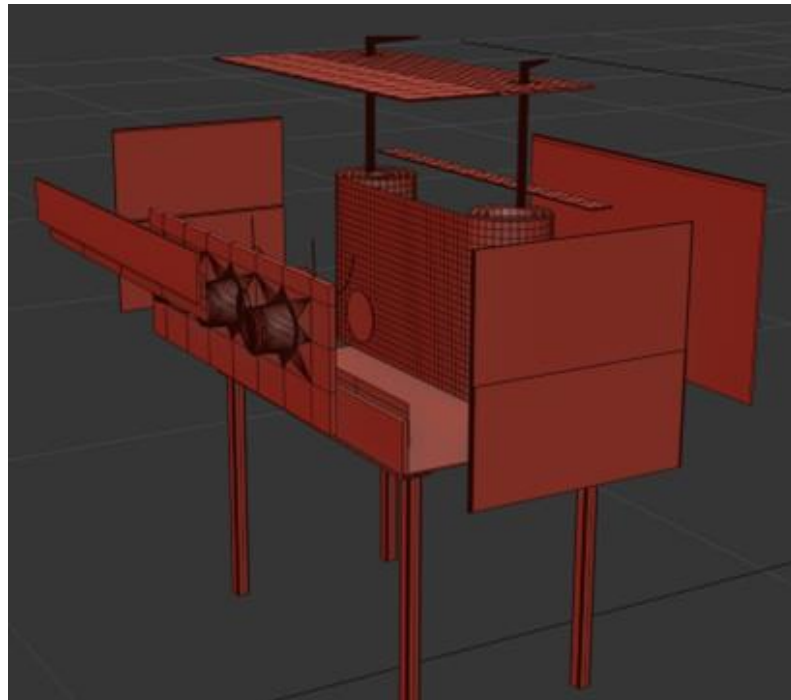


Figure 4.3.1.1.3: All parts of the bioscope

After that I merged all the parts together by attach modifier of 3ds max. So, they act like a single object. I also keep some hole in wood for realism. After all of my parts are merged together then I export my model to Rizom uv for unwarping process.

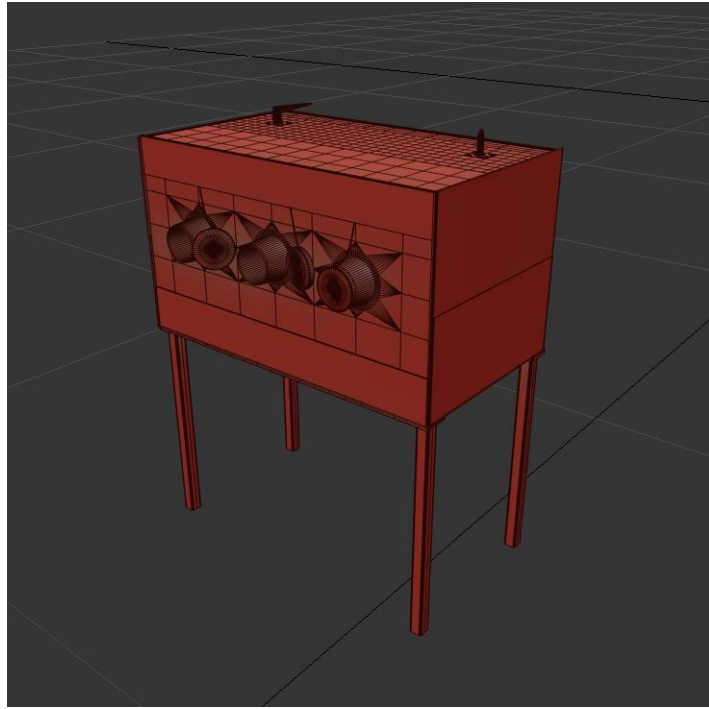


Figure 4.3.1.1.4: Bioscope full model

On Rizom uv I unwrapped and flatten all the parts and packed them together. I used as many grids as possible for packing the model.

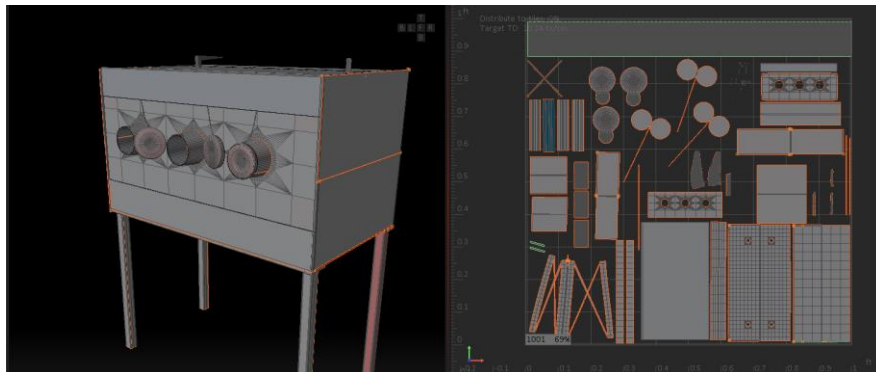


Figure 4.3.1.1.5: Unwrapped model on Rizom Uv

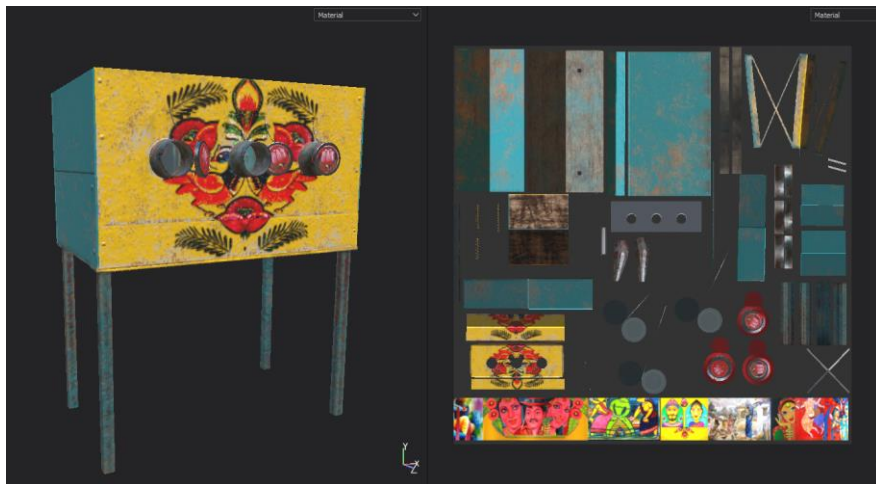


Figure 4.3.1.1.6: Textured model in Substance painter

After I get unwrapped model from rizom uv, then I exported the model as obj file. Then I imported my model on substance painter and baked the model, so that I can find Ao (Ambient Occlusion), normal, world normal. curvature and thickness map. Then I started to do texturing. I decided to give it an old painted wood look. I also added some rust around metal edge. Then I exported the texture in 4k and 8k. And after that I uploaded my bioscope model on sketchfab.

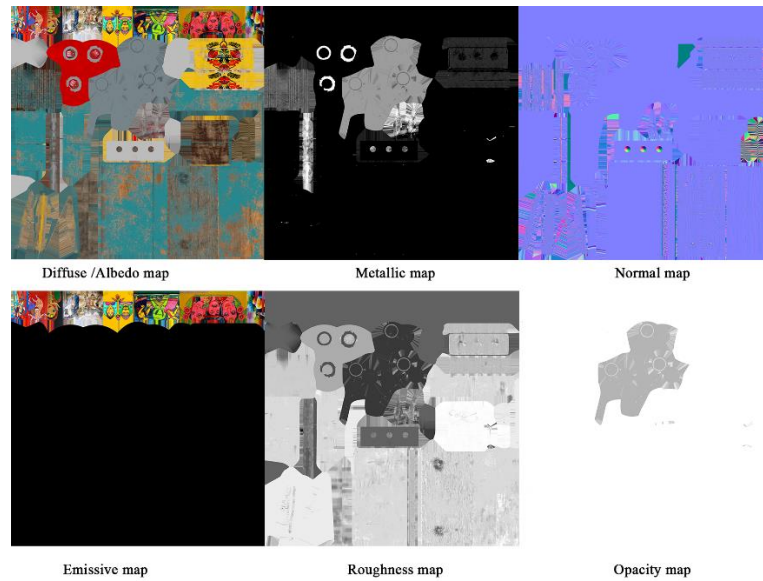


Figure 4.3.1.1.7 Pbr texture sets of bioscope.

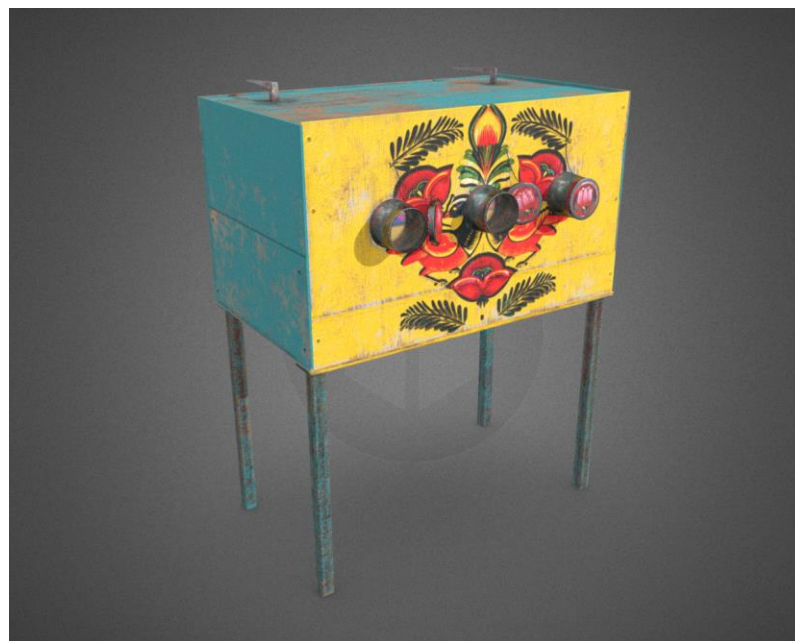


Figure 4.3.1.1.8: Final bioscope on sketchfab

And now I will move to my second model. My second model is palki (Litter vehicle)

4.3.2 Palki: Bangladesh's historic traditional vehicle is called the palki. It was utilized to transport people. It is regarded as a luxury automobile. People from wealthy and noble families would frequently travel between locations using it. Palki-like chariots are thought to have been employed in the past for the ascent of gods and goddesses as well as for transporting their idols. Deities are seen carrying palkis in sculptures found in many old temples. Palki is mentioned in the Hindu epic Ramayana circa 250 BC. The European nobility of the higher classes used to travel in these palkis when Britain was in power. However, the use of palki among British authorities significantly declined once railways were built throughout the subcontinent. [20]

4.3.2.1 Palki modeling and texturing: I crated basic shape of palki using primitive shape like: box, circle, and cylinder. For a bending roof I created a shape and used bend modifier.



Figure 4.3.2.1.1: Basic shape of palki

Then I made curtains using cloth simulations and poly cloth plugin. I tried to make the curtains as smooth as possible. So, it cost me some extra polygons. Then I make three reference of my curtains and placed them among the doorways. I also made a base the sitting area of palki. I took as many references as possible I needed. But it was hard for me, because I can't find any extract

reference of palkis inside. So, I have to work on guess here. But I tried to maintain the originality as much as possible.

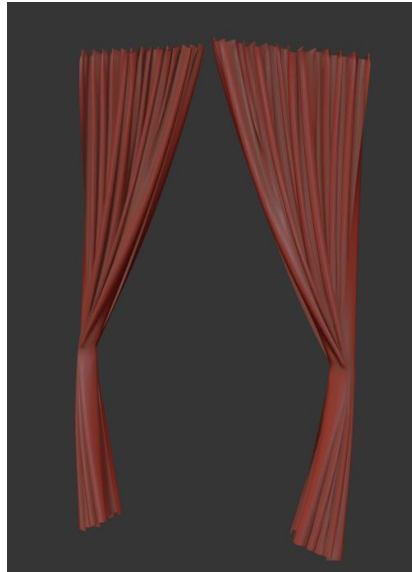


Figure 4.3.2.1.2: Curtains modeling

After that I merged all the objects together and exported the model for unwarp. I unwrapped it by rizom uv and packed the flattened uv sets accordingly.

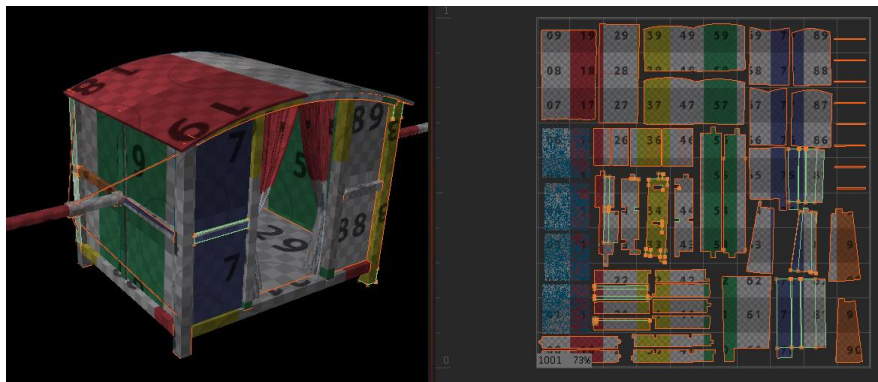


Figure 4.3.2.1.3: Rizom uv unwarping

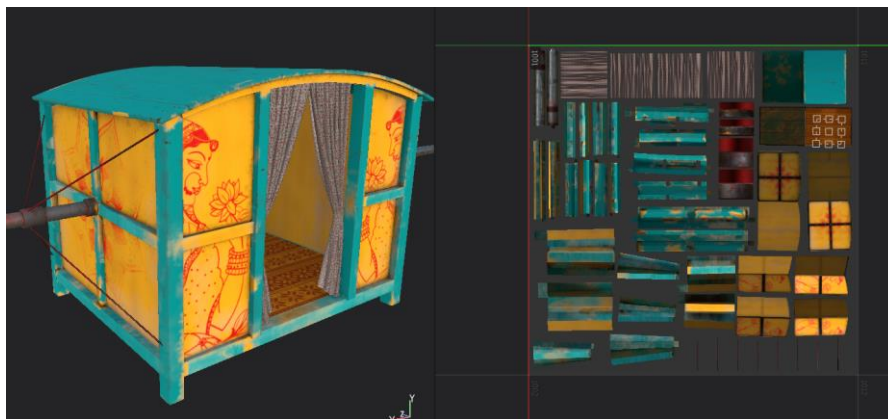


Figure 4.3.2.1.4: Palki texturing

After I get unwrapped palki model from rizom uv, then I exported the model as obj file. Then I imported my model on substance painter and baked the mesh maps, so that I can find Ao (Ambient Occlusion), normal, world normal, curvature, position, id, and thickness map. Then I started texturing. I decide to give it a painted wood look. I choose yellow and cyan color for it, and I added some traditional Bangladeshi drawing and alpona on the top of it. I choose a fabrics material for inside. I also added some rust around metal edge. Then I exported the texture in 4k and 8k. And after that I uploaded my model on sketchfab.

