Fall 2024 - MO2 - UX/UI Design for VR/AR/MR

Treasures of the Realm

An Immersive VR Adventure

Project Guide:
Prof. Ciera Jones

Project By:
Ankita Borwake

Overview

Study of affordances in VR

I am designing and developing this VR gem-collecting game to explore the application of Norman's design principles, such as affordances and feedback, in creating an intuitive and engaging user experience. This project combines my passion for gemstones with a hands-on study of interactive VR design.

Background

How I choose my game?

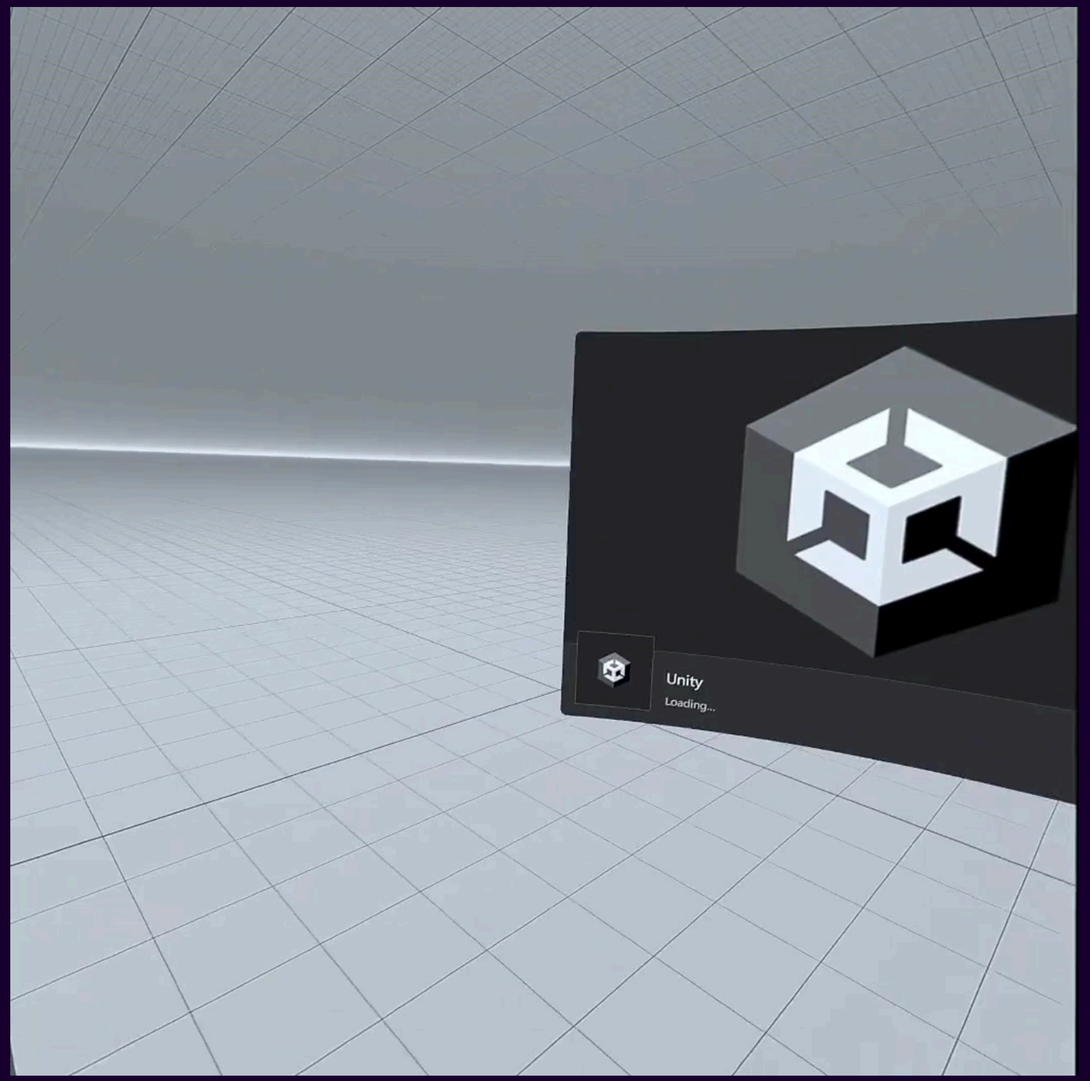
As a child, I loved collecting marbles—the ones that stood out with unique colors and patterns. Growing up, that fascination shifted toward crystals and gemstones, especially in minimal jewelry. Each gemstone felt like it held a bit of magic, a small treasure to add to my collection.

Inspired by this childhood love, I decided to create a VR game where players can experience the joy of collecting gems. This game lets people who share my fascination gather beautiful gemstones in an immersive world, combining my passion for gems with my goal of studying VR affordances and UX principles in a truly interactive experience.

Introduction

Game Idea

The VR game takes place in a lively, virtual world where players see colorful gems scattered around a medieval-inspired environment filled with walls, treasure chests, and glowing gems. The goal is for players to collect these vibrant gems using a virtual basket. Each gem collected adds to the player's score, which updates in real time, creating a fun and satisfying experience.



Goals and objectives

Why I am doing this project?

- To learn how UX design principles like affordances can make VR games more enjoyable and user-friendly.
- To build hands-on skills in VR development learning unity software.

Goals and objectives

Who will be benefited from this?

- Students who wants to study how affordances work in VR environment.
- For players who wants to enjoy VR experiences but are new users.
- Who loves to play treasure-hunting games.
- Who is as fond of gems as me, but can’t collected them all in real life.

Goals and objectives

How I want to study this?

- By designing and developing a small game using unity software.
- To implement pointing, grabbing, throwing and other affordances in this VR game.
- To make this game user friendly and engagement by implementing UX design principles.

Goals and Objectives

How the success will be defined?

My goal for this game is to make it easy and enjoyable for any new user to play. If players find it user-friendly and engaging, then we've successfully applied the right design principles. We aimed to create a VR experience that feels close to real life by focusing on the design principle of affordances, ensuring that interactions feel natural.

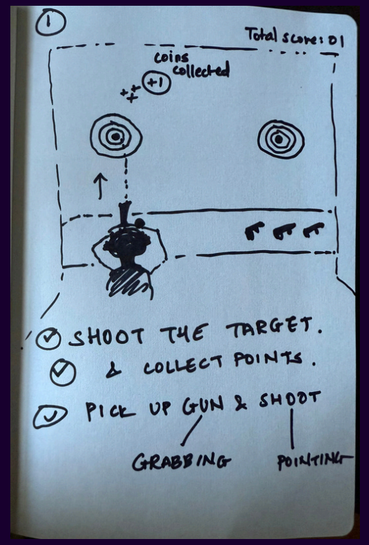
If I was able to strengthen my skills in VR development, user-centered design, and Unity software.

Ideation Phase

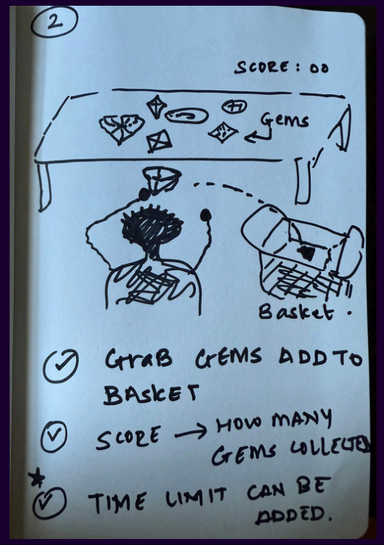
How I Started?

I wanted to study affordances in VR, and my major focus was to implement **pointing**, **grabbing, and throwing** interactions. So I came up with the 4 different game ideas from which I resonated with Gem Collection most because of my childhood memories. In this way, my study procedure will be fun!

