Personal Space

Jade Kelly

N00191459

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Design

When starting the project, I first completed a proposal shown in figures 1 – 4 below. The project's goal was to create a personal room representing an interest.

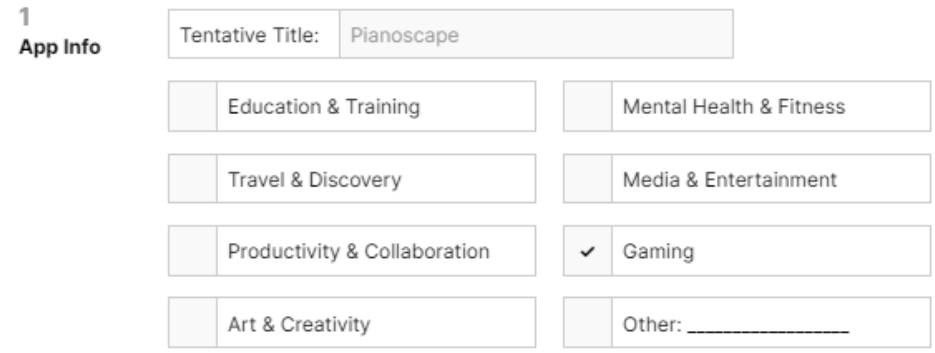

Figure 1 – Proposal 1

I enjoy playing the piano and puzzles, so I designed a piano escape room game called Pianoscape. I used this idea when filling out the proposal.

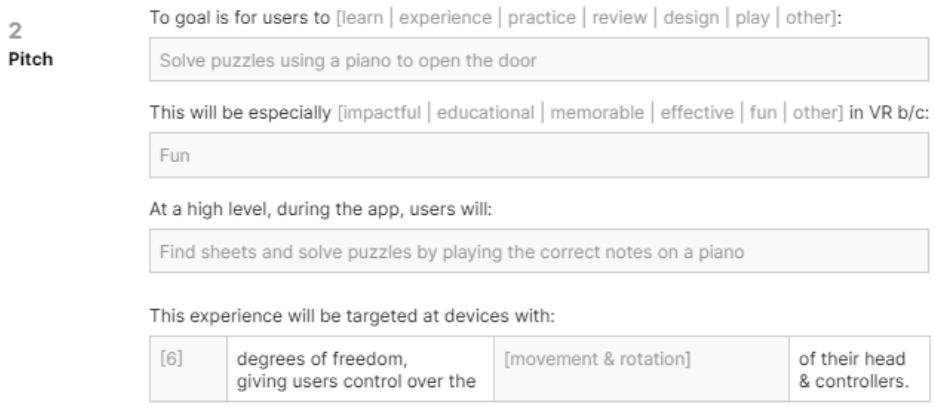

Figure 2 – Proposal 2

I decided the goal would be for users to play the piano in the correct sequence to open the door and escape the room. Some decisions I made in the proposal changed as I worked on the project, such as having multiple puzzles, but the overall idea stayed the same.