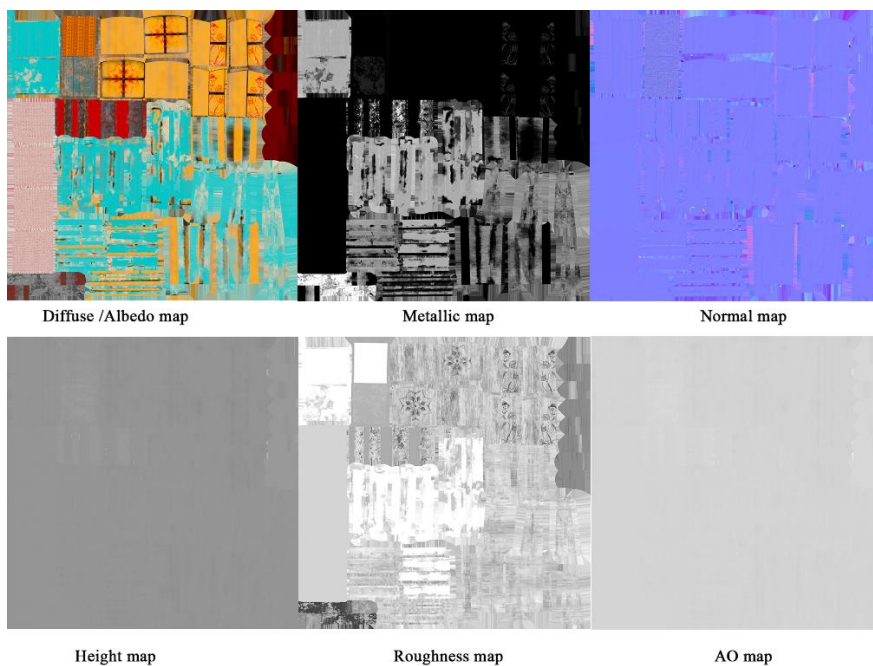


Figure 4.3.2.1.5: Palki pbr texture sets

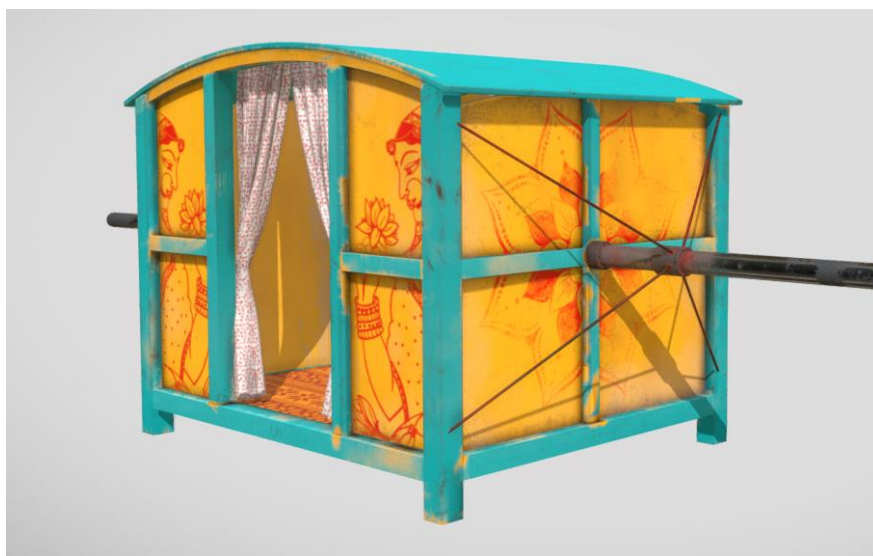


Figure 4.3.2.1.6: Palki on sketchfab

4.3.3 Dekhi: Dekhi is a traditional husking tool used in Bangladesh, India, and other parts of South Asia to remove the husks or outer covering from grains, such as rice or wheat. It consists of a large wooden or metal mortar or barrel, and a pestle or long wooden rod with a flat, rounded end. The grains are placed in the mortar and pounded with the pestle, using a back-and-forth pedaling motion, until the husks are removed. The village has electricity now, and a rice threshing machine has shown up. [21] Dekhi is now a thing of the distant past in many villages as its use has begun to fade after the machine became accessible. Brown rice is not to be found, and the village women are not asked to crush rice on the wedding day. The process of making rice from paddy and rice powder from rice by crushing with one's feet may still be a mystery to the younger generation. For many members of the younger generation, pounded rice is a memory of the distant past.

4.3.3.1 Dheki modeling and texturing: I crated basic shape of dheki using primitive shape like box and cylinder. For paddle part I used boolean and then remeshed the object using quad remasher. I used this technique where I needed any holes. I also took a part from mega scan library for more realism. [14]

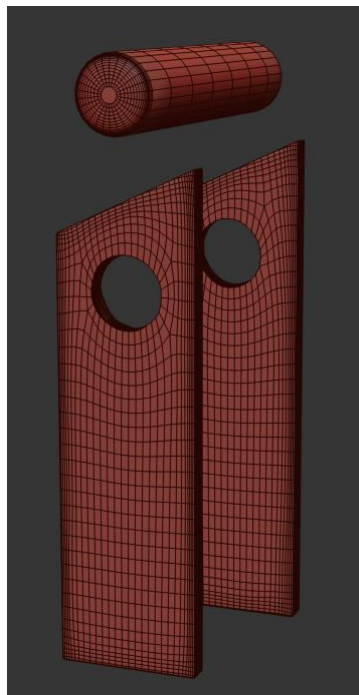


Figure 4.3.3.1.1: Dekhi parts

I added some steel parts around the main wood and on the hammer. Then I added two supporting bamboos on the paddling side of the dheki. When all parts become completed, I merged them together.

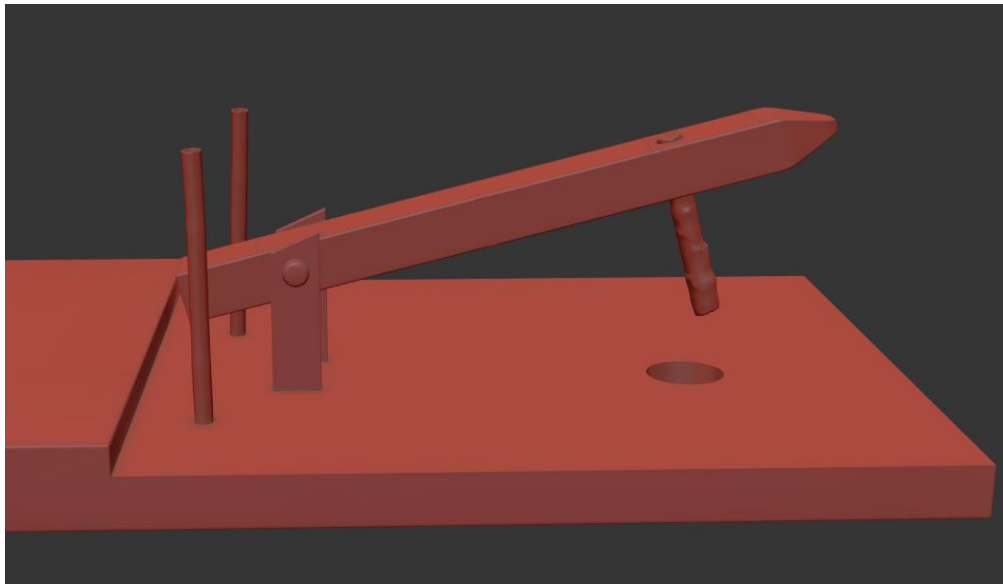


Figure 4.3.3.1.2: Dekhi complete model

After that I exported the model for unwarp. I unwrapped it using rizom uv and packed the flattened uv sets accordingly.

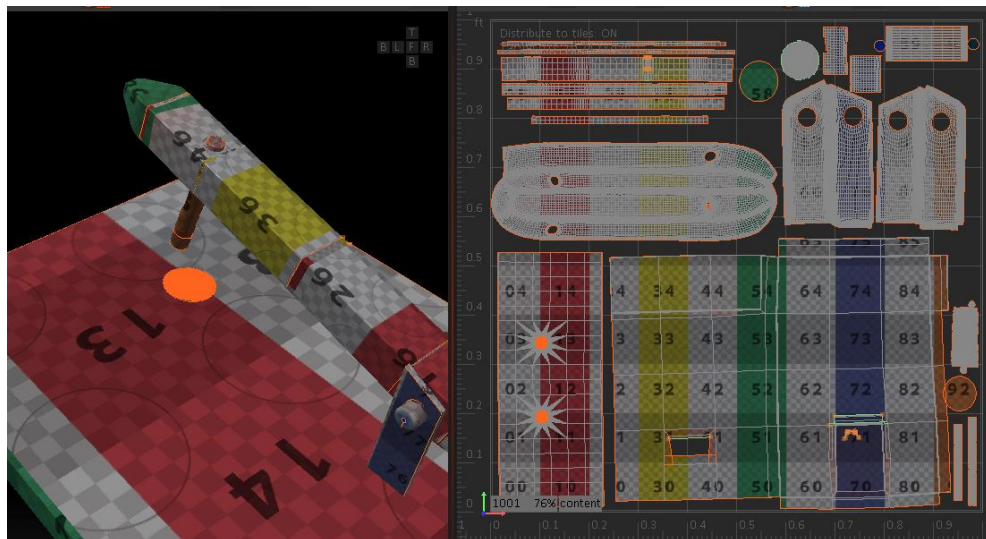


Figure 4.3.3.1.3: Dekhi unwarp.

After I get unwrapped dekhi model from rizom uv, then I exported the model as Obj and Fbx file. Then I imported my model into substance painter and baked the mesh maps for Ao, normal, world normal, curvature, position, id and thickness map. Then I started texturing. For this I made a wood material like

old tree trunk wood and add some dirt on it. Then I added cracks, edge damage and footprint on the paddling side of the model. For the ground I crated a soil texture and added white flour particle around the hammer hole for more realistic result. Then I exported the textures in 4k and 8k. And after that I uploaded my model on sketchfab.

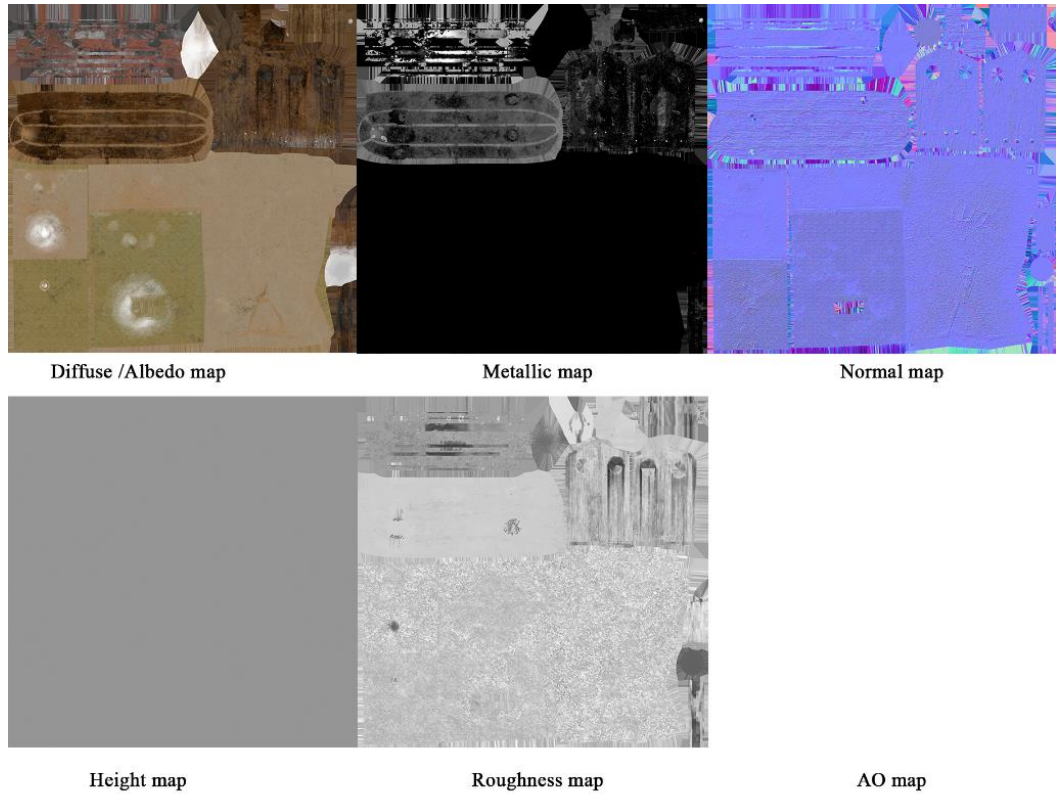


Figure 4.3.3.1.4: Dekhi pbr texture sets



Figure 4.3.3.1.5: Dheki model on sketchfab

4.3.4 Hatpakha: Hatpakha is a hand operated fan used for cooling in heat especially during summer. It is a part of the history and tradition of Bengal and other regions of the world. Since the dawn of time when there was no electricity, people have been using hand fans. Fans have been used in many ways since ancient times. A fan is used to move the warm air, moving the warm air away and moving the relatively cool air. Hand fans are rarely seen today. However, the value of Hatpakha in rural Bengal has not decreased yet. The most advanced in terms of beauty is the colored thread 'Nakshi Pakha'. Birds, flowers, creepers or the names of loved ones or symbols of love are drawn on the fan with yarn. Just as the fan's air is filled with life.

4.3.4.1 Hatpakha modeling and texturing: I crated basic shape of Hatpakha using line tools and primitive shapes. After creating a circle by line tool, I added shell and extrude modifier on it. I made the handle with cylinder shape. I used poly cloth and 3ds max cloth simulation for making the hanging cloth around the fan.



Figure 4.3.4.1.1: Hatpakha cloth simulation

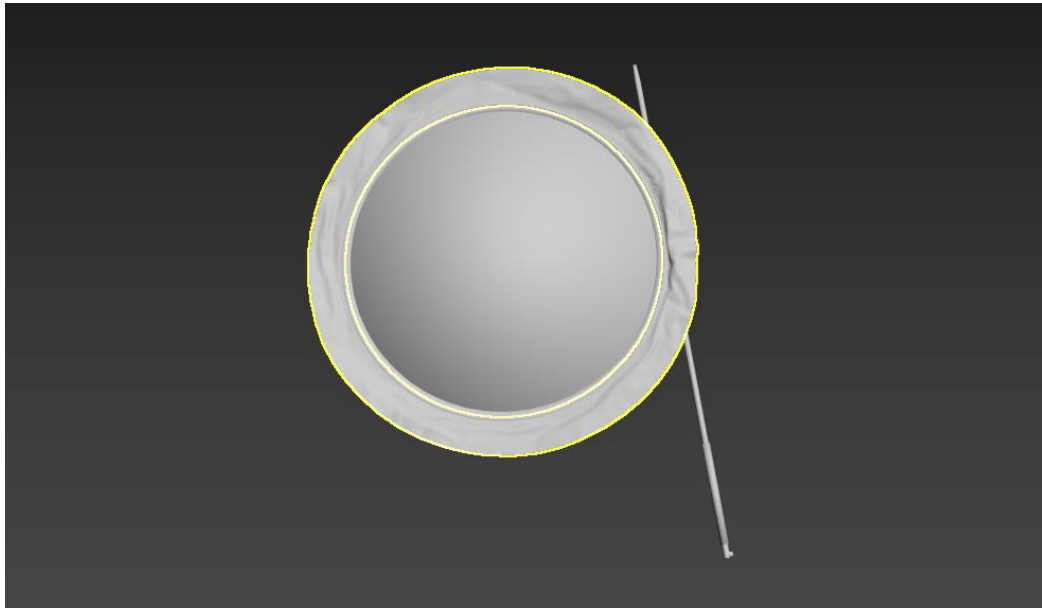


Figure 4.3.4.1.2: Hatpakha full model

After all the necessary parts completed, I merged all the parts together and I transfer the model into Rizom uv for unwarp the model. It was an easy one because there was no complex seam on this model.