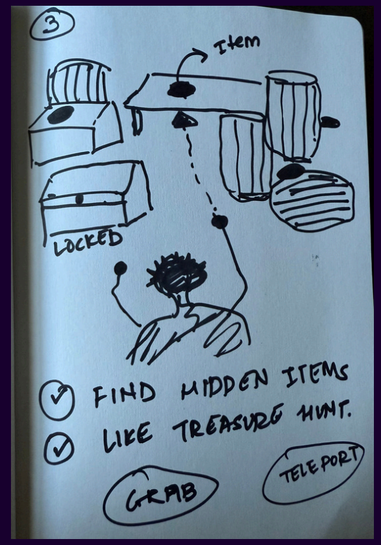
1



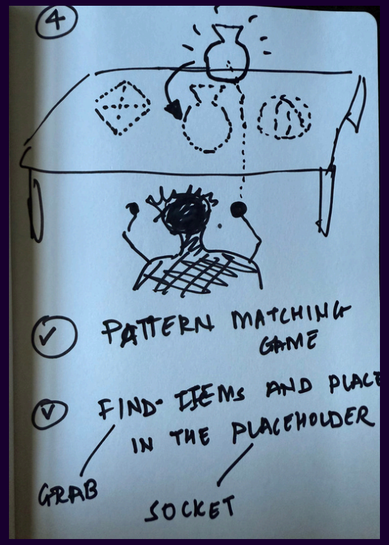
2



3



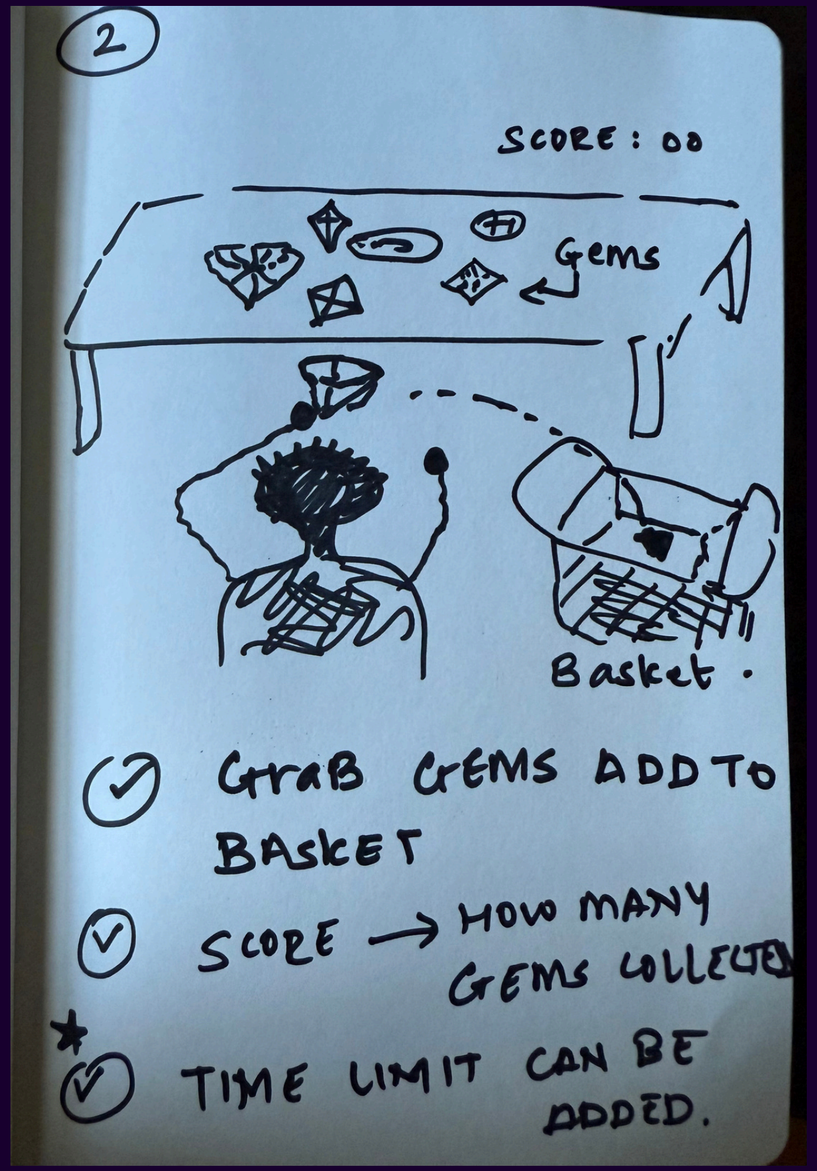
4



Ideation Phase

Refined game idea

- A gem-collecting game where players point, grab, and throw gems into a basket to score points.
- Each successfully collected gem increases the player's score, which updates in real time.
- I chose a medieval theme because it was a time when people raided castles and lands for treasures and jewels. This setting makes the game feel adventurous, as players collect gems like treasure hunters exploring old forts.



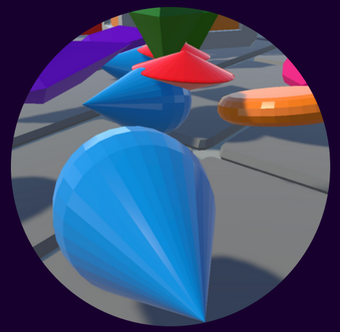
Requirements

Tools & Resources

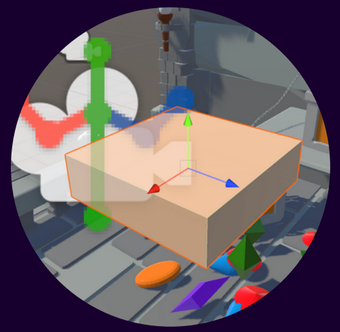
Tools	Version/Source	Description
Unity	2022.3.23f1	Software for developing and designing the VR game environment and mechanics.
C# Programming Language	Visual Studio Code	Language used for scripting game logic and interactivity.
ChatGPT	Open AI	Reference tool for coding assistance and problem-solving.
Unity Asset Store	Unity Platform	Source for VR interaction agents and various game assets.
Itch.io	https://itch.io/	Source for environment assets to create an immersive game world.

Developing phase - step 1

Environment setup in unity

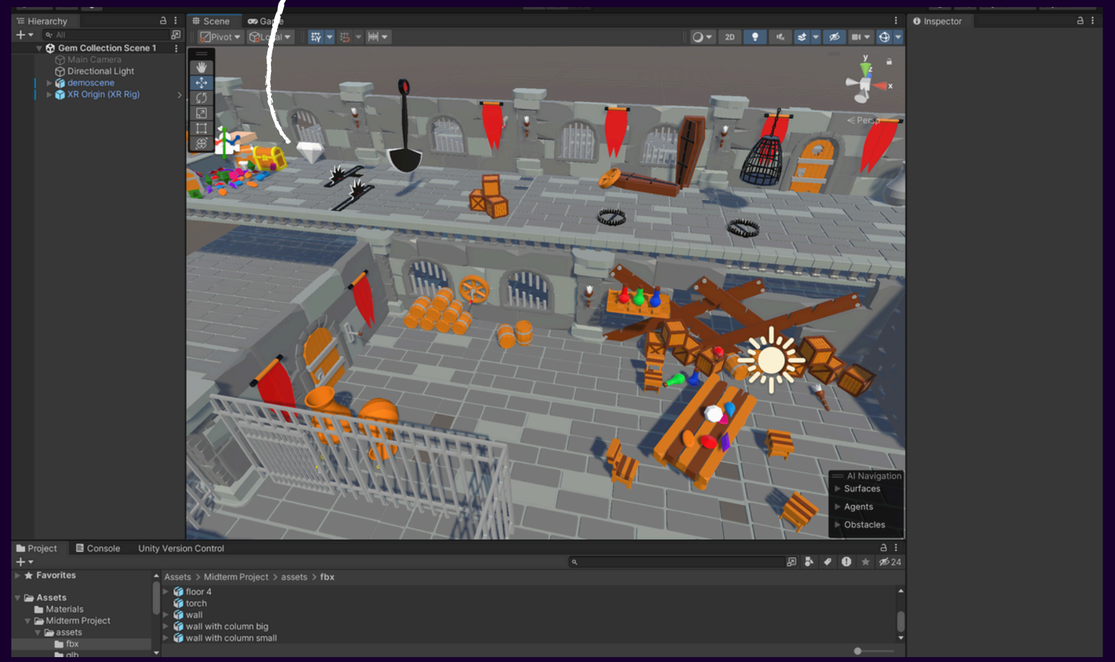


Made adjustments to some assets, adding materials and textures to enhance realism.



Added a temporary basket (a cube)to get started with.

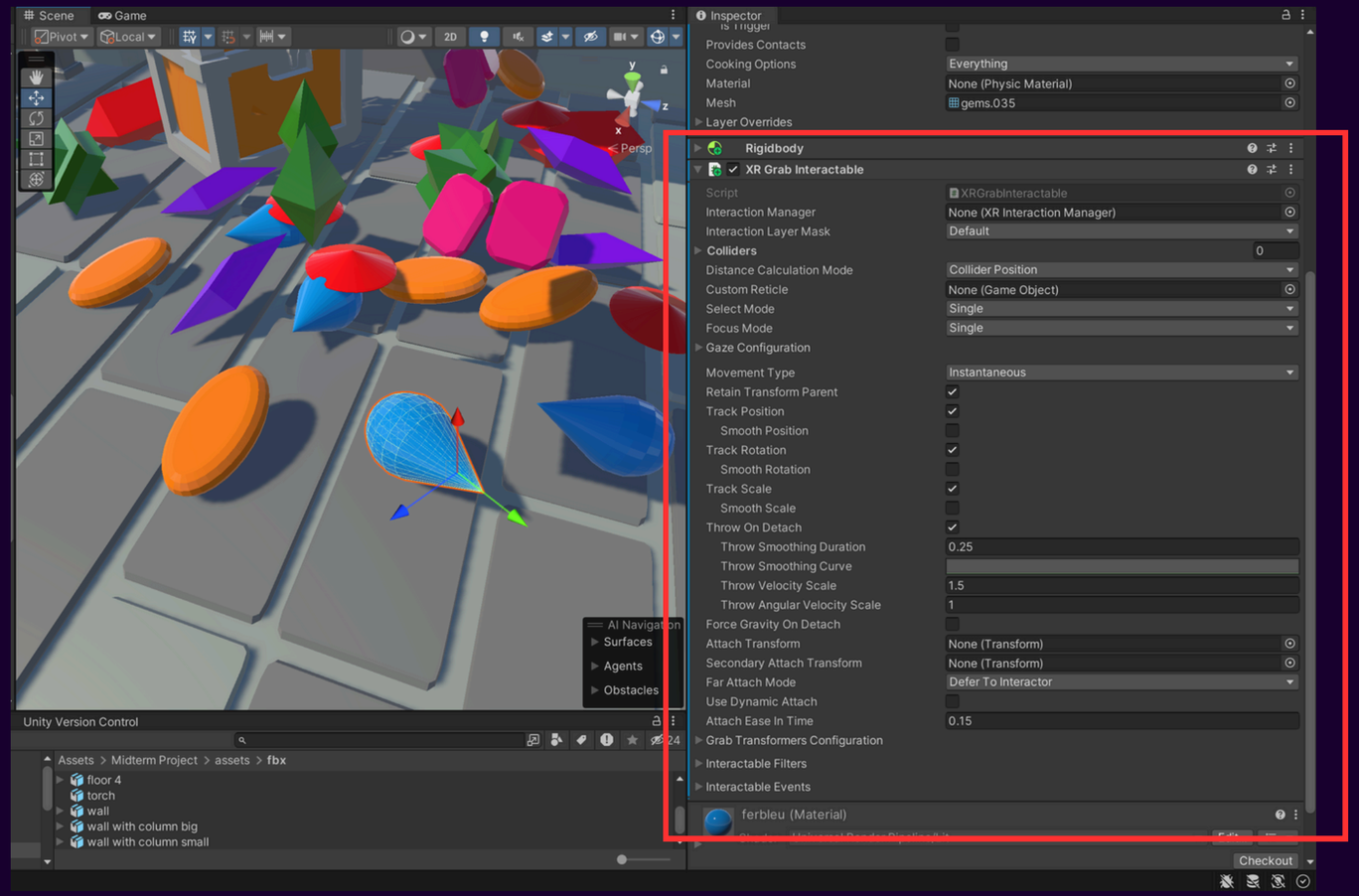
Set up the environment layout, placing key elements like walls, floors, and props.

