DEVOLOPMENT OF A VIRTUAL BANGLADESH NATIONAL MUSEUM
"APPLICATION USING BY UNITY"

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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 **"Development of a Virtual Bangladesh National Museum: Application Using By Unity"**, submitted by Ayon Anthony Peris 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. This presentation has been held on January 11,2025.

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I hereby declare that, this project has been done by me under the supervision of **Md. Salah Uddin, Assistant Professor And Head, Department of MCT** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

In this paper, we discuss the implementation by Unity of interactive systems to build a Virtual Bangladesh National Museum that represents the essence of our heritage and makes it broadly accessible to the public. This project aims to connect both tradition and technology for users, build a virtual environment where users can visit touchable digital representation of historic sites and significant artifacts of Bangladesh. The project pipeline involved the import of the high-fidelity 3D models and textures made in Blender and Substance Painter into Unity where the interactive features such as artifact exploration and guided navigation were designed. The implementation focuses on using friendly interfaces that make visiting the virtual museum easy and effortless. It also delves deep into the challenges faced during the integration of systems, including the optimization of performance for the sake of real-time rendering and ensuring cross-platform compatibility, as well as the solutions applied to mitigate such issues. Utilizing Unity's strengths, this project provides a powerful interactive experience while maintaining the cultural and historical integrity of the asset. This paper details the methodology, tools and results behind the project, and serves as a guide toward future developments of virtual museum apps designed to expand cultural education and preserve cultural heritage.

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CHAPTER 1

Introduction

It represents the backbone of the identity of a nation in connecting the line from past to present. Cultural heritage manifests the historical events, traditional cultures, and values which make people aware of continuity with their ancestors; consequently, a Bangladeshi would feel they do belong to something. The Bangladesh National Museum in Bangladesh possesses an immense opportunity for the welfare of this very purpose as this museum houses scores of valuable art which represents centuries in the country's history and traditions.

However, there are so many limitations that Bangladesh National Museum faces in spite of its importance. First and foremost, accessibility is a major hindrance, more so for the people living far away from, say, towns or rural places. Secondly, museums are by nature static exhibits, which is difficult to keep modern children's interest compared to digital, interactive forms of media that they are exposed to. These are some of the issues that plead for a new form of solution in relation to safeguarding cultural heritage.

Digital technology has opened up new avenues of preservation and accessibility for culture. Among them, virtual museums have emerged as revolutionary platforms that transcend the physical and logistical limitations of traditional museums. Allowing users to explore cultural artifacts from any part of the world through immersive and interactive experiences, this project Development of Virtual Bangladesh National Museum: Application using Unity aims at the digital recreation of two key rooms from the Bangladesh National Museum:

Music Instrument Room: It showcases traditional Bangladeshi instruments that are deeply culturally significant, namely the Aktara, Tabla, and Bansuri. Room of Historical Monuments: It contains the replicas of some renowned architectural landmarks, namely, Lalbagh Fort and National Martyrs' Memorial, symbolizing the perennial fight and history of Bangladesh. This virtual museum connects tradition and technology by using 3D modeling, texturing, and interactivity in Unity

It aims to digitally preserve cultural artifacts and make them more accessible to people all over the world, thus being more interesting for every age group. This project will not only preserve the rich cultural heritage of Bangladesh but also promote it worldwide so that future generations can relate to their heritage.

1.1 Motivation

This project is inspired by deep-rooted cultural, educational, and technological imperatives. The following are the major motivating factors that have been elaborated in the paper:

1. **Global Cultural Representation**: Bangladesh represents an immense and multi-cultural environment that has not yet been fully represented on most international planes. The Virtual Museum Project promises to showcase unique traditions, history, and artifacts of the nation to a worldwide audience for the purpose of its cultural diplomacy and international recognition.
2. **Engaging the Younger Generation**: Traditional museum formats seldom attract the younger generation who has grown up with interactive and technology-based experiences. The rotation of artifacts, guided tours, and even gamified explorations are all features developed to hold their attention and spark an interest in their cultural beginnings.
3. **Accessibility to Remote Audiences**:
   People living in rural areas or even outside Bangladesh will find it rather impossible to visit the physical museum for various geographical and
4. **logistical reasons:** This virtual museum removes these barriers, thus offering an inclusive platform where cultural heritage becomes accessible to all.
5. **Artifacts Preservation**: Physical exhibits are susceptible to deterioration with environmental factors and aging. In this project, such exhibits are digitized to their minute details for longevity and study without having to physically handle them.
6. **Inspiration for Future Innovation**: This project is a prototype for similar projects to be replicated throughout Bangladesh. By showcasing what is possible with regards to digital preservation and virtual interaction, this opens the door for further virtual museums and cultural projects.

The convergence of these motivations underlines the importance and timeliness of this initiative. It addresses critical gaps in cultural representation, accessibility, and preservation while embracing state-of-the-art technologies to reimagine how heritage is experienced.

1.2 Objectives

The main goals of this project are the following:

1. Design an interactive application in Unity that will showcase two rooms of the Bangladesh National Museum, and the user will be able to navigate the museum in a friendly way.
2. To create, as realistically and historically accurate as possible, 3D models of selected artifacts with their intricate details to give a lifelike experience.
3. Digitally preserve cultural artifacts to make them more accessible and long-lasting while preserving them from physical deterioration.
4. To enhance user engagement through interactivity, offering features such as artifact rotation, zoom, and guided tours to create an immersive learning environment.
5. To facilitate cultural education and awareness, especially among the young generation, by integrating storytelling and gamification elements that make learning fun and engaging.
6. To present Bangladesh's heritage to a worldwide audience for research into and appreciation of the history and culture of the nation on a virtual platform.
7. Pave the way for future virtual museum projects and act as a prototype for further rooms or the entirety of all other cultural institutions in Bangladesh that are meant to be digitized.

1.3 Expected Outcomes

At the end of this project, we will have a fully interactive virtual museum application containing two main rooms of the Bangladesh National Museum; the Room of Musical Instruments and the Room of Historical Monuments. The application will serve as a virtual gallery that allows users to delve into high-resolution 3D representations of artifacts — from traditional musical instruments to famous architectural works. These models will be created with exceptional attention to texture, depth, and historical accuracy, ensuring their academic merit while making culturally significant works widely accessible._

The virtual museum will have a user-friendly interface enabling seamless exploration and interaction with artifacts. Visitors will be able to spin objects, zoom in for close-ups and get explanations through multimedia, allowing them to engage more deeply with the objects on view. Theres a bonus of guided tours, backed perhaps by narration about the history and cultural significance of certain artifacts that will be bubbling the experience for people of all ages, especially for younger tech-enhanced audiences. This initiative seeks to foster active learning in a fun way, so the cultural education stays with them.

An important result of this project is the digitization of Bangladesh's cultural heritage. The project meets challenges such as environmental damage and aging over time by creating high-quality digital replicas for fragile artifacts, which increase their longevity. Researches, educators and students will have access to these digital archives, which will be helpful for academic studies and cultural awareness. In addition, the virtual platform is capable of reaching international audiences, providing information on Bangladesh's rich history and artistic heritage," she added.

In doing so, this project paves the way for future growth, proving that entire museum collections can be digitized. The virtual museum's effect could transcend its immediate ambit as it might encourage similar projects among other cultural bodies in Bangladesh, promoting the application of technology for conservation of culture. Scalability also points to new potential for collaboration in culture and education.

The goal of this virtual museum is to provide a bridge between old traditions and avant-garde innovations. The project will preserve the past and make it accessible to present and future generations to celebrate Bangladesh's heritage and help global awareness, which will set a benchmark for the digital transformation of cultural institutions.

1.4 Collaboration and Roles

The project is a collaboration by two team members, each with specific strengths and areas of focus applied towards the project. Under their shared goal of building a complete and interactive virtual museum, each member of the team leads their vertical as it corresponds with their title.

Development of Virtual Bangladesh National Museum: A Unity Based Application

My job is to build the Unity-based application here, which is what runs the virtual museum at the center. This position includes designing interactive components that allow users to explore artifacts, receive guided tours, and understand navigation pathways. Other tasks include optimizing cross-platform functionality, ensuring an improved user experience through other devices. Focusing on what Unity can do, I also wanted to make sure that the virtual museum is functional and engaging for a wider audience.

Prince Purification: Creating a Virtual Bangladesh National Museum: 3D Modelling and Texturing

Prince's specialization work with realistic 3D model artifacts, which provides historical accuracy of what is explained in the museum. Through Blender and Substance Painter, Prince animates the chosen exhibits — traditional musical instruments and architectural attractions. He focuses on baking in complex details, realistic textures and exporting the models for Unity. This position is responsible for ensuring that the museum's visual identity is authentic and visually enticing.

Collectively, these two positions work hand in hand, combining the technical with the creative to provide a seamless experience as if in a physically visited museum. Routine collaboration, along with the exchanging of feedback, guarantees that all of the project's parts mesh perfectly, showcasing each team member's strengths.

1.5 Report Layout

The report is organized into seven chapters:

Chapter 1: an introduction to project motivations, goals, and structure.

Chapter 2: Literature, Tools and Methodologies Review

Chapter 3: Covers the method and flow used in developing the Project.

Chapter 4: Describes the design specification and working flow with screenshots of each stage.

Chapter 5: Discusses the implementation phase and test results.

Chapter 6: Explains the social, environmental, and ethical implications of the project.

Chapter 7: Deal with conclusion of the report, outcomes and future scope.

CHAPTER 2

LITERATURE REVIEW

2.1 Preliminaries/Terminologies

It is essential to know what these base terminologies mean in order to understand the scope and implementation of the Virtual Bangladesh National Museum. Important terms follow, along with how they relate to the project:

Virtual Museum:

The Virtual Museum in this case describes a kind of digital entity developed either to enhance or recreate something which physically would have come through a museum itself. A museum allows the views to have access with the exhibition or artifacts, an interactive technology based on 3-D modeling or virtual reality. Following is the simple Unity application design that enables user immersion by simulated navigation in rooms and interactivities with the showcased artifacts【1】【2】.

• 3D Modeling:

3D modeling is a process of making three-dimensional objects digitally. Tools like Blender allow for very detailed recreations of artifacts. For the project, instruments like the ektara and architectural landmarks like the Lalbagh Fort were created in as much detail as possible to show their historic significance.

• UV Mapping:

UV mapping is a process of projecting a 2D image (texture) onto a 3D model. It serves to ensure that the textures perfectly align with the geometry of an object. For example, UV mapping was used in applying polished wood textures to the tabla and weathered stone textures to the National Martyrs' Memorial.

• Unity Engine:

Unity is a platform for developing interactive 3D applications. In such a case, 3D models can be integrated smoothly into the application and enable navigation and interaction with the artefacts. Unity was quite flexible, and that is why it has been used for this project to develop an interactive virtual museum 【4】.

• Guided Tours:

This feature integrates multimedia content, in the form of narrated descriptions of artifacts and navigation. Indeed, this makes the virtual museum a better way of learning-very much beneficial for young audiences, as well as those not born into Bangladeshi culture.

Such technologies make this project a bridge between traditional and digital divides to one very accessible yet immersive museum experience.

2.2 Related Works

Virtual museums have been developed worldwide to preserve cultural heritage and make it accessible to diverse audiences. The following notable projects served as inspirations and benchmarks for this initiative:

1. **Smithsonian 3D Digitization Project**

   The Smithsonian Institution has digitized many artifacts and made them available online as highly detailed 3D models. However, while it excels in the accuracy of the artifacts, it lacks the immersive environment provided by Unity-based virtual museums 【1】【5】.

2. **Google Arts & Culture**

   While Google's platform does offer a number of global artifact images in high resolution and utilizes AR features for better viewing, it is highly focused on making those accessible and less so on coalescing a nonphysical, interactive museum space.

3. **Virtual tour of the Louvre**

   Furthermore, there is virtual panoramic touring on the Louvre Museum website. This means the panoramic online perceiving of big galleries and getting virtually familiar with Louvre iconic exhibition pieces. While very impressive visually, it does come near and around each artifact somewhat limitedly and too barely interactively.

These projects point to the prospect of virtual museums but also indicate gaps in interactivity, cultural specificity, and user engagement. In this project, an attempt is made to bridge the gaps by developing an immersive experience tailored for Bangladeshi heritage.

2.3 Comparative Analysis

This project stands out for its focus on user engagement and cultural representation. The table below summarizes the differences:

Feature	Existing Projects	This Project
Focus Area	Global cultural heritage	Bangladeshi cultural heritage
Interactivity	Limited	High interactivity (artifact exploration, guided tours)
Technology Used	Web-based	Unity-based immersive application
Audience Engagement	Primarily visual	Interactive and educational

Figure 2.1 Comparative Analysis

This comparison highlights the unique contribution of this project in making Bangladeshi heritage more accessible and engaging for a global audience.

2.4 Scope Of The Problem

The Virtual Bangladesh National Museum solves some of the most important problems with traditional museums:

1. **Limited Accessibility:**

   Physical museums experience a geographical constraint to be inaccessible in many ways to people, mainly those living in rural areas and those from foreign countries. The project erases this barrier to offer its digital form, which is accessible anywhere in the world.

2. **Less Interest by Youth:**

   Traditional museums are failing to attract the new generation, who are more into technology-based platforms. The project incorporates interactivity, such as the rotation of artifacts and audio tours, to attract this category of people.

3. **Preservation of Artifacts:**

   Physical artifacts are at the mercy of disintegration with time. The project is, therefore, digitizing the items so their details can remain for posterity.

4. **Underrepresentation of Bangladeshi Culture:**

The cultural heritage of Bangladesh is poorly represented on global digital platforms. This project is one avenue through which the rich traditions and history of the country will be shared with a wider audience.

2.5 Challenges

This virtual museum was developed in such a way that it needed to overcome quite a number of technical and logistic challenges. Each stage had its own different obstacles that called for ingenuity:

1. **Performance Optimization:**

Accurately building realistic 3D models with detailed textures really stresses a lot of computational resource-heavy loads, especially for lower-specified devices. Thus, certain means of optimizations have to be employed, including the use of baked lighting and a level-of-detail system to allow smooth performance.

2. **Cultural Accuracy:**

Representing artifacts authentically while preserving their cultural and historical significance was paramount. This necessitated extensive research and collaboration with museum curators to ensure every detail reflected reality.

3. **User Experience Design:**

The biggest challenge was to design an intuitively simple user interface that would serve users with big differences in technical proficiency. It took a number of drafts and feedback received from users to reach such a user-friendly design.

4. **Model Import and Texture Mapping in Unity:**

Importation of 3D models into Unity, along with their respective textures, was a real challenge. Despite correct UV mapping and texturing in Substance Painter, there were some misalignments of the textures and compatibility issues while importing them. This needed:

- Debugging the material and texture settings in Unity.
- Changing texture formats and settings in Unity's Inspector panel.
- Testing of different file formats, for example, FBX and OBJ, was made to see whether or not they could work. Creating the whole room and placing accurate models took much time and affected the timeline of the entire project.

5. **Constraints on Resources:**

The availability of quality references for some of the artifacts was indeed restricted, since many were extremely rare and could not support heavy handling. Secondary sources such as photographs and descriptions were therefore used resourcefully to reconstruct the details.

6. **Time Management:**

This had to balance the academic deadlines with the complexity of modeling, texturing, and Unity integration; it had to be carefully planned. Devoting more time to solving importation and texture mapping issues made this timeline even more complex.

CHAPTER 3

Methodology

3.1 Approach to develop the project

The Virtual Bangladesh National Museum Application developed in Unity had a structured, iterative methodology. The main goal was to create an immersive, visually interactive platform for Bangladeshi heritage. It was divided into three major workflows: modeling and texturing of the artifacts, integrating them in Unity, and system development. Each step was planned and well-executed with regard to technical and cultural requirements of the project.

The methodology used included the following phases:

1. **Artifact Selection and Research:**
    - The artifacts were selected to represent the rich cultural heritage of Bangladesh.
    - The Musical Instrument Room represented through the ektara and the tabla was presented as a metaphor for traditional music.
    - The Historical Monuments Room represented the landmarks like Lalbagh Fort and National Martyrs' Memorial, which signify the architectural history of Bangladesh.
2. **3D Modeling and Texturing:**
    - The artifact and room detailed models were realized in Blender, then textured in Substance Painter to achieve a valid and realistic graphic outcome.
3. **Unity Integration and Interactive Features**
    - Models were imported into Unity, where the virtual environment was built. Interactions like zoom, rotation, and guided tours were included to enhance user engagement.

Being a phased approach, this gave quite an explicit roadmap and kept the project on course with its aims.

3.2 Research Design And Data Collection Methods

This project was basically hinged on research and data collection, providing the foundation for all subsequent development stages. A combination of primary and secondary methods ensured cultural and technical accuracy.

3.2.1 Primary Research

Primary research-related interviews were directly involved with the work of the Bangladesh National Museum and the experts in culture:

- **Museum Visits:**
    - Detailed visits to the museum allowed the team to document dimensions for artifacts, material characteristics, and spatial arrangements.
    - Photographs and sketches were used as visual references during the modeling phase.
    - For instance, the intricate carvings on Lalbagh Fort required several angles to depict the details.
- **Expert Consultations:**
    - Discussions with museum curators and historians provided a rich insight into the historical narratives of every single artifact.
    - These interactions helped in ensuring that accuracy was achieved both in design and in cultural representation.

3.2.2 Secondary Research

Secondary research supplemented the findings of the above:

- **Academic Literature:**
    - Books and journal articles on Bangladeshi culture and history provided insight into artifact selection and room design.
    - Studies on digital museums, such as the Smithsonian 3D Digitization Project, informed technical and conceptual decisions【1】【5】.
- **Online Resources:**
    - References of high-resolution images and 3D scans from existing virtual museum projects.

- Some of the interactive features were inspired by platforms such as Google Arts & Culture.(6)

3.2.3 Data Organization

In order to make the development process easier, a centralized database was developed to catalog:

1. **Artifact attributes:** dimensions, materials, and historical descriptions.
2. **Technical references:** texture maps, UV layouts, and lighting parameters.

This database acted as the blueprint for both modeling and system development stages.

3.3 Tools And Software Selection

The project made use of several tools and software platforms, each chosen based on its ability to meet specific technical requirements. Each tool had a critical role to play in ensuring the realization of the project's objectives.

3.3.1 Unity Engine

Unity was used as the base development platform for this project:

- 3D Integration: Unity supports the import and rendering of 3D models, making it easy to integrate artifacts created in Blender.
- Interactivity: Features like rotation, zoom, and guided tours were enabled using C# scripts.
- Optimization: Baked lighting and LOD contributed to high performance on various devices**.**

3.3.2 Blender

- Sculpting Tools: Allowed for intricate detailing of artifacts, such as the strings of the ektara and carvings on the Lalbagh Fort.
- UV Mapping: Essential for preparing models for texturing in Substance Painter 【3】.

3.3.3 Substance Painter

- Material Application: Used to simulate realistic materials such as polished wood, aged stone, and brass.
- Weathering Effects: Added depth to historical artifacts, ensuring authenticity [8]

3.3.4 Adobe Photoshop

Refining textures, creating UV maps, and enhancing visual quality was done in Photoshop:

- Layered Textures: Allowed for detailed adjustments before applying them to 3D models.

3.4 Unity Integration Workflow

One of the most challenging yet rewarding phases in this project was the integration with Unity. This workflow had multiple steps:

3.4.1 Models Import

- Models from Blender were imported as FBX files to be compatible with Unity.
- Textures created in Substance Painter were applied to the models; adjustments of Unity's material settings were also needed.