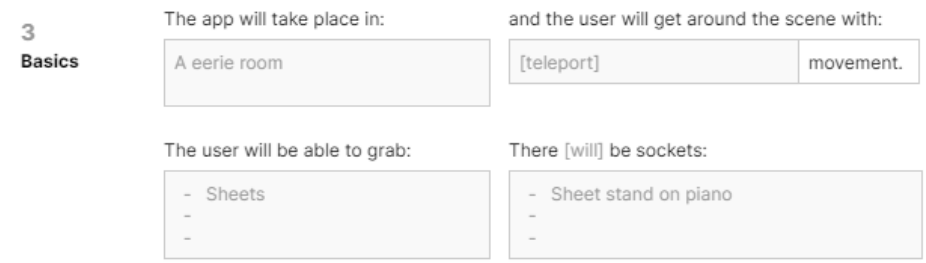

Figure 3 – Proposal 3

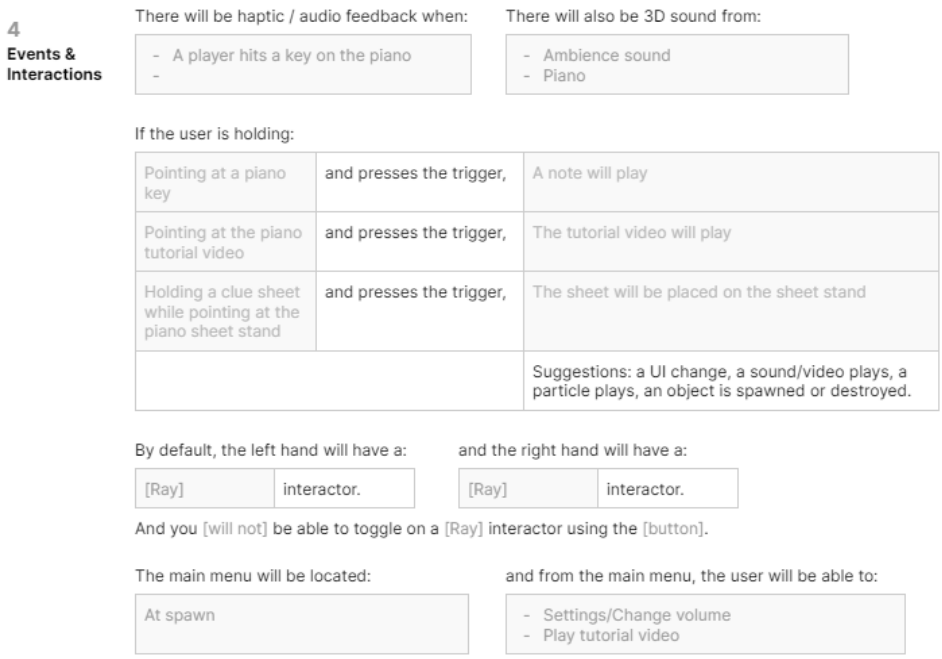

Figure 4 – Proposal 4

I also drew up a sketch of my idea on paper which is figure 5 shown below.

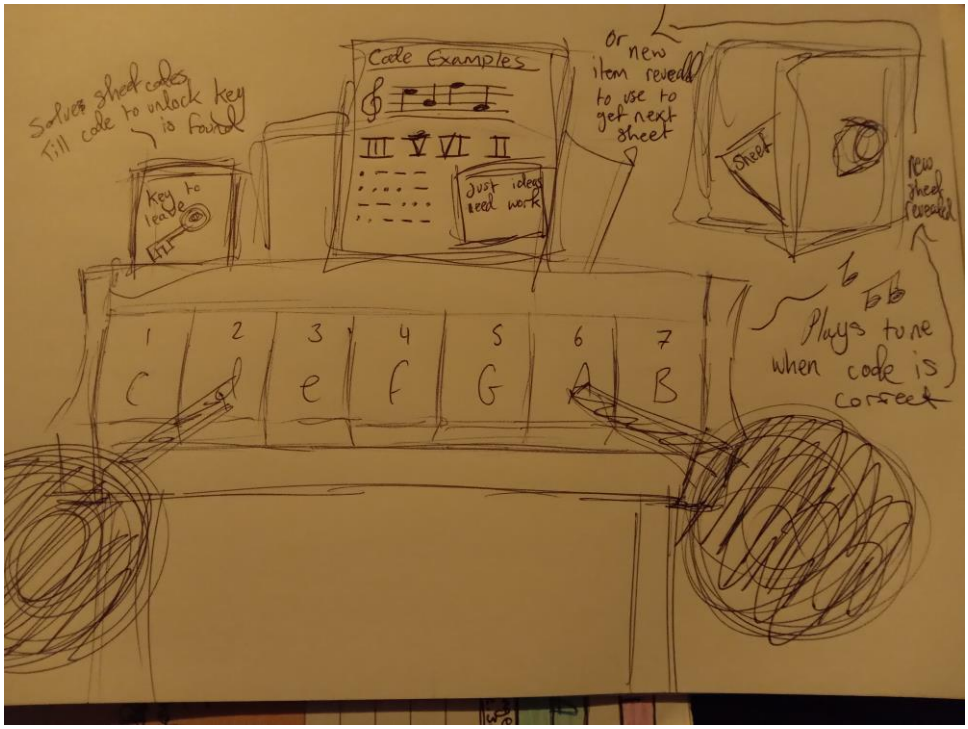

Figure 5 – Sketch

Technical

For this project I used an Oculus Quest 2 VR headset for testing and running Pianoscape and I used Unity to create the game.

