CHAPTER 1: INTRODUCTION

1.1 Overview

The component of Visual Quality is important aspect in aim and shoot game in a gameplay. Virtual Reality (VR) has long been introduced during the early 1950s. Back then, the machines used to display VR was ugly and big, but it was only quite a few years ago that those machines have been upgraded to much prettier and have their size reduced to a rather small amount. There are limitless possibilities to what the technology of VR has in store for us. To experience VR, the user is required to put on a head-mounted display. This device will enable the user to see into a Virtual Environment. VR in the field of entertainment games already have many uses. In this paper, the researcher plans to focus on the important of lighting in aim and shoot game for visual quality in VR game.

Aim and shoot game are a genre of games that uses the weapon. The purpose of the game is to effectively navigate through a 3D environment, target opposing players and avoid obstacles. (Vicencio-Moreira, Mandryk, Gutwin, & Bateman, 2014) It takes time to learn, resulting in a wide range of skill levels. (Vicencio-Moreira et al., 2014) These kinds of games can usually be found at Steam.

Over past few years, a lot of aim and shoot type of game have been implemented into VR. However, not many people are aware of the important of lighting in aim and shoot game. This is because players do not care about the lighting. Therefore, this study plans to explore the important of lighting in aim and shoot game for visual quality in VR game.

1.2 Background of Research

1.2.1 Virtual Reality

"Virtual reality stands for the field of computing which has the objective of creating a virtual world, having one immerse into it and giving one the capability of interacting in this world, while using specific devices to simulate an environment and simulate one by feedback in order to make the experience as real as possible."
(Boas, 2013)
"A high-end user interface that involves real-time simulation and interaction through multiple sensorial channels (vision, sound, touch, smell, taste)" (Ran & Wang, 2011)

1.2.2 Application of Virtual Reality in Aim and Shoot Games

There are many aim and shoot games that have been implemented into virtual reality application. The researcher plans to explore only two applications which are Holopoint and QuiVR.

Holopoint is pure archery madness. Fight your way through waves of responsive targets, samurai and highly dangerous ninjas – all while drawing, nocking, and shooting your arrows as quickly as possible. (Alzan, 2016)

QuiVR literally puts the power of the bow and arrow in your hands. Tasked with defending your keep from an ever- advancing enemy, you will find yourself in a thrilling fight for you very survival. QuiVR is a choice for both VR veterans and newcomers alike. (Alvios, 2018)

1.3 Significance of Study

In this research, it studied on lighting in aim and shoot game and the component of visual quality in virtual reality game. In this paper, the researcher focused on the important of lighting in aim and shoot game for visual quality in virtual reality game.

This research will help you to understand that lighting is important aspect in aim and shoot game in a gameplay.

1.4 Aim and Objective

The aim of this review is to investigate the important of lighting in aim and shoot game for visual quality in virtual reality game. The research objectives are:

- To investigate the type of lighting
- To understand that lighting improve virtual reality game

1.5 Research Question

- What are the type of lighting?
- How does lighting improve virtual reality games?

1.6 Problem Statement

The implementation of Virtual Reality technology being taken into all kinds of field; most people are only interested in the field of entertainment games. But, not many people are aware of the important lighting in a game. This is because players want something that would make them immerse.

1.7 Justification of Research

This research is to prove that lighting in virtual reality game is important aspect in aim and shoot game in a gameplay.

1.8 Scope of Study

In this research the researcher intends to research on the types of lighting that apply in games and lighting improve virtual reality games. The researcher will study

about various kinds of light in aim and shoot game for visual quality in virtual reality game by collecting previous researches and secondary data. To assist in making an accurate type of lighting for visual quality in virtual reality game, details of the elements are important to take in for consideration.

