

Bloons Tower Defense - Oculus Quest VR Game Design Document

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Abstract—This is a design document for our Gesture Based UI project in which we will aim to build a Virtual Reality Game using the Oculus Quest VR Headset. We will be making a virtual reality version of the famous Tower Defense game in our own point of view with Gesture Based UI integrated in the form of either hand or speech recognition. We will be using Unity 2019.3.3f1 64-bit. This document covers everything we need to develop this game.

The GitHub Repository for this Game:

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

I. INTRODUCTION

IN this document we intend to discuss how we came up with the idea and what hardware we wished to use. We initially agreed on creating a drawing type game that would be similar to VR games such as Tilt Brush, however we felt that we could get more creative and come up with something we both enjoyed and wanted to achieve together. We decided to create a Tower Defence Game in Virtual Reality, using the Oculus Quest VR Headset. In this document we will describe our Design, Mechanics, Game Development, Pipeline, Asset Development and the Critical Analysis.

II. DESIGN

We both enjoy playing this game, hence we want to recreate this game in virtual reality. We looked at the existing game for ideas and inspiration to design the game. We also looked at various gestures we could add in the form of speech and hand recognition. Be it voice recognition to speed up the balloons (bloons) for example or hand gestures secretive or known to for example increase health, win the game, restart the game or even interact with the balloons (bloons). We also wish to of course make a main menu for our game to navigate to the game change settings and quit game.



Fig. 1. Bloons Tower Defence Game

For the design of this game we wish to create a plane where the way-points will be with the balloons (bloons) going in the direction of the way-points with the game player wielding a dart gun to pop the balloons (bloons). The aim of the game if unfamiliar is to pop all the balloons (bloons) before they reach the end of the defined track of the way-point. Once the game

starts a wave of blue balloons will be deployed to the 2 road way-points where they will then move along their course, the bloons consist of green bloons which take 1 dart to pop, blue bloons which take 2 darts and finally red bloons which will take 3 darts to pop. The red bloons will only show up in the scene after a wave or two. We also wish to add our own Game music, pop sound and dart gun shot sound. Additionally we wish to add a main menu for this game, we know this may cause problems due to the view of the oculus quest headset and canvas.



Fig. 2. Oculus Quest Tech

A. Inspirations

- Creating a game we both like in Virtual Reality with gestures.
- The challenge and self achievement of successfully creating a virtual reality game to match modern day games and software.

B. Goals

- Wish to create a fully functional Tower Defence game with voice or hand gestures.
- To ensure we make the deadline of the 8th April 2020.
- Play the game on the Oculus Quest Hardware.

C. Software Design

- We will be using Unity to create this project.
- Using C-Sharp Scripts, Unity Oculus Quest Components and Assets.
- Design the game to our satisfaction, may differ in some aspects to the actual game, such as voice and hand gestures.

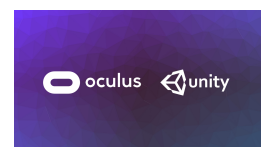


Fig. 3. Combining Oculus Quest and Unity

III. MECHANICS

For the mechanics of our VR game we want the player to select play or quit in the main menu and furthermore we want the user to be able look all around the plane up down left and right. We also want the player to move around and try aim for the balloons to pop them before they reach the end of the defined way point. The user/player should be able press a button to trigger the dart gun to shoot at the balloons. The balloons get harder to pop as the waves continue to come. The speed of the balloons may also change with a secret voice or hand gesture so be careful! The game continues as it becomes more difficult for the player. The game ends when the balloons reach the desired way-points end. The game will then restart. With voice or hand gestures we will have secret and known gestures for certain things such as win game, restart game increase health or decrease health.

IV. DEVELOPMENT

A GitHub Repository for this project was created to co-develop this virtual reality version of Bloons Tower Defence. To develop this application we will use discord to communicate during this project. We will be developing this project in Unity with the Oculus Quest Headset. Also coding c-sharp scripts to make the functionality of the mechanics work to our liking, having a script dedicated to the bloons, the dart gun, waves and the sounds we wish to add. We will also aim to add some form of gesture be it voice or hand gestures to the game in some form, mentioned in the Mechanics above. We will add these when we have the game created.

V. PIPELINE

We hope to firstly create each component for the game including the c-sharp scripts. We hope to have the assets ready before starting, if not while we are doing them. We will need sound files and materials which we can create ourselves in unity or download them of a website.(if done so will be mentioned in references). When Game is fully functional we will aim to add gestures, voice or hand, secretly or known as mentioned in the mechanics side of the game.

VI. ROUGH ARTWORK SKETCHES FOR GAME

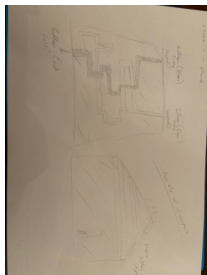


Fig. 4. Unity Plane for Game Sketch

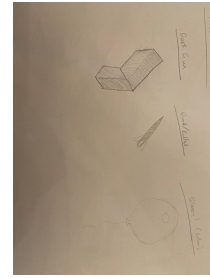


Fig. 5. Assets Sketch

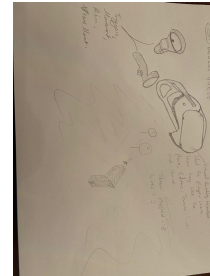


Fig. 6. Oculus Quest Tech Sketch

VII. CRITICAL ANALYSIS

- Not everyone is a fan of this game, we are aiming to create a game we both like in a different reality, a virtual reality with voice or hand gestures.
- Not everyone has played or even heard of the original game.
- You will need an Oculus Quest VR Headset to play this game, they are limited in GMT and very expensive to buy online. Roughly over 500 euro.
- To add to our game we could add different maps/planes or different levels with harder or easier way points. Could offer chance to enhance game later on in life.
- Add a customise gun element maybe such as rapid fire.
- Due To Covid-19 communication to complete this project will have to be moved to online. We will use discord to stay in contact and do project together.
- Limited time with the Oculus Quest Headset to test the games mechanics and functionality. (We didn't have it all the time but luckily had the headset when the college closed).
- We understand we might not add towers into the game as we want the player to pop all the bloons.

VIII. CONCLUSION

To conclude this design document, it is our ambition to produce a game that meets the correct criteria of a playable game for the Oculus Quest VR Headset, treating it like this will be a game that can be downloaded from the likes of steam and android store. We want to achieve this through teamwork and for self accomplishment. To see our game sketches come to life in the eye of virtual reality is what we hope to achieve. We hope to learn more and challenge ourselves to achieve our goals and meet the deadline. We wish to demonstrate this game to our colleagues and lecturer. The challenge of creating a virtual reality game with custom gestures excites us both and are looking forward to the outcome of seeing our design come to life and our own implemented mechanics work how we want them to. To download this game from GitHub enter the following command into the command prompt:
git clone <https://github.com/AndreasFahey/Gesture-Based-UI-Project.git>

REFERENCES

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