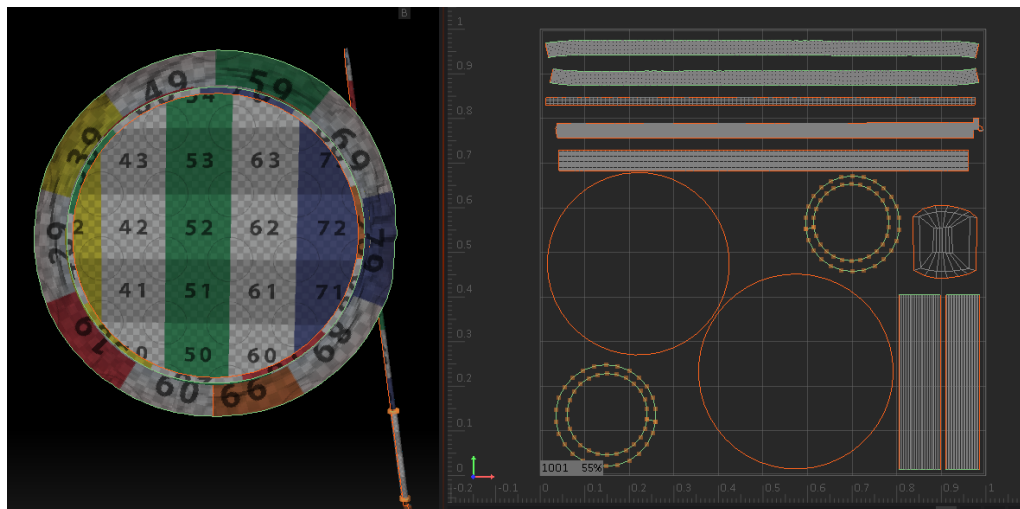


Figure 4.3.4.1.3: Hatpakha unwarp.

After Unwarp I imported the model in substance painter and started texturing. Then I baked the mesh maps for Ao, normal, world normal, curvature, position, id, and thickness map. I make a red fabrics material and a bamboo material for the handle.

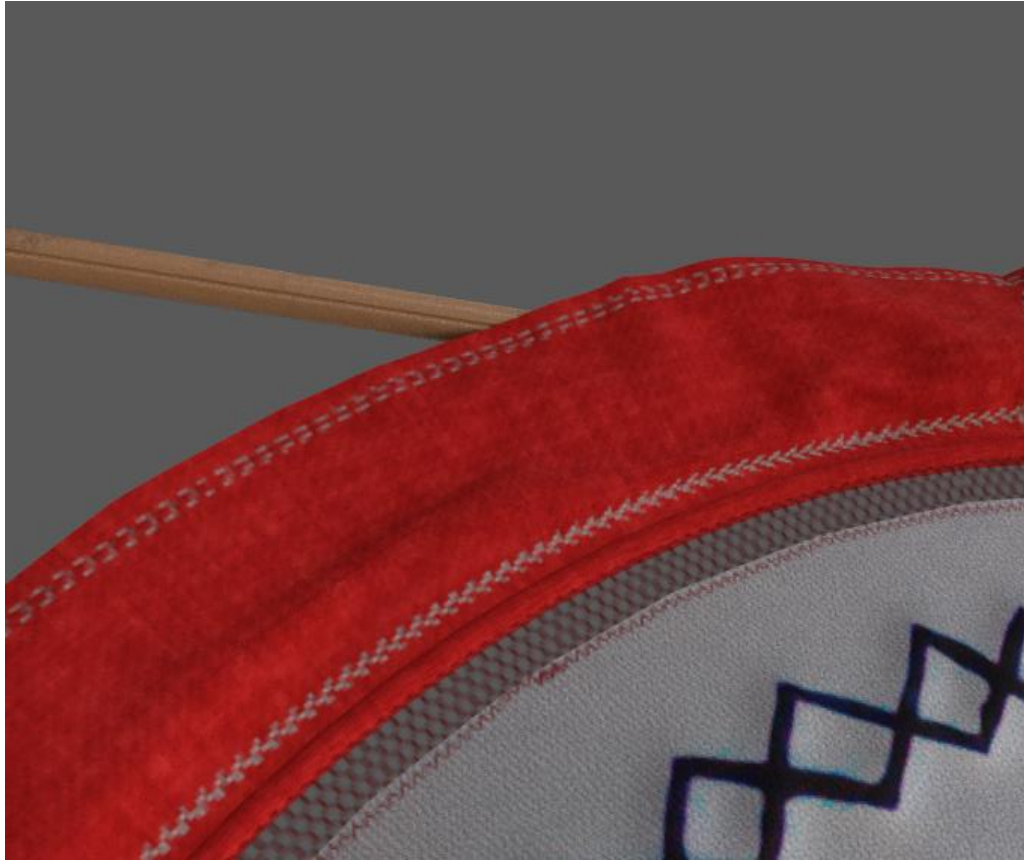


Figure 4.3.4.1.4: Hatpakha details



Figure 4.3.4.1.5: Hatpakha Texturing

I also make the contact part transparent for keeping the originality. Then I paint some stitch around the cloth. Then I exported the textures in 4k and 8k resolution. After that I uploaded my model in sketchfab.

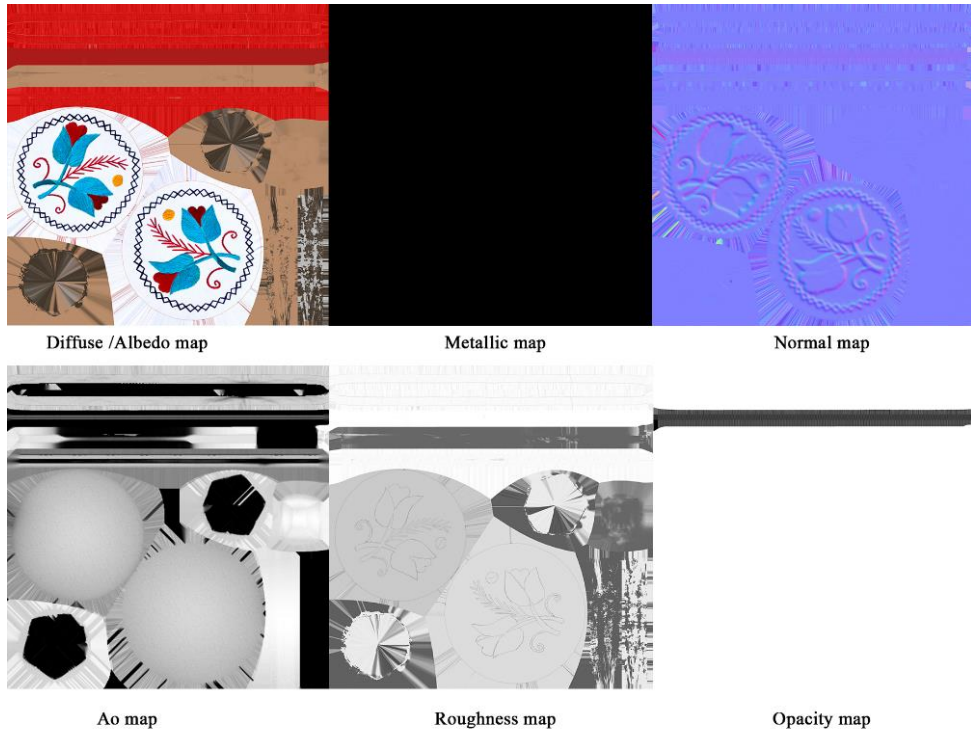


Figure 4.3.4.1.6: Hatpakha pbr texture set



Figure 4.3.4.1.7: Hatpakha Model on shetchfab

4.3.5 Kupi: Kupi bati were used extensively in Bangladesh in the past as a source of light in homes and other settings. Before the widespread adoption of electricity in the country, these kerosene lamps were the primary means of lighting for many people. The use of kerosene lamps in Bangladesh declined significantly with the expansion of the electrical grid in the country. However, they are still used in some rural areas where electricity is not readily available or is unreliable. Many people have carefully preserved kupi bati as a symbol of the tradition of rural Bengal. Soon it will be just a memory or stored in a museum to be presented to future generations. [27]

4.3.5.1 Kupi modeling and texturing: The creation of kupi bati is little bit complicated. Because its shape is not state forward and the inside part of this like of lamp is hollow. I divide this model into three parts and by using like tool I crated the base of it. After that I use extrude and bevel to create the main shape.

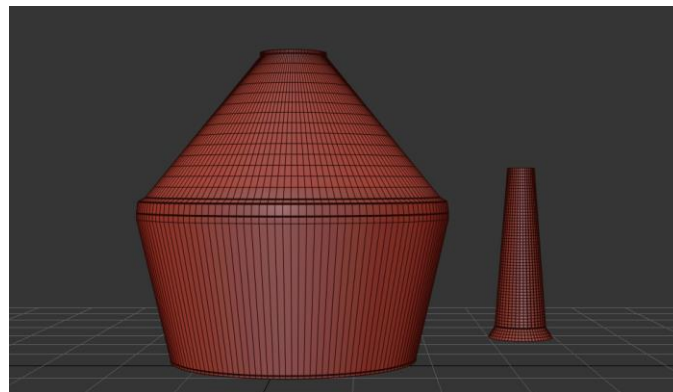


Figure 4.3.5.1.1: Kupi model base

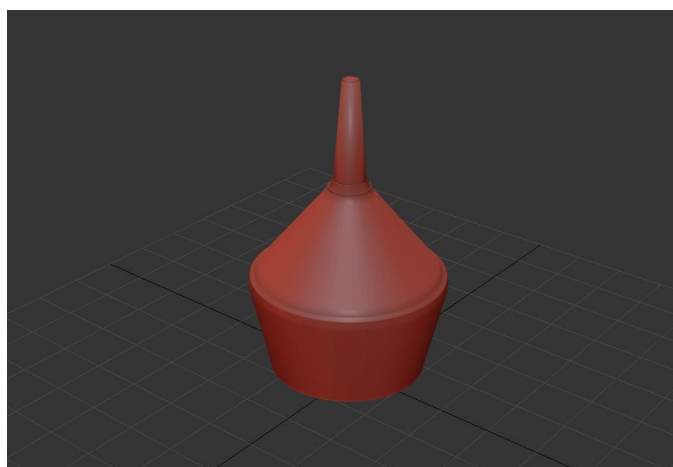


Figure 4.3.5.1.2: kupi model

After that I made the middle part of the lamp which is one kinds of cloth. After all the parts are completed, I merged all the parts together I transferred the model into Rizom uv.

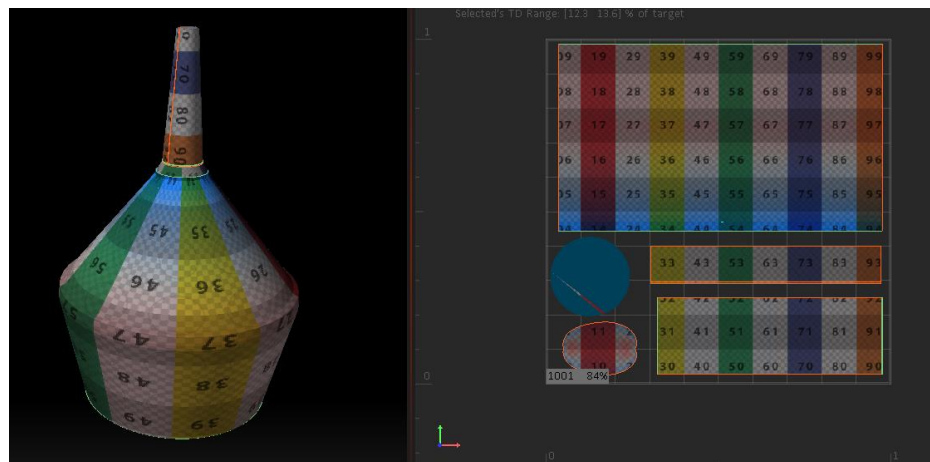


Figure 4.3.5.1.3: kupi model unwrapped.

I unwrapped the model using rizom uv and packed the flattened uv sets accordingly. After Unwrap I imported the model in substance painter and started texturing. Then I baked the mesh maps for Ao, normal, world normal, curvature, position, id, and thickness map.



Figure 4.3.5.1.4: KUPI model texturing

For kUPI bati material I used brass material as base. Then I added some edge damage and surface dent. I painted some oxidation on the bottom of the lamp. Added slightly color deformation. And as a finishing touch I painted leaked oil all over the model. I also added an emission map on the cloth. After that I exported my textures in 4k and 8k resolution. After that I uploaded my model

in sketchfab.

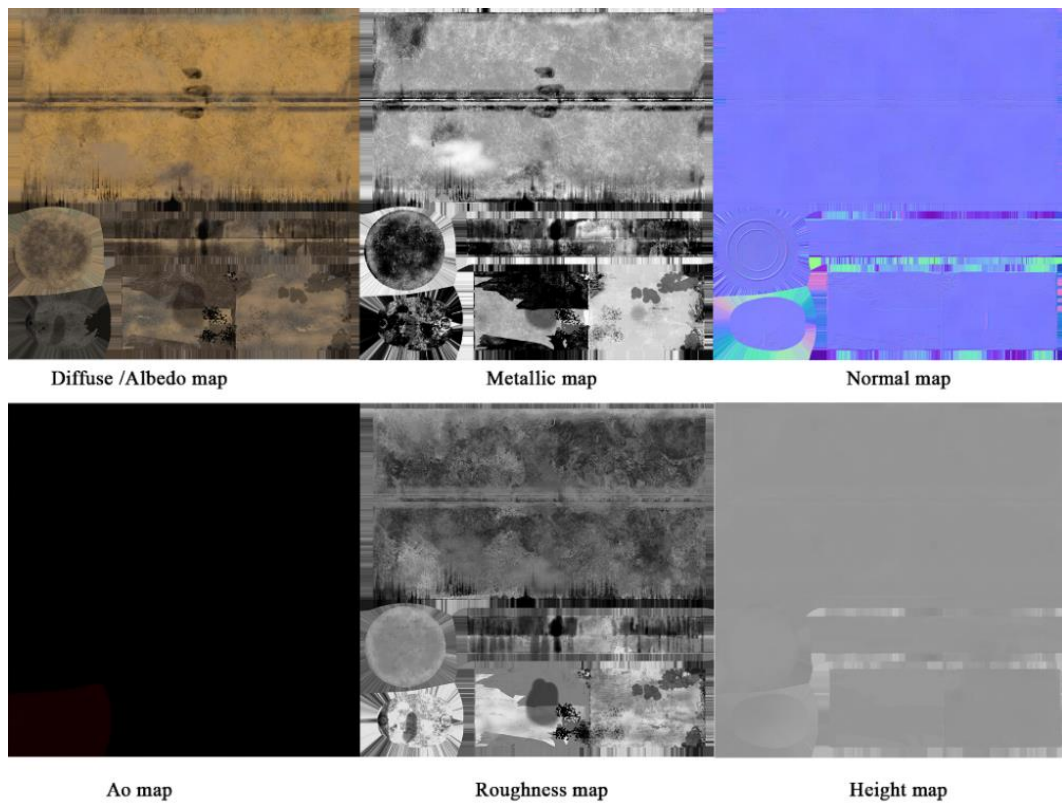


Figure 4.3.5.1.5: Kupi pbr texture sets



Figure 4.3.5.1.6: kupi model on sketchfab

4.3.6: Additional Models: I also made some more models, which are at the edge of extinct. As the workflow is the same as previous, it is not necessary to describe their workflow.

1. **Latim - Spin Top:** A common game in rural Bengal is called Latim or Lattu. Latim is no longer being played as it once was. Latim is rarely seen in toy kiosks, not even at various seasonal fairs. Glass jars containing latim are no longer available at small village stores. Latim is essentially constructed of wood and is rounded. [29]



Figure 4.3.6.1: Latim model

2. **Shil Pata -Traditional spice grinder:** Shil-pata is a two-piece stone mainly used for grinding spices in the kitchen. Pata are rectangular and placed on the floor. Spices such as dry chilies, coriander, turmeric, cumin seeds etc. should be placed on the leaves and sprinkled with shil. A shil is a large block of stone, slightly rounded in width. Grind the spices on the leaves by grasping the leaves with both hands.