3.4.2 Setting Up the Rooms

- The Room of Musical Instruments and the Room of Historical Monuments were modeled according to the real museum.
- Artifacts were placed to maintain spatial accuracy and logical flow for the user.

3.4.3 Adding Interactivity

- **Artifact Interaction:** Scripts allowed users to rotate, zoom, and examine artifacts.
- **Guided Tours:** Incorporated audio descriptions provided cultural and historical context.

3.4.4 Optimization

- **Lighting:** Baked lighting was used to reduce runtime rendering demands.
- **LOD Systems:** Different model complexities were used according to user distance to improve performance.

3.5 Testing and optimization

Testing and optimization were important to ensure a seamless user experience. Particularly, the following methods were used:

3.5.1 Functional Testing

- Interaction and navigation scripts were tested for bugs and usability issues.
- Feedback received from the test users was used to refine features such as zoom sensitivity and rotation controls.

3.5.2 Optimizing Performance

- Texture compression and LOD were altered to work on all devices.
- Performance bottlenecks were identified and resolved using Unity's Profiler.

3.5.3 User Feedback

- Feedback loops identified the areas that needed attention, like the clarity of navigation and the arrangement of artifacts.
- Iterative testing ensured that the final application conformed to user expectations.

CHAPTER 4

Development Process

Here you can visit the Virtual Bangladesh National Museum that I created on Unity. My focus was mainly on 3D modelling & texturing, designing realistic scenes and setting up interactive components to facilitate museum exploration virtually. The project work mainly went to import 3D models, texture, make scenes navigate and optimize the system. Since there is a lot of space at the museum, the focus was placed on two main rooms, namely the Musical Instruments Room and the Cultural Monuments Room, as well as supporting scenes such as outdoor space, lobby and a character selection scene. It integrates creativity with technical acumen to offer users a novel view of Bangladesh's cultural heritage.

4.1 Overview of The Unity System

The Virtual Bangladesh National Museum Unity system is comprised of a series of interconnected scenes aimed at providing a realistic and immersive experience. I implemented the system, which included the following parts:

Scene Design:

I have formed several scenes, a tiny street, a lobby, a room with musical instruments and a room with cultural monuments. All of the scenes were built with fluidity and design in mind.

Below I have added some pictures for ease of understanding.

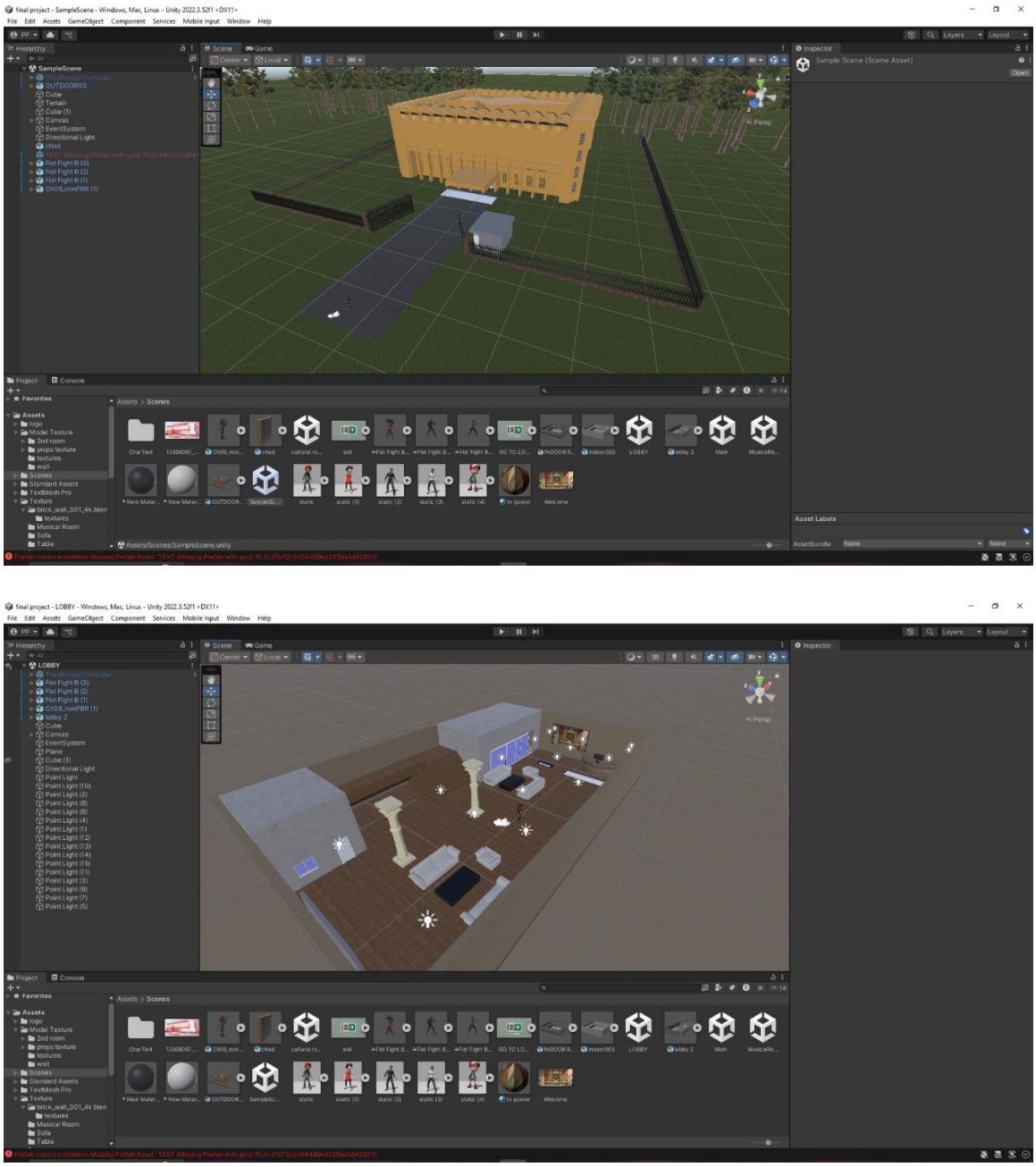


Figure 4.1 Outdoor Model & Lobby Model Import

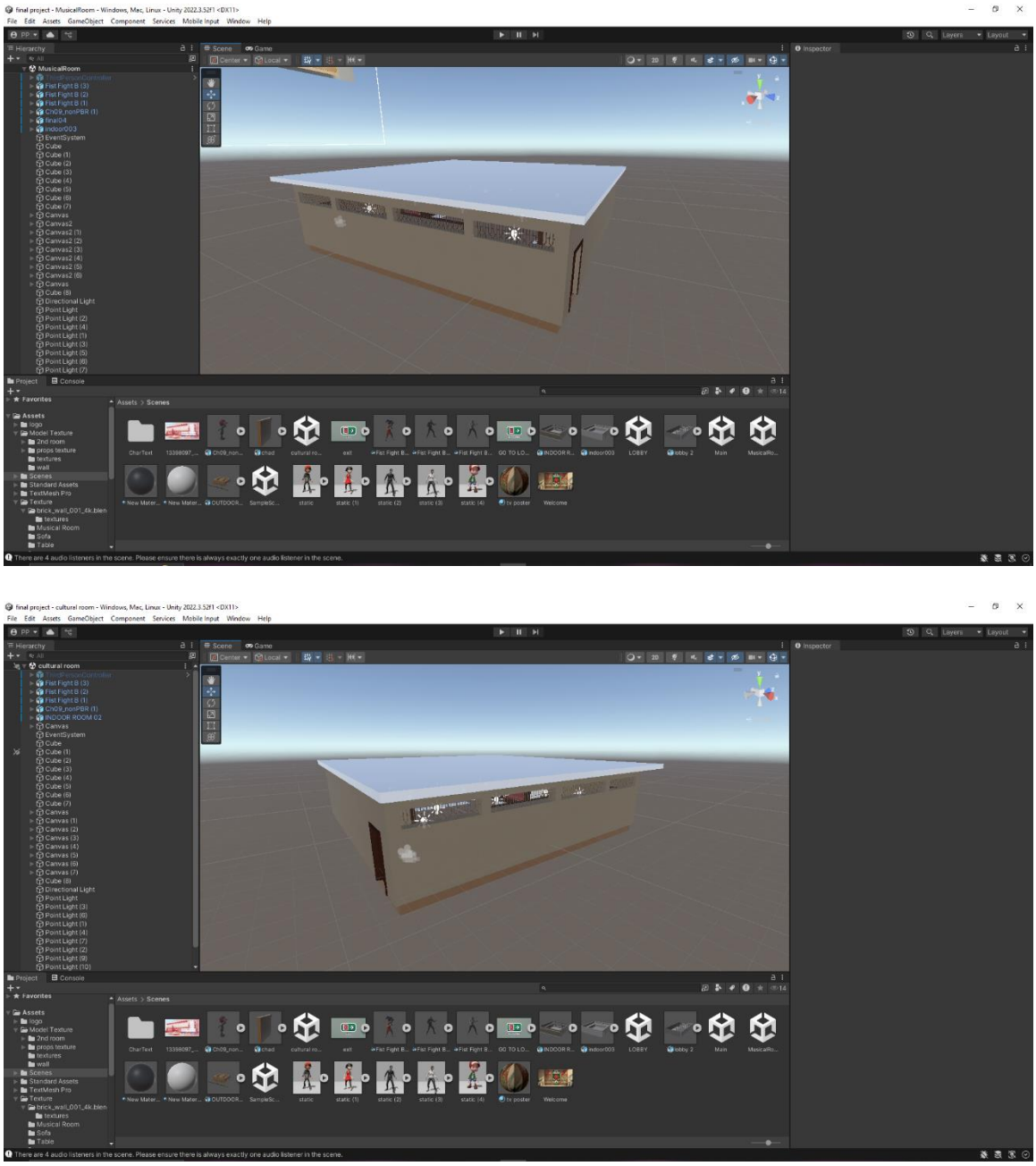


Figure 4.2 Musical Room Model & Cultural Model Import

3D Model and Texture Integration:

All 3D assets were brought in from Blender, while the textures were done in Substance Painter.I specifically matched the textures to the models to stay truthful and realistic.

Interactive Features:
I also included features such as character selection, giving users a chance to personalize their experience before entering the museum. The navigation system allows for seamless transition between rooms and interaction with exhibitions.

System Optimization:

I deeply optimized the scenes for performance such that transitioning between them is instantaneous, and interactions lag-free across devices.Through this Unity system, users will have a digital walkthrough of the museum which will help them to learn and enjoy Bangladesh's art and culture artifacts. I aimed to orient an interactive experience which means through interactivity, visual quality and usability, this will help users connects with history and significance of the museum in an innovative way.

4.2 Model Importing and scene setup in Unity

For the Virtual Bangladesh National Museum, the workflow to bring in the 3D models into Unity and create the scenes was as follows:

Exporting Models from Blender

Poly reduction and UV mapping: Before exporting, all the models were optimized in Blender, as there should be no unnecessary polygons and a proper UV map should be applied.

Export Format: Exported models as FBX files to keep the compatibility with Unity and to keep UV maps and scale.

Importing Models into Unity

Make a Project: Launched Unity and started a new project with the right settings for 3D rendering.

Importing Models: Had imported the FBX files into Unity's Assets folder and made sure the models were correctly scaled and oriented.

Material and Texture Setup: Using Unity's Material Inspector, I set up textures on the models by linking the maps (Base Color, Normal, Roughness on Substance Painter) exported.

Prefab I Conversion: This was around the time we were designing all the models and realized we needed the models in prefab form which meant converted models into prefab form so we could reuse them across our various scenes.

Setting Up Scenes:

Design and Implementation of Scenes: Split the outdoor, lobby, musical instruments room, cultural monuments room, and character selection sections into separate Unity scenes

Placing Models: I dragged them prefabs in scenes and set with the plan.

For example, the Musical Instruments Room had instruments such as the ektara and tabla placed on podiums.

Light setup: I did some tweaks on adding directional lights, spot lights and ambient lights to make it more realistic.

Example: Emit spotlights on vital artifacts inside of every of the rooms.Scene Transitions Configured scene transitions by Unity's SceneManager to go from one scene location to another.

Adding Interactive Features

Character Selection: Developed a Unity-based interactive character selection menu for users to select an avatar before entering the museum.

Navigation System: Created navigation controls that let the players freely navigate through the scenes.

Testing and Optimization

Scene Testing: Go through every scene to test if navigation works properly, does the area have proper lighting, is object placement right.

Performance Optimization: Minimized draw calls and optimized assets to achieve stable framerates on all devices.

