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

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A screenshot of a cell phone

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The scripts for the projects are basically blueprints 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 Joseph Griffith G00350112*:**

To conclude on my side of the project. The tasks I mainly handled were the development inside of unity creating all the objects and linking scripts and tags together to form the finished product that we have now. Although I was mainly doing the unity development side as I had access to a Oculus Quest Andreas and I both contributed equally to all types of the development of the project as we frequently contacted each other and worked together using discord, this was a great help as it allowed for us to share our screens to equally do each part and help out where the other person is stuck.

I learned many things from doing this project together with Andreas one big thing was how frustrating it is to forget to tag a game object correctly. Originally setting up the Oculus Quest was a lesson as Andreas and I had to go into the unity settings and change a lot of the settings for it to recognize the device and send data across while also setting up an Oculus account and creating our own company so that we would have access to develop games for the Quest. From research into hand gestures that can be made using the Oculus Quest and supplying a link to your computer via Oculus link, unfortunately we ended up not being able to get our hands on a Oculus link ready cable due to current circumstances in the world as well as time constraints.

While we were unable to create the hand gestures that we had planned on where once the player makes hand gestures such as thumbs up or thumbs down the players health would increase or decrease accordingly, we were able to create a small mini game in unity where we could showcase a small bit of voice recognition to show that we had done our research into the topic. The hand gestures that were supposed to be implemented would’ve used the finger bone class of unity where the player would be able to track gestures made by doing calculations with said fingerbones.

All in all I really enjoyed completing this project with Andreas as we had a strong sense of team work and worked together on almost everything, if I had the choice to come back to this game in the future I would love to as Andreas and I could then add the hand gestures we had researched and planned to implement and I feel the game would be extremely enjoyable to play.

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/>