Figure 4.3.6.2: Shil pata model

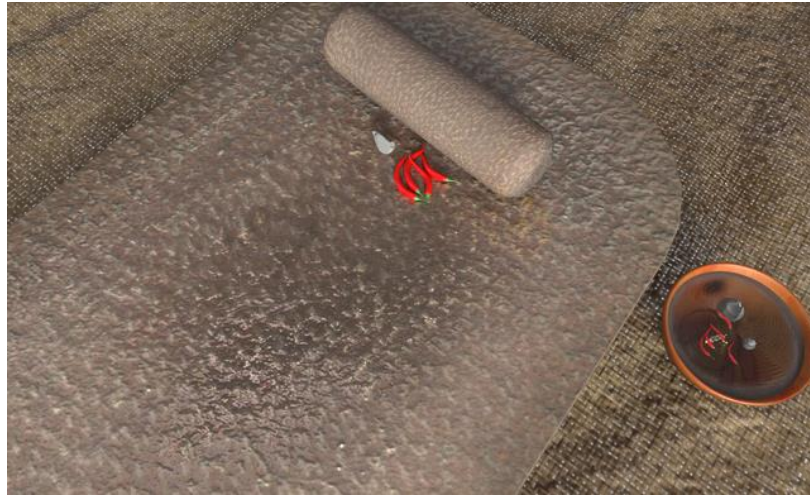


Figure 4.3.6.3: Shil pata render close view.

- 3. Slingshot – Gulti:** Slingshots, also known as hand-held catapults or wrist rockets, have been used in Bangladesh and other parts of the world for centuries as a simple, portable tool for hunting small animals and birds, as well as for recreational purposes. The basic design of the slingshot consists of a Y-shaped frame with a flexible band or cord attached to the two ends of the frame. The frame is held in the hand, and a projectile, such as a small stone or BB, is placed in a pouch on one end of the band. When the band is pulled back and released, the projectile is launched through the air towards its target. In Bangladesh, it is common for children to make their own slingshots using materials that are readily available, such as elastic bands, rubber bands, or strips of leather. They may use a variety of materials as projectiles, including small stones or marbles [29]



Figure 4.3.6.4: Gulti model

- 4. Hookah-Asian Smoking Pipe:** Hookah, also known as shisha or waterpipe, is a traditional smoking device that originated in the Middle East and has been popular in Bangladesh and other parts of South Asia for centuries. It consists of a glass-based waterpipe with a long, flexible hose attached to it, and a bowl that holds the tobacco or other smoking material. One reason for the perceived decline in the popularity of hookah smoking in Bangladesh is widespread of beedi and cigarettes. A beedi cost less and there is no hassle of putting water inside it . Hookah smoking requires the purchase of tobacco and other supplies, which can be expensive over time. But smoking involves inhaling smoke from burning tobacco, and is associated with a range of health problems, including cancer, heart disease, and respiratory issues. [23]

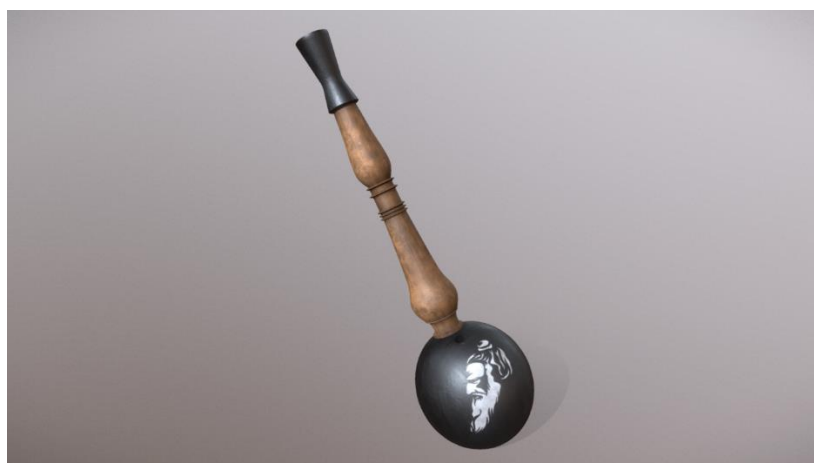


Figure 4.3.6.5: Hookah model

- 5. Paduka - Khorom wooden shoes:** Paduka, also known as khurma or khorom, are traditional wooden shoes worn by people in some parts of South Asia, including Bangladesh. They are typically made of wood and have a flat sole and an open-toed design. Paduka are worn for a variety of purposes, including as a form of protection for the feet, as a symbol of religious devotion, and as a cultural tradition. In Bangladesh, paduka are often worn by people during religious festivals and ceremonies, such as the Eid al-Fitr and Eid al-Adha celebrations. They may also be worn by people who follow certain spiritual practices, such as Hindu sadhus or yogis, as a way to demonstrate their devotion and detachment from material possessions. Paduka are typically made by hand using simple

tools and materials, such as wood, leather, and nails. They are often decorated with intricate patterns and designs, and may be adorned with beads, shells, or other embellishments. However, it is true that the use of paduka has declined in recent years, especially in urban areas where more modern footwear is more widely available. Many people in Bangladesh and other parts of South Asia now have access to a variety of shoes and other footwear options, and may choose to wear these instead of paduka. In addition, the increasing cost of materials and labor involved in making paduka may also contribute to their declining use. Paduka are typically made by hand using wood, leather, and nails, and the cost of these materials can be expensive. As a result, some people may choose to purchase cheaper, mass-produced shoes instead of paduka. [22]



Figure 4.3.6.6: Paduka model

- 6. Bangladeshi Postbox:** Postboxes are used for the collection and delivery of mail. They are typically found in public places, such as near post offices or on the streets, and are used by people to send letters and other mail to destinations within the country and around the world. Postboxes in Bangladesh are typically red in color and are marked with the letters "BD" and the word "Post." They are often located near post offices or other government buildings and are easily recognizable by their distinctive red color. One reason for the perceived decline in the use of postboxes in Bangladesh may be the increasing popularity of electronic communication methods, such as email and social media, which have made it easier for people to communicate with each other

without the need for physical mail. In addition, the increasing availability and affordability of other delivery options, such as courier services, may also contribute to the perceived decline in the use of postboxes in Bangladesh.



Figure 4.3.6.7: Postbox model

- 7. Paddy Rice thresher Machine:** Paddy rice thresher machines have been used in Bangladesh for several decades to help speed up and simplify the process of separating the grains of rice from the stalks and husks of the paddy plant. These machines have played an important role in the development of the rice cultivation industry in Bangladesh and have helped to increase the productivity and efficiency of rice farming in the country. Over time, paddy rice thresher machines have evolved and have become more sophisticated and efficient. While it is true that the use of these machines may have declined somewhat in recent years due to the increasing availability of alternative methods of rice cultivation, they are still widely used in the country and are an important part of the agricultural industry.



Figure 4.3.6.8.8: Paddy thresher machine model

8. **Cotton candy:** Cotton candy, also known as candy floss or fairy floss, is a popular treat in Bangladesh and other parts of the world. It is made by melting sugar and spinning it through small holes to create a fine, fluffy texture. Cotton candy is typically served on a stick or in a paper cone, and is available in a variety of flavors, including strawberry, grape, and blue raspberry. In Bangladesh, cotton candy is often sold at fairs, carnivals, and other public events, as well as at street stalls and sweet shops. It is a popular treat among children and adults alike and is often enjoyed as a sweet and indulgent snack. In old days cotton candy was sold by the hawkers. They used to carry a box painted on blue or green which was wrapped in glass. Cotton candies in old days were look like small balls, but now a days we can't find old cotton candies anymore. Despite the changes in the appearance of cotton candy over the years, it remains a beloved treat in Bangladesh. Its unique texture and variety of flavors continue to attract people of all ages, and it has become an important part of the country's culinary culture. In addition to being sold at public events, cotton candy can also be found in many shopping malls and entertainment centers. It is often enjoyed as a special treat or given as a gift to loved ones. Although the traditional way of selling cotton candy by hawkers may have disappeared, the popularity and enjoyment

of this sweet treat remains strong in Bangladesh.



Figure 4.3.6.9: Cotton candy transformation

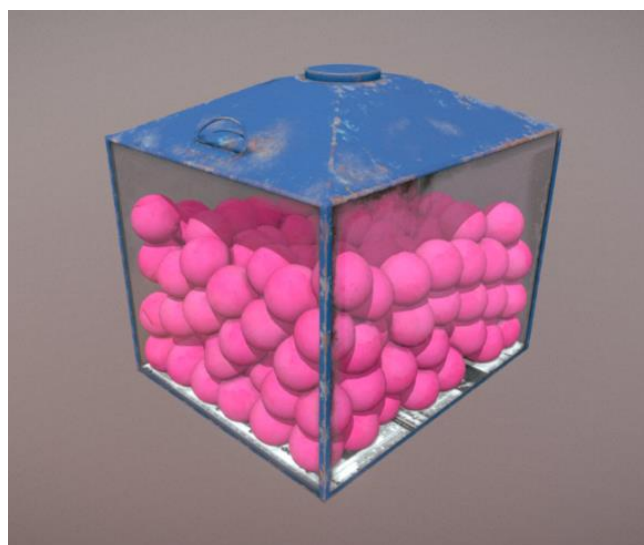


Figure 4.3.6.10: Cotton candy box model

9. **Tomtom Toy:** TomTom cars are made by placing cardboard on top of small clay bones. There are two clay wheels on both sides of the pot. Two strong bamboo sticks are attached to the wheel. Cardboard is attached to the pot. And the stick is tied with thread. As soon as the two sticks attached to the wheel hit the top of the pot by holding the thread, the tang tang sound starts. And around this sound, the children become crazy to buy. The life of shopkeepers revolves around this word. [31]



Figure 4.3.6.11: Tomtom toy model

10. **Bullock Cart:** Bullock carts, also known as ox carts, are traditional vehicles that were commonly used in Bangladesh and other parts of South Asia for transportation and farming purposes. They consist of a cart or wagon that is pulled by a pair of oxen and were traditionally used to transport goods and people over short distances. The history of bullock carts in Bangladesh can be traced back to ancient times when they were used as a primary means of transportation in the region. They were widely used by farmers to transport crops and other goods to market and were also used by traders and merchants to transport goods between towns and cities. In recent years, however, the use of bullock carts has declined significantly in Bangladesh, as more modern forms of transportation, such as cars, buses, and trucks, have become more widely available and affordable. However, there are still some rural areas of the country where bullock carts are used for transportation and farming purposes. In these areas, bullock carts remain an important part of the local culture and way of life.



Figure 4.3.6.12: Bullock carts model

11. Taalpatar Shepai: Taalpatar shepai is a fascinating toy for children's minds. This popular toy of the past is now extinct. The palm leaves are cut into small pieces and made into various parts of the human body and tied together with threads. A bamboo wicker is stuck inside it. [32] The bamboo wicker is fixed in such a way that the hands and feet move as it is rotated. Many people say that this doll started being made from the time of the Sepoy Mutiny, so the pair of dolls is a sahib doll and a mem. It is no longer appreciated in the age of rubber and plastic unbreakable dolls.



Figure 4.3.6.13: Taalpatar shepai model

12. Match Box and Candle set: With the rise of alternative lighting sources, such as electric lighting and LED candles, the demand for traditional matchboxes and candles has declined. In addition, safety concerns with matches and candles, such as fire hazards and the risk of burns, have led to stricter regulations and safety standards. As a result, there has been a growing demand for natural and eco-friendly alternatives, such as beeswax candles, soy candles, and essential oil diffusers. Overall, while matchboxes and candles may be near extinct in some areas, they still hold a special place in many people's hearts and continue to serve important purposes in households and public places.

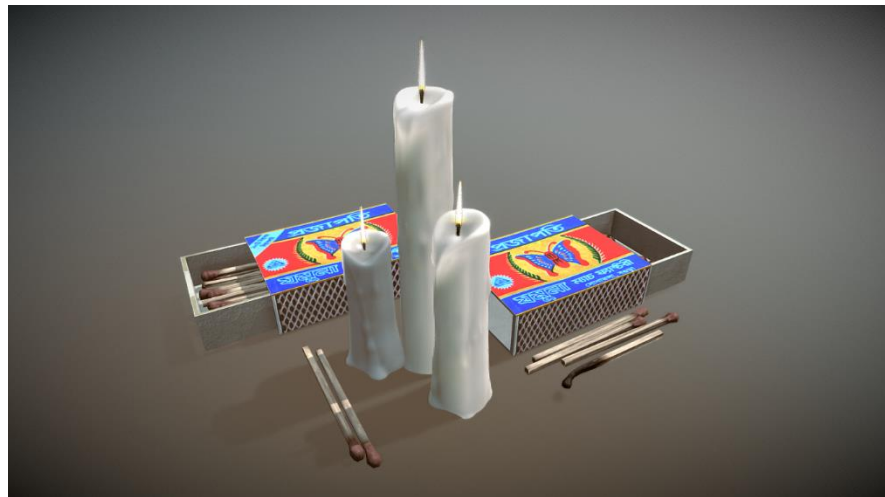


Figure 4.3.6.14: Match box and candle model

13. Bangladeshi Money coin pack: Bangladeshi Taka has gone through various changes and denominations. The currency notes and coins feature images of prominent national figures, landmarks, and cultural symbols of Bangladesh, such as the national emblem, the Shaheed Minar, and the Royal Bengal Tiger. As for the historical value of your Bangladeshi Money coin pack, it could serve as a unique and interesting way to learn about the currency of Bangladesh and its cultural significance. By creating a 3D model of the coin pack, you have a chance to preserve a part of the country's history in a digital format.



Figure 4.3.6.15: Bangladeshi money model



Figure 4.3.6.16: Bangladeshi coin model

14. Old Decorative Wooden Round Table: Wooden round tables have been used for centuries as a functional and decorative piece of furniture. They come in a range of styles and designs, from traditional to modern, and can be made from a variety of different woods, each with its own unique color, texture, and grain pattern.



Figure 4.3.6.17: Old Decorative Wooden Round Table model

15. Umbrella: The Sharif umbrellas were known for their durability, high-quality materials, and beautiful designs. They came in a variety of colors, patterns, and sizes to suit different needs and preferences. [34] The company also produced other types of rain gear, such as raincoats and rain boots. The Sharif umbrella had become a part of the cultural identity of Bangladesh, as it was often seen being used by people of all walks of life, from farmers in rural areas to businessmen in the city.



Figure 4.3.6.18: Sharif chata model

16. Wooden Stool: Wooden stools were a common piece of furniture in Bangladesh for many centuries. They were typically small, portable, and versatile, and were used for a wide variety of purposes throughout history. In rural areas, wooden stools were commonly used for agricultural work, such as separating rice from the husk or grinding spices. They were also used for domestic tasks such as cooking, cleaning, and sewing. In many cases, stools were used to elevate the user off the ground, making it easier to perform tasks that required a flat and stable surface. In urban areas, wooden stools were used for a variety of purposes, from seating in small tea stalls and restaurants to use in shops and markets as a surface to display goods for sale. Despite the popularity of modern furniture, wooden stools remain a symbol of traditional culture in Bangladesh and can still be found in use today in many homes and businesses throughout the country.



Figure 4.3.6.19: Wooden stool model

17. Betel nut cutter: Betel nut cutters have been used for centuries in many parts of Asia, including Bangladesh, India, Myanmar, and Indonesia. They are small handheld tools used for cutting and preparing betel nuts for chewing or medicinal purposes. The betel nut cutter typically consists of a sharp blade, which is usually made of steel, attached to a small handle made of wood, bone, or metal. The blade is curved and pointed, and is designed to easily cut through the hard outer shell of the betel nut. The handle is often decorated with intricate designs and patterns and is designed to be easy to grip and maneuver. Betel nuts have a long history of use in many Asian cultures, and are often chewed as a mild stimulant or as a traditional medicine. [33]



Figure 4.3.6.20: Betel nut cutter

4.4 Post-Production: The postproduction process of this is straight forward. I have decided this part into three sections.

4.4.1 Modify for web: After uploading my models on sketchfab I made some of those models downloadable as a testing purpose. Because sketchfab gives up freedom to automatically convert a 3d files to another format . When it comes to AR and VR or web , a lightweight 3d model is necessary . USDZ, glTF and GLB format is well known for their compact, web-friendly format which allows fast loading and smooth viewing of 3D models. I made them ready for the web. These optimized files can be easily uploaded to a web server and embedded in web pages. This allows for smooth and efficient viewing of the 3D models, making them accessible to anyone with an internet connection. By making my models web-friendly, I can share them with a wider audience and increase their visibility and impact.