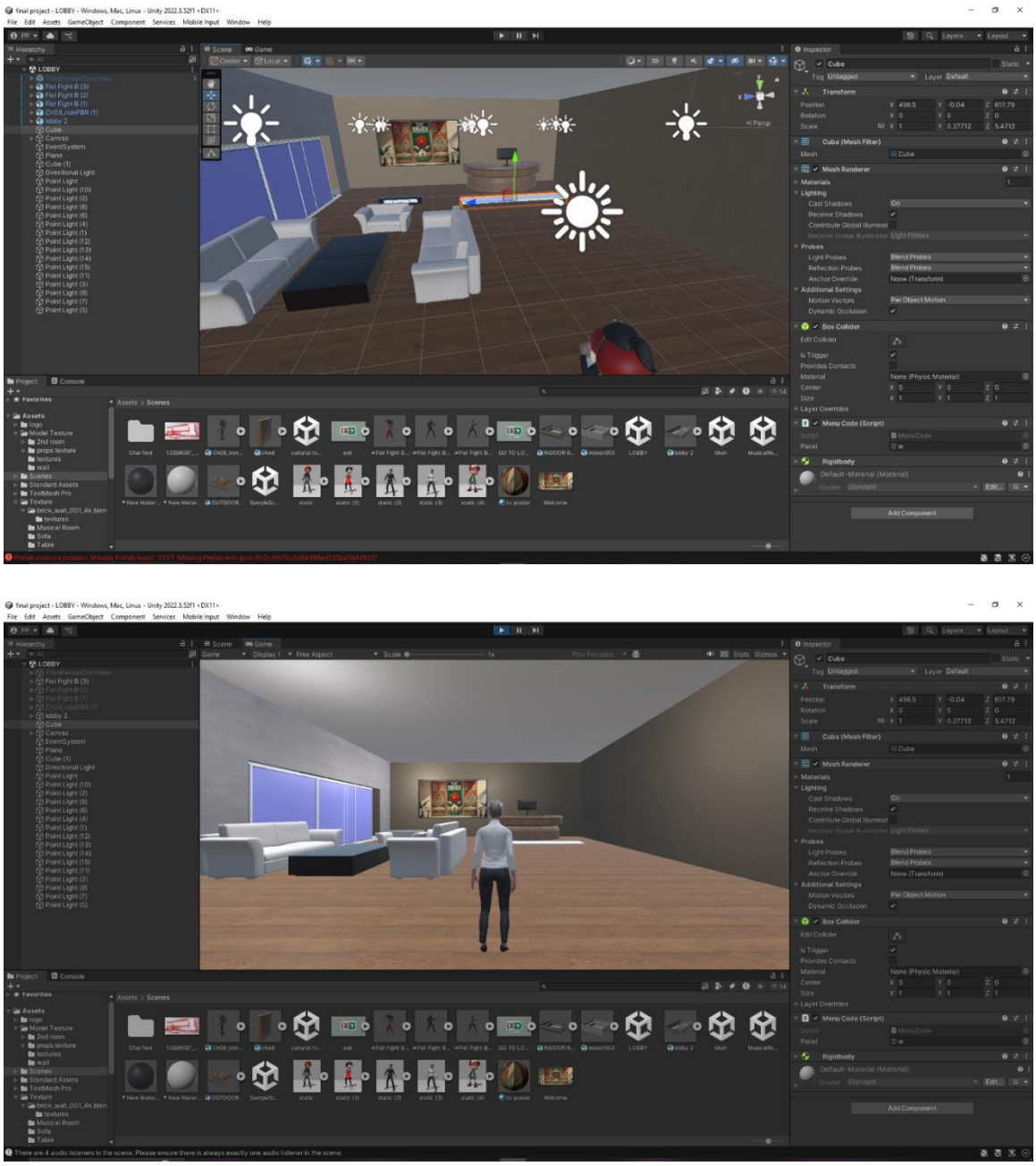


Figure 4.3 Set Character In Lobby Room

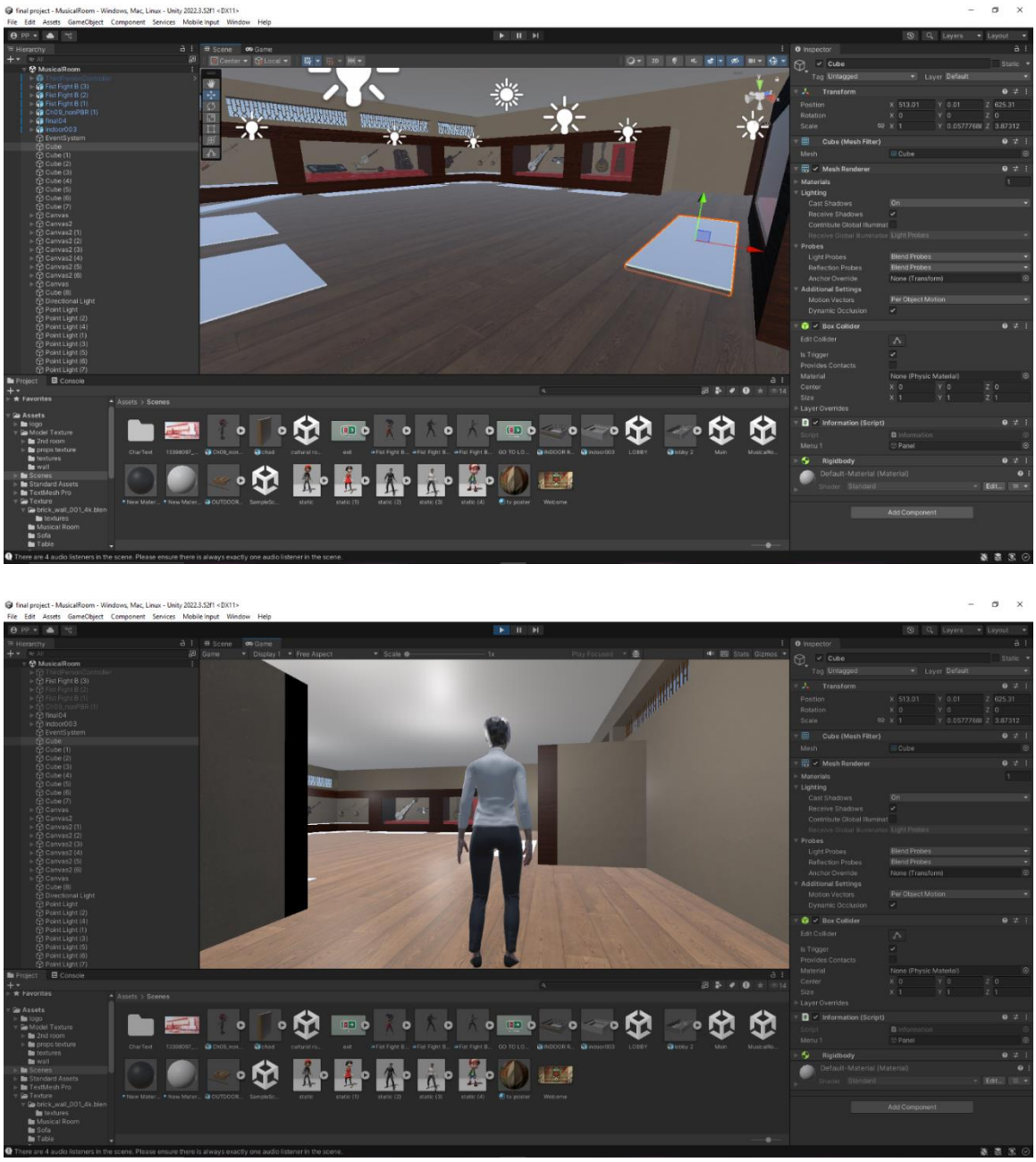


Figure 4.4 Set Character in Musical Room

Figure 4.5 Set Character in Cultural Room

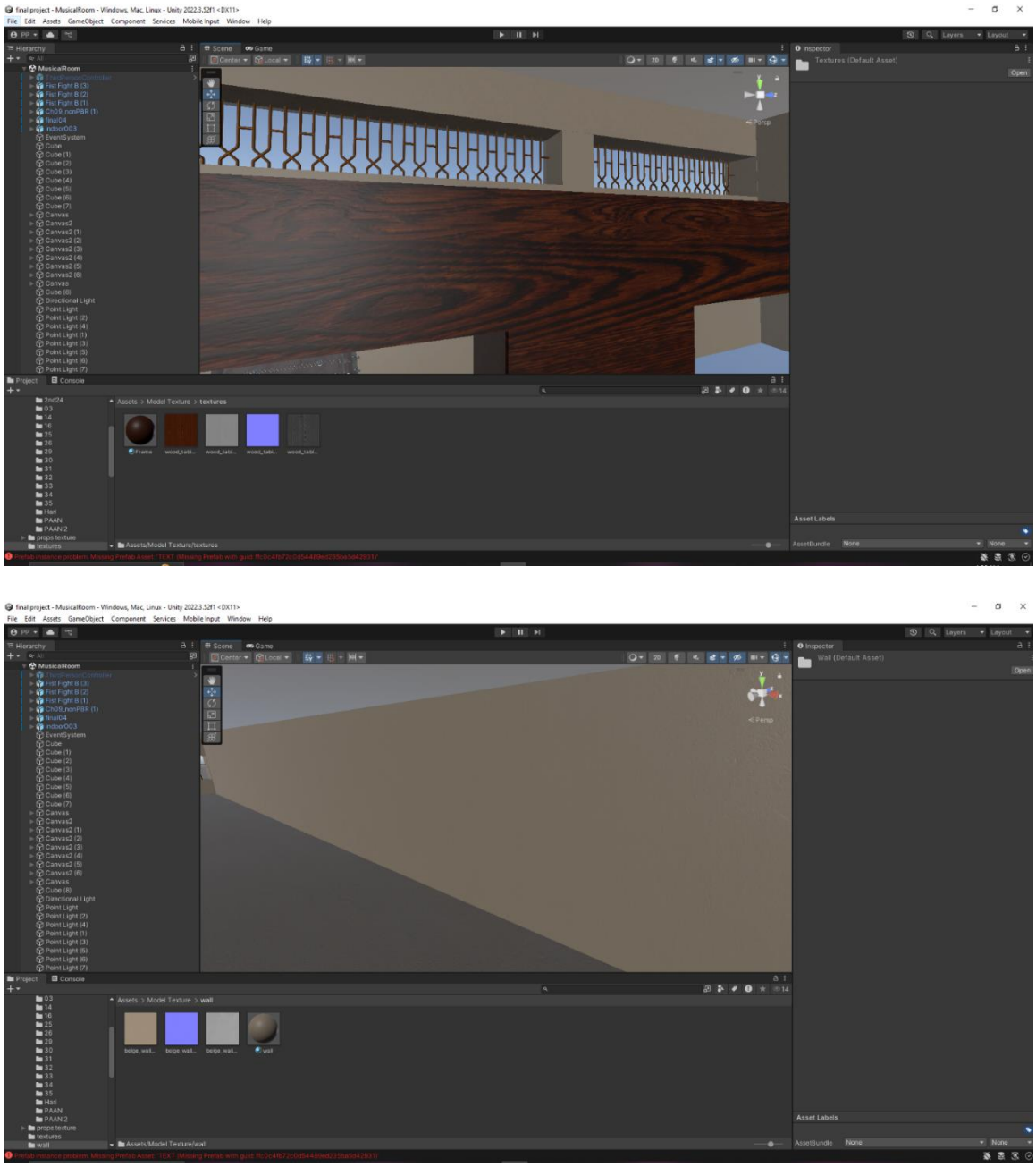


Figure 4.6 Texture for Wall & Gallery

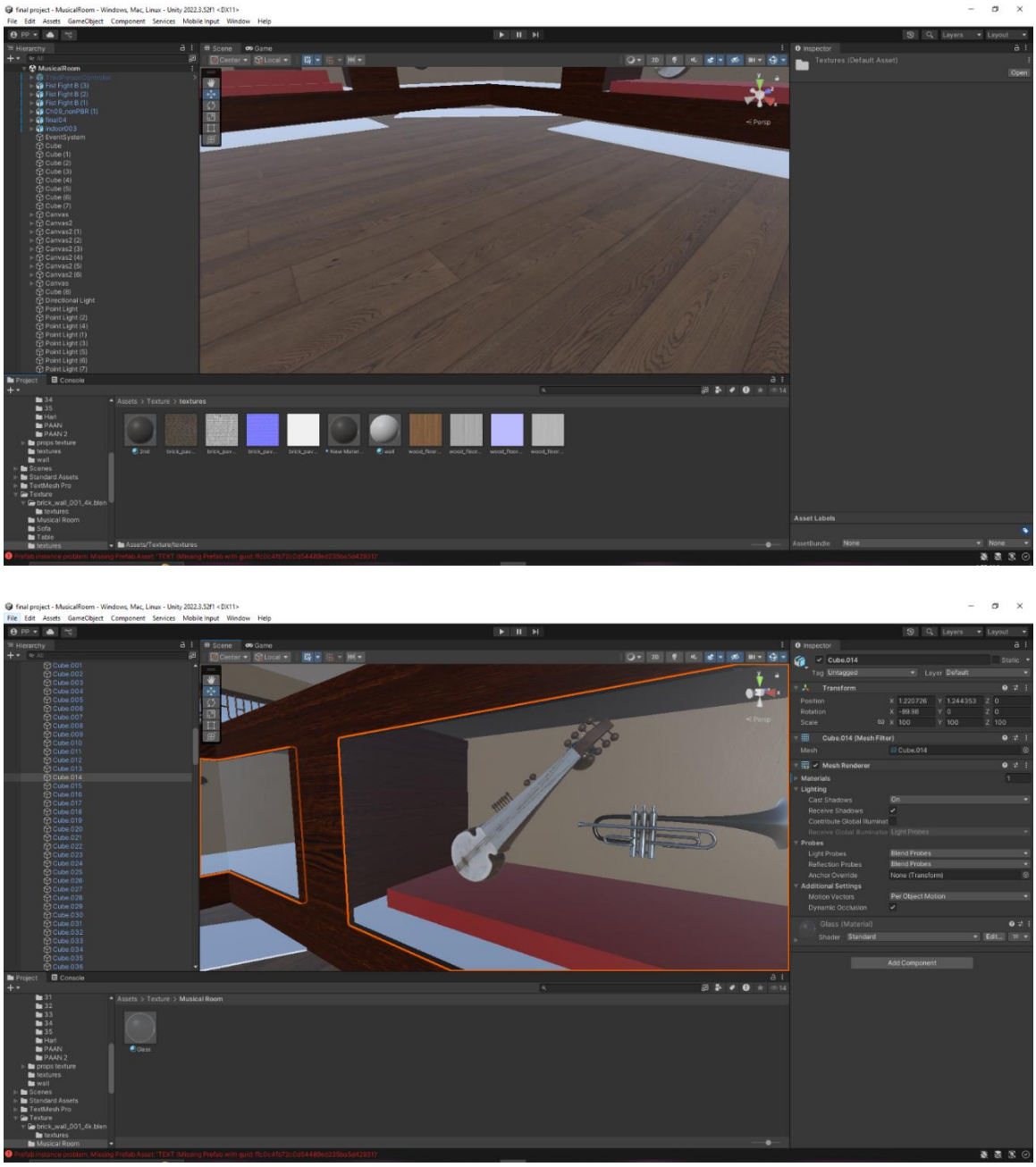


Figure 4.7Texture for Floor & Gallery Glass

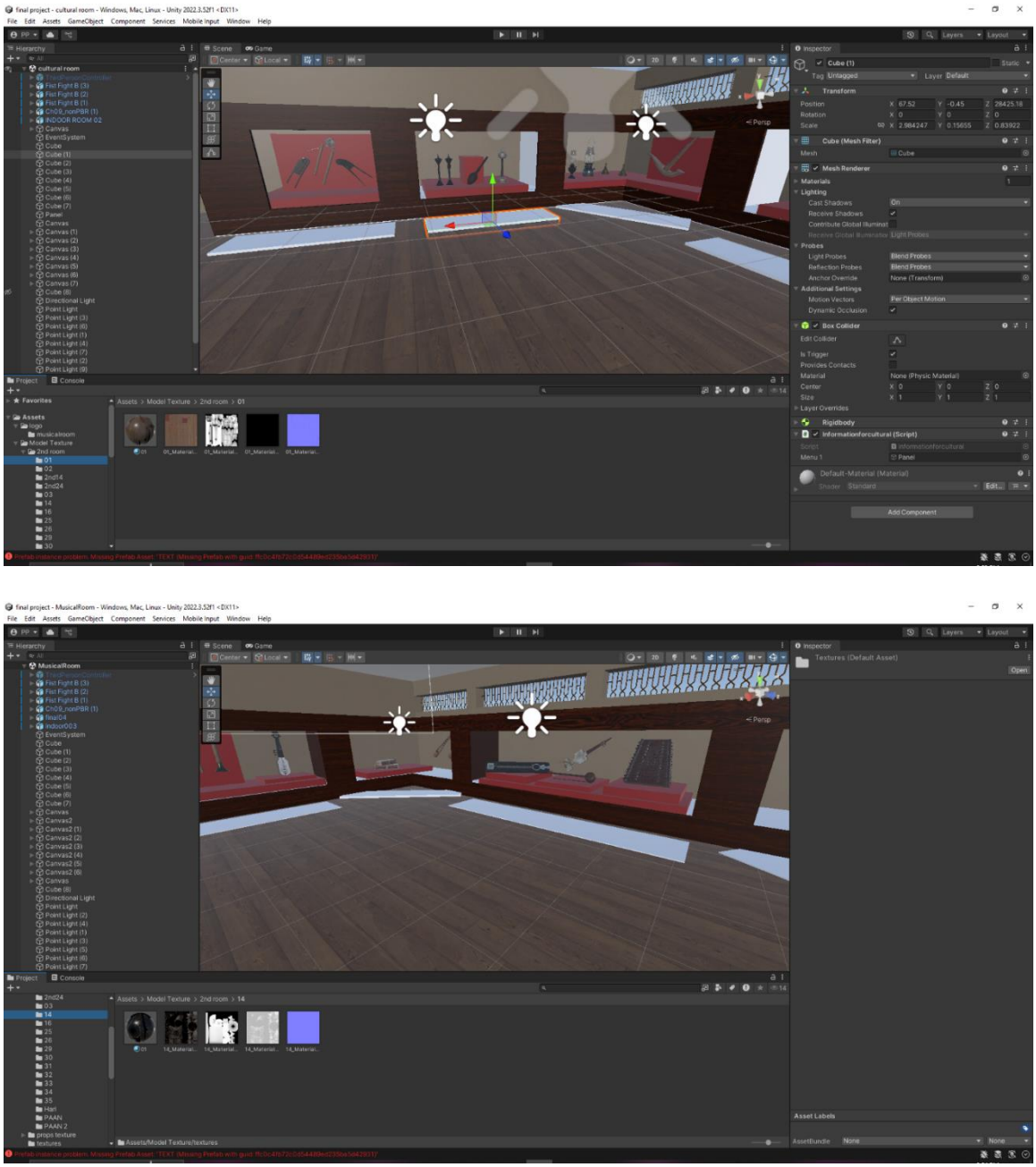


Figure 4.8 Texture for cultural room model & musical room

4.3 Workflow for Unity System Design and Features

Designing the Unity system came down to coding functionality such as scene navigation and some basic user-face UI elements. I outline my step by step workflow as follows:

Coding for Scene Transition: I used SceneManager of unity to code the scene transition between the lobby, musical room and cultural room.

Box Collider Triggers: I set up box colliders in Unity for each gallery. I then made an abstraction of the gallery where the character, after entering it and colliding with an object, shows a scene with information about the exhibits.

Navigation System: My navigation system is based on Unity's Character Controller which allows users to walk around and experience the museum in an intuitive way.

4.3.1 UI Design Workflow

UI Logos: I created logos for every button with Adobe Photoshop ensuring the UI kept its uniformity and professionalism.

Canvas Setup: In Unity, I set up a Canvas to keep all the Menu/Buttons/Etc. organized and scaled correctly.

UI Architecture: I structured the menus, like the Main Menu, Character Selection, and Exit Menu, to work seamlessly.

Primary Menu: Login Menu, Lobby Menu, Information Display Menu, Character

Selection Menu

Button Integration: I imported logos and mapped them to their respective actions (starting the museum experience, quitting, etc.).

UI Interaction: I utilized Unity's On Click() events to associate buttons with the scene transitions or actions they were designed to trigger.

Final Adjustments

Scene Trigger Testing: Each gallery has a box collider that I tested to make sure it loaded each respective information scene without issues.

Design Crackdowns: I tweaked button positions, tweaked animations, and dabbled with colours for a refined look.