Figure 6 – Oculus Quest 2

In Unity, the XR Plugin Management and Oculus XR Plugin packages were installed which allowed me to test the app during development and to install the app directly onto the headset.

Figure 7 – Packages

Since I was using Unity, I had access to the Asset Store and was able to download low poly assets to use in the game for free.

Development

To start the development, I created a new scene in the 'Create with VR' Unity project which has all the packages I will need and supplies useful scripts. I added an XR Rig and made it so that the rays are toggled using the primary buttons.

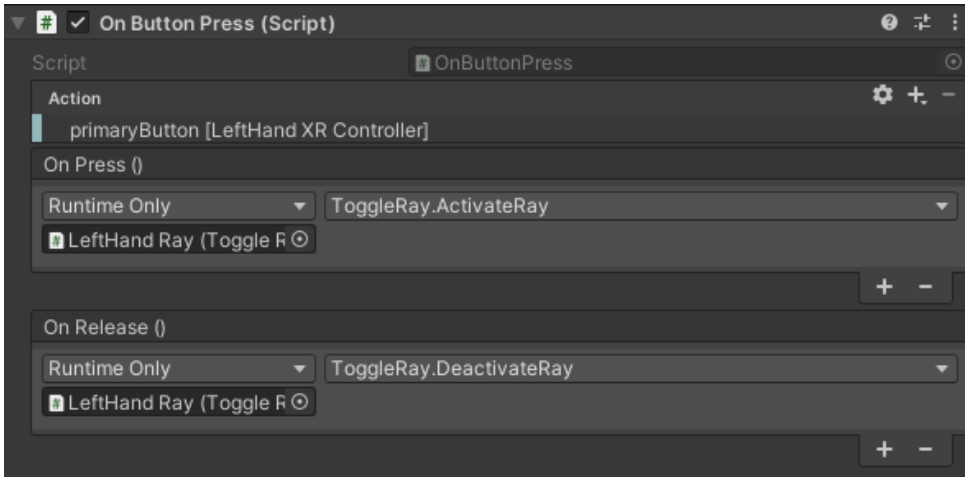

Figure 8 – Ray Toggle

On the asset store I found a low poly Piano model which I put into the scene. The white keys in the model were individual models so I kept seven keys and removed the rest. I resized everything to be more comfortable for the user. I also added a chair with a Teleportation Anchor in front of the piano which allows the user to teleport to the piano.

I found some free piano key sound effects and downloaded them. On each key I added an AudioSource and XR Simple Interactable which allowed me to play a sound when the key is selected. Once I had the keys playing sound, I added that they change material and animated them to move down then back into original position.