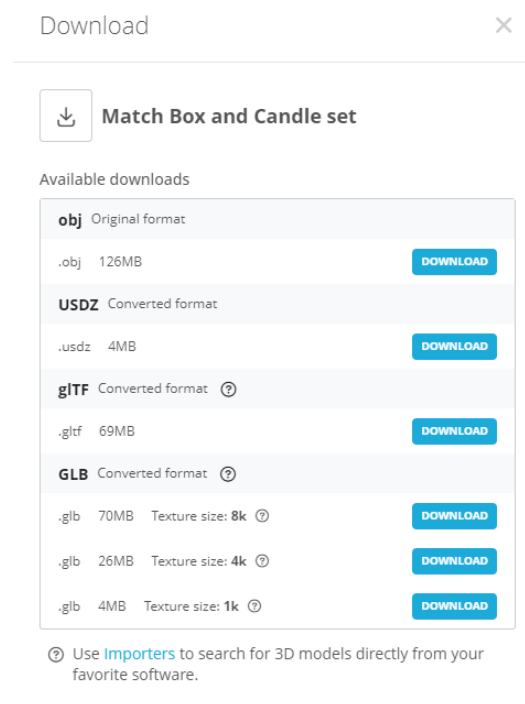


Figure 4.4.1.1: Sketchfab file converted for web

4.4.2 Retouching: For the best possible image, retouching is essential. There is less color control available in 3D. Retouching is needed for this after rendering. I render some of my models on keyshot . After that I retouched some of my

renders for social media sharing. This will enable me to communicate my idea to a wider audience. Here are some retouched renders.



Figure 4.4.2.1: Gulti- Slingshot retouched render for social media

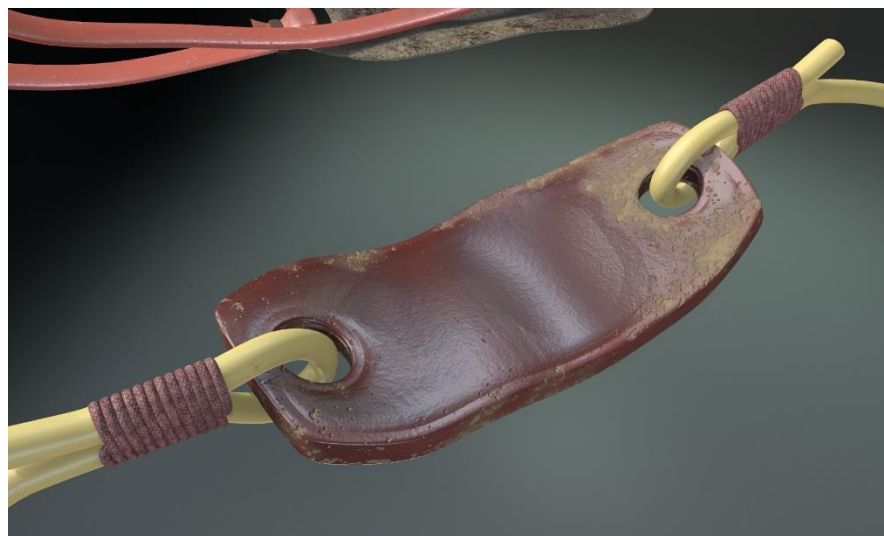


Figure 4.4.2.2: Gulti- Slingshot closed view retouched render for social media.



Figure 4.4.2.3: Shorif umbrella retouched for social media

4.4.3 Regular work and optimization: Every 3D model needs to be optimized, but occasionally we become so obsessed with modeling and texturing that we unintentionally overlook some minor problems. But after some time, we became aware of the issue. Then, to improve accuracy, we must resolve those problem. After a few years, what is present today might be from a long ago. Therefore, in order to preserve our culture, I must continually create new models.

CHAPTER 5

DISCUSSION

As I mentioned on chapter 2.3, already exists sites and projects have some issues. As those are discontinued or outdated. But there is also a significant difference between those projects and my projects. Those only works with historical sites; they documented already preserved historical sites. but they did not work with any historical or traditional objects. This is the main difference. My project presents all traditional objects which has already been extinct or on the way to extinction. My objects can be used as game objects and props. As I published my model in .Fbx and .obj formats, which includes 4k and 8k pbr textures so my assets can be used in VFX production. And when I will make all the models downloadable, anyone working with Ar-Vr and web can easily get glb , glTF format files. As far as my knowledge, nobody is currently providing this kind of files when it comes to Bangladeshi heritage objects.

5.1 My own evaluation

I believe my work has a strong chance of competing in the other virtual museums. And to continue advancing, I plan to create additional models of conventional objects and develop a collection of Bangladeshi textures, which will require the use of photogrammetry and 3D scanning. Overall, I think the use of 3D virtual technology to the preservation of traditional Bangladeshi heritage is an excellent and innovative strategy that has the potential to significantly improve our knowledge and respect of the country's rich cultural past. By utilizing 3D virtual technology to preserve traditional Bangladeshi heritage, I hope to inspire and educate the new generation about the country's rich cultural past.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

In conclusion, the use of 3D virtual technology for the preservation of conventional Bangladeshi heritage has the potential to be a powerful and innovative approach to preserving and promoting the country's rich cultural and historical legacy. By creating detailed and accurate 3D models of historical sites, buildings, and other cultural artifacts, it is possible to document and preserve these essential elements of Bangladesh's cultural heritage in a way that is accessible and engaging to people of all ages.

Looking to the future, there is great potential for the use of 3D virtual technology for the preservation of conventional Bangladeshi heritage to continue to grow and evolve. As technology advances and becomes more widely available, it is likely that more and more historical sites and artifacts will be digitized and made available to the public through virtual platforms. This could provide people with new and exciting ways to explore and learn about Bangladesh's cultural and historical heritage and could help to promote a greater appreciation and understanding of the country's rich cultural legacy.

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3D VIRTUAL PRESERVATION OF CONVENTIONAL BANGLADESHI HERITAGE BY MD SHAFIKUL ISLAM ID: 191-40-565 This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Multimedia and Creative Technology Supervised By MR. ARIF AHMED Associate Professor Department of MCT Daffodil International University DAFFODIL INTERNATIONAL UNIVERSITY DHAKA, BANGLADESH 4th MARCH, 2023 APPROVAL This Project titled "3d virtual preservation of conventional Bangladeshi heritage", submitted by Md Shafikul Islam 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 4 March, 2023. BOARD OF EXAMINERS Md. Salah Uddin Assistant Professor & Head (In-Charge) Department of Multimedia and Creative Technology Faculty of Science & Information Technology Daffodil International University Chairman Arif Ahmed Associate Professor Department of Multimedia and Creative Technology Faculty of Science & Information Technology Daffodil International University Internal Examiner Mizanur Rahman Assistant Professor Department of Multimedia and Creative Technology Faculty of Science & Information Technology Daffodil International University Internal Examiner Abul Fatah Md. Baligur Rahman External Examiner Project Director Digital Entrepreneurship and Innovation Ecosystem Development Project Bangladesh Hi-Tech Park Authority (BHPTA) Information and Communication Technology (ICT) Division Ministry of Posts, Telecommunications and Information Technology ©Daffodil International University i DECLARATION I hereby declare that, this project has been done by me under the supervision of Mr. Arif Ahmed, Associate Professor, Department of MCT Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma. Supervised by: Mr. Arif Ahmed Associate Professor Department of Multimedia and Creative Technology Daffodil International University Submitted by: Md Shafikul Islam ID: 191-40-565 Department of Multimedia and Creative Technology Daffodil International University ©Daffodil International University ii ACKNOWLEDGEMENT First, I express my heartiest thanks and gratefulness to almighty God for His divine blessing makes us possible to complete the final year project/internship successfully. I really grateful and wish our profound our indebtedness to Mr. Arif Ahmed, Associate Professor, Department of MCT Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of "3d modeling and animation" to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this project. I would like to express my heartiest gratitude to Dr. Shaikh Muhammad Allayear, Associate Professor and Head, Department of MCT, for his kind help to finish our project and also to other faculty member and the staff of MCT department of Daffodil International University. I would like to thank my entire course mate in Daffodil International University, who took part in this discuss while completing the course work. Finally, I must acknowledge with due respect the constant support and patients of my parents. ©Daffodil International University iii ABSTRACT With a long history that dates back to ancient times, Bangladesh has a rich and diverse culture and tradition. The nation has been shaped by a number of cultural and historical factors, including its geographic position at the meeting point of South and Southeast Asia and its past experiences with colonization and foreign rule. A method known as 3D virtual preservation uses 3D modeling and visualization technology to produce a digital replica of a real historical site or object. This can be used to protect and preserve historical sites and artifacts that are in danger of deterioration or destruction as a result of various factors like natural disasters, human interference, or the passage of time. In the case of conventional Bangladeshi heritage, 3D virtual preservation can be used to create accurate and detailed digital models of historical buildings, monuments, artifacts, and other cultural heritage sites. These digital models can be used for a variety of purposes, including research, education, and public outreach. One potential benefit of 3D virtual preservation is that it allows people to access and experience these heritage sites and objects from anywhere in the world, without the need to physically visit the location. Additionally, 3D virtual preservation can help to conserve and protect these heritage sites and objects by providing a record of their current state, which can be used for future restoration and conservation efforts. Overall, 3D virtual preservation is a valuable tool for preserving and promoting the cultural heritage of Bangladesh and other countries around the world. iv TABLE OF CONTENTS CONTENTS Approval Letter of Declaration Acknowledgement Abstract Table of contents List of Figures Abbreviations CHAPTER 1: INTRODUCTION 1.1 Introduction 1.2 Motivation 1.3 Objective 1.4 Expected Outcome 1.5 Report layout 1.6 Project Timeline CHAPTER 2: BACKGROUND STUDY 2.1 Introduction 2.2 Related work and research 2.3 Competitive Analysis 2.4 Challenges PAGE i ii iii iv v-vi vii-ix ix 1-3 1-2 2-3 3 3-4 4 5-10 5 5-6 7-8 9-10 CHAPTER 3: REQUIREMENT SPECIFICATION 11-19 3.1 Autodesk 3ds Max 2023 11 3.2 Boa Ref 11-12 3.3 Poly cloth V2 12 3.4 Sini tools 13-14 3.5 Quad remesh 1.2 14 3.6 Rizom Uv 2022 15 v 3.7 Substance Painter 3.8 Adobe photoshop 2023 3.9 Keyshot 11 3.10 Sketchfab 3.11 Hardware specification CHAPTER 4: WORK PROCESS 4.1 Thought process 4.2 Pre-production 4.2.1 Understanding My Limits 4.2.2 Organize a survey 4.2.3 Collect Reference 4.3 Production 4.3.1 Bioscope 4.3.1.1 Bioscope modeling and texturing 4.3.2 Palki 4.3.2.1 Palki Modeling and texturing 4.3.3 Dekhi 4.3.3.1 Dekhi Modeling and texturing 4.3.4 Hatpakha 4.3.4.1 Hatpakha Modeling and texturing 4.3.5 Kupi 4.3.5.1 Kupi Modeling and texturing 4.3.6: Additional Models 4.4 post-production 4.4.1 Retouching: 4.4.2 Regular Optimization 4.4.3 Find out most efficient ways CHAPTER 5: DISCUSSION 5.1 Comparison with previous works 5.2 My own evaluation 16 16 17 17-18 19 20-56 20 20 20-24 24 25 25 26-29 30 30-32 33 33-35 36 36-39 40 40-42 42-55 56 49 49 49 57 57 57 CHAPTER 6: CONCLUSION AND FUTURE SCOPE 58 REFERENCES 59-60 vi LIST OF FIGURES FIGURES Figure 2.3.1: Project Timeline Gantt chart Figure 2.3.1: Texture problem in Virtual Museum Bangladesh Figure 2.3.2: Lighting issue in Virtual Museum Bangladesh Figure 2.3.3: Bangladesh national museum virtual tour Figure 2.3.4: Bangladesh national museum virtual gallery Figure 3.1.1: Logo of 3ds max Figure 3.2.1: Interface of Boa Ref Figure 3.3.1: Poly cloth interface Figure 3.4.1: Sini tools interface Figure 3.4.1: Sini tools interface Figure 3.5.1: Quad remesh demo Figure 3.6.1: Rizom Uv interface Figure 3.6.2: Rizom Bridge interface Figure 3.7.1: Substance Painter interface Figure 3.8.1: Adobe photoshop logo Figure 3.9.1: Keyshot logo Figure 3.10.1: Sketchfab Figure 3.10.1: Sketchfab exporter for 3ds max Figure 4.2.2.1: Survey results for age Figure 4.2.2.2: Survey results for gender Figure 4.2.2.3: Survey results of Occupation Figure 4.2.2.4: Survey results about childhood memories Figure 4.2.2.5: Survey results about thoughts Figure 4.2.2.6: Survey results of object list Figure 4.2.2.7: Survey results about virtual museum Figure 4.2.2.8: Survey results about virtual museum idea Figure 4.2.2.9: Survey results about virtual museum Bioscope reference form Bajjaner bioscope movie Bioscope reference form