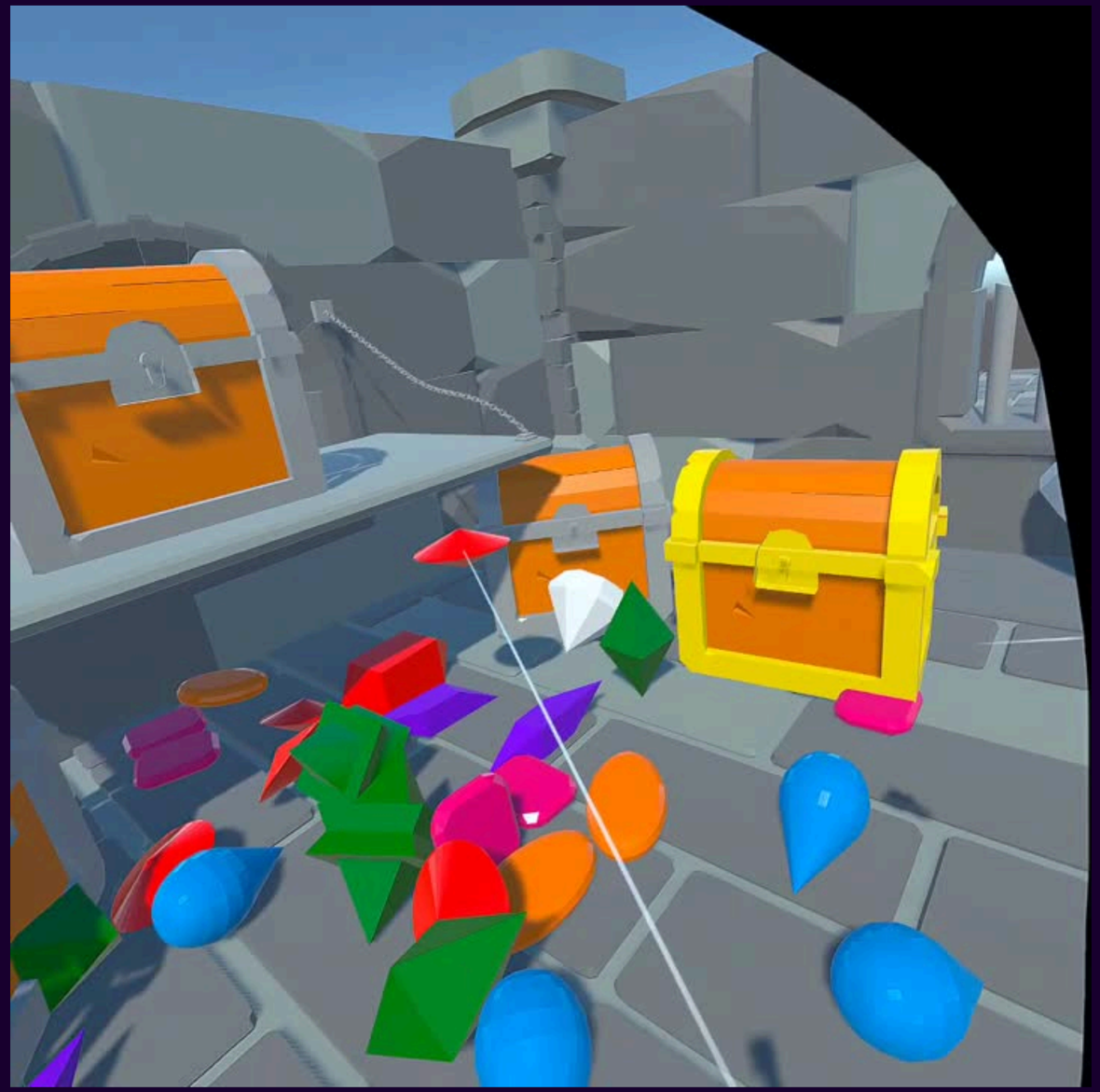


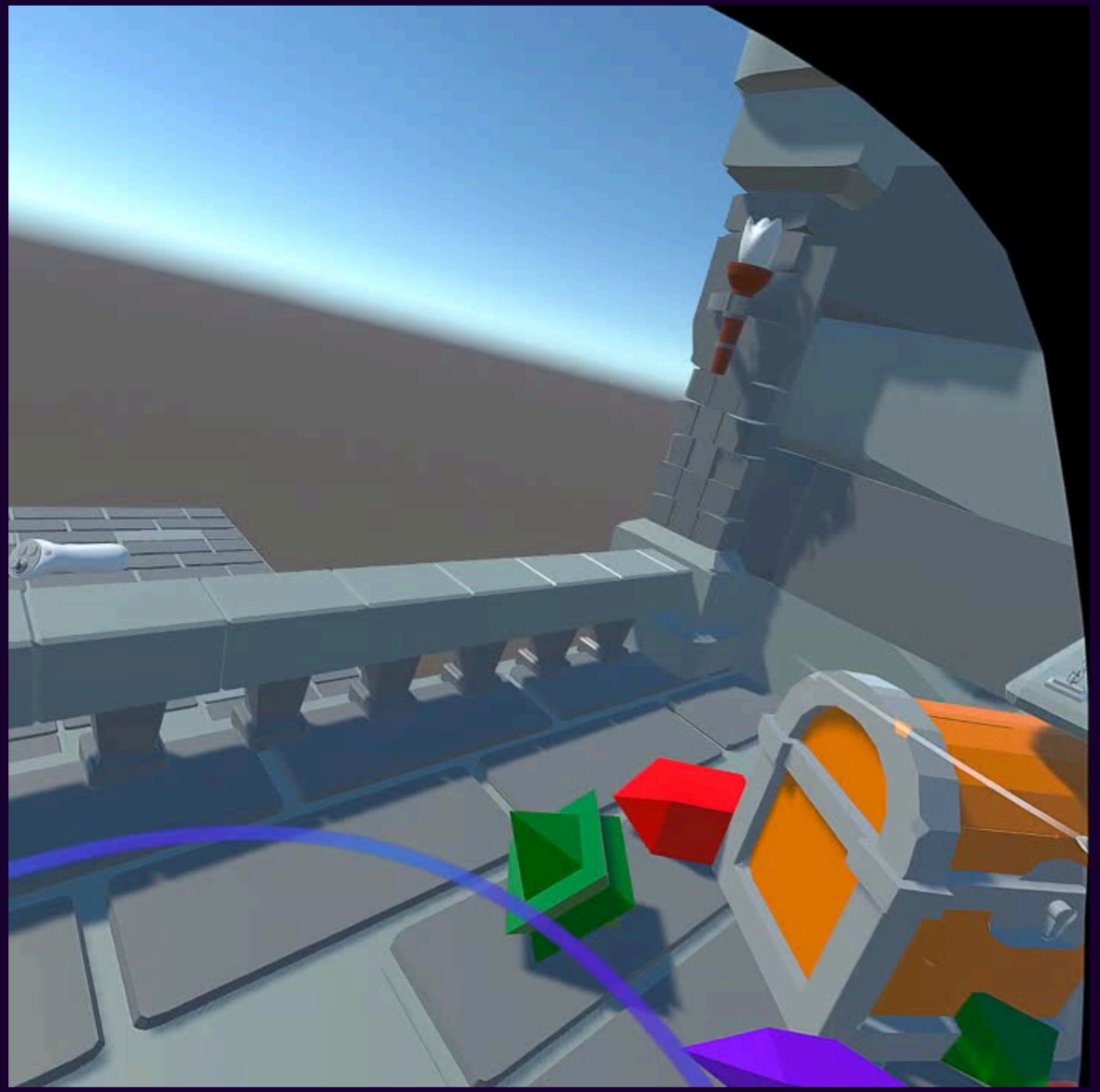
Developing phase - step 2

Core part of the game

- The main part of my game is collecting gems in a basket.
- To make the gems interactive, I used a component called **XR Grab Intractable** in Unity. I attached this to each gem so player can grab them all.
- Then, I tested to make sure it works smoothly.