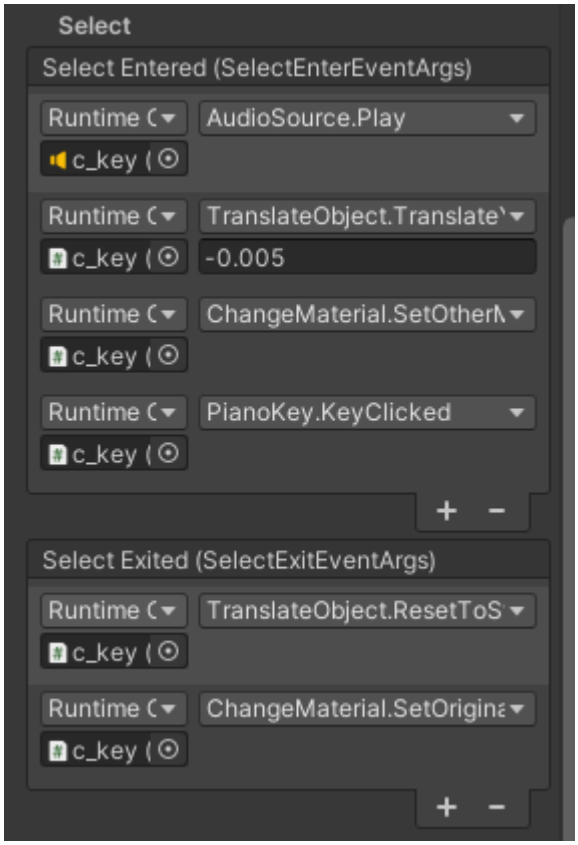

Figure 9 – Piano Key Interact

Once I was happy with the piano I built a dungeon-like room around it. I used a low poly dungeon I found on the Asset Store which came with models for dungeons, furniture, lighting and clutter. I also added black keys which make the piano more real but aren't playable.

I found a YouTube tutorial for making a color sequence puzzle game in Unity which I followed to make scripts for the piano keys and the door. First, I created a script for the keys which would send a value which is the name of the key to the door.

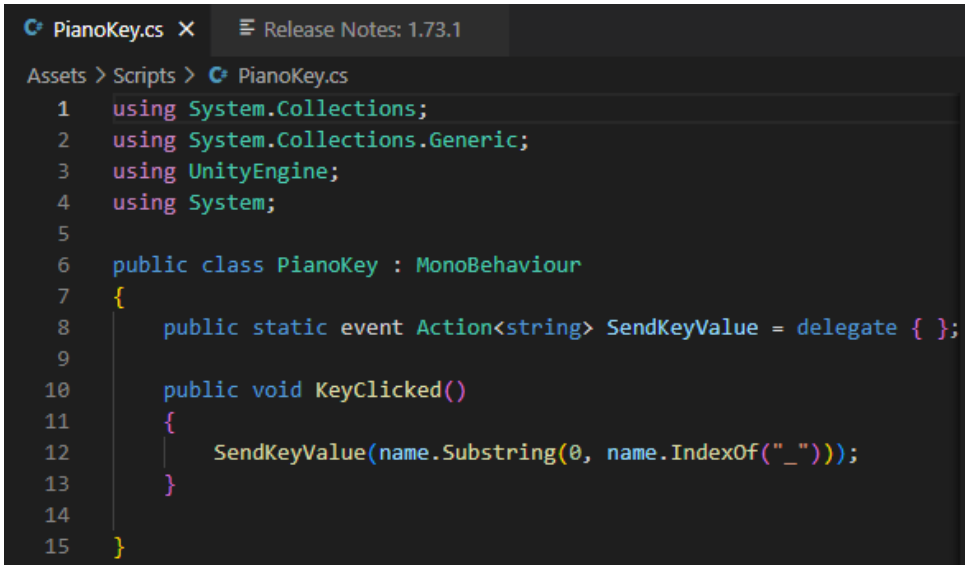

Figure 10 – Piano Key Script

I added this script to each key and set it that it activated when the key was selected. Next, I created the script for the door which would take the value of the key and put it into a string called currentSequence. It would then see if it matched the set correct string and if it didn't it would clear currentSequence.

```
12      void Start()
13      {
14          PianoKey.SendKeyValue += AddValueAndCheckSequence;
15          correctSequence = "3764152";
16          currentSequence = "";
17      }
18
19      private void AddValueAndCheckSequence(string pianoKey)
20      {
21          switch(pianoKey)
22          {
23              case "c":
24                  currentSequence += 1;
25                  break;
26              case "d":
27                  currentSequence += 2;
28                  break;
29              case "e":
30                  currentSequence += 3;
31                  break;
32              case "f":
33                  currentSequence += 4;
34                  break;
35              case "g":
36                  currentSequence += 5;
37                  break;
38              case "a":
39                  currentSequence += 6;
40                  break;
41              case "b":
42                  currentSequence += 7;
43                  break;
44          }
45
46          if (currentSequence != correctSequence.Substring(0, currentSequence.Length))
47          {
48              Wrong.Play();
49              currentSequence = "";
50          }
51          else if (currentSequence == correctSequence)
52          {
53              Right.Play();
54              currentSequence = "";
55              Destroy(gameObject);
56          }
57
58      }
```

Figure 11 – Door Script

When the sequence is correct the door is destroyed. I also added audio Sources to the script so that sounds played when the sequence is wrong and when the door is destroyed to notify the player.

