# Final Report

## Title Page

## Acknowledgements

## Abstract

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## Main body

### Introduction

The purpose of this project was to create a Virtual Reality game made using Unity3D, intended for use with the HTC Vive HMD (Head mounted display).

Although there is no definitive intended client at present, there are many potential ones. Small innovative indie games can often end up on digital distribution platforms such as Steam after being noticed by online communities such as Steam Greenlight. In this case the intended client is any consumer interested in pc gaming, particularly those who are interested in small-scale, innovative games.

### Background

**Mobile VR**

Virtual reality has been around in primitive forms for many years. In 1838 Charlies Wheatstone invented the stereoscope, demonstrating that the brain “processes the different two-dimensional images from each eye into a single object of three dimensions”. However, even before this there were 360-degree murals / panoramic paintings from the 19th century, “intended to fill the viewer’s entire field of vision, making them feel present at some historical event or scene”.

However, it is only in the last 15 years or so that ‘VR’ has made its first successful steps into the mass market. This has been due to several factors: Firstly, the prevalence of computer technology has exploded exponentially (it is almost essential in most countries to own and keep to hand a mobile phone). This demand has spurred mass production and automation, which in turn continues to drive prices downward. Secondly, in the last decade there has been a “rise of smartphones with high-density displays and 3D graphics capabilities”.[[1]](#footnote-1) This makes them extremely practical as virtual reality devices. Google have already taken advantage of this by launching the ‘Google Cardboard’, bringing “immersive experiences to everyone in a simple and affordable way”[[2]](#footnote-2). Samsung followed suit soon after by releasing the ‘Gear VR’. Both these products are simply devices to hold your phone comfortably in front of your eyes. Their importance is that they signal that the big players in the tech industry now see VR as something worth investing in.

[[3]](#footnote-3)

**Head-mounted displays**

In addition to the surge in cheap, mobile VR applications, there has also been huge growth in VR head-mounted displays (HMDs). Three main competitors corner this market at present: Sony with the PlayStation VR, Oculus (now owned by Facebook) with the Oculus Rift, and HTC with the HTC Vive. These devices offer unparalleled performance for VR experiences due mainly to the quality of the displays. For example, both the Rift and Vive offer “two OLED panels boasting a combined 2,160x1200.” This means that “each eye gets its own 1080 x 1200 display.”[[4]](#footnote-4) As the goal of VR is to convince the brain that you really are in the virtual space being simulated, it is essential to have displays that offer a resolution as close to that of the human eye as possible. At present this is the main drawback of mobile VR; it simply does not offer a good enough resolution to make the experience completely convincing or immersive.

The drawback of these HMDs, however, is two-fold. Firstly, both headsets currently require you to be “tethered to a... Windows machine with a number of cables in order to function”. Secondly, they both require very powerful (and thus expensive) computer specs in order to run smoothly, especially when it comes to the GPU. The Vive recommends a NVIDIA GeForce GTX 1060 equivalent or better.[[5]](#footnote-5) This cost, coupled with the hefty price of the headset £759, puts the total price over the £1000 mark.

These two expanding forms of VR, then, highlight a huge gap in price-range. The cheapest mobile VR (Google Cardboard) at £15 (presuming the consumer already owns the phone they plan to use it with, and the cheapest high end HMD at ~£700 (PlayStation VR with PlayStation 4).

**VR and Gaming**

VR has countless applications, stretching from military (flight and battle simulations), education (e.g. astronomy – virtual solar systems), healthcare (virtual robotic surgery), fashion (trying on virtual clothes before buying) and countless more. By the nature of virtual reality, anything that is possible in the (supposedly) non-virtual world has an application in virtual reality. However, this report is focused on a gaming related project, and so I will focus on this area.

With the release dates of the Vive, Rift and PSVR all being in 2016, the games market is not yet saturated and is still growing. Although there is not yet a huge number of high quality games, some stand out from the rest. ‘Super Hot VR’ let players “live out a collection of harrowing slow-mo action sequences, dodging bullets and snatching throwing stars out of the air”. It feels a bit like taking part in a bullet-time Matrix style fight scene. ‘House of the Dying Sun’ puts the player “in the cockpit of an imperial Starfighter”[[6]](#footnote-6), allowing the player to feel as though they are piloting their own dog-fighting spaceship.

As well as VR standalone games, many originally non-VR games have had VR functionality added (either officially by the game’s creators) or by the player community using 3rd party software. Games such as Minecraft, Elite Dangerous , Project Cars and Universe Sandbox have all had VR functionality added.

Current issues with VR

My interest in VR. VR in general. Game development in general

### Objectives

The predominant objectives whilst undertaking this project were to develop skills relating to Game development. These include but are not limited to Game Design, asset creation/3D modelling and proficiency in specific software such as Unity3D and Blender. In addition, carrying out a project of this scale as a solo developer from start to finish has provided me with invaluable experience in development methodologies, effective versioning using GIT, bug tracking and time management.

### Deliverables

### Literature review (if applicable)

### Method of approach

### Legal, social, ethical, and professional issues

### Project management

### Stage 1

### Stage 2

### Stage 3

### Stage 4

### Project post-mortem

### Conclusions

## Statement of word count

## Reference List

## Bibliography

## Appendices

### User Guide

### Project Management Artefacts

### Other materials (UMLs, designs, test results)

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1. https://www.vrs.org.uk/virtual-reality/history.html [↑](#footnote-ref-1)
2. https://vr.google.com/cardboard/get-cardboard/ [↑](#footnote-ref-2)
3. <https://store.google.com/product/google_cardboard> <http://www.samsung.com/global/galaxy/gear-vr/> [↑](#footnote-ref-3)
4. http://www.techradar.com/news/wearables/htc-vive-vs-oculus-rift-1301375 [↑](#footnote-ref-4)
5. https://www.vive.com/uk/ready/ [↑](#footnote-ref-5)
6. http://www.kotaku.co.uk/2016/12/16/the-state-of-virtual-reality-in-2016 [↑](#footnote-ref-6)