Tower Defence - Unity Gesture Based Game – Oculus Quest

By Andreas Fahey and Joseph Griffith

**Purpose of the Application:**

The planned design of the application is in the design document on the GitHub Repository for the project, which shows the sketches for the planned design of the project. Here are some screen shots of the completed game:

Main Game:

A picture containing sitting, flying, water, table

Description automatically generated

Substitution Mini Game:

A picture containing furniture, curtain, red

Description automatically generated

We had planned to add hand gestures to the game once we completed the game itself, however we encountered problems. We acquired a USB 3 port however the wire we had for the Oculus Quest was not working and we did not have a party link cable to be able do and test the hand gestures for the game. In substitution of this we created a mini voice recognition game to show some form of gesture in our project to make up for our scuppered plans of hand recognition. We did not intend to just leave it as is. We wanted to prove and show what we learned in this module.

A screenshot of a computer

Description automatically generated

**Gestures identified as appropriate for this application:**

Due to the circumstances highlighted above, we were unable to incorporate hand gestures what we wanted; however, I will discuss what we had planned. We planned to incorporate certain hand gestures, some known and some secretive. For example, a thumbs up to increase the players lives, thumbs down decreases lives with a text displayed saying “we don’t condone people disliking our game, only Damien can judge us”, gun sign to shoot the dart gun, a full hand palm to freeze/pause the game and a secret hand gestures for restarting the game and winning the game, and we also were looking to add foreign objects to the plane of the game for the player to pick up and throw at the balloons(bloons) as well as the dart gun. As a substitute we created a mini game to move a bloon around a plane using speech recognition. With voice commands we were able to move the bloon up down left and right across the plane.

**Hardware used in creating the application:**

For this application we used the Oculus Quest Virtual Reality Headset with the controllers that come with it. For the hand gestures we wanted to use for our game, we were only going to use the right-hand controller, to allow the left hand to be the gesture hand. We used Unity to create this project and downloaded the required SDK to run and test in oculus. Due to COVID-19 we did secure the Oculus Quest Headset before the college closed, however one had the headset and one did not, so we were not able both test it. But thanks to modern technology and software we were still able to create this project together through the social media application known as Discord. We were able to do screen shares to help each other with various parts such as components, objects, and C# scripts for the project. We did however split the work, one was to do the unity stuff while the other did the scripts and gather any assets needed outside of the asset store for example, sounds.

**Architecture for the solution:**

A screenshot of a computer

Description automatically generated

A screenshot of a cell phone

Description automatically generated

The scripts for the projects are basically blue prints for the components for the game objects. The bloons script contains the behaviour of that game object and so on. The sound scripts Pop Sound and Fire Sound are for when the event of the player bursts the bloon the script allows the audio to be played and the same for when the dart gun is fired and so on.

Libraries Used:

Oculus Integration – Required for usage of Oculus Quest Headset.

**Conclusions & Recommendations: *by Andreas Fahey G00346830*:**

To conclude on my end of the project. I was tasked to code the scripts for this project and gather any required assets outside of the unity asset store, I also attempted to create a main menu for the game however when tested, the oculus headset was drawing a blank, so we had to remove it from the build settings, we still have the scene and script for it in the project folder. Joseph and I had different tasks but we both did the project together through screen sharing on discord and using online resources to help us complete this project.

I feel even under the circumstances that were uncontrollable I learnt a lot from making this project. I learned more about the functionality of game objects and components and how they function, in the backend and front end, how they are created in 3d and scripted via online sources and tutorials. I also learned about connecting the oculus quest headset and testing our game in virtual reality in unity.

Through online tutorials and helping each other out we managed to connect the headset to unity and see our creation in virtual reality, I really enjoyed seeing this, I could not test it physically as I didn’t have the headset. Unfortunately we were unable to add our planned hand gestures to our game due to hardware issues mentioned above however we managed to add a mini voice command bloons game to show we did know how to add gestures to a game in unity and to make up for being unable to produce what we wanted.

I really enjoyed the different way of doing a group project via screen sharing and I loved seeing the results from our work. The work was split for obvious reasons but through contact via screen sharing we helped each other out in every sense, game objects, scripts, components, and game design. We also did the design document together on Overleaf which is in the GitHub Repository for the project.

There are some things I would change if we were to undertake the project again. Due to time we were not able to add voice commands to our actual game so I would try adding some elements such as a voice command for “restart”, “reload”, “bang” or “fire”. I would also like to acquire equipment that works and equipment we did not have to test out our plan of hand recognition in our game. Although the circumstances and the issues and limitations we faced I am proud of what we achieved and since I do not have the oculus quest, I would love to test it out!

GitHub Repository: <https://github.com/AndreasFahey/Gesture-Based-UI-Project>

Containing:

* 2 Projects – Main & Mini Game (Substitute for hardware issue)
* Design Document for Project
* Readme
* Screencast of GitHub repo
* Screencast Main Game Demo
* Screencast Mini Game

Project References:

<https://freesound.org/>

<https://developer.oculus.com/downloads/package/unity-integration/>

<https://www.youtube.com/watch?v=eySe4Wj6xbk>

<https://www.youtube.com/watch?v=Z-9nxJT5UA4>

<https://www.youtube.com/watch?v=8zG-Zs2J_N0>

<https://www.youtube.com/watch?v=lBzwUKQ3tbw&t=585s>

<https://www.youtube.com/channel/UCPJlesN59MzHPPCp0Lg8sLw>

<https://www.youtube.com/watch?v=Xau3hFEcn0U>

<https://assetstore.unity.com/>

<https://discordapp.com/>