1.9 Organisation of Dissertation

Chapter one discusses the Virtual Reality, and the application of Virtual Reality in aim and shoot games. Research aim and objective on this research are also presented. Chapter two will list out and review a visual quality and type of light in 3D. This chapter intends to answer the first proposed research question. Then Chapter three will explain the methods of data collection. An analysis on how different type of lights has different effect in a gameplay. This chapter intends to answer the second proposed research question. Chapter four will analyse the findings from all the different games in lighting. The different type of lights that are use in their games. Finally, Chapter five will attempt to conclude collected secondary data and provide answers for the research questions which have been proposed in previous chapters.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In this chapter, the researcher intends to investigate the type of lighting and understand that lighting improve virtual reality game. The researcher believes that by studying about it will give a clear picture on how important lighting in virtual reality game and to know and learn. It can be benefit knowledge to the researcher itself and to other people in the future.

This chapter will answer the first research question, what are the type of lighting? The literature review in this chapter will strengthen the researcher opinion on the important of lighting in aim and shoot game for visual quality in virtual reality games.

2.2 Visual Quality

Visual quality is defined as the visual attributes of nature landscape, structure and communities. Visual quality of exiting views using three criteria. First, vividness is the memorability of landscape components as they combine in striking and distinctive visual pattern. Second, intactness is the visual integrity of the nature and human landscape and its freedom from encroaching elements. Third, unity is the visual coherence and compositional harmony of the landscape considered as a whole. (Tunnel, 2006)

Computer enable the creation of environment that can be perceived. Virtual environment using lighting to communicate information about the composition and content of the scene. However, quality of light simulated in the virtual environment is controlled entirely artificially. (Zimmons, 2004)

2.3 Type of light

There are many type of light than can be use in a virtual environment which are spot light, directional light, point light, ambience light,

2.3.1 Spot light

“ Spot light has a specified location and range over which the light falls off. However, the spot light is constrained to an angle, resulting a cone-shaped region of illumination. The centre of the cone points in the forward (Z) direction of the light object. Light also diminishes at the edges of the spot light’s cone. Widening the angle increases the width of the cone and with it increases the size of this fade, known as the ‘penumbra’.” (Unity Technologies, 2018)

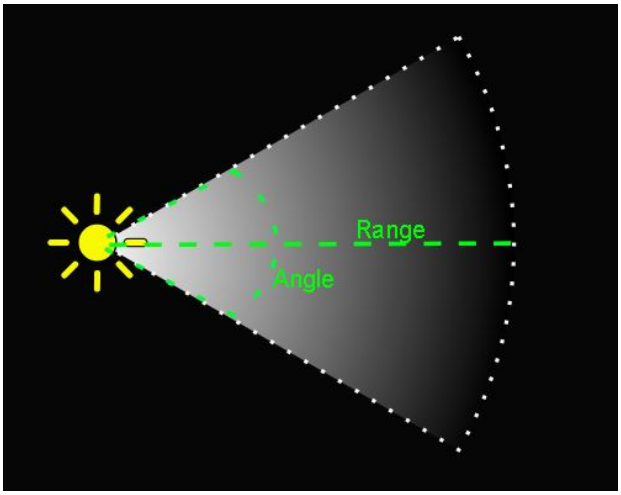

Figure 2.1 Spot Light

“ Spot lights are generally used for artificial light sources such as flashlights, car headlights and searchlights. With the direction controlled from a script, a moving spot light will illuminate just a small area of the scene and create dramatic lighting effects.” (Unity Technologies, 2018)