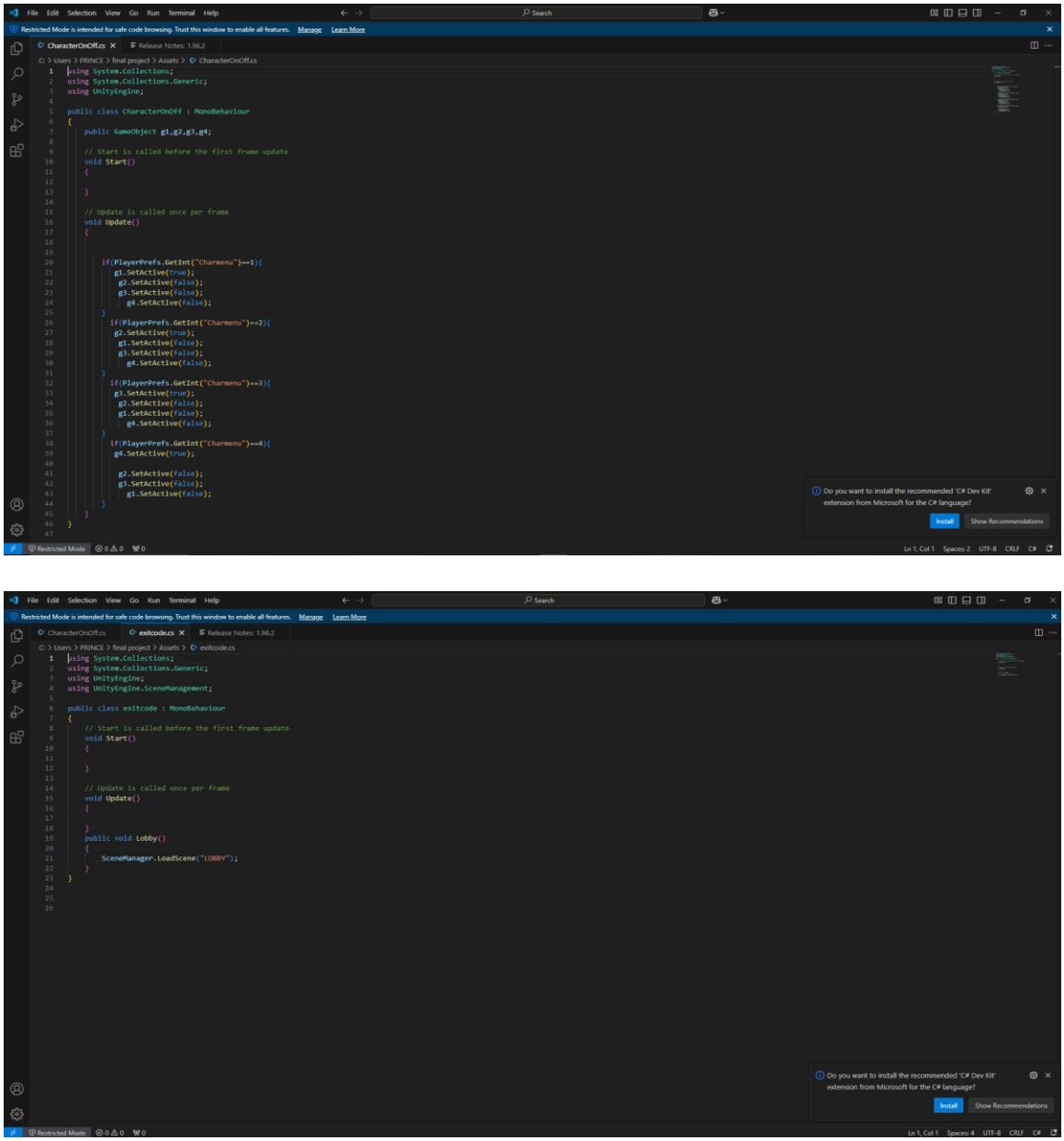


Figure 4.9 Coding for Character Selection & Exit Code

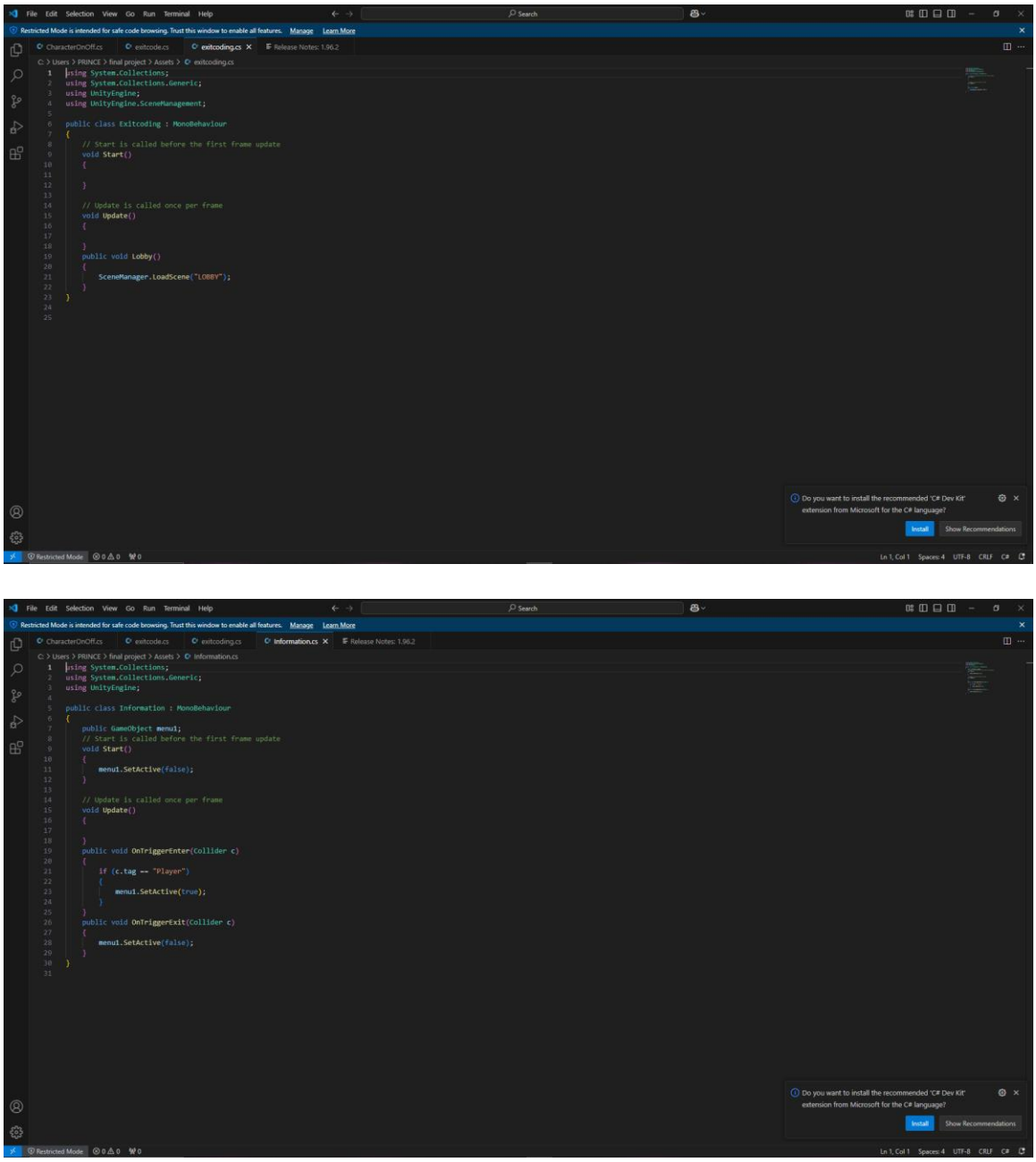
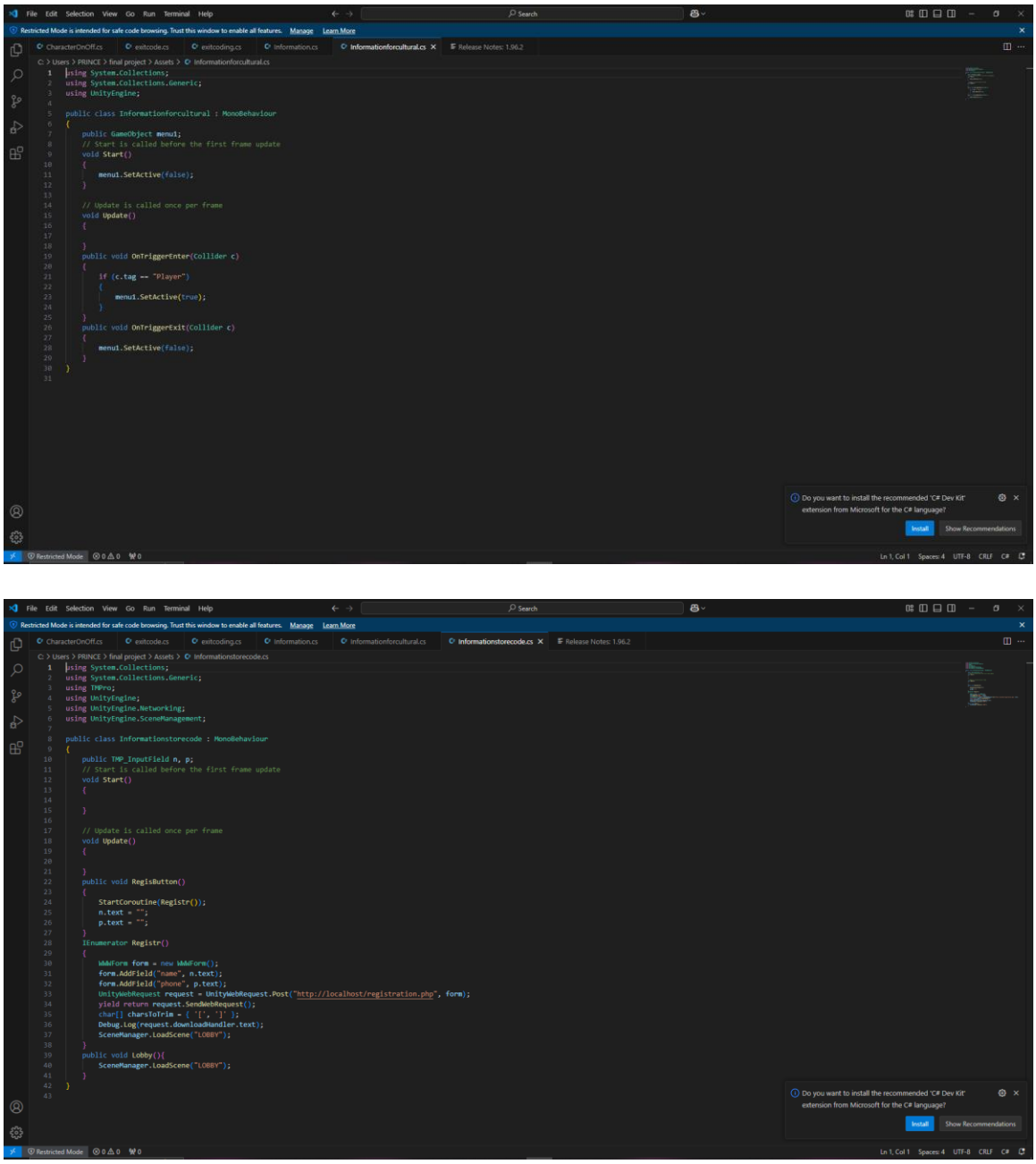


Figure 4.10Lobby Exit Code & Props Information Code

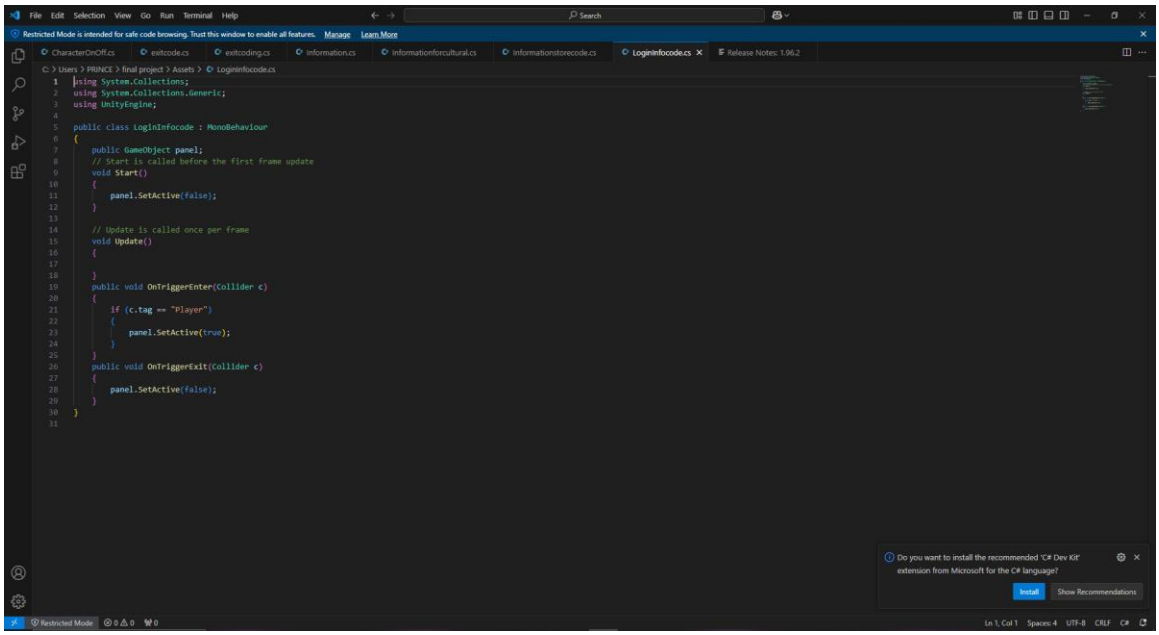


```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class Informationforcultural : MonoBehaviour
{
    public GameObject menu1;
    // Start is called before the first frame update
    void Start()
    {
        menu1.SetActive(false);
    }

    // Update is called once per frame
    void Update()
    {

    }
    public void OnTriggerEnter(Collider c)
    {
        if (c.tag == "Player")
        {
            menu1.SetActive(true);
        }
    }
    public void OnTriggerExit(Collider c)
    {
        menu1.SetActive(false);
    }
}
```



```
using System.Collections;
using System.Collections.Generic;
using TMPro;
using UnityEngine;
using UnityEngine.Networking;
using UnityEngine.SceneManagement;

public class Informationstorecode : MonoBehaviour
{
    public TMP_InputField n, p;
    // Start is called before the first frame update
    void Start()
    {

    }

    // Update is called once per frame
    void Update()
    {

    }
    public void RegisButton()
    {
        StartCoroutine(Registr());
        n.text = "";
        p.text = "";
    }
    IEnumerator Registr()
    {
        WWWForm form = new WWWForm();
        form.AddField("name", n.text);
        form.AddField("phone", p.text);
        UnityWebRequest request = UnityWebRequest.Post("http://localhost/registration.php", form);
        yield return request.SendWebRequest();
        char[] charsToTrim = { '[', ']' };
        Debug.Log(request.downloadHandler.text);
        SceneManager.LoadScene("LOBBY");
    }
    public void Lobby(){
        SceneManager.LoadScene("LOBBY");
    }
}
```

Figure 4.11 Props Information Code & Login Code



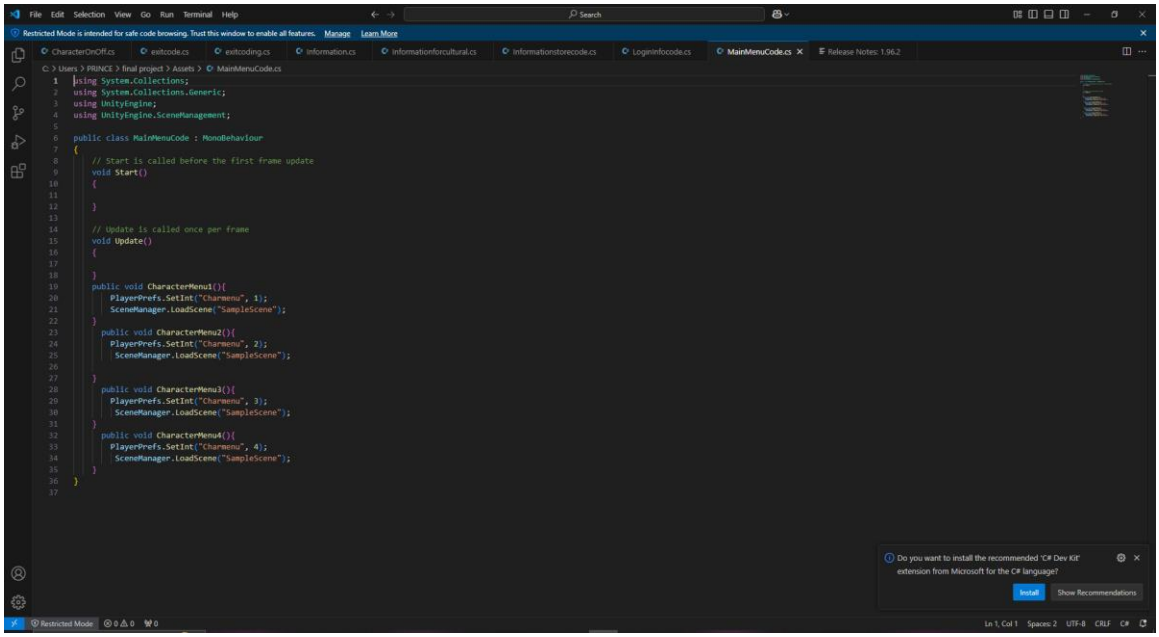
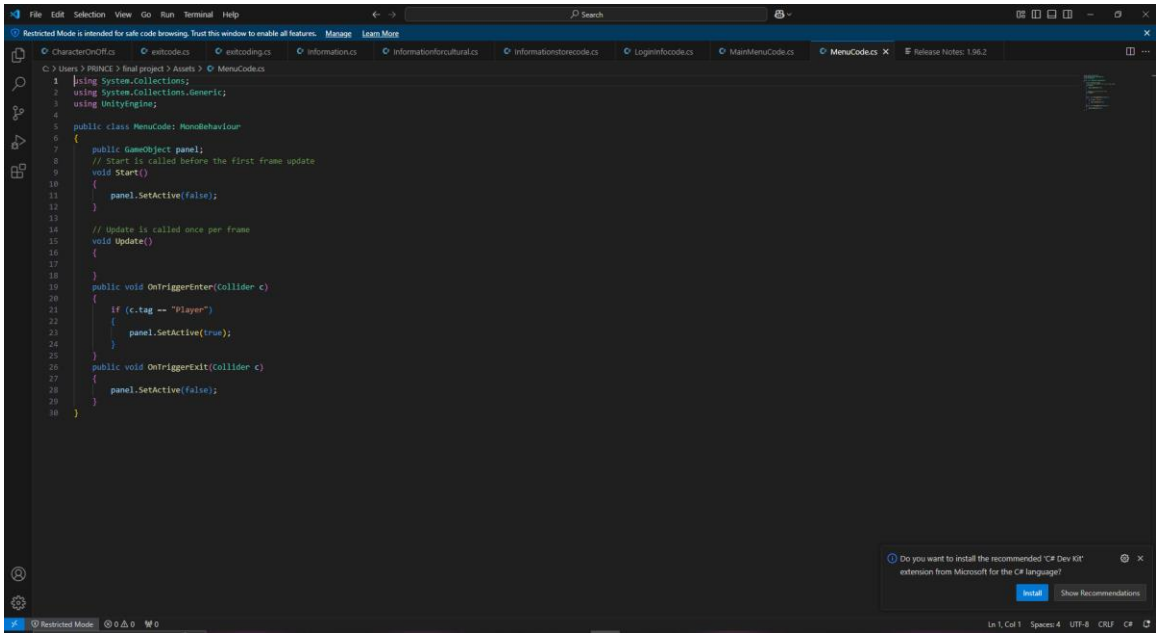