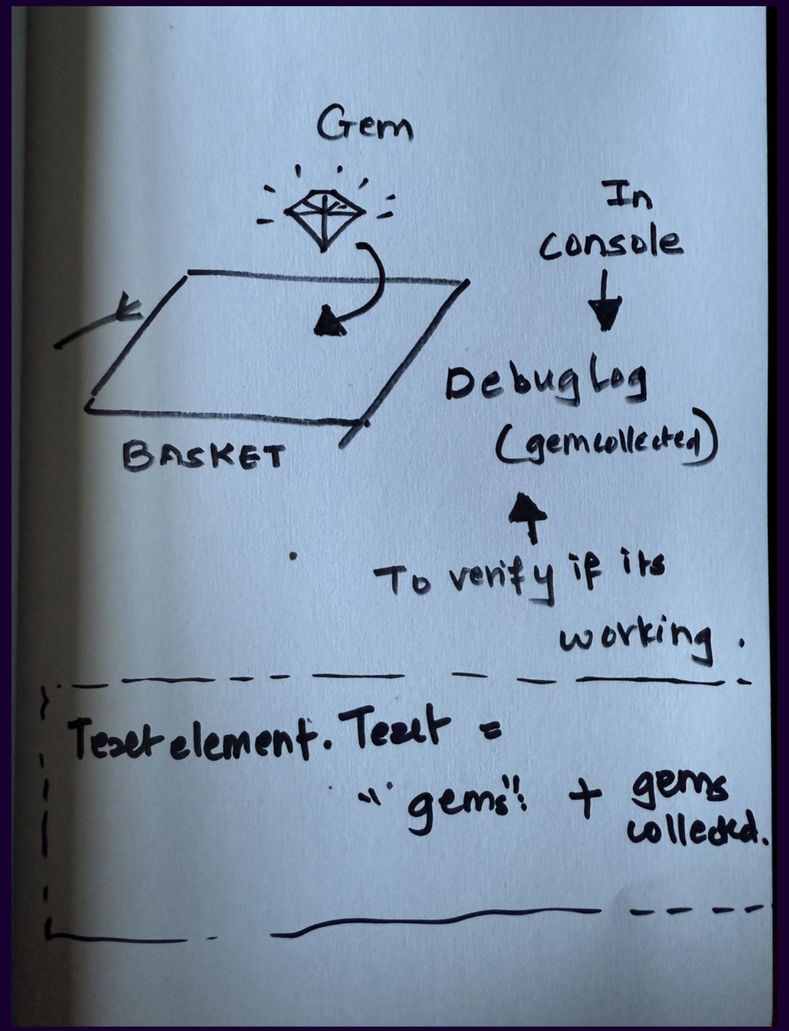




Developing phase - step 2

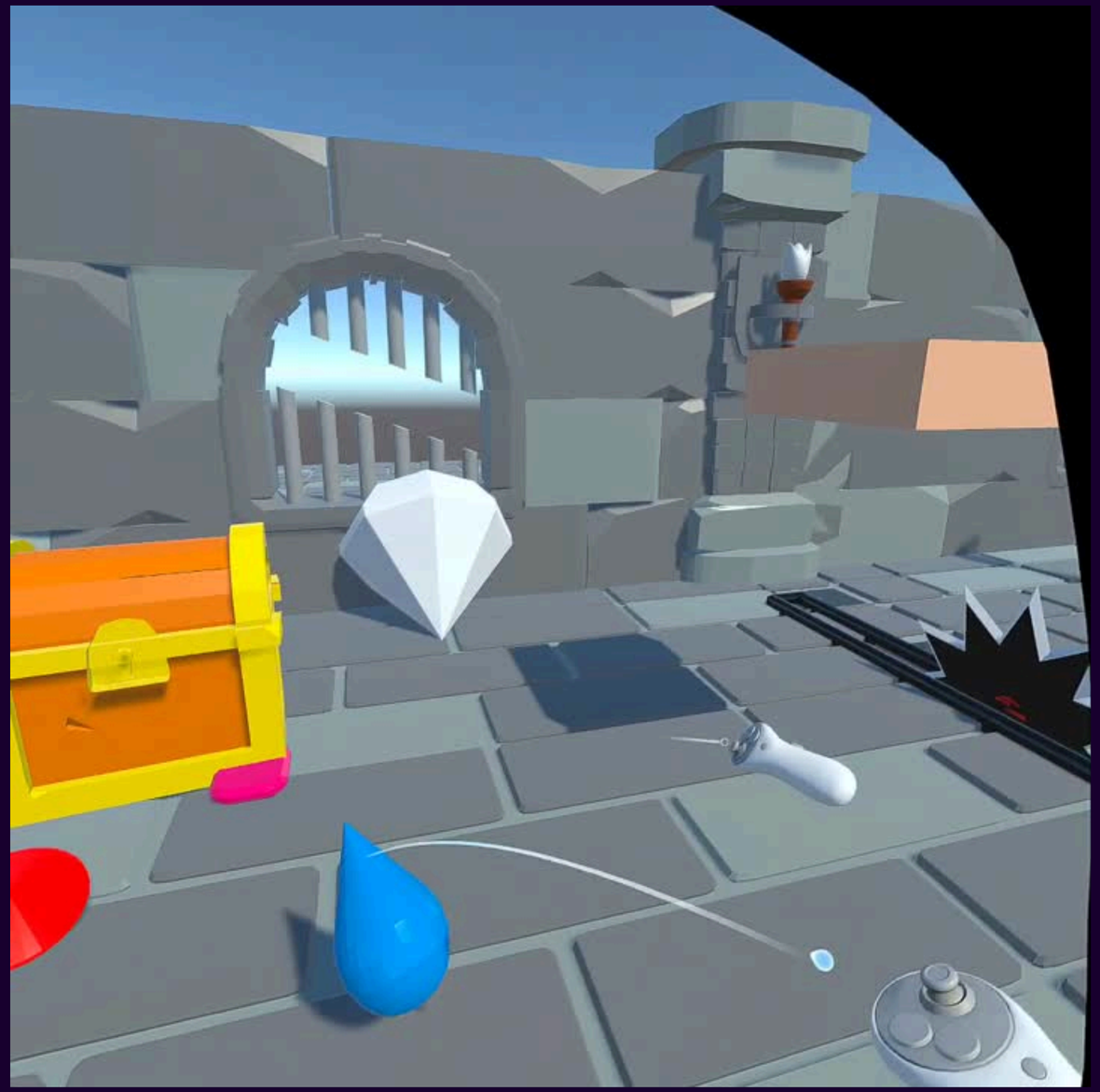
Core part of the game

- I need to place those gems in the basket. For that I added box collider to the basket (cube).
- With the help of chatGPT was able to generate a script which helped me to disappear the gem when it touched the basket (cube).
- Inserted debug.log message to check if the gems were colliding and disappearing successfully.



Miscellaneous Files — GemCollector

```
using UnityEngine;
using TMPro; // Add this to use TextMeshPro components

public class GemCollector : MonoBehaviour
{
    public int score = 0; // The player's inital score
    public TMP_Text scoreText; // Use TextMeshProUGUI instead of Text

    void Start()
    {
        // Initialize the score text at the start
        UpdateScoreUI();
    }

    // This method is called when the gem enters the basket
    private void OnTriggerEnter(Collider other)
    {
        if (other.CompareTag("Gem"))
        {
            Debug.Log("Gem collected! Current score: " + score);

            // Increase the score
            score += 1;

            // Update the score text on the UI
            UpdateScoreUI();

            // Destroy the gem after collection
            Destroy(other.gameObject);
        }
    }
```

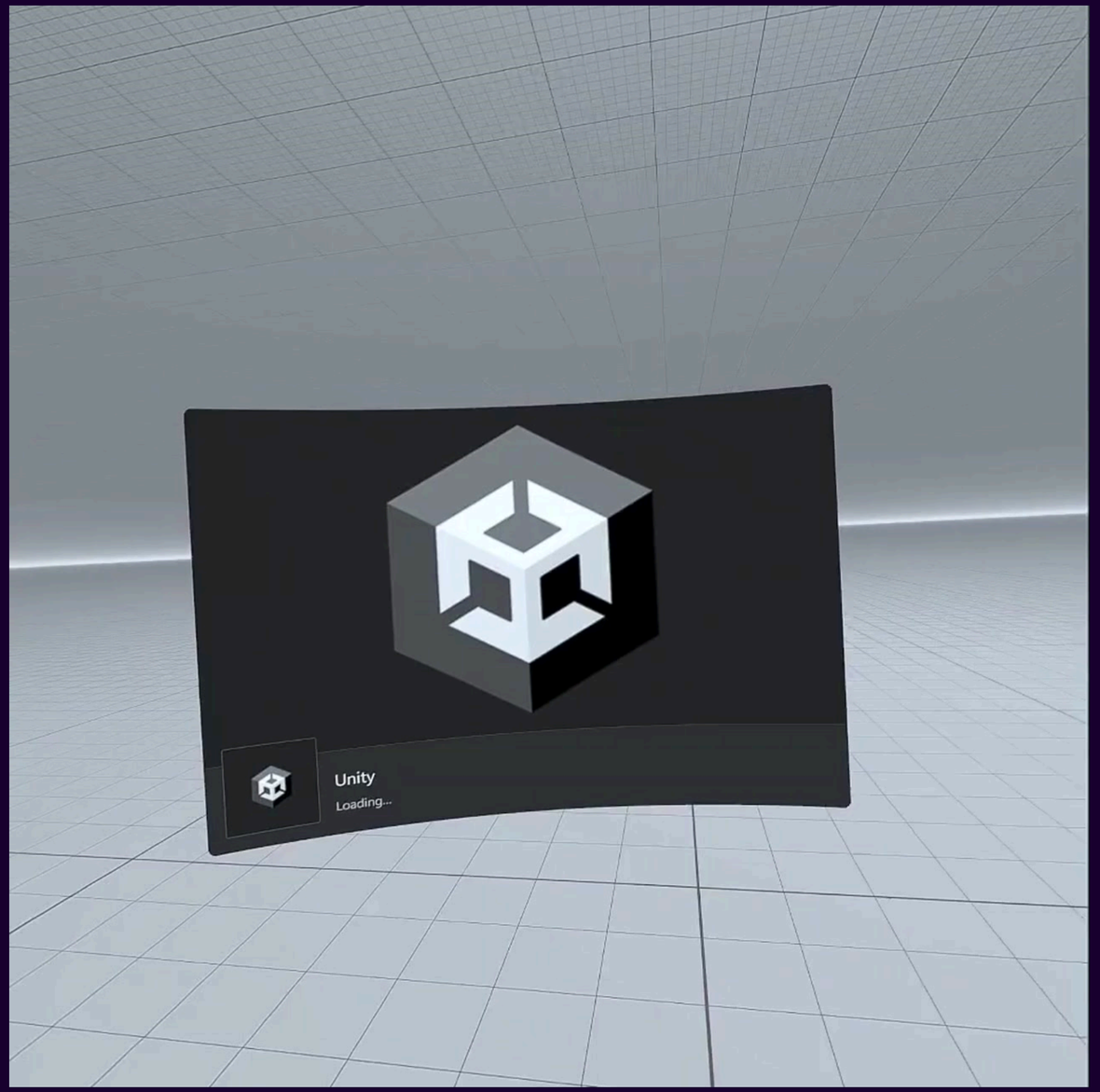


Developing phase - step 2

Applying UX Law

We realized that asking players to collect each gem and then walk over to a fixed basket to place it could feel tiring and make them lose interest. According to **Fitts' Law in UX**, the farther away a target is, the harder and slower it is to reach. So, inspired by how people naturally hold a bag in one hand when collecting things, I made the basket dynamic and attached it to the player’s left hand.

Now, the basket moves with the player’s hand, making it much easier and faster to collect gems on the go.