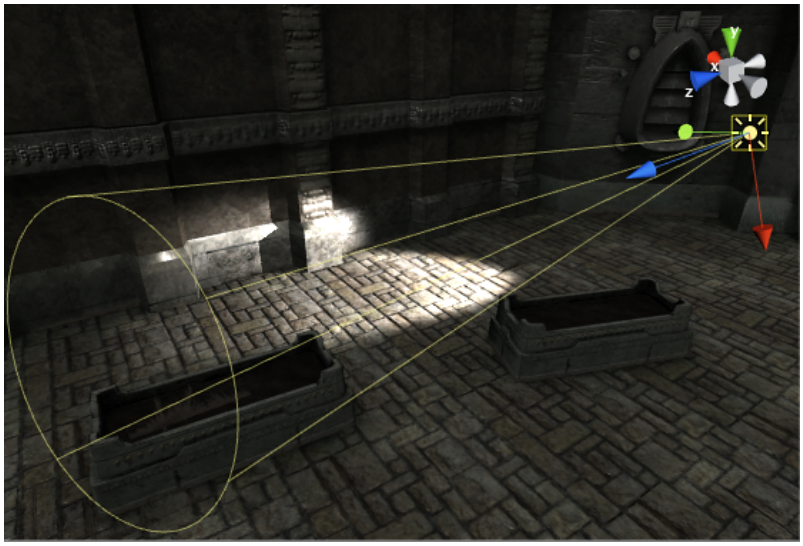

Figure 2.2 Spot Light

2.3.2 Directional light

" Directional lights are very useful for creating effects such as sunlight in your scene. Behaving in many ways like the sun, directional lights can be thought of as distant light sources which exist infinitely far away. A directional light does not have any identifiable source position and so the light object can be placed anywhere in the scene. All objects in the scene are illuminated as if the light is always from the same direction. The distance of the light from the target object is not defined and so the light does not diminish." (Unity Technologies, 2018)

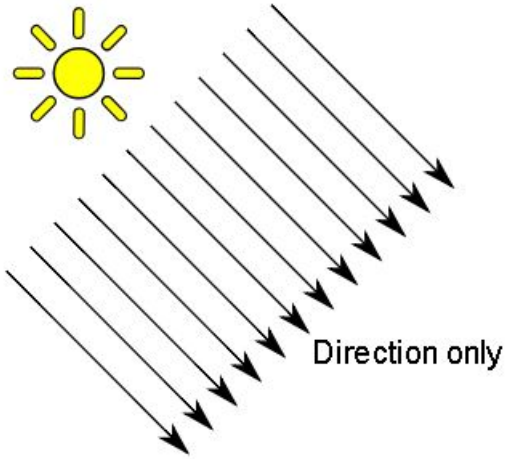

Figure 2.3 Directional Light

“ Directional lights represent large, distant sources that come from a position outside the range of the game world. In a realistic scene, they can be used to simulate the sun or moon. In an abstract game world, they can be a useful way to add convincing shading to objects without exactly specifying where the light is coming from.“ (Unity Technologies, 2018)

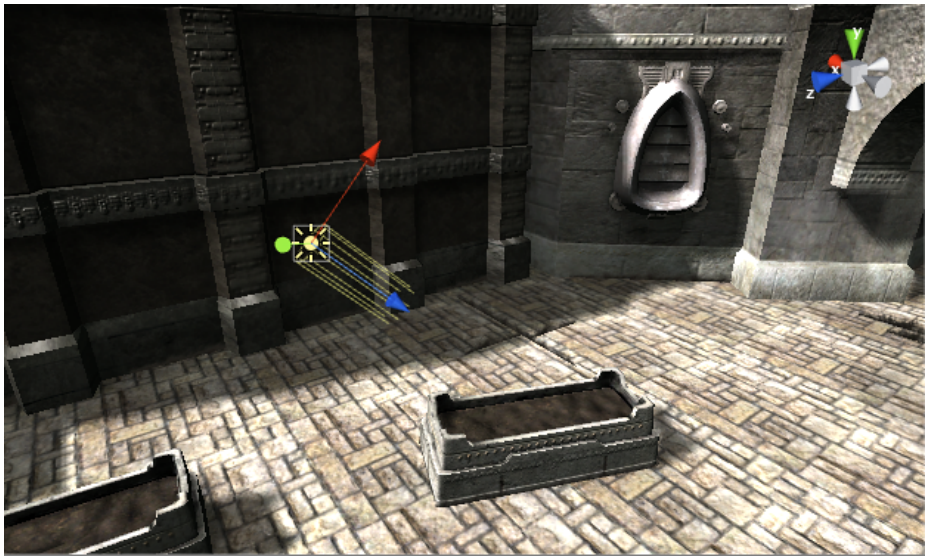

Figure 2.4 Directional Light

2.3.3 Point light

"A point lights is located at a point in space and sends light out in all directions equally. The direction of light hitting a surface is the line from the point of contact back to the centre of the light object. The intensity diminishes with distance from the light, reaching zero at a specified range. Light intensity is inversely proportional to the square of the distance from the source. This is known as 'inverse square law' and is similar to how light behaves in the real world." (Unity Technologies, 2018)