Figure 4.12 Login Code & Main Menu Code



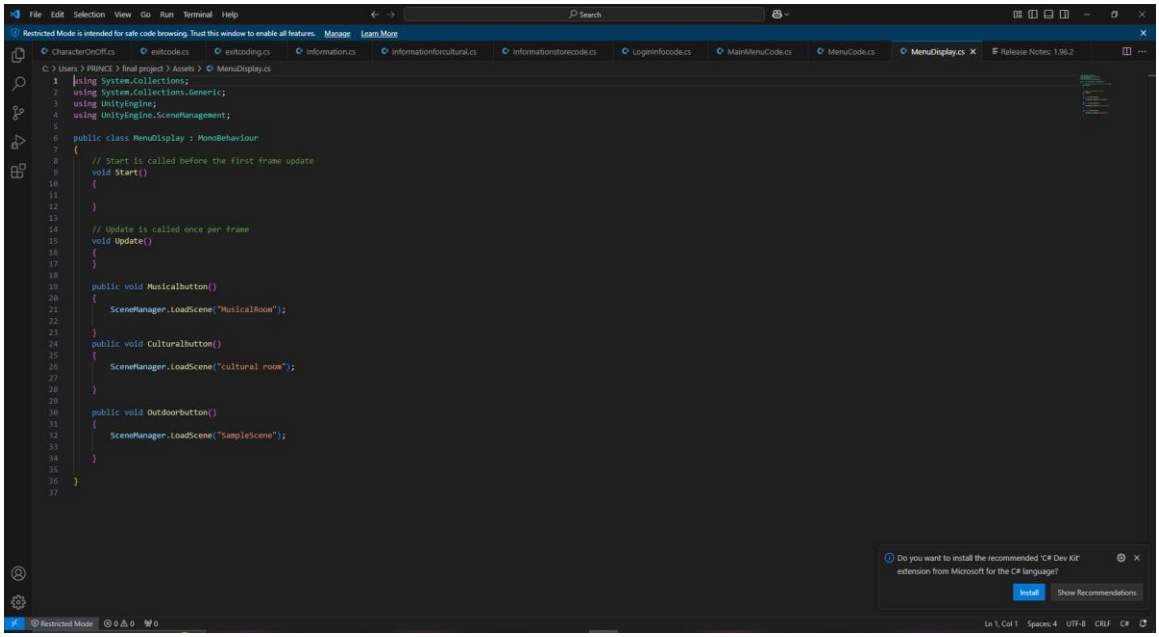


Figure 4.13 Menu Code & Scene Transition Code

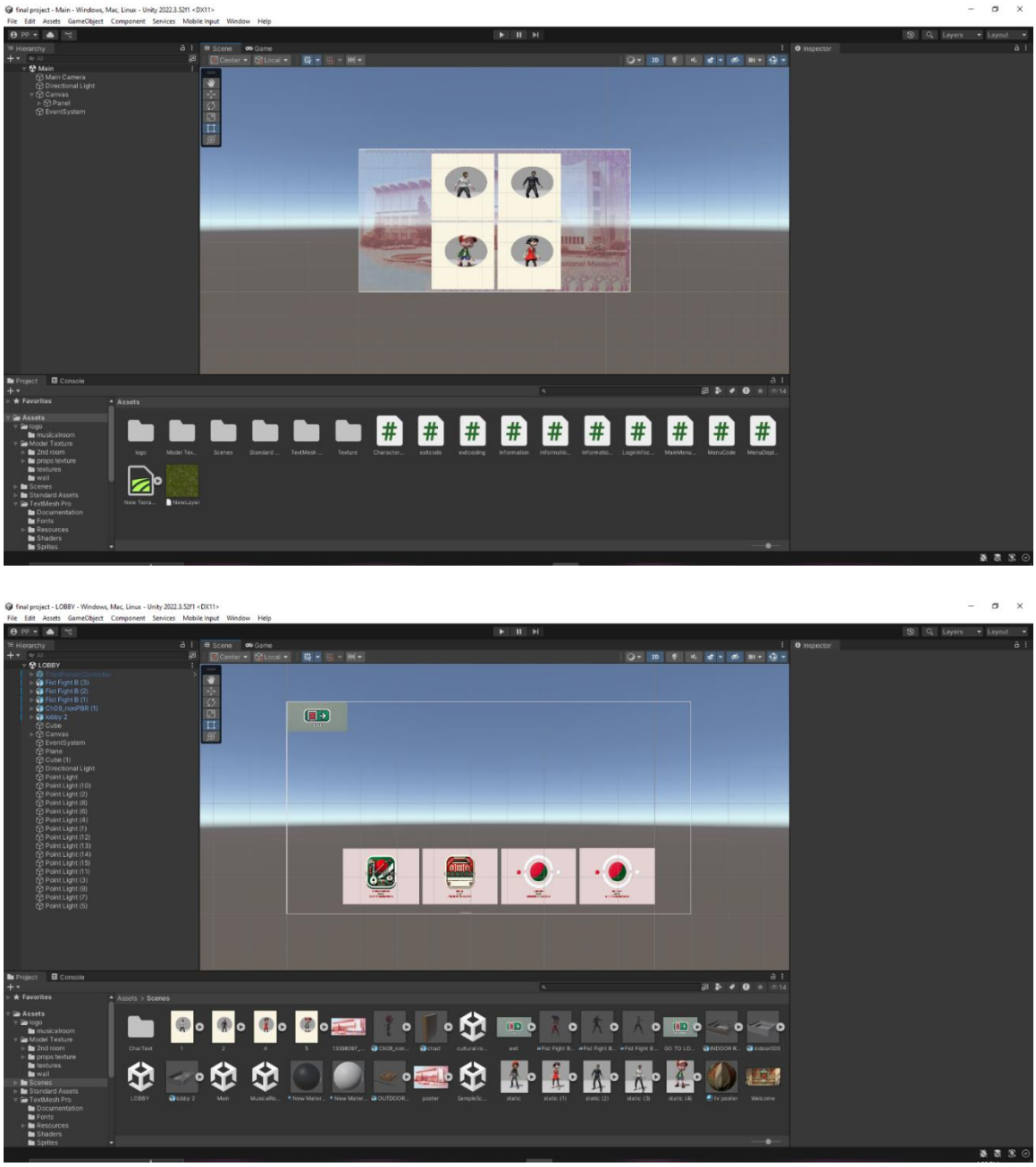


Figure 4.14 UI Design for character and room selection

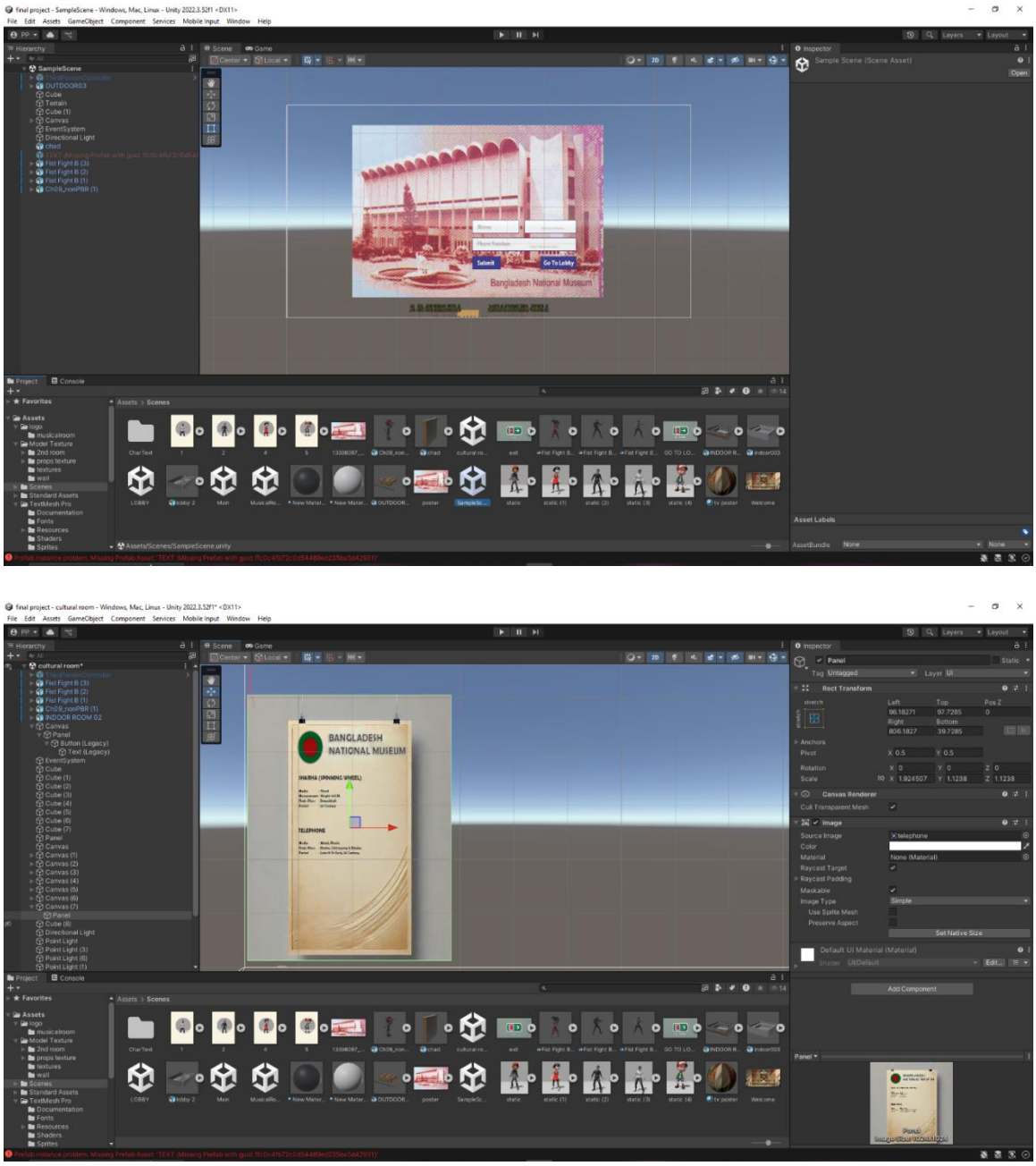


Figure 4.15UI Design for login and props Information

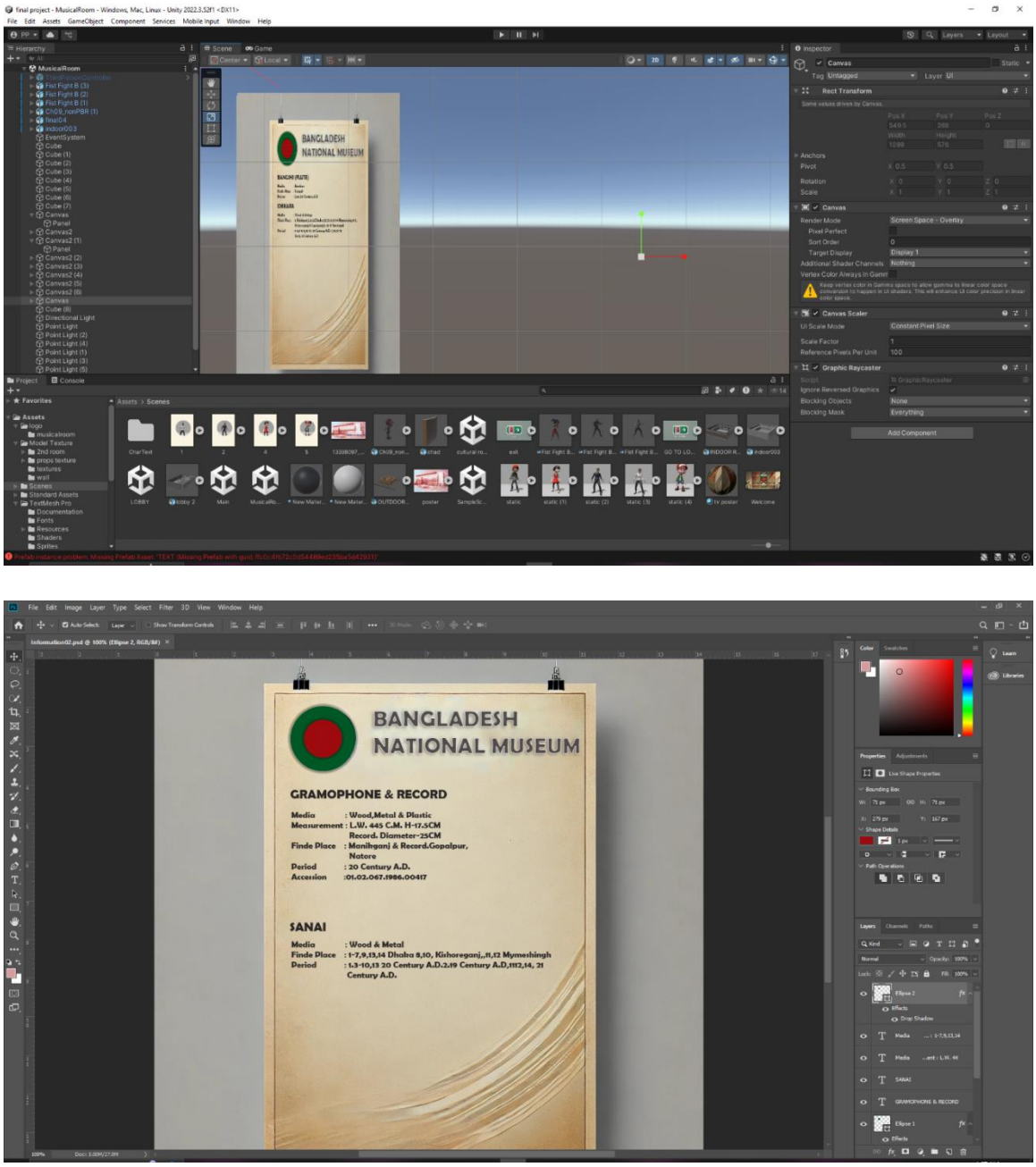


Figure 4.16 Logo design props Information

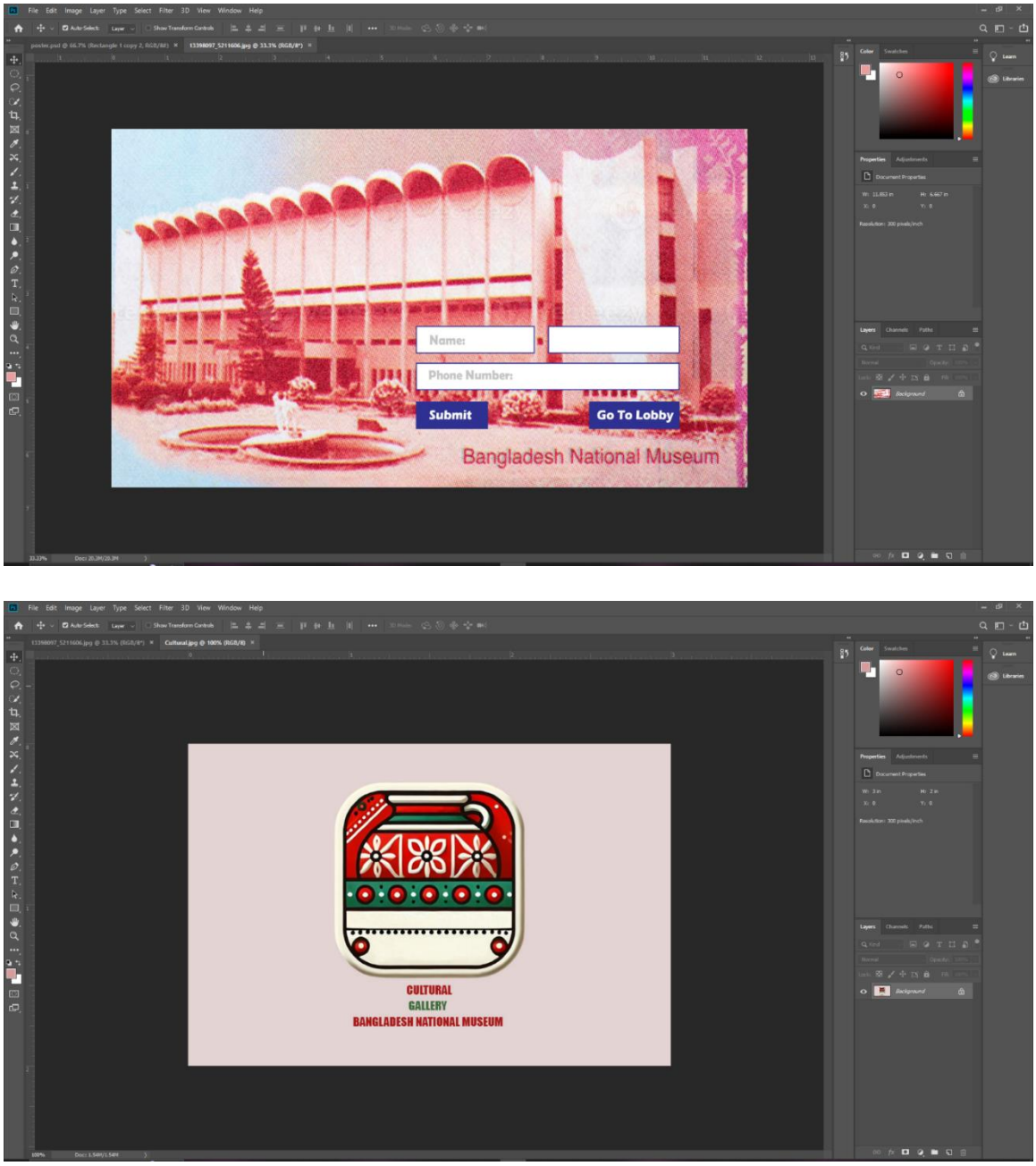
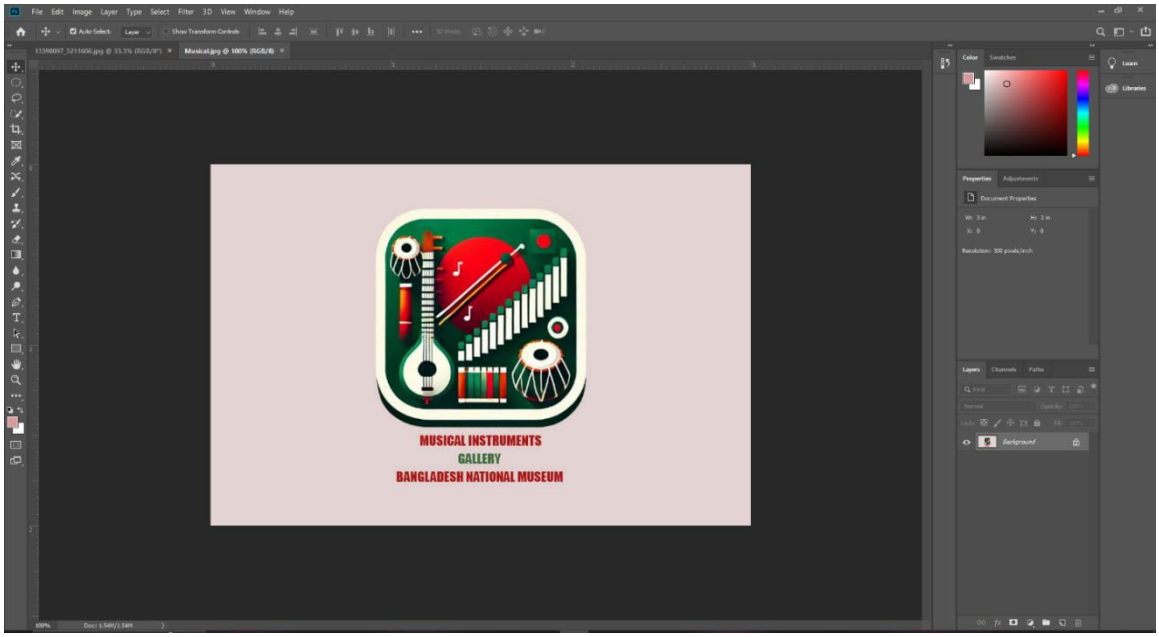


Figure 4.17 Login design & Button Icon



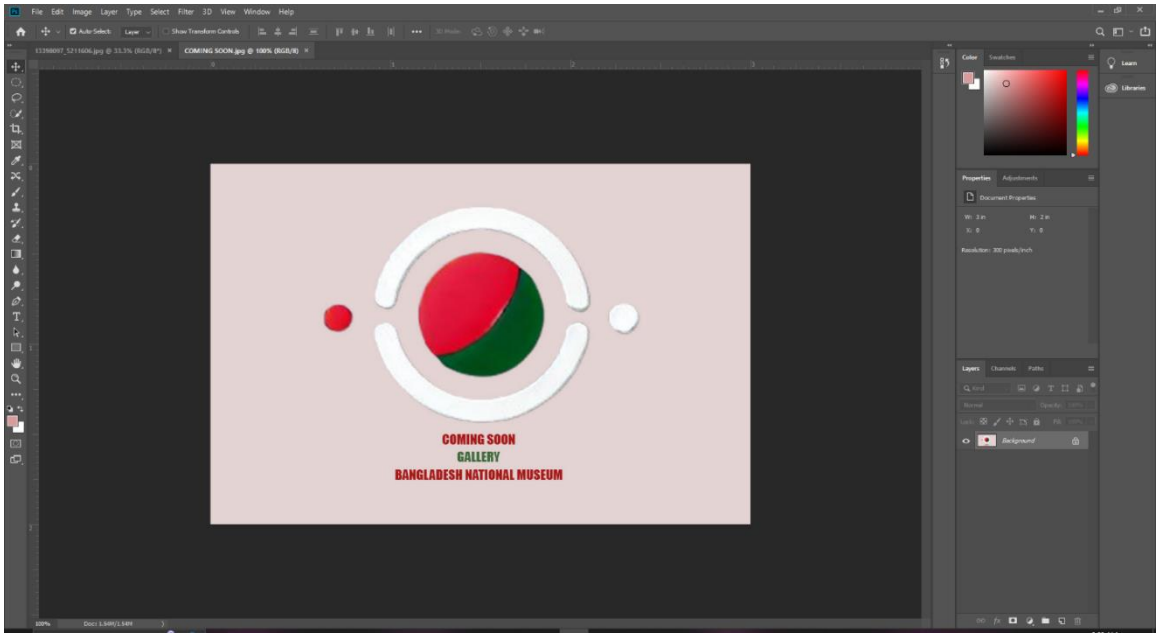


Figure 4.18 Button Icon & Coming Icon

Figure 4.19 Go to lobby Button Icon & Coming Icon

4.4 Final System Output Workflow

I successfully developed a fully functioning interactive application of the Virtual Bangladesh National Museum to explore the entire museum across scenes. Beginning with an easy-to-use Main Menu, I created a way to navigate to various areas of the site: returning to the outdoor environment from where you are, the lobby, the Musical Instruments Room, and the Cultural Monuments Room.

While the character is exploring the museum, I placed box colliders to trigger scene pop-ups that provide further information whenever the character enters a particular gallery. These pop-ups offer in-depth information about the exhibits in an interactive and amusing way. The lighting was also carefully planned, using ambient lights to create a general atmosphere and spotlights to highlight individual artifacts.

In the Unity environment, each room encapsulates the cultural importance of its exhibits, a relationship that its textures and models seamlessly fit. To capture the essence of Bangladesh's cultural heritage, I designed the virtual museum to be dynamic and engaging using interactive features, realistic visuals, and smooth transitions.