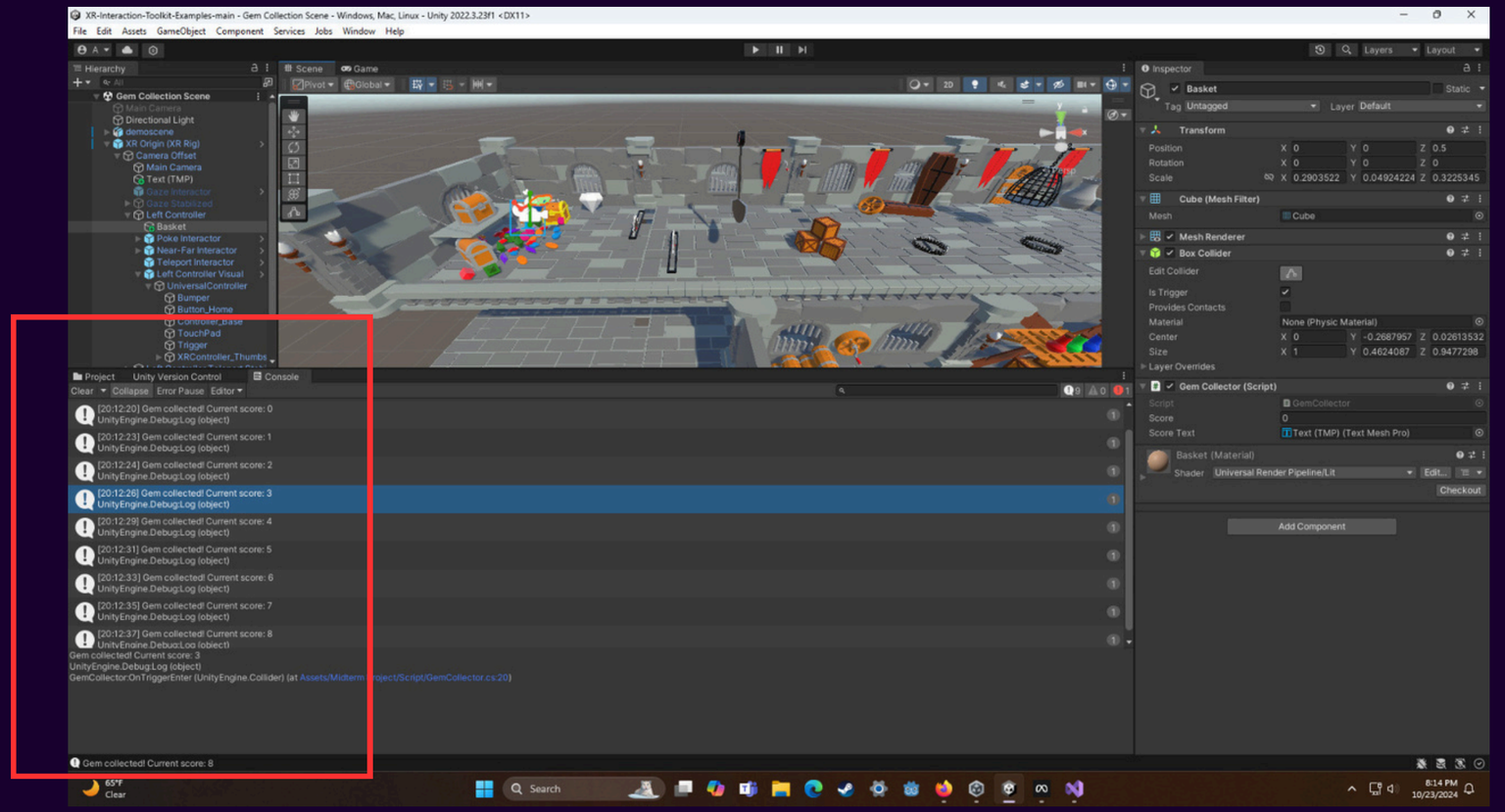

Unity
Loading...

Developing phase – step 3

Displaying the score

Currently, I was only seeing a debug log message in the console showing the count of gems collected.

Debug.log(“Gem Collected! Current Score: “ + score);



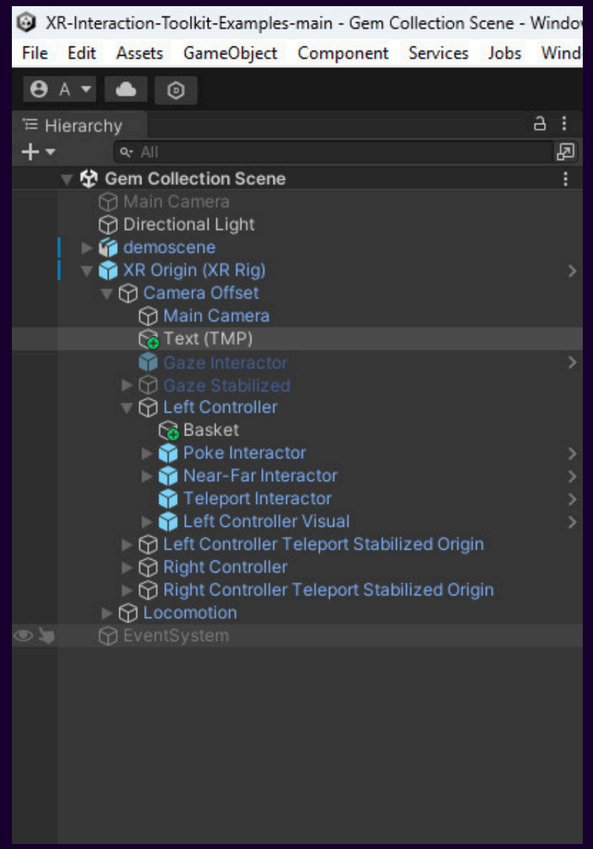
Developing phase – step 3

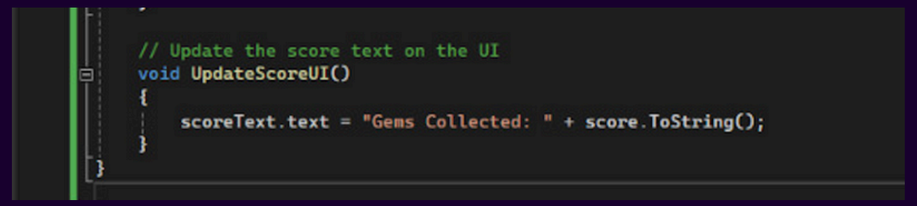
Displaying the score

I wanted to display the gem count as UI text in the VR environment instead of just in the console. I used a Text variable and updated my script with the help of ChatGPT.

I added a new function to handle this:

```
void UpdateScoreUI()
{
    scoreText.text = "Gems Collected: " +
dscore.ToString();
}
```





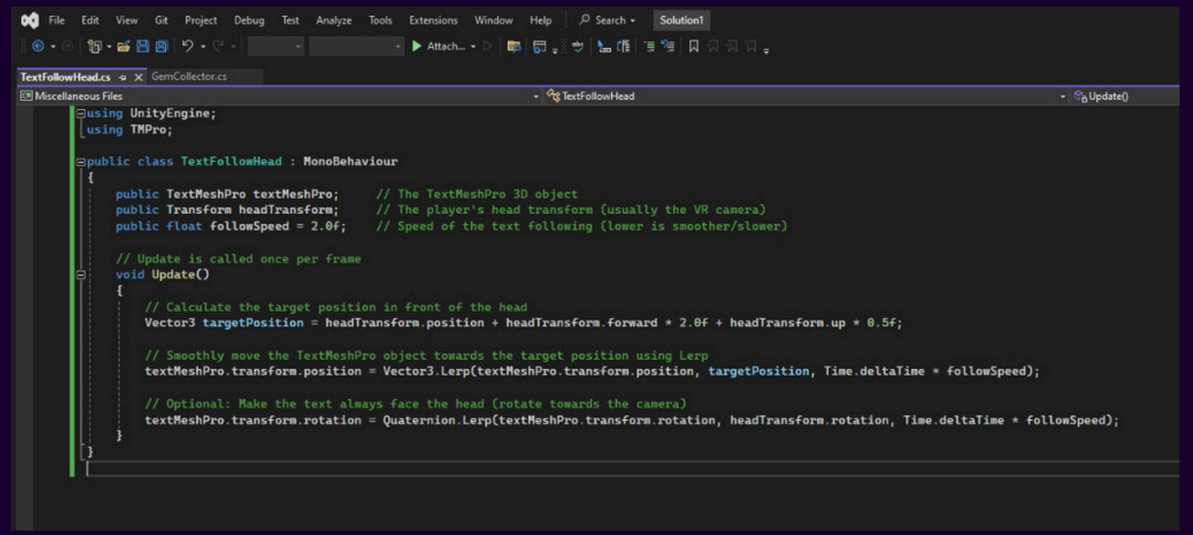
Developing phase – step 3

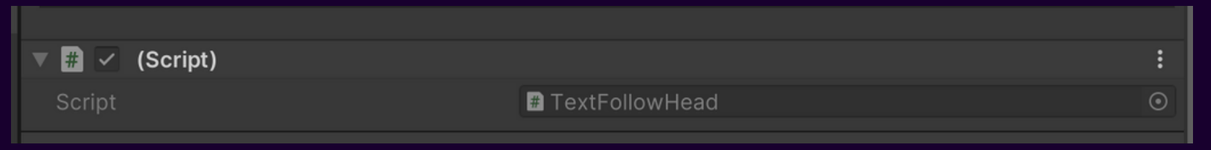
Displaying the score

- The score was displaying successfully, but because it was attached to the player's head position, it moved too quickly and caused issues like headaches and motion sickness.

- To fix this, my professor suggested using Lerp, a technique that smooths the movement. This helped control the speed of the text, reducing headaches and frustration significantly.

- Got the required code from chatGPT and attached it to the Score Text UI.

