PROJECT PLAN – FINAL YEAR PROJECT

# MIXED REALITY

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# TABLE OF CONTENTS

## ABSTRACT

This project is about new ways of multi-player interaction for a Virtual Reality game. It tries to overcome the limitation of Virtual Reality applications which normally allows only one player wearing the headset, interact with the system. In this game, at least two HTC Vives and various mobile devices can be used simultaneously to get a multiplayer effect.

## INTRODUCTION

Virtual Reality is an experience of completely immersing yourself into a virtual world. People often can achieve/do things that they cannot think about doing in the real world. There are many developers who are now focusing their attention to develop applications for Virtual Reality and create new and innovative way to interact with the whole system. There are various levels of immersion for VR. Devices like Google Cardboard which use mobile phones as a source of VR does not detect hand movements, hence the applications are limited to using mobile phone sensors. Then there are devices like HTC Vive, Oculus Rift which comes with the controllers to let you do more because it can detect your hand movements.

For VR applications, the major limitation is that, only people wearing the headset can see the VR world. Others around that person do not understand what is happening. People get similarly annoyed as when they see someone wearing headphone and singing loudly. Therefore, this project aims to develop a multiplayer game which allows users to alter the fields inside the virtual world using their mobile phone. So any number of people can be part of one experience. Currently, there are a few multiplayer applications for Virtual Reality but they do

not allow interaction through mobile phones. All the player needs to have the headset to play and interact with each other.

Being a developer, I wanted to explore the latest technology and contribute to its development process, therefore I decided to make an application for VR. When I was using HTC Vive, I saw the other people around me could see what I could see in the Virtual World but they could not be a part of it. I was finishing a task in a game in VR and missed out a few details but the person with me could not explain to me where to look since that person could only see what I could see and without sounds. This arouse a curiosity in me to try and develop an application which can allow users to see the entire VR scene and interact with the player without using the headset. As a result, I intend to let at least two people wearing headsets and many mobile phone users to play a game simultaneously and be part of the same experience.

## OBJECTIVE

The objective of this project is to develop a way for the mobile phone users to interact with a person wearing a VR headset in the same VR experience. This will also allow people to use different devices and play the same game with different experience entirely.

## SCOPE

The scope of this project is develop aVR game application which allows many players to use many types of devices and play simultaneously. This project focusses more on making use of many devices to play the VR game rather than the

game mechanics. The game will be modified from the work of some Post Graduate students. At the end, the deliverable from this project would be working multi player – multi device compatibility VR game.

## METHODOLOGY

This project would be made on Unity 3D because it comes with many packages which can be used with this project. Since this game would be multiplayer, a game server would be required to communicate between different players.

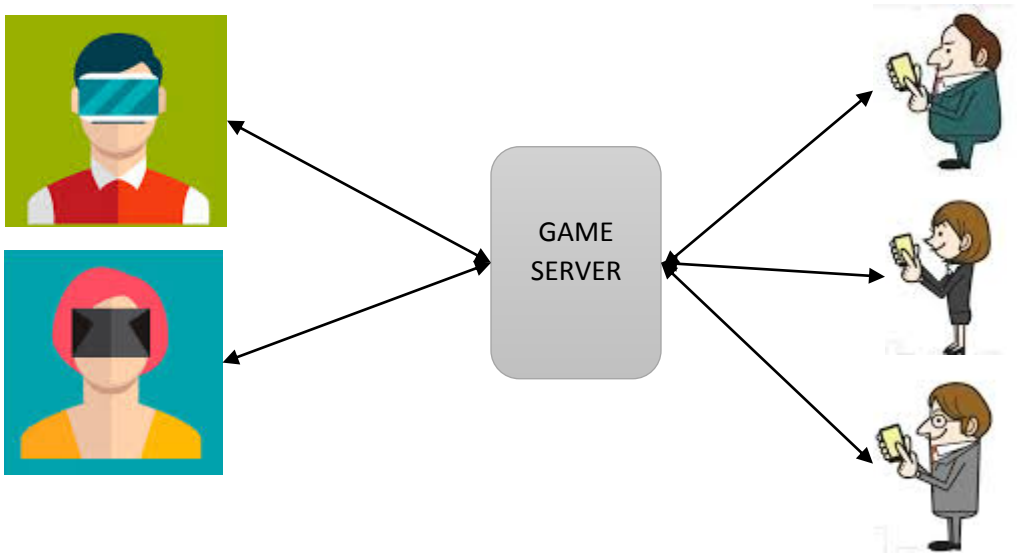


Figure 1: This figure shows how can the players interact with each other.