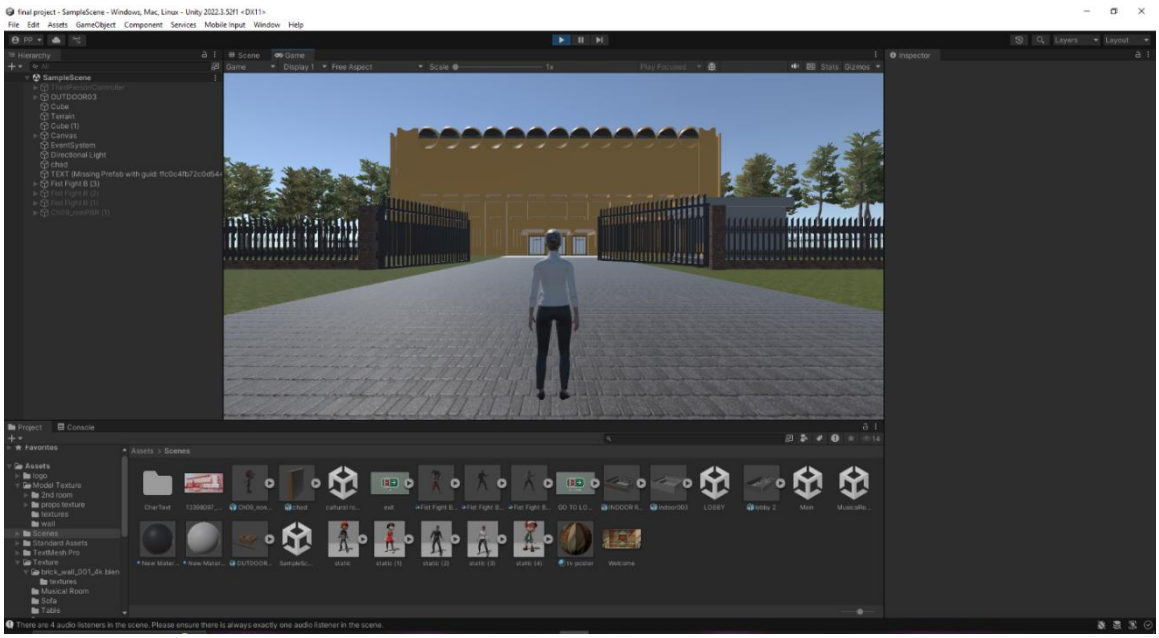


Figure 4.20 Select character for visiting museum

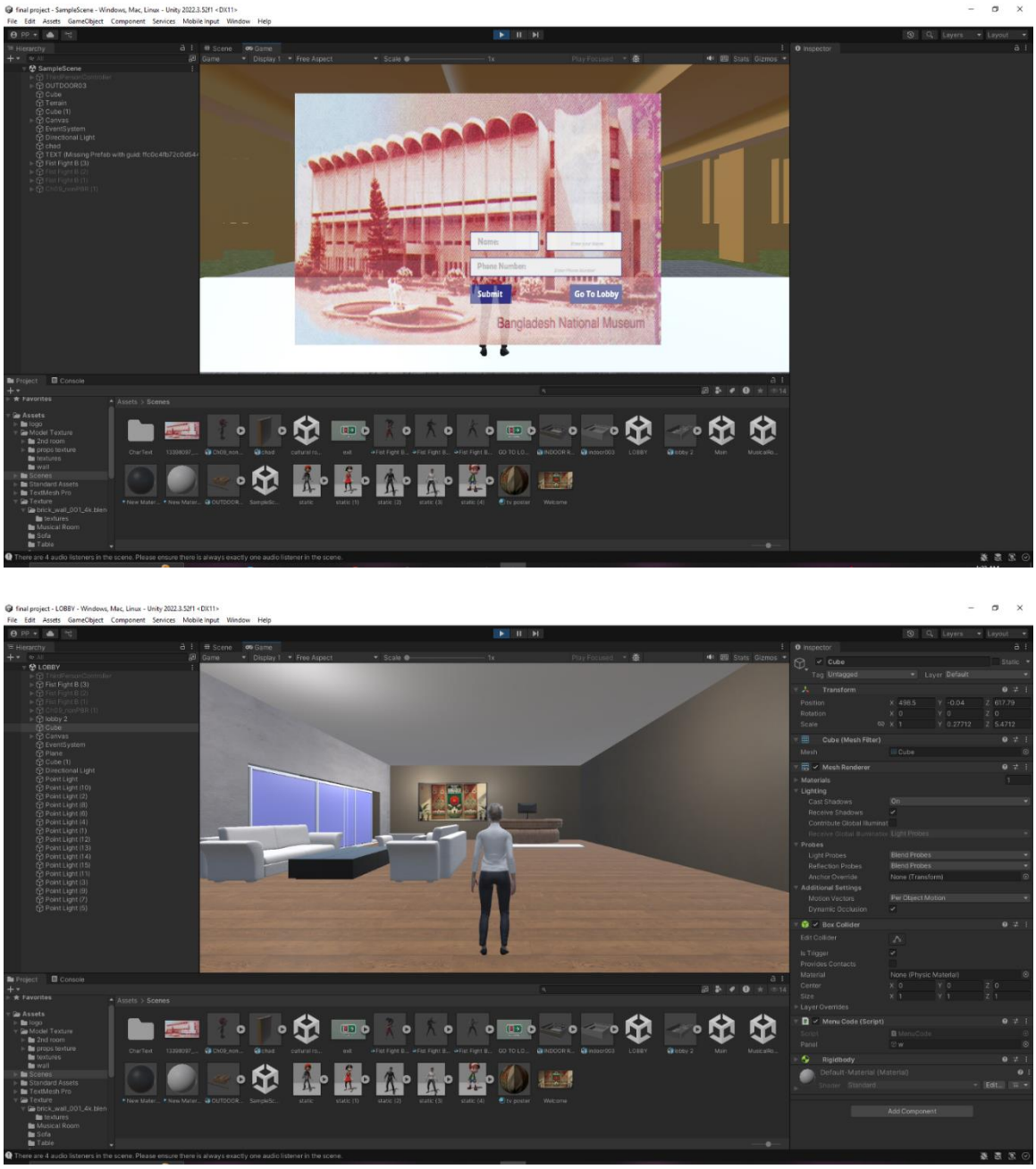


Figure 4.21 Login information & Enter lobby room

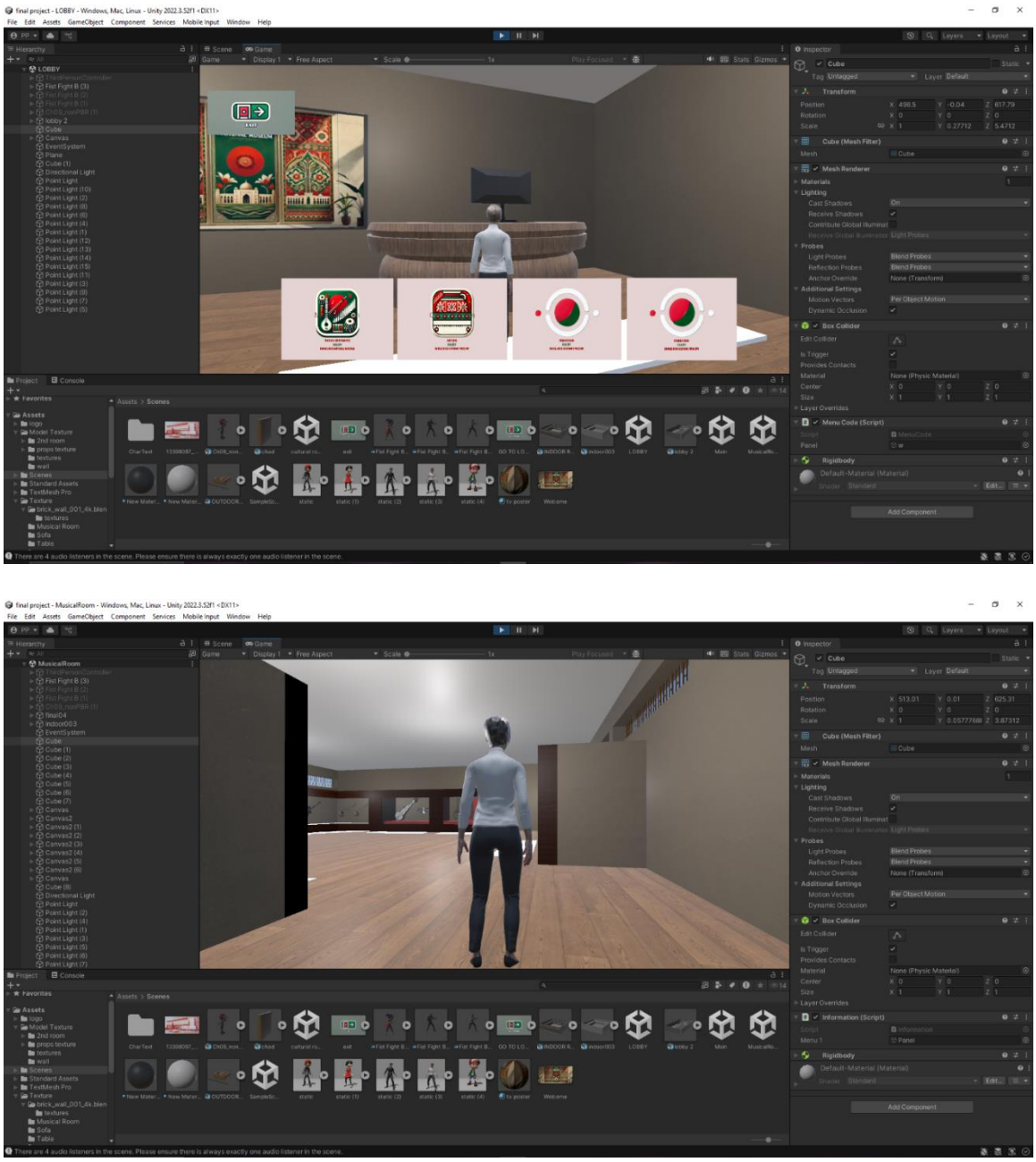


Figure 4.22 Select musical room & Enter musical room

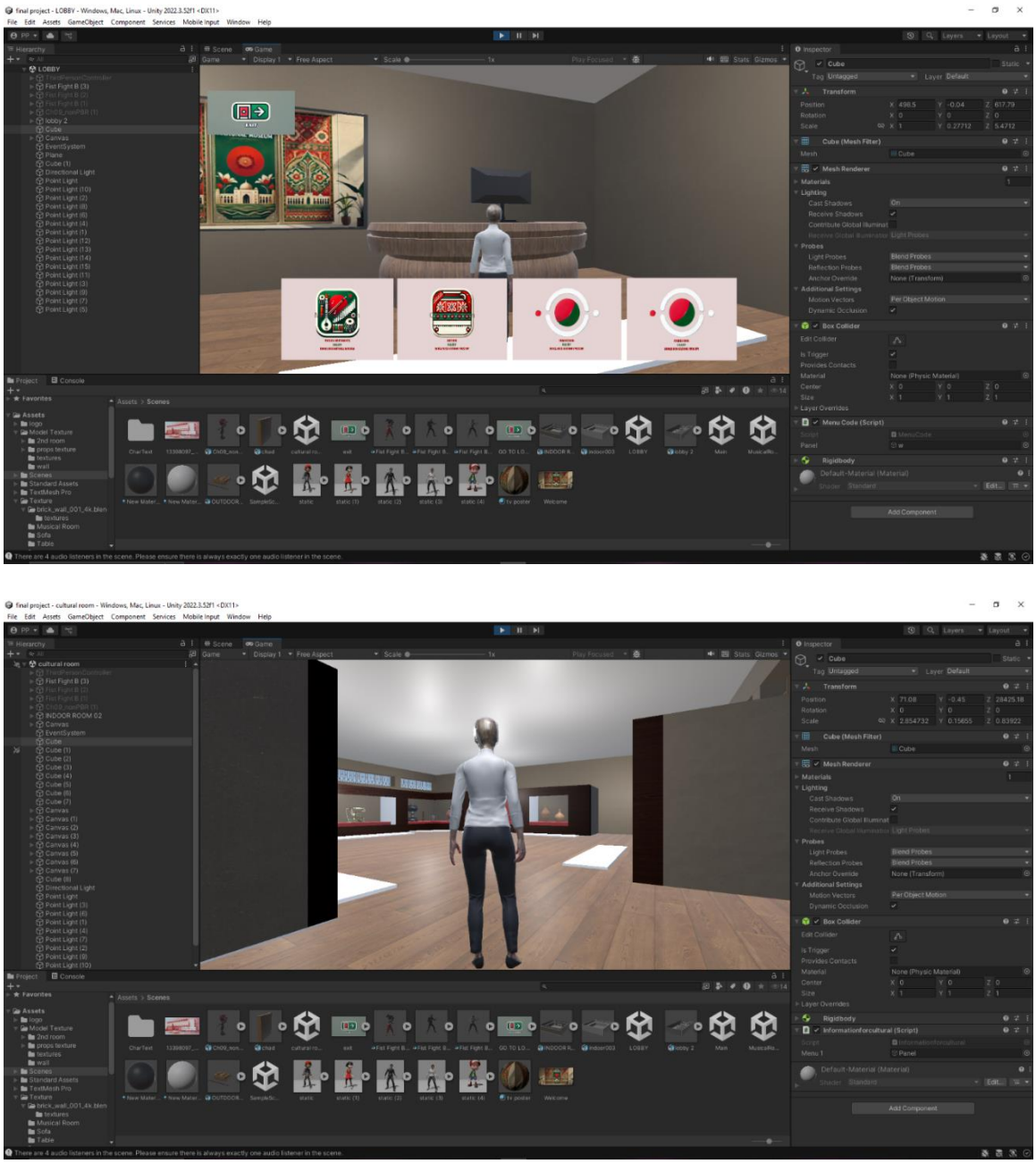


Figure 4.23 Select Cultural room & Enter Cultural room

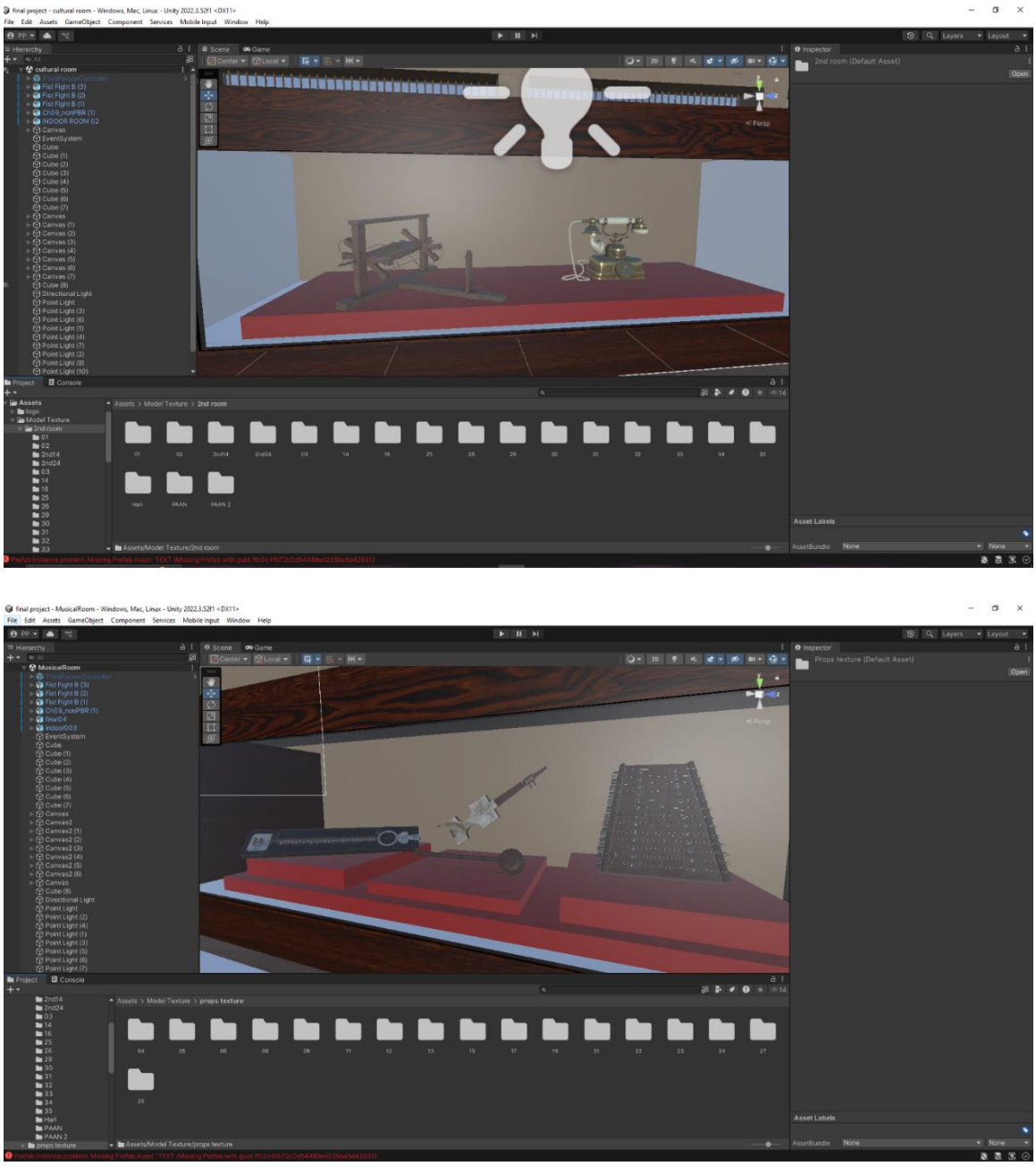


Figure 4.24Musical Room Final Setup

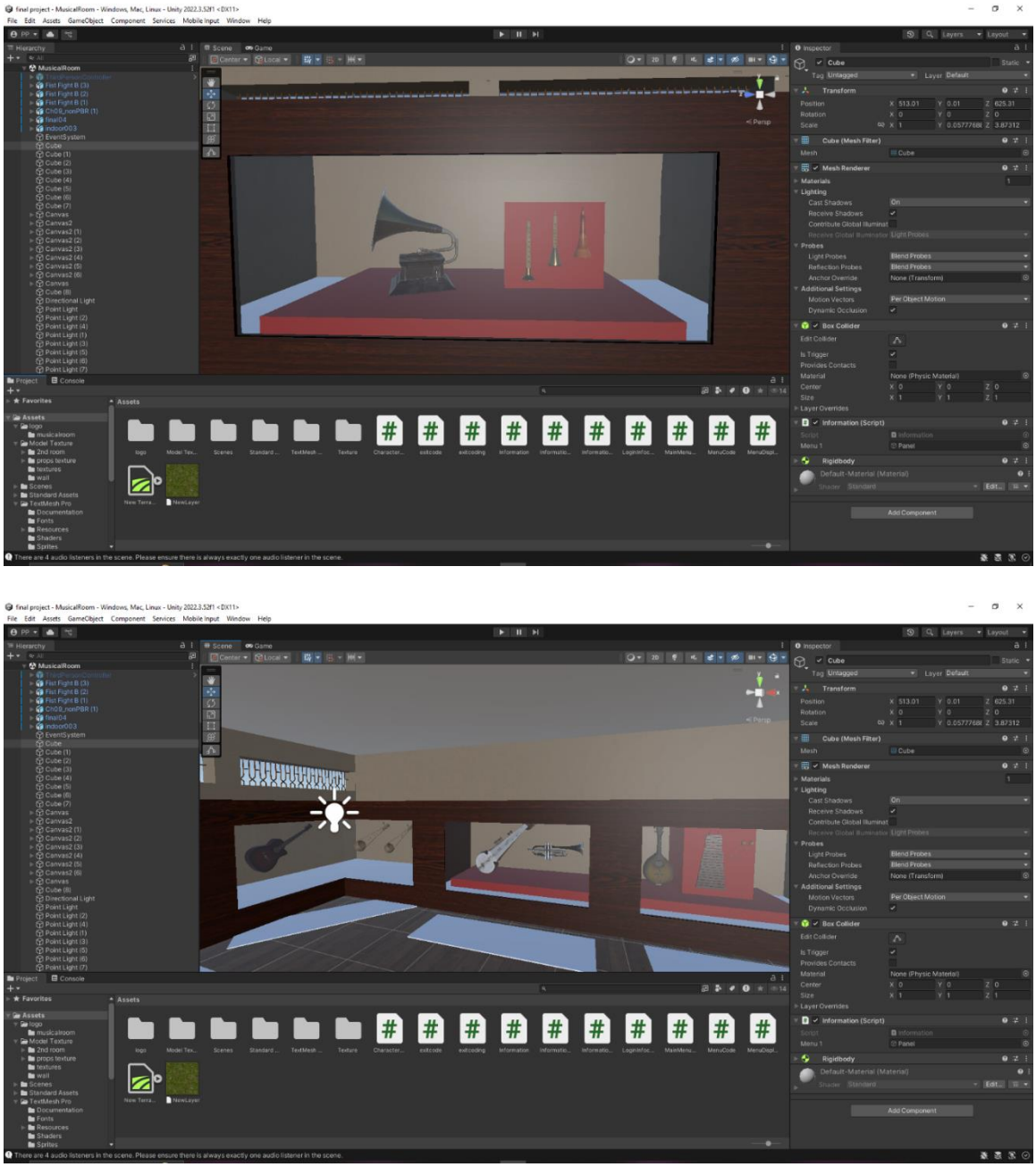


Figure 4.25 Musical Room Final Setup

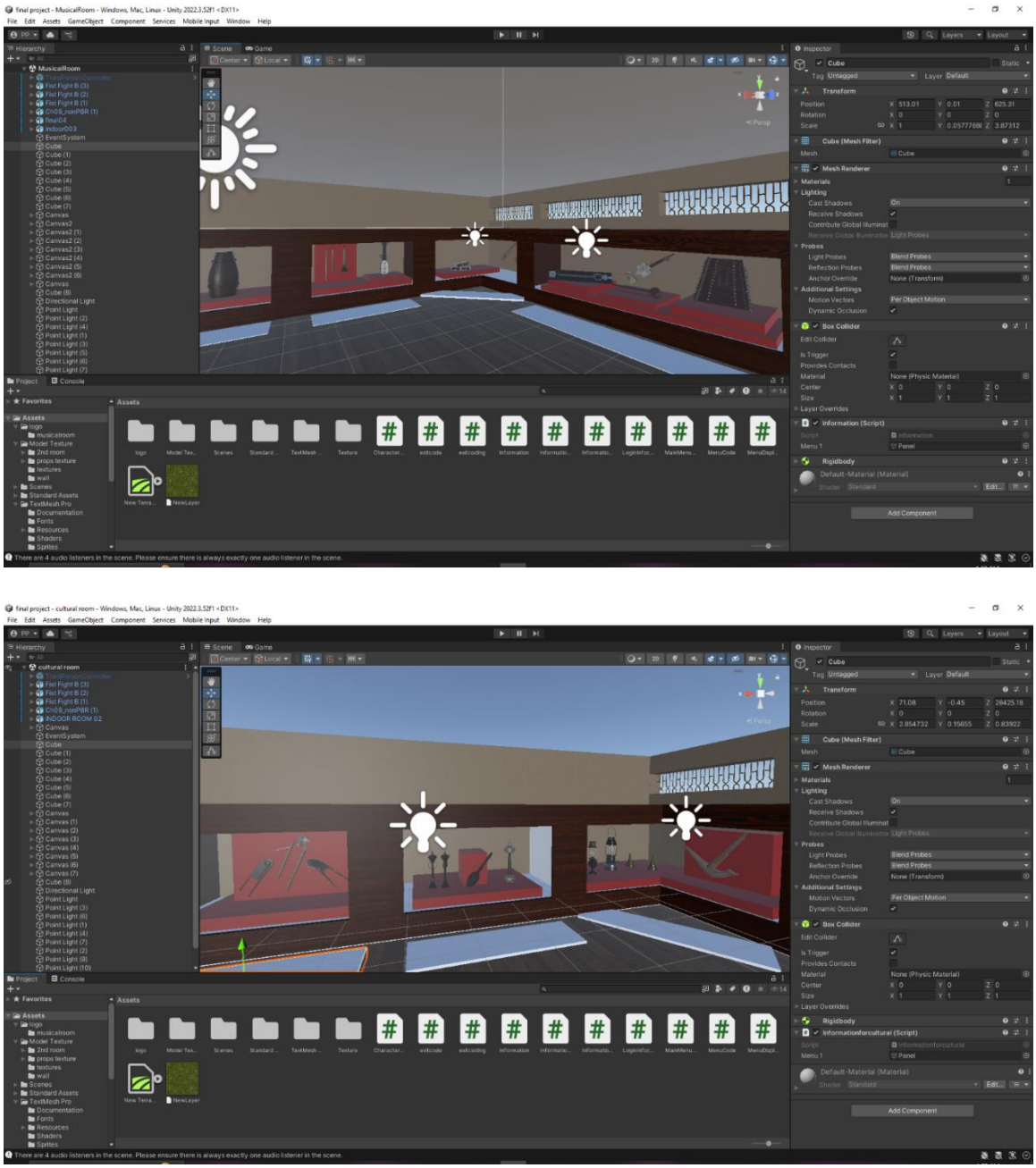


Figure 4.26 Musical Room & Cultural Room Final Setup