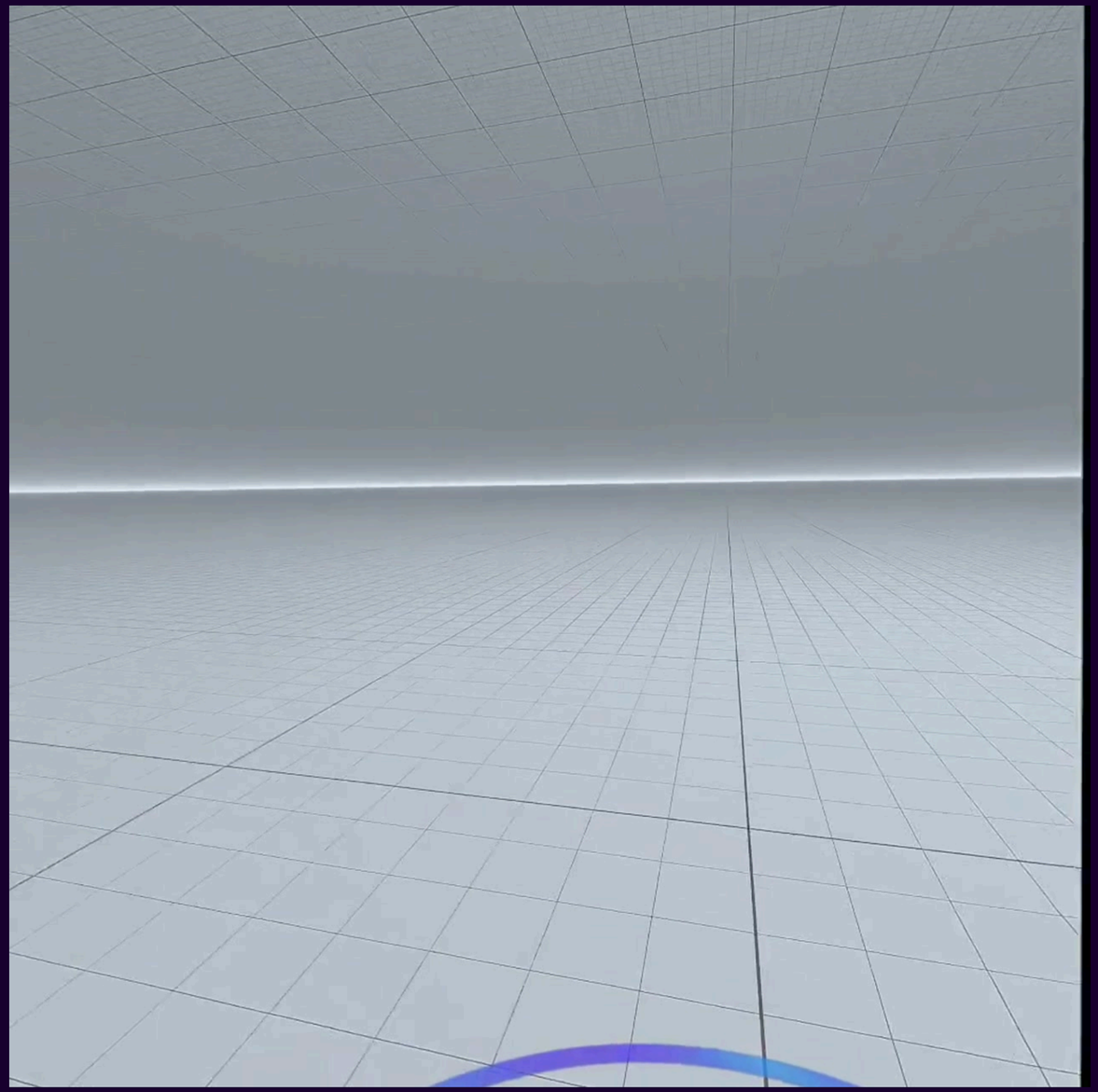




Developing phase - step 3

Displaying the score

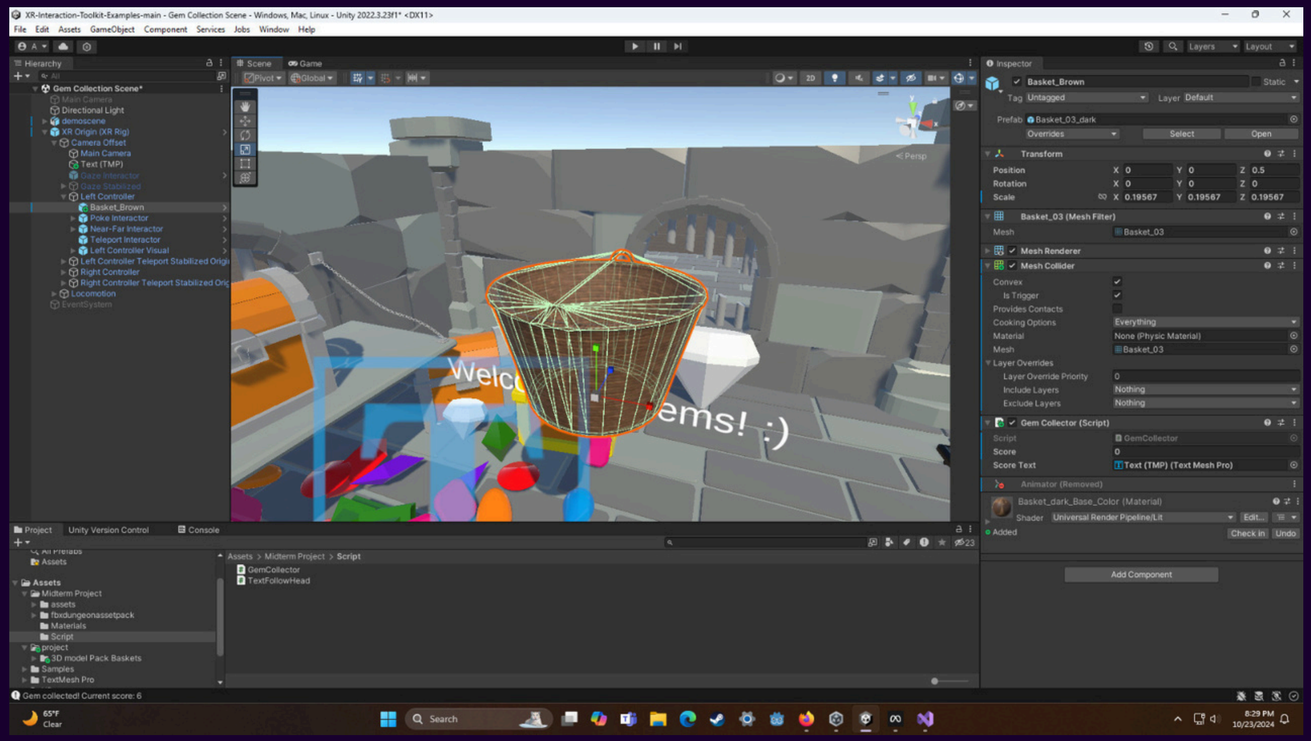
Observe the text movement closely to check its speed and how long it takes to arrive.



Developing phase - step 4

Making the Basket Feel Real

I replaced the basket asset and added a skybox to make the scene feel like nighttime, giving it a thrilling, treasure-hunting vibe similar to the world of pirates.

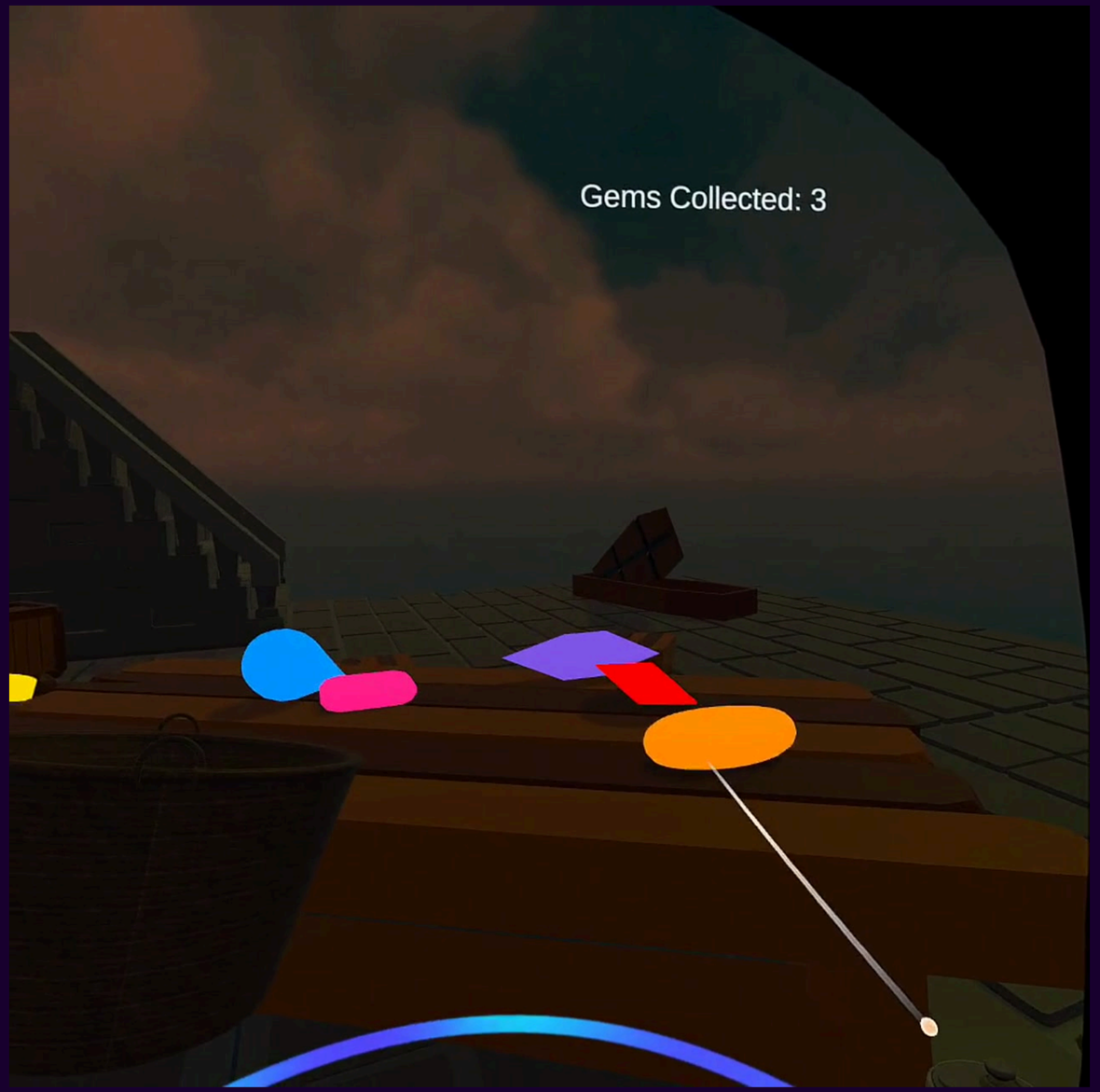


Developing phase - step 4

Making the Basket Feel Real

- I replaced the basket asset and began testing, but noticed that the basket felt empty, like something was missing. After experiencing the gameplay multiple times, I realized that the collection felt incomplete because the gems weren’t visible in the basket.

