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| University of reading |
| Individual Project Report – Virtual Campus |
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**Virtual Tour of Whiteknights Campus for Android Virtual Reality**

School of Mathematical, Physical and Computational Sciences

Individual Project – CS3IP16

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# Abstract

This report discusses in detail about the creation of my Final Year Individual Project, Virtual Campus. Virtual Campus is a Virtual Reality version of University of Reading’s WhiteKnights Campus. The Virtual Tour of Whiteknights Campus is an Android application, which allows users to explore a part of Whiteknights campus using a teleportation based movement. The campus has been built using unity and runs on Nougat Android phones or higher. The android application has been built using Unity and the models of the building was created using SketchUp and users are free to explore a part of WhiteKnights campus. The aim of the Virtual Tour of WhiteKnights Campus is to allow users freely explore campus in a virtual reality setting, this also helps users who wish to come to University of Reading but may be unable to attend an open day, so they can download this app and then explore campus in Virtual Reality.

# Acknowledgements

I would like to personally thank Timothy Threadgold for his support and suggestions for my project. Without his help, half of the implementations in this project wouldn’t be possible without him. His assistance has been supportive and assisted lead the project into the right way.

# Glossary of Terms & Abbreviations

API – Application Programming Interface

FOV – Field of View

GPU – Graphics Processing Unit

GUI – Graphical User Interface

SKD – Software development kit

# Introduction

Virtual Reality has been on the arise of popularity ever since 2010s when Palmer Luckey designed the first prototype of the virtual reality headset called the Oculus Rift. Two years later in 2015, video game developer and digital distribution company, Valve Corporation and consumer electronics company HTC, announced their virtual reality headset named HTC Vive. It featured controllers that allowed the user to interreact with the virtual environment. [1]

Today, Virtual Reality is possible and nearly accessible to anyone who possesses the latest model of a smartphone such as the iPhone or an Android phone (Like the Pixel or Samsung Galaxy) or own a console such as having a PS4 [2]. Virtual Reality headsets are becoming cheaper in general as well, so meaning that virtual reality is becoming more accessible to the public and thus increasing the popularity. [3]

The project is about creating a virtual reality version of WhiteKnights Campus, the application will be created primarily in Unity and all the buildings featured inside the WhiteKnights campus was made using SketchUp, the virtual campus application will be made for Android Devices running nougat or higher and have daydream/cardboard installed on it (The virtual reality software). The aims of the virtual reality campus are Provide users with a comfortable experience of Virtual Reality (Allowing to explore campus at their own pace), learn about the history of each building in WhiteKnights Campus. The App itself should be able to be installed on all phones running Android Nougat or higher and should provide smooth framerates and response no matter the hardware.

The personal motivation to pursue this project is explore and develop skills about virtual reality and how the public can benefit from using Virtual Reality to discover new worlds and experiences that might not be possible in real life. Virtual Reality can be used provide learning skills as it can be used as a training tool for example, using Virtual Reality to explore the human body for the medical sector or travel industry using virtual reality to encourage customers to buy holiday packages. [4] [5]

This report will discuss in detail about the creation of the application, the research made to prefect the Application, the approaches and implementations to create the project. The testing of the project along with its results. This report will also talk about the potential social, legal, ethical and health & safety issues that the project will have. Finally, this report will discuss the personal reflection and outcomes of the project.

# Problem Articulation and Objectives

The problem this project is addressing is many potential students in Sixth Forms/Colleges or postgraduate students may wish to study at University of Reading, however it is a possibility that they are unable to come to an open day, it could be for a variety of reasons ranging from; it could be too far away from them, they couldn’t afford travel to campus, they may be unavailable on the open day for example. Outside users may wish to visit the campus in general to see what it looks like. With virtual reality, it is possible that users can see what campus looks like virtually without them needing to be physically there, it may feel artificial but it should be a good substitute.

This project attempts to address the issue by creating a virtual reality version of Whiteknights campus which users can freely explore around a part of Whiteknights campus by using a ‘blink teleport’ feature where the user points by holding down a button to show an indicator to be teleported to the location specified by the user and then letting go once the user has chosen a location to be instantly teleported to that location. The user can also listen to voiced narration about the building that they are currently near, about what the building is and the history of the building.

The project was made using Unity and all buildings featured inside the campus was made using SketchUp. To create the virtual reality programming of the campus, a google cardboard/daydream SDK was used for allowing virtual reality to be enabled inside the project [6]. This project is made people using Android devices running Nougat (Android version 7.0) or higher with Daydream/cardboard installed (The software the android uses for virtual reality). The reason why I choose android devices instead of using Computer or Apple devices, is because Android devices are cheaper for virtual reality as most android devices today meet the suitable specifications for virtual reality [7]. This also helps University of Reading open days members who may wish to bring the virtual reality campus to open days on other schools or colleges because it would be easier to bring a smartphone with a virtual reality headset rather than carrying a computer/laptop with a headset.

The stakeholders that were identified of this project during development are: The first stakeholder is myself, as I am responsible for the development of the Virtual Campus application throughout the project’s development life cycle. The second stakeholder is my project manager, Timothy Threadgold who aided and recommended features that the project should have in terms of tools for aiding virtual reality creation and quality of life changes to the end user. Finally the final stakeholder of the project is the end user, which is any potential student who owns an android device and wishes to study at the University of Reading who maybe is unable to attend an open day for a variety of reasons.

The objectives of the project will have to fulfil to meet the following technical specifications are:

* Provide users with a comfortable experience of Virtual Reality (Allowing to explore campus at their own pace).
* Learn about the history of each building in WhiteKnights Campus.
* The App itself should be able to be installed on all phones running Android Nougat or higher and should provide smooth framerates and response no matter the hardware.

# Literature Review

# Technical Specification

# Research

# Solution Approach

# Design

# Implementation

# Testing

# Discussion

# Social, Legal, Health & Safety & Ethical Issues

# Conclusion and Future Improvements

# Reflection

# References

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# Appendices

## Project Initiation Document

## Project Log Book

## Script

## Poster

## Map of WhiteKnights Campus



Figure 1 Map of WhiteKnights Campus - link: <https://www.reading.ac.uk/web/files/whiteknights-campus-map-and-keys-2016.pdf>

## Github

<https://github.com/JamesTang2905/Individual-Project-2017-18>