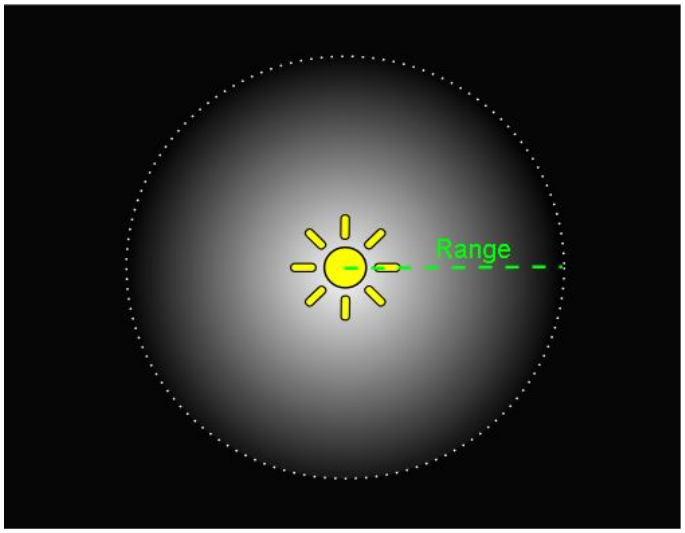

Figure 2.5 Point Light

"Point lights are useful for simulating lamps and other local sources of light in a scene. You can also use them to make a spark or explosion illuminate its surroundings in a convincing way." (Unity Technologies, 2018)

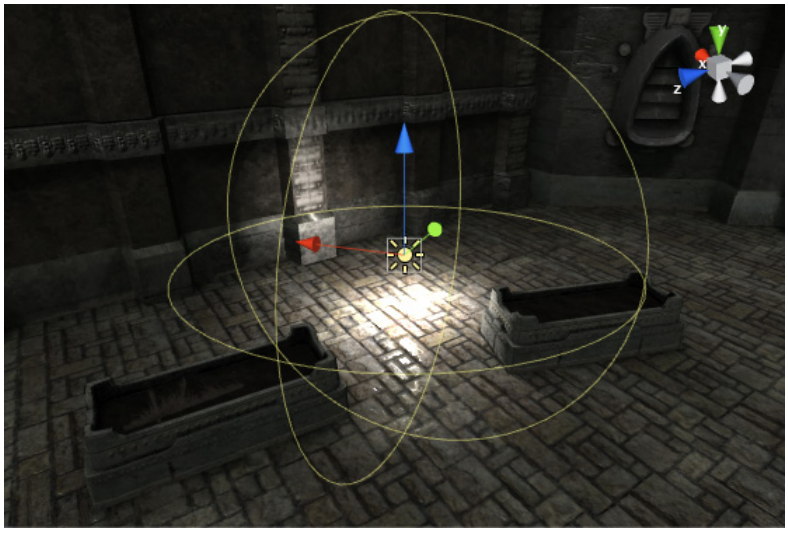

Figure 2.6 Point Light

2.3.4 Ambient light

"Ambient light is light that is present all around the scene and doesn't come from any specific source object. It can be an important contributor to the overall look and brightness of a scene. Ambient light can be useful in a number of cases, depending upon your chosen art style. An example would be bright, cartoon style rendering where dark shadows may be undesirable or where lighting is perhaps hand-painted into textures. It also can be useful if you need to increase the overall brightness of the scene without adjusting individual lights." (Unity Technologies, 2018)

2.4 Chapter Summary

This chapter has answer research question one which is what are the type of lighting. There are many type of lights which is spot light, directional light, point light and ambient light. On each light it has a different effect on an environment. Lighting can have a good effect on game. It just the matter on how the user use it.

CHAPTER 3: METHODOLOGY

3.1 Introduction

In this chapter, researcher will introduce and provide the detailed information about the methodology and methods used to collect the data in this research. The research design is case study type which researcher will select few cases and determine data gathering and analysis techniques through the cases. Data, information and facts are used in secondary types. Approaches of analysis are qualitative type.