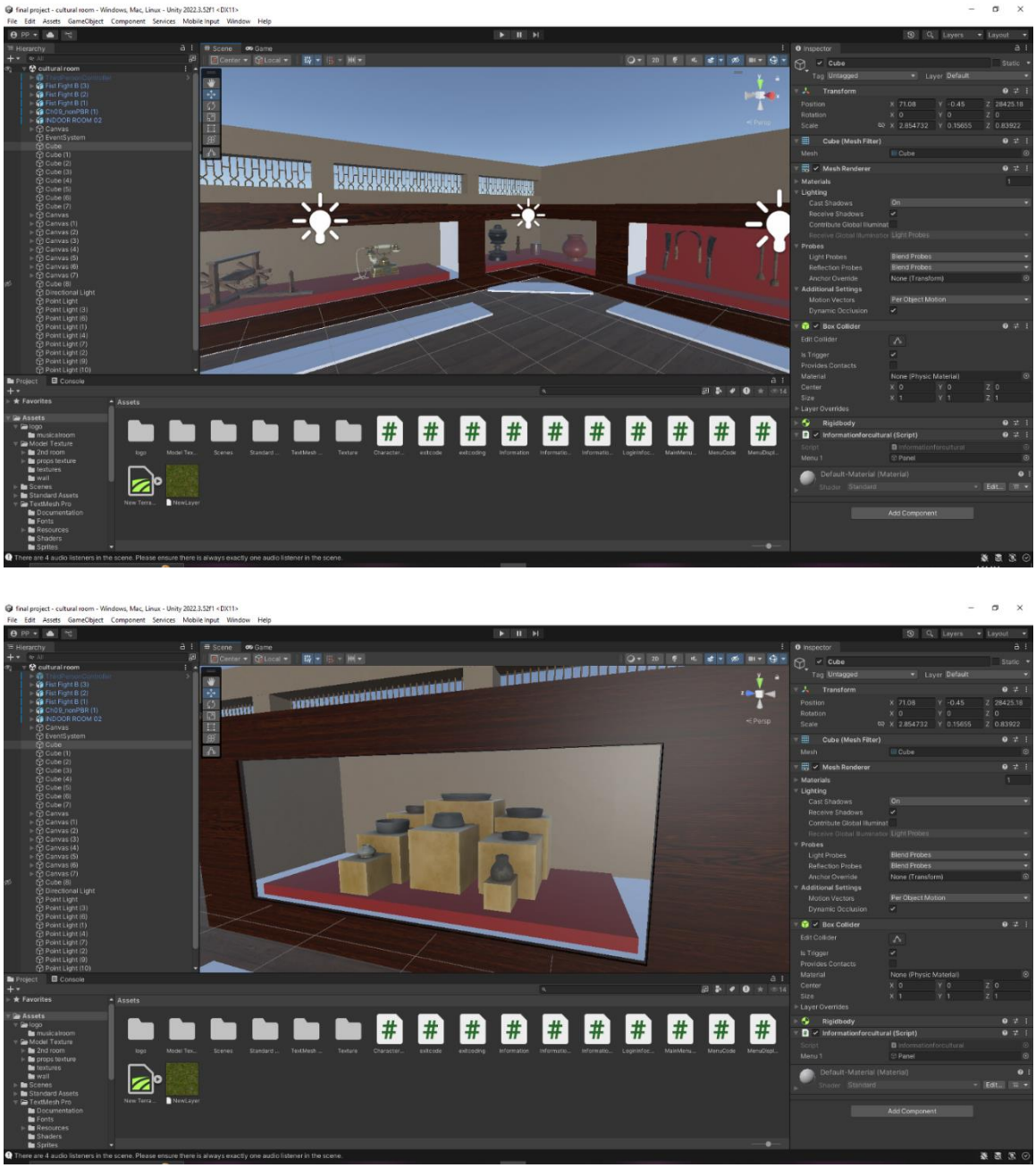


Figure 4.27 Cultural Room Final Setup

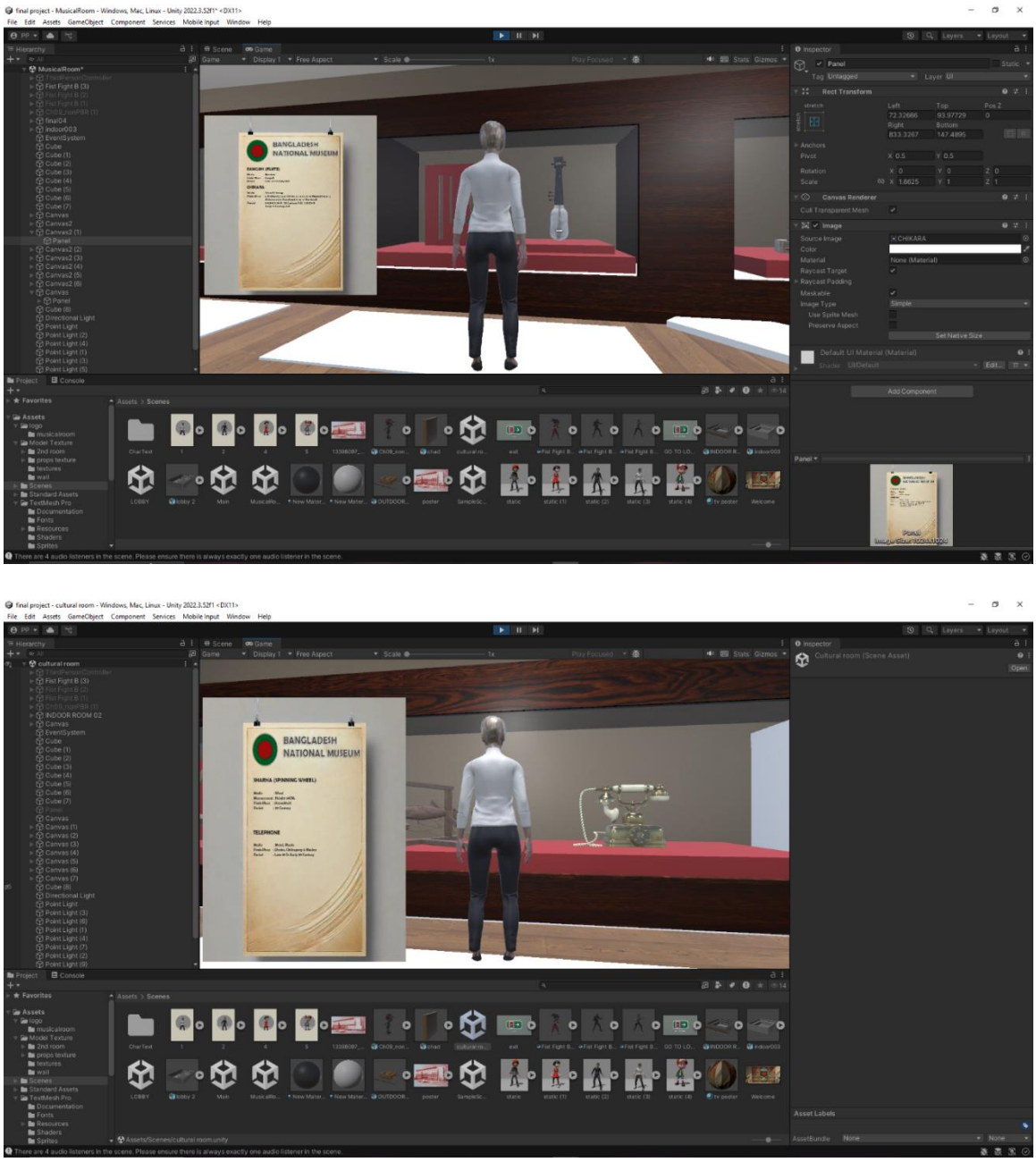


Figure 4.28Musical Room Information Cultural Room Information Final Setup

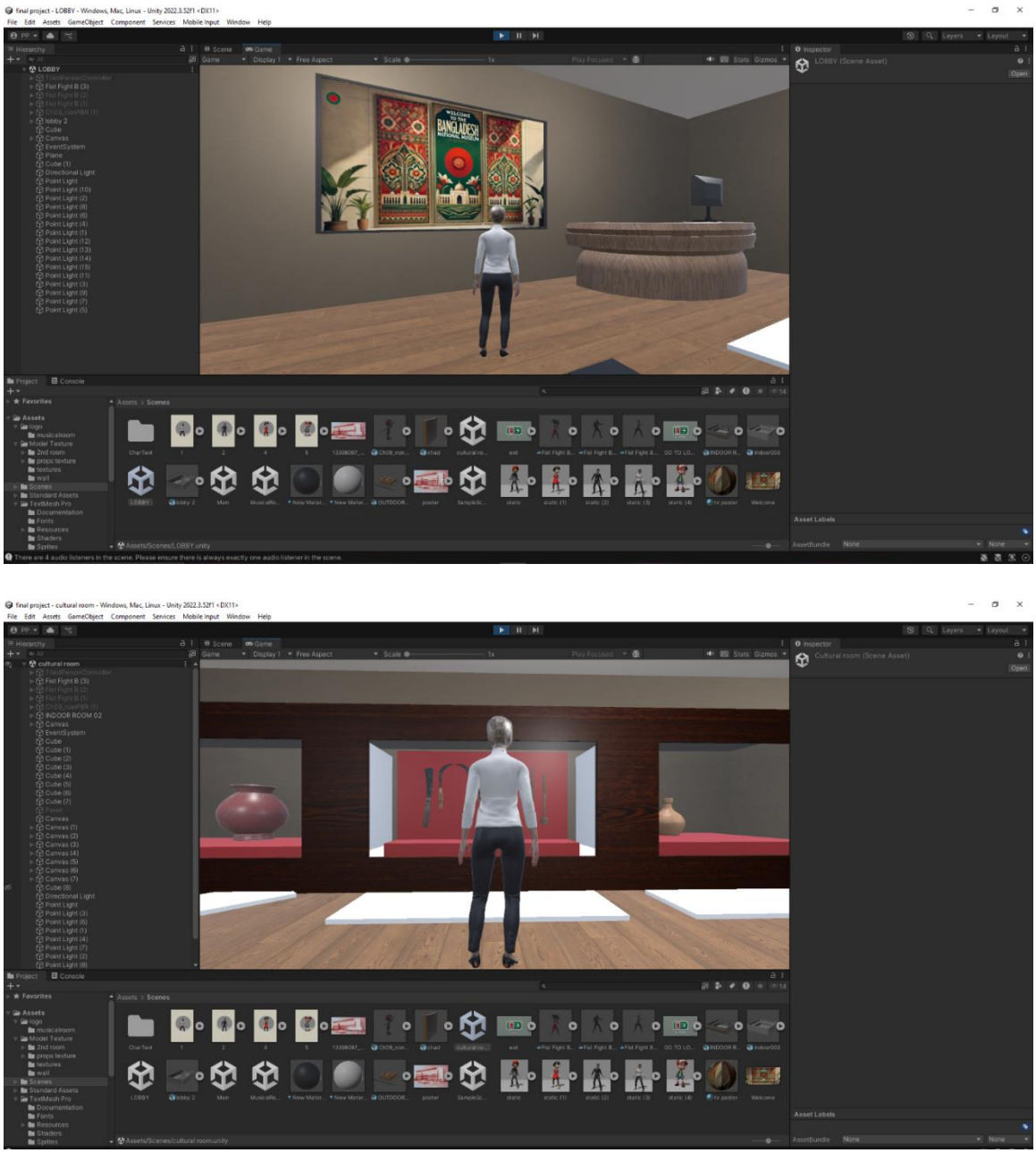


Figure 4.29 Lobby Room & Cultural Room Final Setup

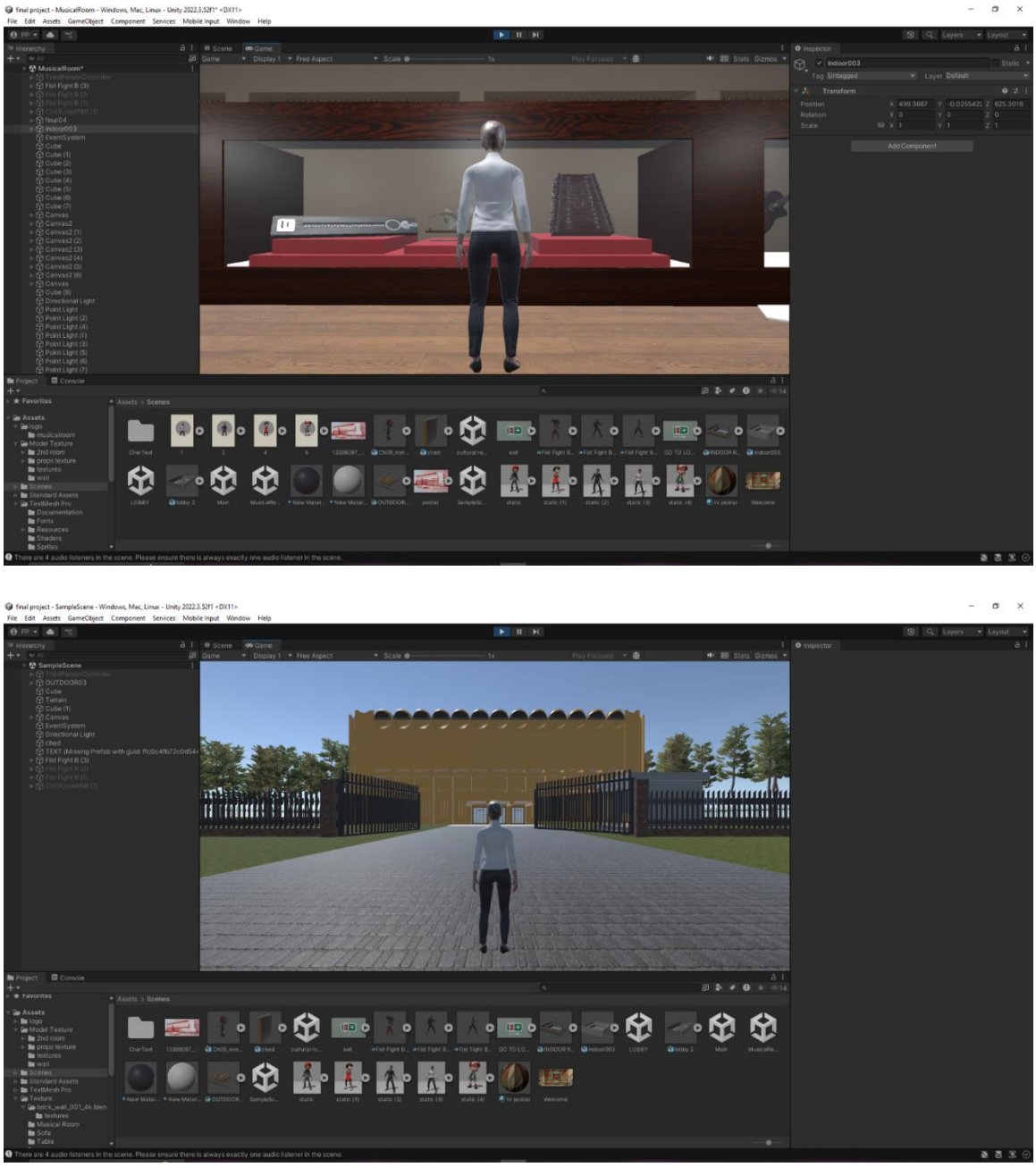


Figure 4.30 Musical Room & Outdoor Final Setup

Using this ordered workflow, the project work for Virtual Bangladesh National Museum was completed with Unity. The outcome is a dynamic and visually driven application that successfully represents the cultural and historical background of Bangladesh.