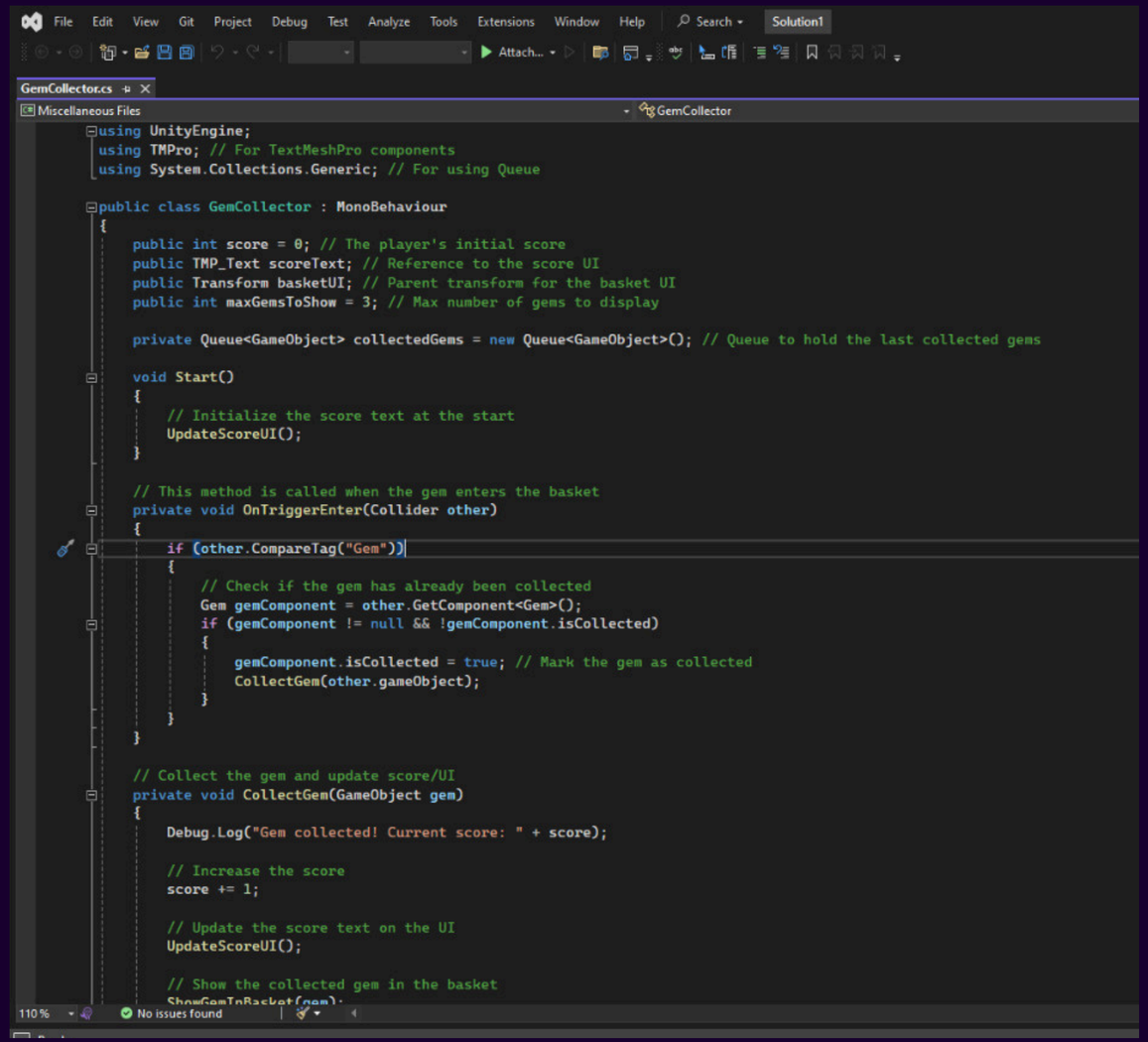
- In real life, when we collect items, we can see them in our bag. However, in the game, the basket appeared empty because the gems disappeared after being collected due to the disappear function in our script.



Developing phase – step 4

Making the Basket Feel Real

Since showing all the gems in the small basket wasn’t feasible, I came up with a code logic to display only the 3 most recently collected gems. As soon as a 4th gem is collected, the first one disappears.



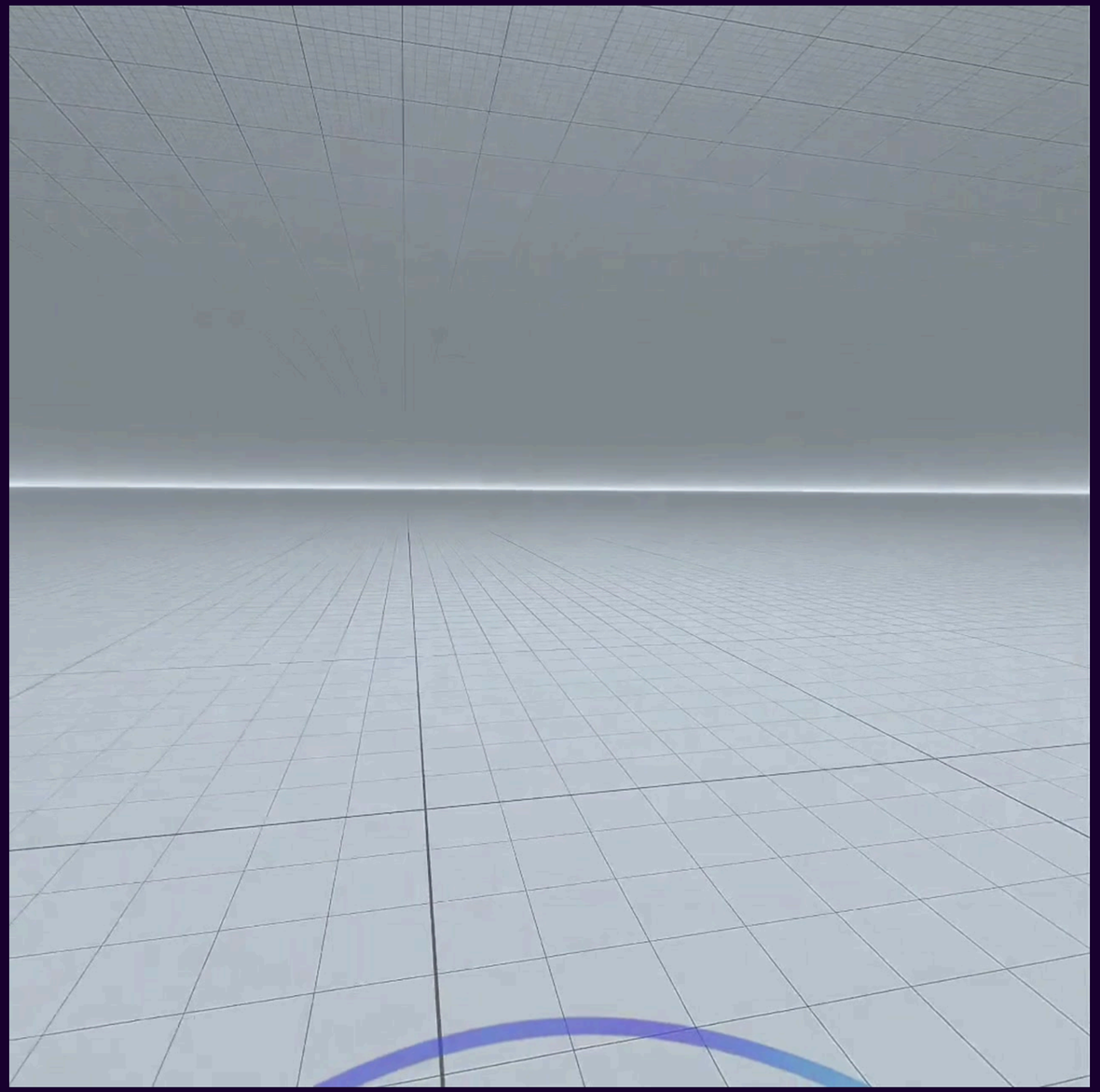
Developing phase - step 4

Making the Basket Feel Real

However, I faced a major issue:

The score was increasing continuously because the gems stayed in constant contact with the basket's collider. I remembered that the score should only increase once when a gem first collides with the basket surface.

Since the gems remained in the basket for a few seconds before disappearing, the score kept rising automatically each time they touched the collider.



Developing phase - step 4

Making the Basket Feel Real

- I solved the issue using my computer science skills, along with help from ChatGPT. I added a boolean variable, isCollected, to check if a gem has already been collected.

- This prevents the score from increasing repeatedly. Now, the basket displays the 3 most recent gems perfectly, along with the correct score count.