Bapjaner bioscope movie Bioscope reference form Bapjaner bioscope movie Figure 4.3.1.1.1 Boolean PAGE 4 7 7 8 8 11 12 12 13 14 14 15 15 16 16 17 18 18 21 21 22 22 22 23 23 23 24 25 25 26 26 vii Figure 4.3.1.1.2 Solving boolean Figure 4.3.1.1.3 All parts of the bioscope Figure 4.3.1.1.4 Bioscope full model Figure 4.3.1.1.5 Unwrapped model on Rizom Uv Figure 4.3.1.1.6 Textured model in Substance painter Figure 4.3.1.1.6 Pbr texture sets of bioscope Figure 4.3.1.1.6 Final bioscope on sketchfab Figure 4.3.2.1.1 Basic shape of palki Figure 4.3.2.1.2 Curtains modeling Figure 4.3.2.1.3 Rizom uv unwarping Figure 4.3.2.1.4 Palki texturing Figure 4.3.2.1.6 Palki pbr texture sets Figure 4.3.2.1.6 Palki on sketchfab Figure 4.3.3.1.1 Dekhi parts Figure 4.3.3.1.5 Dekhi complete model Figure 4.3.3.1.6 Dekhi unwarp Figure 4.3.3.1.7 Dekhi pbr texture sets Figure 4.3.3.1.8 Dekhi model on sketchfab Figure 4.3.4.1.1 Hatpakha cloth simulation Figure 4.3.4.1.2 Hatpakha full model Figure 4.3.4.1.3 Hatpakha unwarp Figure 4.3.4.1.4 Hatpakha details Figure 4.3.4.1.5 Hatpakha Texturing Figure 4.3.4.1.6 Hatpakha pbr texture set Figure 4.3.4.1.7 Hatpakha Model on sketchfab Figure 4.3.5.1.1 Kupi model base Figure 4.3.5.1.2 Kupi model Figure 4.3.5.1.3 kupi model unwrapped Figure 4.3.5.1.4 kupi model texturing Figure 4.3.5.1.5 kupi pbr texture sets Figure 4.3.5.1.6 kupi model on sketchfab Figure 4.3.6.1 Latim model Figure 4.3.6.2 Shil pata model Figure 4.3.6.3 Shil pata render close view Figure 4.3.6.4 Gulti model Figure 4.3.6.5 Hookah model Figure 4.3.6.6 Paduka model Figure 4.3.6.7 postbox model Figure 4.3.6.8 7. Paddy thresher Machine model Figure 4.3.6.9 Cotton candy transformation Figure 4.3.6.10 Cotton candy model Figure 4.3.6.11 Tomtom toy model Figure 4.3.6.12 Bullock carts model 27 27 28 28 29 29 30 31 31 31 32 32 33 34 34 35 35 36 37 37 38 38 39 39 40 40 41 41 42 42 43 43 44 44 45 46 47 48 49 49 50 51 viii Figure 4.3.6.13 Taalpatar shepai model Figure 4.3.6.14 Match box and candle model Figure 4.3.6.15 Bangladeshi money model Figure 4.3.6.16 Bangladeshi coin model Figure 4.3.6.17 14 Old Decorative Wooden Round Table model Figure 4.3.6.18 Sharif chata model Figure 4.3.6.19 Wooden stool model Figure 4.3.6.20 Betel nut cutter 51 52 53 53 54 55 55 ABBREVIATIONS PBR Physically based rendering Ao Ambient occlusion AR Augmented reality VR Virtual reality UV UV mapping .obj Geometry definition file format /Wavefront .obj file .fbx Autodesk (Filmbox) proprietary file format GHZ Gigahertz ix CHAPTER 1 INTRODUCTION 1.1 Introduction The cultural heritage of Bangladesh is a rich and diverse tapestry, reflecting the country's long and varied history and the many influences that have shaped its society and culture. Among the most important aspects of this heritage are the conventional, or traditional, elements that reflect the customs, practices, and beliefs of Bangladesh's people. From ancient temples and palaces to traditional crafts and techniques, these elements are a vital part of the country's cultural identity and provide a connection to its past. As with any cultural heritage, it is important to preserve and protect these traditional elements for future generations. One way to do this is using 3D virtual preservation, which allows for the creation of digital models and interactive experiences that allow people to explore and learn about these heritage sites and artifacts without having to physically visit them. In order to preserve our cultural heritage virtually and educate future generations about it, as part of this project I will recreate a few traditional heritage items and host them on Sketchfab. We can anticipate that as soon as Bangladesh gets 5G, we will be ready for applications that use the metaverse. The metaverse has a wide range of potential uses, including socializing, entertainment, education, and business, so it might one day act as a hub for a variety of activities. Because Sketchfab integrates with AR/VR, we can easily create a virtual museum. 1.2 Motivation The culture and traditions of Bangladesh are a fusion of many different cultures. Bangladesh's culture is distinct as a result of these mixtures. It is the age of technology now. As technology advances daily, some outdated items are becoming obsolete. For instance, the bioscope was well-known in rural Bangladesh between 1960 and 1990. The bioscope technology then advances. A light was used at the time to project the image onto a larger surface from behind the painted canvas. After a short while, televisions became more widely available, and nowadays, most modern people are unaware of what a bioscope was. another example is Dheki. Dheki is a traditional tool used in Bangladesh for husking, or removing the outer husk, from rice grains. Dheki was typically used in rural areas of Bangladesh, where it was a common sight in rice- processing centers and village homes. In addition to husking rice, dheki was also sometimes used to crush other grains, such as wheat and maize, and to grind spices and other materials. Although dheki is a traditional tool that has been used in Bangladesh for centuries, it has become less common in recent years due to the availability of more modern, mechanized husking methods. As a child of the 1990s, I witnessed these changes and came to understand how our tradition is losing value. Therefore, I believe that my effort will be the first step in preserving our tradition and culture for future generations. 1.3 Objective Main objective of my project is: i. Sharing information and knowledge: By creating this project, I can share valuable information and knowledge about the cultural heritage of Bangladesh and the importance of preserve it. This can help to educate people about the country's rich cultural history and can encourage a greater appreciation and understanding of these important cultural elements. ii. Providing a reference for future research: By creating a comprehensive report on 3D virtual preservation in Bangladesh, we can provide a useful resource for future researchers and those interested in this topic. This can help to build on the knowledge and understanding of these efforts and can support ongoing efforts to preserve and share traditional Bangladeshi heritage. iii. Documenting the state of current preservation efforts: By creating a report on 3D virtual preservation, we can provide a comprehensive overview of the current state of these efforts in Bangladesh. This can help to identify any gaps or areas where more work is needed and can serve as a useful reference for future efforts. iv. Highlighting the benefits of 3D virtual preservation: We can showcase the many benefits of 3D virtual preservation as a tool for preserving and sharing traditional Bangladeshi heritage. This can help to promote the use of this approach and encourage more people to get involved in these efforts. v. To provide recommendations for how 3D virtual preservation efforts in Bangladesh can be improved and expanded upon in the future. 1.4 Expected Outcome Some potential expected outcomes for this project are: i. ii. A 3D library of Bangladeshi traditional objects. Increased knowledge and understanding of the cultural heritage of Bangladesh and the importance of preserving it. iii. Increased awareness and appreciation of the benefits of 3D virtual preservation as a tool for preserving and sharing traditional Bangladeshi heritage. iv. A more accurate and thorough description of Bangladesh's traditional objects' current situation. 1.5 Report Layout My project is described in detail in the report, which is divided into six chapters. In Chapter One, I provided an introduction to my project, including my motivation for undertaking this work, the expected outcomes, and the significance of the project. Chapter Two covers related work, including a comparative study of similar projects, the scope of the problems that I aimed to address, and the challenges that I faced during the project. In Chapter Three, I discussed the software and tools that I used throughout the project. This included a detailed description of the 3D modeling software and other applications that were necessary for completing the work. Chapter Four covers my workflow in detail. I discussed my approach to creating the 3D models, including the techniques and methods that I used. I also described the various stages of the project, including the planning, execution, and finalization of the 3D models. In Chapter Five, I compared my work to previous projects and evaluated my own project's strengths and weaknesses. I also discussed how my project differed from previous work, and the ways in which it represents an improvement in terms of accuracy, detail, and quality. Finally, in Chapter Six, I concluded my report by summarizing my key findings and the significance of my project. I also discussed future scope for this type of work, including areas where more research is needed and potential avenues for further exploration. 1.6 Project Timeline Figure 1.6.1: Project Timeline Gantt chart CHAPTER 2 BACKGROUND STUDY 2.1 Introduction 3D virtual preservation is a process that involves creating digital 3d models of physical heritage sites and objects, with the aim of preserving and sharing these cultural elements for future generations. This can be done using a variety of techniques, such as 3D scanning, computer-generated graphics, and virtual reality technology. This can be especially useful if the physical site is not easily accessible or has been damaged or destroyed. In addition, 3D virtual preservation can be a valuable tool for education, allowing people to learn about the history and cultural significance of these sites and artifacts in an interactive and immersive way. Overall, 3D virtual preservation can be a useful way to preserve and share cultural heritage, helping to ensure that these important cultural elements are not lost or forgotten. It can also provide a way for people to experience and learn about these cultural sites and artifacts in new and innovative ways. 2.2 Related Work and Research In many countries, 3D virtual preservation is a well-known concept. Several museums have created complete 3D recreations of their catalogs. Top-rated 3D museums are: 1. Virtual Museums of Malopolska: An accessible website operated by the Regional Digitalization Lab, a unit of the Maopolska Institute of Culture, situated in Kraków, Poland. [9] They create 1202 of their pieces in 3d. 2. The Virtual Curation Lab: The Virtual Curation

Laboratory was established in Richmond, Virginia in August 2011 with the goal of using 3D scanning and printing to digitally conserve and share the world's cultural history. 3157 models are available in the 3D collection. [10] 3. [The Harvard Museum of the Ancient Near East](#): The collections, formerly [known as the Harvard Semitic Museum](#), are utilized for instruction, study, publication, and exhibition of the archaeology, history, and languages of the ancient Near East. There are 1097 models in the 3D collection. [11] 4. The British Museum: Recently, the British Museum has begun to preserve its collection of masterpieces. The 3D museum catalog contains 277 models. [12] 5. Quixel megascans: Megascan has a big assets collection that is constantly expanding. The powerful 3D scanning technology used to develop Quixel assets allows for extremely accurate and realistic designs that can be used to create photorealistic 3D visuals and visual effects. [14] There is some project which was build keeping Bangladesh on focus. 6. Virtual museum Bangladesh: This was created by Ahamed Jaman Sonjib and two other people. The project, which may be among the first of its sort in the nation, was recognized by the government as one of the top three inventions at the 2017 trade show [1] [2]. Additionally, as part of their project plan, virtual museum stations will be set up in the National Museum and at well-known tourist destinations like Ahsan Manjil, Lalbagh Fort, and Saat Gambuj Mosque. 7. Bangladesh national museum virtual tour: The Bangladesh National Museum was first founded on March 20, 1913; however, it was initially known as the Dhaka Museum. It was publicly launched on August 7, 1913, and on November 17, 1983, it was given the title of national museum of Bangladesh. The Bangladesh National Museum opened a 360-degree virtual gallery on April 25, 2017, allowing anybody to take a virtual tour of the museum and view the exhibits online.[6] [8] 8. [Preserving Heritage Sites of Dhaka City Using 3D Modeling and Virtual Reality Technology](#): BRAC University's Department of Computer Science and Engineering published a thesis paper in 2018 with the goal of preserving Dhaka's historical landmarks. The website displays 3D animations of the historical [buildings of Lalbagh Fort](#), including [The Tomb of Pori Bibi](#), [The Diwan-i-Aam and the Mosque](#), [The Shahid Minar's structure](#), and [The Greek Memorial's model](#). [5] 2.3 Competitive Analysis Therefore, at least three initiatives were known to have been done to protect Bangladesh's historical sites. The "Virtual Museum Bangladesh" initiative was innovative. However, that website has not received any updates in the past few years. Six virtual reality locales are included in this project: Kantajew Temple, Boro Sordar Bari, Choto Shona Mosque, Panam City, Sixty Dome Mosque, and Eleven Shiva Temple. [24] The project's biggest issue is that almost every brick's texture is the same, and there are serious tiling problems. Compared to modern standards, they are of extremely poor quality. And several of their scenes have lighting-related problems. They are really dark in comparison to the surroundings. For their web user interface, they are utilizing 3d vista player 1466. User controls for this player are limited. Figure 2.3.1: Texture problem in Virtual Museum Bangladesh Figure 2.3.2: Lighting issue in Virtual Museum Bangladesh Since the Bangladesh National Museum has access to all the country's historical objects, more projects of this nature might be undertaken. There should not be a problem with that since it is a government project. However, it is disappointing that the virtual tour of the Bangladesh National Museums is not visually striking. There is a design flaw in their website, <https://vt.bnm.org.bd>. The documentation page for the museum leads to a blank page. On the homepage, there is an educational video where we can see how users can click on items to learn more about their specifics. On the website, however, that is not integrated. The website appears to be a 360-degree photo tour of the museum; however, everything appears distorted, and the photos are hazy and of very poor quality. There is really no user control. Only an arrow is used to guide the user. [8] Figure 2.3.3: Bangladesh national museum virtual tour Figure 2.3.4: Bangladesh national museum virtual gallery Although the initiative from BRAC University to preserve [heritage sites in Dhaka City using 3D modeling and virtual reality technology](#) appears promising, no more work is being done on it. Since their website is inaccessible. [5] 2.4 Challenges There are a number of challenges that can arise when it comes to 3D virtual preservation of cultural heritage. Some of the key challenges include: 1. Cost: Creating 3D virtual models of heritage sites and artifacts can be a time-consuming and expensive process, especially if the site is large or the artifacts are numerous. This can make it difficult for organizations or individual to invest in these efforts, especially if funding is limited. 2. Accuracy: It can be challenging to create 3D virtual models that are completely accurate and true to the original site or objects. Factors such as lighting, shadows, and perspective can all affect the appearance of the model, and it can be difficult to recreate these elements perfectly. 3. Limited immersion: While 3D virtual models can provide an immersive experience, they are still limited compared to physically visiting a site or interacting with an artifact in person. This can make it difficult to fully convey the experience of visiting a heritage site or handling an artifact. 4. Technical challenges: There can be technical challenges involved in creating 3D virtual models, such as the need for specialized equipment and software, and the need to ensure that the models are compatible with different devices and platforms. 5. Lack of reference: One of the challenges that can arise when it comes to 3D virtual preservation is the lack of reference images or documentation for the heritage site or artifact being preserved. In order to create an accurate 3D virtual model, it is important to have access to high-quality, detailed images or other documentation that can be used as a reference. Without sufficient reference images or documentation, it can be difficult to accurately recreate the appearance and details of the site or artifact. This can result in an incomplete or inaccurate 3D model, which may not accurately represent the original site or artifact. 6. Internet speed limitations: Another challenge that can arise with 3D virtual preservation is limited internet speed, which can affect the ability of people to access and view virtual models and exhibits. In areas with slow or unreliable internet connections, it may be difficult for people to access 3D virtual models and experience them in a satisfactory way. To overcome this challenge, it may be necessary to optimize the virtual models and exhibits for low-bandwidth environments, or to provide alternative methods for accessing the content, such as downloading the models or exhibits to view offline. It may also be helpful to work with local internet service providers to try to improve internet speeds and connectivity in the area. Overall, addressing the challenge of limited internet speed is important for ensuring that as many people as possible can access and enjoy 3D virtual models and exhibits. Chapter 3 REQUIREMENT SPECIFICATION I required some specific software and materials for my project. In addition, I need to use a few custom scripts and plugins to finish this project successfully. These are the programs, plugins, and scripts I use. 3.1 Autodesk 3ds Max 2023 [Autodesk 3ds Max is a professional 3D graphics and animation software used by artists and designers in a variety of industries, including film, television, gaming, and architecture](#). It is known for its powerful modeling, texturing, and rendering capabilities, and is widely used by professionals around the world. It is designed to be more user-friendly and easier to use, while still providing the powerful features and capabilities that professionals need to create high-quality 3D graphics and animations. Overall, 3ds Max 2023 is a powerful and flexible tool that is widely used by professionals in a variety of industries. It is well-suited for creating high-quality 3D graphics and animations and is a popular choice among artists and designers around the world. [15] Figure 3.1.1: Logo of 3ds max 3.2 Boa Ref BOA Ref is a 3ds Max plugin that is used to create and manage reference planes within a 3D scene. It is designed to make it easier to align and position objects in the scene, and to make it easier to work with reference planes in general. Figure 3.2.1: Interface of Boa Ref 3.3 Poly cloth V2 Poly Cloth V2 is a 3ds Max plugin that is used to create realistic cloth simulations within a 3D scene. It is designed to be easy to use and to provide a high level of realism, and is [suitable for a wide range of applications](#), including character animation, visual effects, and game development. Figure 3.3.1: Poly cloth interface ©Daffodil International University 3.4 Sini tools Sini Tools is a 3ds Max plugin that is used to automate various tasks and processes within the 3D software. It is designed to make it easier to work with 3ds Max, and to save time and improve productivity. Some of the features of Sini Tools include: 1. A set of tools for creating, modifying, and manipulating 3D models, including tools for creating curves, lofting surfaces, and extruding shapes. 2. A set of tools for working with materials, textures, and shading, including tools for creating and editing materials, applying textures, and controlling the appearance of objects. 3. A set of tools for animating and simulating objects and characters, including tools for creating and editing animations, setting up dynamic simulations, and working with particle systems. 4. A set of tools for rendering and compositing, including tools for setting up and rendering scenes, and for compositing rendered images and other elements together. It is well-suited for professionals working with the software and can help to save time and improve productivity. [Figure 3.4.1: Sini tools interface Figure 3.4.2: Sini tools interface](#) 3.5 Quad remesher 1.2 Quad remesher is a 3ds Max plugin that is used to automatically generate quad-based mesh models from existing mesh models.it has the ability to generate quad-based mesh models from any type of mesh, including triangles, quads, and n-gons and The ability to preserve the