CHAPTER 5

Implementation and testing

5.1 System Implementation

In implementing the Virtual Bangladesh National Museum, importance was given to creating a virtual environment where cultural and exhibited items could be explored via character navigation and dynamic information. Unity was used as the foundation, providing seamless embedding and integration of 3D models, interactivity, and system optimization.

5.1.1 Unity Setup

The virtual museum was based on structuring the Unity environment and setting up its key elements:

1. **Scene Design:**
    - The project was divided into two major Unity scenes: the Musical Instruments Room and the Historical Monuments Room.
    - Each scene was designed to emulate the structure of the Bangladesh National Museum, ensuring a realistic spatial arrangement of exhibits.
2. **Character Navigation System:**
    - A character-controlled navigation system was implemented to allow users to explore the museum interactively.
    - Unity's NavMesh system defined walkable areas, ensuring smooth and precise character movement within the virtual space.

5.1.2 Dynamic Interactivity

We solve the virtual museum interactivity problem essentially by the automated display of information in addition to characteristics that determine the virtual museum navigation.

Dynamic Information Panels:

Unity's Trigger and Collider components were used to activate information panels when the character neared certain artifacts or gallery areas.

Example: As the character nears the Lalbagh Fort gallery, a panel appears onscreen providing historical information. When the character leaves the trigger zone, the panel is removed, keeping the interface clean.

Navigation System:

Users manipulate a character, which became necessary for the exhibits in the museum to be realistically navigated.The use of dynamic camera angles was used to give the best view of the exhibits to immerse the user.

Guided Tours:

A guided tour feature enabled the user to take a stroll through the museum on a pre-determined path, indicating important pieces.Educational content was provided through audio narrations, with corresponding visual cueing.

5.1.3 Optimization Techniques

The following optimizations were introduced to keep the performance stable:

Compressing Texture:

Textures were also compressed significantly, making very good use of the memory with in the bounds of the graphics card, while anything that could not help smooth rendering would hurt the quality.

Level of Detail (LOD):

Models were perfomed based on character distance to avoid undesired performance degradation.

Lighting Optimization:

Well, baked lighting retained realistic shadow and highlight detail, cutting down on run-time computational overhead.

5.2 Testing Implementation

In the development cycle, an integral step was the testing process to guarantee that every feature functioned flawlessly and the application provided a seamless experience across devices.

5.2.1 Functional Tests

Functional testing was performed to validate the key components of the virtual museum:

Character Navigation:

There was rigorous testing of the navigation systems responsiveness and room transitions.Test users said that movement controls were intuitive and error free.

Dynamic Information Display:

In effect testing of trigger zones worked to ensure they activated the right information panels at the right time.Feedback from users led some adjustments to the sizes and activation thresholds of the trigger zones.

Guided Tours:

They tested predefined paths of the tour moving through an ice tunnel and harmonic resonance chamber to validate the movement of the tour through all areas and the correct sync with narrations and visual cues.User testing would polish timing and transitions for consistency.

5.1.3 Performance Testing

Performance testing targeted to get and keep the 30 FPS goal across all devices:

Device Testing:

The app has been tested on different hardware platforms from high-end computers and mid-range laptops to phones.We have simplified the scenes and texture resolutions however the gameplay should still be smooth and playable across the range of supported platforms.

Efficient Lighting and Rendering:

This freed up runtime rendering costs as the shadows and reflections can simply be precomputed with the use of lightmapping techniques.Various optimizations helped to ensure smooth performance at this visual fidelity.

5.1.4 User Testing

A cohort of test users were asked to evaluate the virtual museum, including students, educators, and cultural enthusiasts. Observations included:

Ease of Navigation:

“With the mouse, users highly rated the character navigation system.Positive feedback mentioned that navigation promoted exploration.

Interaction with Information Panels:

Testers found the dynamic information displays clear and simple. The recommendations for new audio narrations were recorded for possible future development.

Overall Experience:

Users praised the immersive environment and the museum's functional interactive display of Bangladeshi culture.

5.2 Test Results And Reports

Testing enabled us to validate functionality, performance, stability, and user engagement capabilities in the system

5.2.1 Functional Outcomes

Navigation and movement controls run flawlessly on all devices tested.

Dynamic information displays triggered and displayed the pertinent information for each artwork.

5.2.2 Performance Results

Across all of the devices we tried, from smartphones to low-end laptops, the application held a steady 30 FPS.Optimization efforts resulted in consistent performance with no compromise on sight quality.

5.2.3 User Feedback Summary

Users testing the museum found it engaging and interactive.They also noted areas for potential future improvements including adding customizable viewing modes and audio descriptions.

Each digital artefact then underwent a period of implementation and testing, which brought to life the virtual museum as envisioned on paper. The interactive elements, stable functionality, and visually-engaging design showed its conduct as the tool for cultural education and preservation.

CHAPTER 6

SOCIETAL IMPACT, ENVIRONMENTAL IMPACT, AND SUSTAINABILITY

The Virtual Bangladesh National Museum reinvents the very way cultural heritage can be disseminated and preserved across a digitally interlinked world. It leverages virtual technologies to serve the goal of inclusiveness, education, and cultural exchange by reaching groups no conventional museum could serve.

Cultural Awareness and Preservation

Bangladesh has a rich, diverse cultural history, and preserving it is very important in terms of identity and pride. The connecting of modern technology with traditional heritage in the Virtual Museum is found in the following ways:

• It provides an interactive stage for the people to walk around and get acquainted with icons specially brought in, such as the ektara, tabla, and Lalbagh Fort.

• Make it possible for the cultural heritage that might not have the opportunity to physically present themselves in a museum to become accessible to all, including people from rural areas and expatriates.

Educational Advancement

Education is one of the mainstays of growth in society, and the virtual museum acts like an innovative educational tool:

1. Interactive Learning:
   Students will be interactively able to study historical artifacts and monuments for more insight into them. Guided tours and information panels can be further used by teachers to assist in history and cultural studies.

2. Accessible Research:
   Researchers and academics can access high-quality digital representations of artifacts for analysis and study. The virtual format allows for worldwide collaboration by scholars.

Global Cultural Exchange

The museum crosses borders, inviting global audiences to explore and appreciate Bangladesh's heritage:

• Such a virtual approach will let the tourists and culturally interested people seek the richness of Bangladeshi history without having to travel there.

• Virtual platforms are bound to foster a cross-cultural exchange of ideas, mutual respect, and, therefore, greater understanding between them in today's world.

6.2 Impact on Environment

Other than the social benefits, the virtual Bangladesh National Museum is also in tune with sustainable practices that reduce environmental impact related to museums.

6.2.1 Reduction in Carbon Emissions

Among the most important environmental benefits of virtual museums is a reduction in carbon emissions from traveling:
• Most of the traditional museum visits involve long-distance travels, even from abroad. One of the great contributions of the project is a big reduction in the issue of greenhouse gas emissions.

6.3 Resource Conservation

The operations of a physical museum require considerable resources:
• **Energy Consumption**: The consumption of electricity is high when it comes to maintaining ideal climate conditions in museums for preserving the artifacts. This is eliminated in the case of the virtual museum, as the collection is digitized.
• **Material Usage**: No longer any need for display cases, physical brochures, and other materials, reducing waste and resource dependence.

6.3.1 Artifact Preservation

The handling and transportation of artifacts for exhibition purposes increase the potential for damage:
• **Digitizing Artifacts**: This lessens the physical handling of the items, thereby preserving them for the future.
• **Virtual Backups**: Virtual copies can serve as backups should the original pieces get lost or destroyed due to natural disasters, theft, or deterioration.

6.3.2 Complementary to Physical Tourism

While virtual tourism reduces environmental impacts, it also enhances more traditional forms of tourism:
• **Preview Tool**: The virtual museum serves as an introduction, encouraging more mindful visits to the physical museum, helping to avoid overcrowding.

6.1 Ethical Considerations

The idea of a virtual museum develops around the issue of ethics in how cultural representation is done, accurately, respectfully, and inclusively.

6.1.1 Preserving the Cultural aspect

Authenticity is one of the pillars of the project:

• In-Depth Research Relation to Virtuality: The design reflects in-depth research on the real-live settings of the artefacts and galleries.

● Expert Consultations Descriptions, designs, and layouts were checked for accuracy with curators, historians, and cultural advisors.

6.1.2 Respecting in Cultural Sensitivity

Artifacts and monuments have significant cultural and emotional value. This project does that by:

• Preventing Exploitation: Preventing the commercial exploitation of cultural items.

• Respecting Traditions: Delivering content that honors what is sacred and traditional about each exhibit.

6.1.3 Accessibility for All

Inclusivity is one of the key guiding principles for its design:

• Disability Access: Audio descriptions, text-to-speech functionality, and adjustable text sizes will all be present to accommodate the visually and hearing-impaired.Validator: Accessibility Material aientertainment5

• Technological Inclusivity: The Virtual Museum can be run on a variety of devices ranging from high-end desktops to basic smartphones, meaning that no one is excluded based on technology.

6.1.4 Ownership and Intellectual Property

The Biden project respects the intellectual property rights inherent to digital assets:

• Licensing agreements: Required licenses for the use of external assets, such as 3D models or textures, were upfront.

• Acknowledged Properly: All ownership of traditional items is acknowledged accordingly, when the original items are the property of the Bangladesh National Museum.

6.2 Sustainability Plan

Tourism perspective is another important note when it comes to the overall sustainability of the Virtual Bangladesh National Museum. This will keep the platform interesting, affordable and technically sustainable in the long run.

6.2.1 Updates of Contents

A responsible digital museum has to adapt with the times:

• Expanding Collections: Other rooms and artifacts can be added to continually provide fresh, relevant content.

• Seasonal Features: Special exhibitions that cover festivals, anniversaries of events or a specific cultural theme will bring audiences back.

6.2.2 Scalability related to Technology

The platform's architecture makes it scalable as user demand increases.

• Cloud Hosting: Hosting of application in cloud based servers can manage increased traffic with no performance degradation.

• Cross-Platform Compatibility — Future updates can even improve the system for new technologies like VR and AR.

6.2.3 Working Together and Community Contributions

Work with stakeholders keeps the museum relevant:

• Partnerships: Educational institutions and cultural organizations can provide both funding and content support.

• Audience Expectations: The audience constantly changes its expectations and feedback mechanisms can help identify where we currently stand as a business.

6.2.4 Financial Sustainability

A sound business model is needed for long-term functioning:

• Monetization: Revenue can be generated through premium features (e.g., exclusive guided tours, educational packages).

Challenges around funding: • Sponsorships and Grants- the government and private sponsors may collaborate to provide the funds. Donations, You encourage users to donate money to cultural preservation and give them ownership and financial support in their own community.

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

This is a state-of-the-art project related to culture and technology. Virtual Bangladesh National Museum. And it did damn well as far as its actual mission: building an up to date interactive platform to find and share Bangladesh with the world. Reimaging the historic experience and display of cultural artifacts and monuments through 3D modeling, texturing and development in Unity for streaming.

Rather, the Musical Instruments Room and the Historical Monuments Room, the museum's two centerpiece spaces, do much more than replicate digital spaces. These broad, diverse worlds foster national pride and education. Users traverse those rooms as digital avatars, inspecting artifacts and reading about them through dynamic information panels. This design also facilitates individual discovery, and acts as an innovative teaching environment for instructors and scientists.

I mean, from a society point of view, the project is, I would say, really also about bringing people to access culture in a more wideness (more inclusive way), end quote. It also connects rural populations, migrants and global collectives with Bangladeshi heritage and legacy, eruption every geographic and physical barriers. The museum is designed for accessibility already, and can be accessed through almost any device, contributing to the democratization of culture as well.

Other major accomplishment: Environmental benefits Providing a virtual option for visiting the museum in person, the project also allows visitors to take the trip without traveling at all, vastly decreasing the carbon footprint in the process. Moreover, there is also a concern with regard to wear and tear of the artifacts in case of virtual replicas, thus protecting the masterpieces for future generations.

While the project was quite successful overall, there were a few challenges that the team faced, the most prominent of these being importing the 3D models into Unity. This went through many iterations due to texture alignment, model optimization and other challenges. User testing had also highlighted areas of improvement (internal navigation better and responsiveness of some interactive elements) These and other hurdles were tackled in an orderly fashion, with the team able to pivot with zeal to provide a finished viable product.

The Virtual Bangladesh National Museum: A new tech-enabled model for cultural preservation and education Jan 06, 2023 Jan 05, 2023 Jan 04, 2023 Less than a minute

Read Next And it is not just an end-state accomplishment in its own right, it is also past-starting-gate, real-time launchpad for better progress, creativity and social good.

7.1 Areas for Future Enhancements

What they have for a virtual museum now is an excellent foundation, but it can go much further. Improving upon the following aspects of the project would take it even further:

7.2 Content Expanding

New Rooms and Artifacts:

"More rooms could broaden the museum's reach to cover a multitude of interests and demographics." Possible themes include:

• **Traditional Attire:** Displaying garments such as the Jamdani Sari representing the dynamic development and craft of Bangladeshi textiles.

• **Ancient Manuscripts:** Showcasing historic documents, inscriptions, and calligraphy to highlight the nation's intellectual heritage.

Bangladesh Bangladeshi Festivals Cultural celebrations with Pohela Boishakh, its history and celebration today.

Regional Representation:

Future expansions can capture the regional diversity in Bangladesh by including unique traditions, crafts and histories there.

• Exhibits might highlight Chittagong's tribesmen artifacts, Sylhet's tea growing and Rajshahi's silk knitting.

Thematic Exhibitions:

• Seasonal and thematic exhibits can make the content lively and timely. For example, a special exhibition observing the 50th anniversary of Bangladesh's independence may well pique interest.

7.2.1 Deploying Emerging Technologies

Virtual Reality (VR):

• A museum in a VR setting would give the users an unprecedented experience to "walk" through the displays, interact with artifacts, and have such an experience so close to reality.

Augmented Reality (AR):

• The integration of AR could allow the user to project virtual artifacts into the physical environment. For instance, through AR users could see the life-sized model of the Lalbagh Fort in their own living room.

Artificial Intelligence (AI):

• Interactive AI tour guides would respond to user queries, recommend exhibitions based on preferences, and share additional context to exhibits.

Gamification Features:

• Create mini-games and challenges to make the museum experience more interactive and engaging. For example:

Scavenger Hunt: Users might be assigned tasks to "find" different artifacts throughout the virtual environment.

Quizzes: Tests of Bangladeshi history and culture knowledge.

7.2.2 Improving User Interaction

Interactive Storytelling:

• Artifacts might be paired with animated tales or dramatized accounts that re-create historical events.

• **Example:** Users could discover the historical importance of the Shaheed Minar through an immersive narrative of the Language Movement.

Collaborative Experiences:

• Social features might allow for group tours, with friends or classmates exploring the museum together synchronously.

• These users could narrate their experience on social media, amplifying the museum's reach and visibility.

Learning Modules:

• Modular guides could be customized for different ages or academic levels. This is crucial for the system.

• School leaders might add these modules to history or cultural studies classes. We Must focus on this side.

7.2.3 Widening Access

Supporting Multilanguage and Localization:

• Providing translations in dominant global languages (Bengali, English, Hindi and French) would extend the reach of the museum across the world.

• Voice-overs in different languages may allow for broader audience reach.

Disability-Friendly Features:

• Including important features such as closed captions, audio descriptions, and alternative navigation options would provide every user with access who has some sort of visual, auditory or physical impairment.

7.2.4 Sustainability & Scalability

Partnerships:

• Partnerships with academic, cultural and NGO organizations could offer financial and technical support;

• Collaborations with other global museums may allow for exchange of knowledge as well as cross-cultural exhibitions.

Contributed by the Community:

• A user contribution model would invite the public to submit digital content, like photographs or oral histories, and add value to the museum's database.

Financial Viability:

• Offering premium features, such as tours behind the scenes or exclusive exhibitions, could generate revenue to keep the operation financially sustainable.

Scalable Architecture:

• And migrating to a cloud infrastructure would allow us to scale effortlessly as traffic to the platform increases along with the popularity of the museum.

• Frequent updates and optimizations will ensure the platform remains contemporary and effective.

CONCLUSION

As an ambitious and fulfilling project to revolutionize my experience creating the future of cultural heritage preservation, I developed the Virtual Bangladesh National Museum. In this project, my goal was to develop a digital platform to photograph and allow users to interact with the various history and artifacts available throughout the Bangladesh National Museum. Using the latest technologies including 3D modeling, texturing and Unity-based system integration, I was able to provide a contemporary solution for presenting the cultural heritage of the country to a global audience. This project tackles some major issues, like accessibility and preservation. I know that not everyone can physically visit the Bangladesh National Museum, for geographic or logistical reasons. So, as I was developing this website, I was keen to make it avocado, by which I mean to ensure that anyone who is interested in exploring heritage of Bangladesh will be able to access it easily through this virtual platform. My aim was to overcome these constraints by designing a museum that the users can tour anywhere around the world, promoting a universal recognition of the history of the country. Preservation was another primary driver of this project. I knew that physical artifacts can be fragile, subject to deterioration from the elements and time. Through the construction of these detailed 3D models of artifacts & ensuring their endurance in a digital format. Such an approach not only protects the cultural heritage of the country of Bangladesh, but also enables educators, researchers, and students who explore these treasures without impacting their physical integrity. Digital preservation makes these artifacts accessible and relevant for future generations.One of the key aspects of my work was interactivity. I thought this theme would lend itself well to an interactive experience unlike museums where most of the time people walk around passively, I wanted it to be more active. I implemented various interactive features like interacting with artifacts, guided tours, and character selection. I wanted to design something that allowed the user to explore and also be curious, which I hoped, especially with younger audiences and those who were already familiar with these digital platforms, would make learning about culture more enjoyable and meaningful. Sustainability was another design consideration for this project. This practice of digitizing the museum helps to mitigate the costs of energy consumption related to lighting and climate control, much of which is a time-consuming process, thus impacting the environment. My methodology exemplifies how digital methods can support sustainable stewardship of cultural heritage within resource-sensitive contexts. The project is part of a global goal to adjusted sustainability and is example of how cultural institutions can combine eco-friendliness with good practices.

Moving forward, there is tremendous potential for this project to grow. I plan to get augmented reality (AR) and virtual reality (VR) technologies to provide an even profounder experience. AR can allow users to place 3D models in their own space while VR can provide a real-like walkthrough of the museum. I hope to include gamification and collaborative learning features as well, to make the educational component of the platform even stronger. Mark taking the museum to the next level by adding in an extra two rooms and some other artifacts. This project was not only technical but it became a personal mission to bring technology closer to cultural heritage. My motto would be: innovation and tradition together is a perfect way for keeping past stories and artifacts fresh and inspiring for future use! With this work, I have tried to both preserve history of Bangladesh and make it accessible and engaging for people of all ages and backgrounds."

All in all, through this project, Virtual Bangladesh National Museum, I am expressing my pledge to keep the heritage and identity of Bangladesh alive through technology. The project unites past and present, allowing the past to be remembered and celebrated. This experience also challenges me to think about future advancements in the field of cultural preservation, ensuring that the history of Bangladesh will be something that generations from now on can learn about through these built structures, accessible to everyone through sustainability and interactivity.

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