With the main part of the game now developed I worked on the UI. I created a short video of a presentation to use as a tutorial video that can be played from the welcome UI. I also made it so this UI can be redisplayed by the user using the secondary button.

For the music sheet I drew it up and then imported the image as a sprite. I then added the XR Grab Interactable so the user can pick it up. I added an anchor to the piano where the stand is so that the sheet can be placed at the piano.

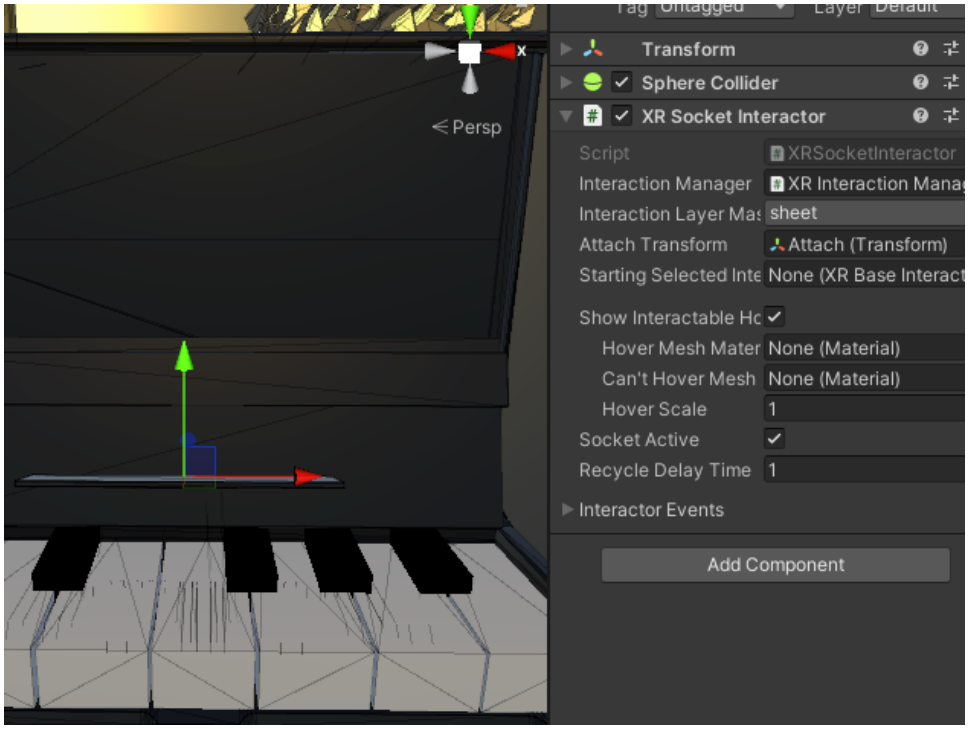

Figure 12 – Socket

I added clutter to the room and placed the sheet on a table so the user can teleport to find it then place it on the piano and solve the puzzle. The teleport anchors around the room are carpets on the floor.

Testing

Once I was happy with the game I built and ran it, so it installed on the Oculus Quest 2 Headset which allowed me to let two participants play it. From testing I learnt that I need a stronger tutorial as the participants didn't know where or how to teleport they also didn't know that they could play the music sheet on the piano.

Reflection

For this project I managed to create a VR escape room game using Unity. It has a playable piano and when the right sequence is played the door opens. I found it difficult to figure out how to script the door to open once the right sequence is played on the piano until I found that YouTube tutorial. I am proudest of the piano as the animations make it really look like it is being played. I feel that I have a better understanding of Unity and feel more confident using it.

Overall, I am proud of what I achieved during this project and will carry what I learnt with me for future projects.

References

Figure 6 Oculus Headset - https://www.techadvisor.com/article/738419/oculus-quest-2-release-date-price-features-spec-news.html

Sequence Puzzle Game YouTube Tutorial - https://www.youtube.com/watch?v=q1QJAEYYpsQ