topology of the original mesh, including the edge flow and the distribution of vertices. Figure 3.5.1: Quad remesher demo 3.6 Rizom Uv 2022 Rizom UV is a software tool that is used to create and edit UV maps for 3D models. [16] UV maps are used to map the surface of a 3D model to a 2D texture, and are an essential part of the texturing process in 3D graphics. Some of the features of Rizom UV include: 1. The ability to automatically unwrap UVs for a 3D model, using algorithms that minimize distortion and maximize the use of texture space. 2. The ability to edit and manipulate UVs manually, including tools for scaling, rotating, and moving UV islands. 3. The ability to check the quality of UVs, including tools for identifying and fixing UV errors and distortions. 4. The ability to work with multiple UV sets at once, and to transfer UVs between different 3D models. 5. The ability to export UVs in a variety of formats, including OBJ and FBX. Figure 3.6.1: Rizom Uv interface Rizom UV Bridge is a 3ds Max plugin that allows you to use the Rizom UV software directly within 3ds Max Figure 3.6.2: Rizom Bridge interface 3.7 Substance Painter Substance Painter is a professional software tool that is used to create and edit textures for 3D models. It is designed to be easy to use and to provide a high level of realism, and is suitable for [a wide range of applications, including](#) character modeling, sculpting, [and](#) texturing. [17] Figure 3.7.1: Substance Painter interface 3.8 Adobe photoshop 2023 [Adobe Photoshop is software that is extensively used for raster image editing, graphic design and digital art. It makes use of layering to allow for depth and flexibility in the design and editing process, as well as provide powerful editing tools, that when combined, are capable of just about anything.](#) [18] Figure 3.8.1: Adobe photoshop logo 3.9 Keyshot 11 KeyShot 11 is a 3D rendering and animation software developed by Luxion. It allows users to create high-quality, photorealistic images and animations of 3D models with ease. KeyShot 11 offers a wide range of features, including real-time rendering, advanced lighting and material editing tools, HDRI lighting, animation capabilities, and more. Some of the new features in KeyShot 11 include: Keyframe Animation: Allows users to create complex animations using keyframe control over geometry, cameras, and lighting. Environment Library: Provides a library of pre-built HDRI environments that can be used to quickly set up lighting for a scene. RealCloth: A new material type that accurately simulates woven fabrics and textiles. Light Manager: Enables users to quickly adjust lighting settings for individual lights in a scene, making it easier to fine-tune the look of a rendering. Intuitive UI: KeyShot 11 features a redesigned user interface that makes it easier to navigate and use all of the software's features. Figure 3.9.1 Keyshot1 Logo 3.10 Sketchfab Sketchfab is an online platform that is used to share, publish, and discover 3D models and other 3D content. It is designed to be easy to use and to provide a wide range of features and tools for working with 3D content. Some of the features of Sketchfab include: 1. The ability to upload and publish 3D models and other 3D content, including support for a wide range of file formats, such as OBJ, FBX, and GLTF. 2. The ability to view 3D models and other 3D content using a variety of viewing options, including support for VR (virtual reality) and AR (augmented reality). 3. The ability to share 3D models and other 3D content with others, including the ability to embed 3D content on other websites. 4. The ability to interact with other users and creators on the platform, including the ability to leave comments and feedback on 3D content. Figure 3.10.1: Sketchfab Sketchfab has an exporter plugin for 3ds Max that allows you to export 3D models and other 3D content from 3ds Max and upload it to the Sketchfab platform. It is designed to be easy to use and to provide a wide range of features and tools for working with 3D content on Sketchfab. Figure 3.10.1: Sketchfab exporter for 3ds max 3.11 Hardware specification When it comes to 3D modeling, I know that having a powerful computer is essential. Not only does it make the work faster and more efficient, but it also allows for more complex and detailed models. That's why I've put together a hardware setup that I believe will be ideal for my 3D project. First, I chose the Ryzen 5 3600 CPU. This is the brain of my computer, and it is responsible for running all of my software and applications. I knew I needed a CPU that was fast and efficient, and that could handle complex calculations and processes. The Ryzen 5 3600 has six [cores and 12 threads](#), and a [base clock speed of 3.6 GHz](#). It can [boost up to 4.2 GHz](#) when needed, making it a smart choice for 3D modeling. Next, I looked at the RAM. For 3D modeling, I knew I needed a lot of RAM to handle the large files and complex calculations. I opted for 32 GB of DDR4 RAM, which I think is a good amount for most 3D projects. With this much RAM, I can work with multiple programs and applications at once without slowing down. Finally, I chose the GPU. This is the component that's responsible for rendering images and videos, and for handling the visual aspects of my 3D project. I went with the 1660 Super OC edition GPU, which I think is a great choice for my needs. It has high clock speeds and dedicated video memory, with 6 GB of GDDR6 memory. It can handle complex 3D models and graphics with ease, which is exactly what I need for my project. CHAPTER 4 WORK PROCESS 4.1 Thought process. My entire workflow for the 3D virtual preservation of traditional Bangladeshi heritage will be described in this chapter. Prior to beginning the project, I conducted research on Bangladeshi heritage artefacts, including why they are disappearing day by day, and I made a survey to find out what the general public thought about the issue. Additionally, I watched certain documentaries and movies to learn more about our rural culture. I also spoke with a few older people about their childhood. I divided my workflow in [three parts: 1. Pre-production 2. Production 3. Post-production](#) 4.2 [Pre-production](#) 4.2.1 Understanding My Limits: Knowing my capabilities and selecting a project with plenty of room for skill development were my top priorities throughout the pre-production phase. Avoiding projects that do not fit my abilities is absolutely essential. It would have been disastrous if I had accepted a project that called for skill sets that were well beyond what I could manage. I therefore had great awareness of my ability sets. 4.2.2 Organize a survey: After collecting the basic information and historical artefacts list, I created an online survey that people could easily access and complete. The survey was designed to be user-friendly and intuitive, so that participants would find it easy to complete. I gathered some basic information and a list of historical artifacts the survey, people were given a list of historical artefacts and asked to select the item they missed the most. I included a variety of artefacts, ranging from traditional instruments to cultural instruments. Participants were also asked to provide some basic demographic information, such as their age, gender, and occupation. To reach a wider audience, I shared the survey on social media and through various online communities. I also encouraged people to share the survey with their friends and family, to help spread the word and gather as many responses as possible. After the survey period was over, I compiled and analyzed the data. The results were very interesting and provided some valuable insights into people's perspectives on historical artefacts and cultural preservation. Figure 4.2.2.1: Survey results for age Figure 4.2.2.2: Survey results for gender Figure 4.2.2.3: Survey results for Occupation Figure 4.2.2.4: Survey results about childhood memories. Figure 4.2.2.5: Survey results about thoughts Figure 4.2.2.6: Survey results of object list Figure 4.2.2.7: Survey results about virtual museum Figure 4.2.2.8: Survey results about virtual museum idea Figure 4.2.2.9: Survey results about virtual museum 4.2.3 Collect Reference: Collecting references is a crucial step in any research or documentation process, including in the context of virtual preservation of conventional Bangladeshi heritage. References provide a way to verify and validate the information that you have gathered about a heritage site or object, as well as to learn more about it from other sources. It is important to collect a range of references when documenting a heritage site or object, including primary sources such as archival documents and photographs, as well as secondary sources such as academic articles, books, and websites. I mainly used Wikipedia and Wikimedia for resource collection. Beside that I used: 1. Pinterest: [Pinterest is a social media platform and image-sharing platform developed in the United States to help users save and find information online using images, videos, and, to a lesser extent, animated GIFs.](#) 2. The British Museum online archive: The British Museum online archive is a digital collection of resources related to the collections and research of the British Museum in London. It includes a wide range of materials, including photographs, manuscripts, correspondence, drawings, prints, and other documents. 3. Facebook public database. 4. Documentaries. 5. Films. 6. Reddit. 4.3 Production As now I have people's data and references, now I can start my production. I will describe them one by one. 4.3.1 Bioscope: Urban life no longer resembles the scene of viewing photographs in a wooden box while listening to music. To the rhythm of the tambourine and the music, the image inside the box changes. A bioscope cannot currently be found anywhere, not even to be stored in a museum, as they are so uncommon in rural Bengal. In reality, bioscope was like a cinema hall in rural Bangladesh. Like a cinema hall, a show would start with three or four people in the bioscope. This folk medium of entertainment in Bengal has been lost in the evolution of time. Bioscope has automatically taken off due to the availability of TV and sky culture satellites and smart mobiles. [19] Figure 4.3.1.1: Bioscope reference form bapjaner bioscope movie Figure 4.3.1.2: Bioscope reference form bapjaner bioscope movie Figure 4.3.1.3: Bioscope reference form bapjaner bioscope movie 4.3.1.1 Bioscope modeling and texturing: After viewing all the

references and reading articles on bioscope, I started to model it. I took basic shapes and created the outer shell of bioscope. After that took a cylinder similar sized to viewer hole of the bioscope. After that I used boolean. Boolean means creating objects by intersection or uniting of objects as well as subtracting objects from each other's. Figure 4.3.1.1.1: Boolean After creating holes, I created quad topology for my objects. So, it will be easier for me to do unwarp of these objects. After that I completed all necessary parts for my bioscope. Figure 4.3.1.1.2 Solving Booleans Figure 4.3.1.1.3 All parts of the bioscope After that I merged all the parts together by attach modifier of 3ds max. So, they act like a single object. I also keep some hole in wood for realism. After all of my parts are merged together then I export my model to Rizom uv for unwarping process. Figure 4.3.1.1.4 Bioscope full model On Rizom uv I unwrapped and flatten all the parts and packed them together. I used as many grids as possible for packing the model. Figure 4.3.1.1.5 Unwrapped model on Rizom Uv Figure 4.3.1.1.6 Textured model in Substance painter ©Daffodil International University After I get unwrapped model from rizom uv, then I exported the model as obj file. Then I imported my Model on substance painter and baked the model, so that I can find Ao (Ambient Occlusion), normal, world normal, curvature and thickness map. Then I started to do texturing. I decided to give it an old painted wood look. I also added some rust around metal edge. Then I exported the Texture in 4k and 8k. And after that I uploaded my Bioscope on sketchfab. Figure 4.3.1.1.6 Pbr texture sets of bioscope. Figure 4.3.1.1.6 Final bioscope on sketchfab And now I will move to my second model. My second model is palki (Litter vehicle) 4.3.2 Palki: Bangladesh's historic traditional vehicle is called the palki. It was utilized to transport people. It is regarded as a luxury automobile. People from wealthy and noble families would frequently travel between locations using it. Palki-like chariots are thought to have been employed in the past for the ascent of gods and goddesses as well as for transporting their idols. Deities are seen carrying palkis in sculptures found in many old temples. Palki is mentioned in the Hindu epic Ramayana circa 250 BC. The European nobility of the higher classes used to travel in these palkis when Britain was in power. However, the use of palki among British authorities significantly declined once railways were built throughout the subcontinent. [20] 4.3.2.1 Palki modeling and texturing: I crated basic shape of palki using primitive shape like: box, circle, and cylinder. For a bending roof I created a shape and used bend modifier. Figure 4.3.2.1.1 Basic shape of palki Then I made curtains using cloth simulations and poly cloth plugin. I tried to make the curtains as smooth as possible. So, it cost me some extra polygons. Then I make three reference of my curtains and placed them among the doorways. I also made a base the sitting area of palki. I took as many references as possible I needed. But it was hard for me, because I can't find any extract reference of palkis inside. So, I have to work on guess here. But I tried to maintain the originality as much as possible. Figure 4.3.2.1.2 Curtains modeling After that I merged all the objects together and exported the model for unwarp. I unwrapped it by rizom uv and packed the flattened uv sets accordingly. Figure 4.3.2.1.3 Rizom uv unwarping Figure 4.3.2.1.4 Palki texturing ©Daffodil International University After I get unwrapped palki model from rizom uv, then I exported the model as obj file. Then I imported my Model on substance painter and baked the mesh maps, so that I can find Ao (Ambient Occlusion), normal, world normal, curvature, position, id, and thickness map. Then I started texturing. I decide to give it a painted wood look. I choose yellow and cyan color for it, and I added some traditional Bangladeshi drawing and alpona on the top of it. I choose a fabrics material for inside. I also added some rust around metal edge. Then I exported the Texture in 4k and 8k. And after that I uploaded my model on sketchfab. Figure 4.3.2.1.6 Palki pbr texture sets Figure 4.3.2.1.6 Palki on sketchfab 4.3.3 Dekhi: Dekhi is a traditional husking tool used in Bangladesh, India, and other parts of South Asia to remove the husks or outer covering from grains, such as rice or wheat. It consists of a large wooden or metal mortar or barrel, and a pestle or long wooden rod with a flat, rounded end. The grains are placed in the mortar and pounded with the pestle, using a back-and-forth pedaling motion, until the husks are removed. The village has electricity now, and a rice threshing machine has shown up. [21] Dekhi is now a thing of the distant past in many villages as its use has begun to fade after the machine became accessible. Brown rice is not to be found, and the village women are not asked to crush rice on the wedding day. The process of making rice from paddy and rice powder from rice by crushing with one's feet may still be a mystery to the younger generation. For many members of the younger generation, pounded rice is a memory of the distant past. 4.3.3.1 Dekhi modeling and texturing: I crated basic shape of dekhi using primitive shape like box and cylinder. For paddle part I used boolean and then remeshed the object using quad remasher. I used this technique where I needed any holes. I also took a part from mega scan library for more realism. Figure 4.3.3.1.1 Dekhi parts I added some steel parts around the main wood and on the hammer. Then I added two supporting bamboos on the paddling side of the dekhi. When all parts become completed, I merged them together. Figure 4.3.3.1.5 Dekhi complete model After that I exported the model for unwarp. I unwrapped it using rizom uv and packed the flattened uv sets accordingly. Figure 4.3.3.1.6 Dekhi unwarp. After I get unwrapped dekhi model from rizom uv, then I exported the model as Obj and Fbx file. Then I imported my model into substance painter and baked the mesh maps for Ao, normal, world normal, curvature, position, id and thickness map. Then I started texturing. For this I made a wood material like old unpainted tree trunk wood and added some dirt on it. Then I added cracks, edge damage and footprint on the paddling side of the model. For the ground I crated a soil texture and added white flour particle around the hammer hole for more realistic result. Then I exported the Texture in 4k and 8k. And after that I uploaded my model on sketchfab. Figure 4.3.3.1.7 Dekhi pbr texture sets Figure 4.3.3.1.8 Dekhi model on sketchfab 4.3.4 Hatpakha: Hatpakha is a hand operated fan used for cooling in heat especially during summer. It is a part of the history and tradition of Bengal and other regions of the world. Since the dawn of time when there was no electricity, people have been using hand fans. Fans have been used in many ways since ancient times. A fan is used to move the warm air, moving the warm air away and moving the relatively cool air. Hand fans are rarely seen today. However, the value of Hatpakha in rural Bengal has not decreased yet. The most advanced in terms of beauty is the colored thread 'Nakshi Pakha'. Birds, flowers, creepers or the names of loved ones or symbols of love are drawn on the fan with yarn. Just as the fan's air is filled with life. 4.3.4.1 Hatpakha modeling and texturing: I crated basic shape of Hatpakha using line tools and primitive shapes. After creating a circle by line tool, I added shell and extrude modifier on it. I made the handle with cylinder shape. I used poly cloth and 3ds max cloth simulation for making the hanging cloth around the fan. Figure 4.3.4.1.1 Hatpakha cloth simulation Figure 4.3.4.1.2 Hatpakha full model After all the necessary parts completed, I merged all the parts together and I transfer the model into Rizom uv for unwarp the model. It was an easy one because there was no complex seam on this model. Figure 4.3.4.1.3 Hatpakha unwarp. After Unwarp I imported the model in substance painter and started texturing. Then I baked the mesh maps for Ao, normal, world normal, curvature, position, id, and thickness map. I make a red fabrics material and a bamboo material for the handle. Figure 4.3.4.1.4 Hatpakha details Figure 4.3.4.1.5 Hatpakha Texturing I also make the contact part transparent for keeping the originality. Then I paint some stitch around the cloth. Then I exported the texture in 4k and 8k resolution. After that I uploaded my model in sketchfab. Figure 4.3.4.1.6 Hatpakha pbr texture set Figure 4.3.4.1.7 Hatpakha Model on shetchfab ©Daffodil International University 4.3.5 Kupi: Kupi bati were used extensively in Bangladesh in the past as a source of light in homes and other settings. Before the widespread adoption of electricity in the country, these kerosene lamps were the primary means of lighting for many people. The use of kerosene lamps in Bangladesh declined significantly with the expansion of the electrical grid in the country. However, they are still used in some rural areas where electricity is not readily available or is unreliable. Many people have carefully preserved kupi bati as a symbol of the tradition of rural Bengal. Soon it will be just a memory or stored in a museum to be presented to future generations. 4.3.5.1 Kupi modeling and texturing: The creation of kupi bati is little bit complicated. Because its shape is not state forward and the inside part of this like of lamp is hollow. I divide this model into three parts and by using like tool I crated the base of it. After that I use extrude and bevel to create the main shape. Figure 4.3.5.1.1 Kupi model base Figure 4.3.5.1.2 kupi model After that I made the middle part of the lamp which is one kinds of cloth. After all the parts are completed, I merged all the parts together I transferred the model into Rizom uv. Figure 4.3.5.1.3 kupi model unwrapped. I unwrapped the model using rizom uv and packed the flattened uv sets accordingly. After Unwarp I imported the model in substance painter and started texturing. Then I baked the mesh maps for Ao, normal, world normal, curvature, position, id, and thickness map. Figure 4.3.5.1.4 kupi model texturing For kupi bati material I used brass material as base. Then I added some edge damage and surface dent. I painted some oxidation on the bottom of the lamp. Added slightly color deformation. And as a finishing tough I painted leaked oil all over the model. I also