In the above figure (figure 1), the double sided arrows represent that in order to facilitate the multiplayer interaction, all of the players actions are first sent to the game server and then everyone including the player who initiated the action get an update in the game state. Since the update needs to in real time, the players would have to be connected to the same internet connection. The game server would be hosted on the Department of Computer Science servers. MySQL database would

be used to store user's information temporarily to notify game state updates and if the time allows, this project would have a good user interface where in you can resume your last played game or save history or play this game across the globe and does not restrict itself to be played on same internet connection.

I would be developing the game based on some Post Graduate student's game. The game basics and two player Vive connection is what I will be developing my project on. The programming language that would be used for the front end of the project would be C# and files for desktop – Windows, Mac OS and mobile – Android, iOS can be generated in Unity 3D with some slight variations. There would be different variations of game generated for Desktop and Mobile. Desktop users would need Vive support but the Mobile Phone users can use the app and interact using touch screen or use the Google cardboard to interact in VR mode. The Vive users will attach the controllers to their feet to detect feet movements and use leap motion to detect hand gestures. This will allow them to use their feet and hands to perform activities and make activities like combat close to what it is in real life.

The current storyline for the game would be that there are two people using Vive and battling each other on a battlefield. Mobile phone users can join in at any time using the QR code open on the desktop app and choose either players team to battle against the other. The role of the mobile user would be to help their team defeat the other team in the battle. Battle here is not limited to battle by combat. There would be several tasks that the team needs to perform before they are declared winners like surviving mine field by carefully navigating your way out of that area. The mobile phone user has to play different types of mini games to play his/her next move on the battlefield. For example, if the mobile phone user wants to plant a bomb for the other team, he/she needs to draw a circle with given radius

and should have 96% accuracy to be able to place the bomb. Then the mobile phone user and the Vive user can plan a strategy and perform the tasks accordingly.

## SCHEDULE

I am choosing Wednesday as my day of completion for any week that I expect this project to be achieve a milestone.

| **Date** | **Milestone** |
|---|---|
| Wed - 26 October, 2016 | Multiplayer Vive to Vive game by Post Graduate students. |
| Wed –16 November, 2016 | Game Server modifications |
| Wed – 30 November, 2016 | Third person view for the VR game on mobile |
| Wed – 28 December, 2016 | Real time syncing for mobile phones and Vive |
| Wed – 15 February, 2017 | Project game mechanics and implementation |
| Wed – 1 March, 2017 | Mobile game application - UI |
| Wed – 15 March, 2017 | Mobile game application - mini games automization |
| Wed – 5 April, 2017 | Any additional features |
| Wed – 12 April, 2017 | Deploying application for various platforms |
| April, 2016 | Testing |
| April, 2016 | Final Presentation |

## RISKS, CHALLENGES & MITIGATION

The biggest challenge for this project is that as this project is mainly for entertainment, The UI, UX for this project needs to be attractive to all types of people. On the other hand, there might need an extra motivation for the mobile phone users to join in the game. The whole experience needs to be new and interesting otherwise, the aim of the project would not be met.

The risks for this project are the server connection and real time updates between mobile user and Vive user as it needs to be extremely fast and deal with broken connections like when a mobile user gets a call/message. Also, some scene rendering in the mobile would require good computing power which some phones might not have. Therefore, majority of the processing needs to be done on the server side which will take time to update and hence real time update will not be possible which in turn would end up giving the player a bad experience.

I intend to solve the severity of these problems by writing fast algorithms to render the scenes extremely fast on the server side and design a good interface to keep the interest of the users.

## CONCLUSION

This project aims to entertain people by developing fun ways to interact with Virtual World and alter its fields. It can also be used for other types of applications like an experience application which would allow parents to see and interact with their child’s virtual world. This project will help many users stay updated with technology by transforming the ways of playing games.

# REFERENCES

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2. iStock [Internet] Canada: iStock by Getty Images. Available from:http://www.istockphoto.com/no/vector/office-workers-using-smartphone-gm180303588-27041778