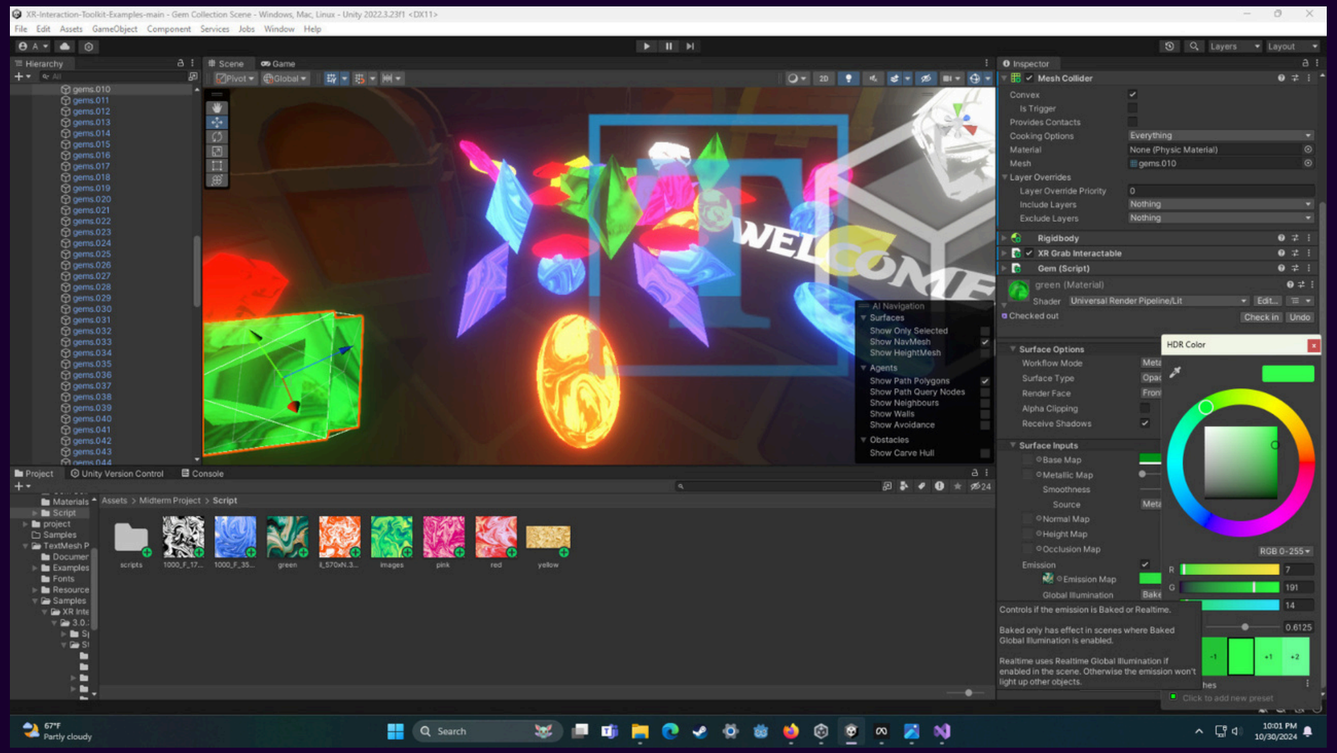
```
public class Gem : MonoBehaviour
{
    public bool isCollected = false;
}
```

Developing phase - step 5

Game World Enhancement

- I adjusted the material textures and experimented with the emission settings to give the gems a more realistic look.

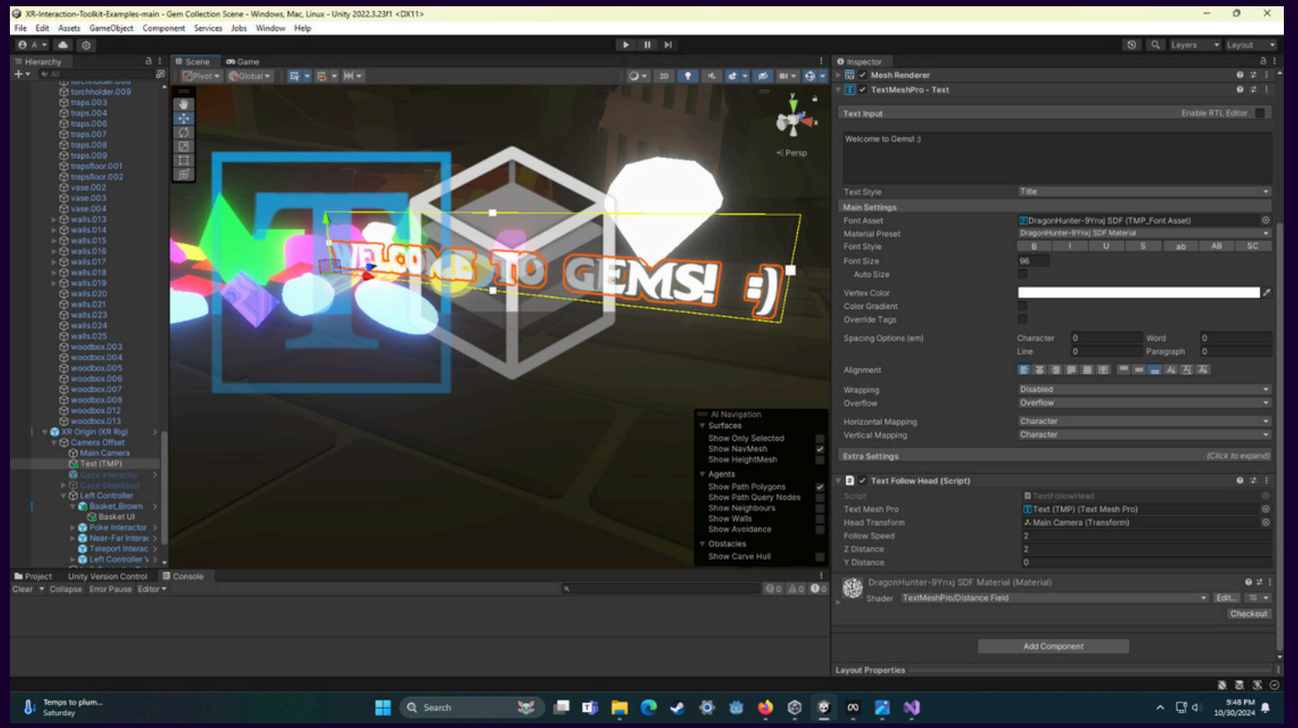
- My professor encouraged me to use the global volume and bloom components to add a glowing effect, enhancing the gems' appearance even further.



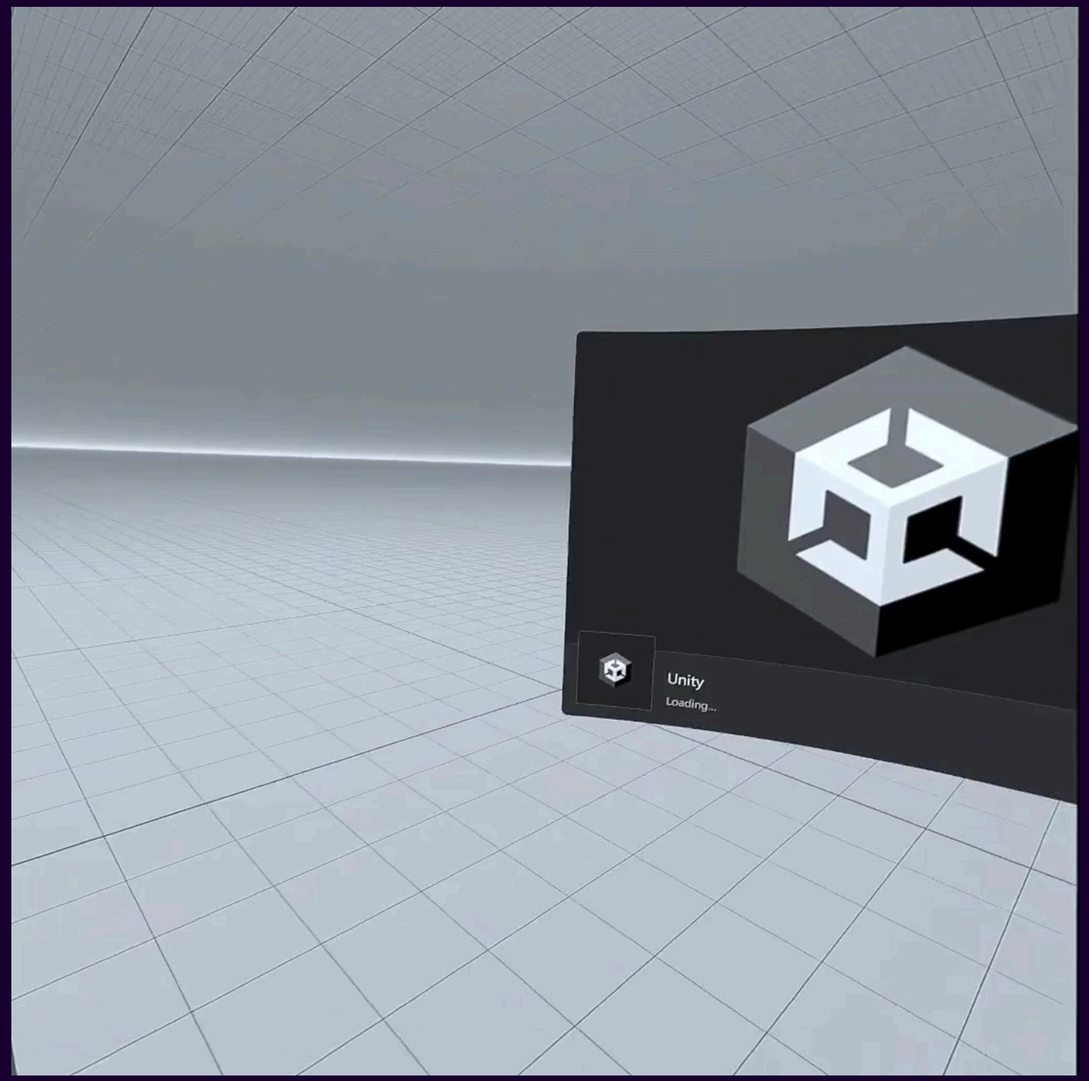
Developing phase - step 5

Game World Enhancement

I also changed the text font to better match the gaming aesthetic. I used the font "Dragon Hunter" to give it a more immersive, game-like feel.



Output



Insights Gained

What I learned?

- Through developing this game, I gained valuable insights into VR design and the concept of affordances—how objects should clearly show how they can be used.

- I learned how important it is to make interactions feel natural, like holding the basket in one hand to collect gems, which mirrors real-life actions.

- I also saw how small design changes, like smoothing the UI movement with Lerp, can make a big difference in user comfort.

- Overall, this project taught me how thoughtful design choices can enhance user experience and make a game more intuitive and enjoyable.

Insights Gained

Technical Learnings

- Throughout this project, I gained a deeper understanding of Unity, especially in managing colliders and how different objects interact. I learned to use the XR Grab Interactable component to make objects easily grabbable in VR.

- I also improved my scripting skills, adapting code to meet specific game requirements. Additionally, I learned how to add custom fonts in Unity, like "Dragon Hunter”.

- Learnt to create glowing effects with the bloom tool. There were many other small but valuable lessons along the way that added to my technical knowledge.

Game Advancement

Future Proposals

- Should include sound effects for when gems are collected, as well as a fitting background soundtrack.

- Adding a time limit could make the game more challenging, giving players a set time to collect all the gems.

- I’d also like to add levels, where players advance to new stages by finding hidden gems and scoring points. These changes would make the game more exciting and give players more to explore and achieve.

Thank you