added an emission map on the cloth. After that I exported my texture in 4k and 8k resolution. After that I uploaded my model in sketchfab. Figure 4.3.5.1.5 Kupa pbr texture sets Figure 4.3.5.1.6 kupa model on sketchfab 4.3.6: Additional Models: I also made some more models, which are at the edge of extinct. As the workflow is the same as previous, it is not necessary to describe their workflow. 1. Latim - Spin Top: A common game in rural Bengal is called Latim or Lattu. Latim is no longer being played as it once was. Latim is rarely seen in toy kiosks, not even at various seasonal fairs. Glass jars containing latim are no longer available at small village stores. Latim is essentially constructed of wood and is rounded. Figure 4.3.6.1 Latim model 2. Shil Pata -Traditional spice grinder: Shil-pata is a two-piece stone mainly used for grinding spices in the kitchen. Pata are rectangular and placed on the floor. Spices such as dry chilies, coriander, turmeric, cumin seeds etc. should be placed on the leaves and sprinkled with shil. A shil is a large block of stone, slightly rounded in width. Grind the spices on the leaves by grasping the leaves with both hands. Figure 4.3.6.2 Shil pata model Figure 4.3.6.3 Shil pata render close view. 3. Slingshot - Gulti: Slingshots, also known as hand-held catapults or wrist rockets, have been used in Bangladesh and other parts of the world for centuries as a simple, portable tool for hunting small animals and birds, as well as for recreational purposes. The basic design of the slingshot consists of a Y-shaped frame with a flexible band or cord attached to the two ends of the frame. The frame is held in the hand, and a projectile, such as a small stone or BB, is placed in a pouch on one end of the band. When the band is pulled back and released, the projectile is launched through the air towards its target. In Bangladesh, it is common for children to make their own slingshots using materials that are readily available, such as elastic bands, rubber bands, or strips of leather. They may use a variety of materials as projectiles, including small stones or marbles Figure 4.3.6.4 Gulti model 4. Hookah-Asian Smoking Pipe: Hookah, also known as shisha or waterpipe, is a traditional smoking device that originated in the Middle East and has been popular in Bangladesh and other parts of South Asia for centuries. It consists of a glass-based waterpipe with a long, flexible hose attached to it, and a bowl that holds the tobacco or other smoking material. One reason for the perceived decline in the popularity of hookah smoking in Bangladesh is widespread beedi and cigarettes. A beedi cost less and there is no hassle of putting water inside it. Hookah smoking requires the purchase of tobacco and other supplies, which can be expensive over time. But smoking involves inhaling smoke from burning tobacco, and is associated with a range of health problems, including cancer, heart disease, and respiratory issues. [23] Figure 4.3.6.5 Hookah model 5. Paduka - Khhorom wooden shoes: Paduka, also known as khurma or khorom, are traditional wooden shoes worn by people in some parts of South Asia, including Bangladesh. They are typically made of wood and have a flat sole and an open-toed design. Paduka are worn for a variety of purposes, including as a form of protection for the feet, as a symbol of religious devotion, and as a cultural tradition. In Bangladesh, paduka are often worn by people during religious festivals and ceremonies, such as the Eid al-Fitr and Eid al-Adha celebrations. They may also be worn by people who follow certain spiritual practices, such as Hindu sadhus or yogis, as a way to demonstrate their devotion and detachment from material possessions. Paduka are typically made by hand using simple tools and materials, such as wood, leather, and nails. They are often decorated with intricate patterns and designs, and may be adorned with beads, shells, or other embellishments. However, it is true that the use of paduka has declined in recent years, especially in urban areas where more modern footwear is more widely available. Many people in Bangladesh and other parts of South Asia now have access to a variety of shoes and other footwear options, and may choose to wear these instead of paduka. In addition, the increasing cost of materials and labor involved in making paduka may also contribute to their declining use. Paduka are typically made by hand using wood, leather, and nails, and the cost of these materials can be expensive. As a result, some people may choose to purchase cheaper, mass-produced shoes instead of paduka. [22] Figure 4.3.6.6 Paduka model 6. Bangladeshi Postbox: Postboxes are used for the collection and delivery of mail. They are typically found in public places, such as near post offices or on the streets, and are used by people to send letters and other mail to destinations within the country and around the world. Postboxes in Bangladesh are typically red in color and are marked with the letters "BD" and the word "Post." They are often located near post offices or other government buildings, and are easily recognizable by their distinctive red color. One reason for the perceived decline in the use of postboxes in Bangladesh may be the increasing popularity of electronic communication methods, such as email and social media, which have made it easier for people to communicate with each other without the need for physical mail. In addition, the increasing availability and affordability of other delivery options, such as courier services, may also contribute to the perceived decline in the use of postboxes in Bangladesh Figure 4.3.6.7 postbox model 7. Paddy Rice thresher Machine: Paddy rice thresher machines have been used in Bangladesh for several decades to help speed up and simplify the process of separating the grains of rice from the stalks and husks of the paddy plant. These machines have played an important role in the development of the rice cultivation industry in Bangladesh, and have helped to increase the productivity and efficiency of rice farming in the country. Over time, paddy rice thresher machines have evolved and have become more sophisticated and efficient. While it is true that the use of these machines may have declined somewhat in recent years due to the increasing availability of alternative methods of rice cultivation, they are still widely used in the country and are an important part of the agricultural industry. Figure 4.3.6.8 Paddy thresher machine model 8. Cotton candy: Cotton candy, also known as candy floss or fairy floss, is a popular treat in Bangladesh and other parts of the world. It is made by melting sugar and spinning it through small holes to create a fine, fluffy texture. Cotton candy is typically served on a stick or in a paper cone, and is available in a variety of flavors, including strawberry, grape, and blue raspberry. In Bangladesh, cotton candy is often sold at fairs, carnivals, and other public events, as well as at street stalls and sweet shops. It is a popular treat among children and adults alike and is often enjoyed as a sweet and indulgent snack. In old days cotton candies was sold by the hawkers. They used to carry a box painted on blue or green which was wrapped in glass. Cotton candies in old days were look like small balls, but now a days we can't find old cotton candies anymore. Despite the changes in the appearance of cotton candy over the years, it remains a beloved treat in Bangladesh. Its unique texture and variety of flavors continue to attract people of all ages, and it has become an important part of the country's culinary culture. In addition to being sold at public events, cotton candy can also be found in many shopping malls and entertainment centers. It is often enjoyed as a special treat or given as a gift to loved ones. Although the traditional way of selling cotton candy by hawkers may have disappeared, the popularity and enjoyment of this sweet treat remains strong in Bangladesh. Figure 4.3.6.9 Cotton candy transformation Figure 4.3.6.10 Cotton candy box model 9. Tomtom Toy: TomTom cars are made by placing cardboard on top of small clay bones. There are two clay wheels on both sides of the pot. Two strong bamboo sticks are attached to the wheel. Cardboard is attached to the pot. And the stick is tied with thread. As soon as the two sticks attached to the wheel hit the top of the pot by holding the thread, the tang tang sound starts. And around this sound, the children become crazy to buy. The life of shopkeepers revolves around this word. [31] Figure 4.3.6.11 Tomtom toy model 10. Bullock Cart: Bullock carts, also known as ox carts, are traditional vehicles that were commonly used in Bangladesh and other parts of South Asia for transportation and farming purposes. They consist of a cart or wagon that is pulled by a pair of oxen and were traditionally used to transport goods and people over short distances. The history of bullock carts in Bangladesh can be traced back to ancient times, when they were used as a primary means of transportation in the region. They were widely used by farmers to transport crops and other goods to market, and were also used by traders and merchants to transport goods between towns and cities. In recent years, however, the use of bullock carts has declined significantly in Bangladesh, as more modern forms of transportation, such as cars, buses, and trucks, have become more widely available and affordable. However, there are still some rural areas of the country where bullock carts are used for transportation and farming purposes. In these areas, bullock carts remain an important part of the local culture and way of life. Figure 4.3.6.12 Bullock carts model 11. Taalpatar Shepai: Taalpatar shepai is a fascinating toy for children's minds. This popular toy of the past is now extinct. The palm leaves are cut into small pieces and made into various parts of the human body and tied together with threads. A bamboo wicker is stuck inside it. [32] The bamboo wicker is fixed in such a way that the hands and feet move as it is rotated. Many people say that this doll started being made from the time of the Sepoy Mutiny, so the pair of dolls is a sahib doll and a mem. It is no longer appreciated in the age of rubber and plastic unbreakable dolls. Figure 4.3.6.13 Taalpatar shepai model 12. Match Box and Candle set: With the rise of alternative lighting sources, such as electric lighting and LED candles, the demand for traditional matchboxes and candles has declined. In

addition, safety concerns with matches and candles, such as fire hazards and the risk of burns, have led to stricter regulations and safety standards. As a result, there has been a growing demand for natural and eco-friendly alternatives, such as beeswax candles, soy candles, and essential oil diffusers. Overall, while matchboxes and candles may be near extinct in some areas, they still hold a special place in many people's hearts and continue to serve important purposes in households and public places. Figure 4.3.6.14 Match box and candle model 13. Bangladeshi Money coin pack: Bangladeshi Taka has gone through various changes and denominations. The currency notes and coins feature images of prominent national figures, landmarks, and cultural symbols of Bangladesh, such as the national emblem, the Shaheed Minar, and the Royal Bengal Tiger. As for the historical value of your Bangladeshi Money coin pack, it could serve as a unique and interesting way to learn about the currency of Bangladesh and its cultural significance. By creating a 3D model of the coin pack, you have a chance to preserve a part of the country's history in a digital format. Figure 4.3.6.15 Bangladeshi money model Figure 4.3.6.16 Bangladeshi coin model 14. Old Decorative Wooden Round Table: Wooden round tables have been used for centuries as a functional and decorative piece of furniture. They come in a range of styles and designs, from traditional to modern, and can be made from a variety of different woods, each with its own unique color, texture, and grain pattern. Figure 4.3.6.17 Old Decorative Wooden Round Table model 15. Umbrella: The Sharif umbrellas were known for their durability, high-quality materials, and beautiful designs. They came in a variety of colors, patterns, and sizes to suit different needs and preferences. [34] The company also produced other types of rain gear, such as raincoats and rain boots. The Sharif umbrella had become a part of the cultural identity of Bangladesh, as it was often seen being used by people of all walks of life, from farmers in rural areas to businessmen in the city. Figure 4.3.6.18 Sharif chata model 16. Wooden Stool: Wooden stools were a common piece of furniture in Bangladesh for many centuries. They were typically small, portable, and versatile, and were used for a wide variety of purposes throughout history. In rural areas, wooden stools were commonly used for agricultural work, such as separating rice from the husk or grinding spices. They were also used for domestic tasks such as cooking, cleaning, and sewing. In many cases, stools were used to elevate the user off the ground, making it easier to perform tasks that required a flat and stable surface. In urban areas, wooden stools were used for a variety of purposes, from seating in small tea stalls and restaurants to use in shops and markets as a surface to display goods for sale. Despite the popularity of modern furniture, wooden stools remain a symbol of traditional culture in Bangladesh and can still be found in use today in many homes and businesses throughout the country. Figure 4.3.6.19 Wooden stool model 17. Betel nut cutter: Betel nut cutters have been used for centuries in many parts of Asia, including Bangladesh, India, Myanmar, and Indonesia. They are small handheld tools used for cutting and preparing betel nuts for chewing or medicinal purposes. The betel nut cutter typically consists of a sharp blade, which is usually made of steel, attached to a small handle made of wood, bone, or metal. The blade is curved and pointed, and is designed to easily cut through the hard outer shell of the betel nut. The handle is often decorated with intricate designs and patterns and is designed to be easy to grip and maneuver. Betel nuts have a long history of use in many Asian cultures, and are often chewed as a mild stimulant or as a traditional medicine. [33] Figure 4.3.6.20 Betel nut cutter 4.4 Post-Production: The postproduction process of this is pretty straight forward. have decided this part into three sections. 4.4.1 Retouching: For the best possible image, retouching is essential. There is less color control available in 3D. Retouching is needed for this after rendering. Retouching is made more effective with the aid of render passes. Sometimes it can take a while for clouds and fog to render. But we can easily get similar kinds of result after retouching. 4.4.2 Regular Optimization: Every 3D model needs to be optimized, but occasionally we become so obsessed with modeling and texturing that we unintentionally overlook some minor problems. But after some time, we became aware of the issue. Then, in order to improve accuracy, we must resolve those problem. 4.4.3 Find out most efficient ways: As technology advances, more efficient and simple workflows are developing. Recently, I get familiar with a website, where no app is required to view AR/VR contains. An user can easily scan a QR code and an interactive browser window will pop-up where a user can easily play with the model. So when these technologies become available to the general public, I will try to include them in my project. Truth be told, the journey never ends. After a few years, what is present today might be from a long ago. Therefore, in order to preserve our culture, I must continually create new models. CHAPTER 5 DISCUSSION 5.1 Comparison with previous works As I mentioned on chapter 2.3, already exists sites and projects have some issues .As those are discontinued or outdated . But there is also a significant difference between those projects and my projects. Those only works with historical sites; they documented already preserved historical sites. but they didn't work with any historical or traditional objects .This is the main difference. My project resents all traditional objects which has already been extinct or on the way to extinction. My objects can be used as game objects and props. As I published my model in Fbx and Obj formats, which includes 4k and 8k pbr textures so my assets can be used in VFX production. The possibilities are limitless. 5.2 My own evaluation I believe my work has a strong chance of competing in the other virtual museums. To advance further, I only need to create additional models of conventional objects and a collection of Bangladeshi textures. In my workflow, photogrammetry and 3D scanning is required in future. Overall, I think the use of 3D virtual technology to the preservation of traditional Bangladeshi heritage is an excellent and innovative strategy that has the potential to significantly improve our knowledge and respect of the country's rich cultural past. CHAPTER 6 CONCLUSION AND FUTURE SCOPE In conclusion, the use of 3D virtual technology for the preservation of conventional Bangladeshi heritage has the potential to be a powerful and innovative approach to preserving and promoting the country's rich cultural and historical legacy. By creating detailed and accurate 3D models of historical sites, buildings, and other cultural artifacts, it is possible to document and preserve these essential elements of Bangladesh's cultural heritage in a way that is accessible and engaging to people of all ages. Looking to the future, there is great potential for the use of 3D virtual technology for the preservation of conventional Bangladeshi heritage to continue to grow and evolve. As technology advances and becomes more widely available, it is likely that more and more historical sites and artifacts will be digitized and made available to the public through virtual platforms. This could provide people with new and exciting ways to explore and learn about Bangladesh's cultural and historical heritage and could help to promote a greater appreciation and understanding of the country's rich cultural legacy. REFERENCES [1] Bangladesh's Storied Cultural Heritage Arrives in The Virtual Realm, available at <>Last accessed on 20nd January 2023 at 7:27 pm. [2] Preserving Bangladesh's heritage sites in virtual reality, available at <>Last accessed on 16th January 2023 at 9:07 pm. 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