3.2 Research Design

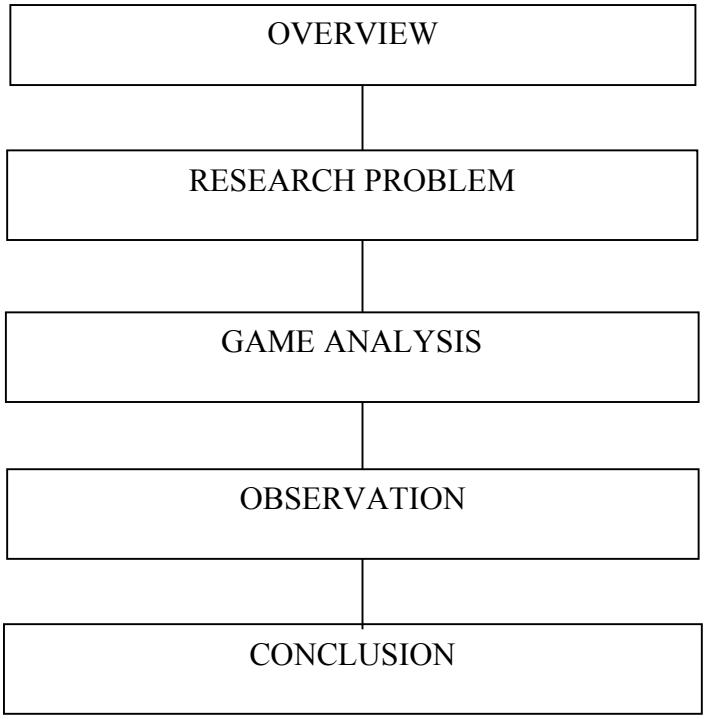

Figure 3.1 Research Process

Figure 3.1 is a figure of research process of this research. This research will include a game analysis whereby the researcher will study three type of lighting from top 3 games for aim and shoot games.

For this research, the qualitative method will be based on these questions that are provided in Chapter one:

- What are the type of lighting?
- How does lighting improve virtual reality games?

The secondary research approach would consist of reviewing on existing literature article, data analysis or journal article to extend knowledge toward related topic by other researcher. Secondary data approach is efficient and time saving as the time research process is limited for this research. To understand lighting helps in improving virtual reality game, the researcher uses keywords such as lighting, aim and shoot, visual quality and virtual reality game to find relevant articles in the domain.

3.3 Reliability & validity

3.3.1 Secondary Data Analysis

The researcher uses secondary data analysis for the research problem which stated in Chapter one. The researcher source of data included reliable search engine browsers such Google Scholar, Google, Mendeley and vlib. In order to gain valid data, the researcher would prefer to search for more literature review from online journal, article and scholar journal to gain more supportive evidence of the obtained more data.

3.4 Research approach & methodology

3.4.1 Data Collection Method

The researcher chooses one method as main data collection techniques which is secondary data collection in order to collect sufficient and interrelated data to solve the research objectives of this study. Nevertheless, the researcher used qualitative research method.

3.5 Chapter Summary

This chapter has covered the method of research for the study. The researcher has went through the research design and structure, relevant findings, population and sampling method, and research methodology which enables researcher to easily find data and sources systematic. As conclusion, the research question will be investigated by the researcher in data analysis of Chapter four.

CHAPTER 4: DATA ANALYSIS

4.1 Introduction

This chapter answered the research question as stated on chapter one through findings and gathered using secondary data approach. Research question number one is type of lighting. The researcher determines this question by using secondary data analysis involving various articles and journal to draw the conclusion. To answer the research question number two, the researcher conduct secondary research to collect and analyse the data of top 3 aim and shoot games. To enhance the understanding of this chapter, it consist and include figures as part of ways to present the data analysis, findings, multiple case study with shared issues are described as relevant with studies.

4.2 Findings

The researcher focus on finding secondary data on type of lighting. By understanding the method to type of lighting, the researcher can obtain the information to answer research question two which is how does lighting improve virtual reality game.

4.3 Case Studies

The researcher has studied o few articles related to cases such as the top 3 aim and shoot games. This research will be able to answer research question one and two.

4.3.1 Doom (2016)

Figure 4.1

Figure 4.1 show that this is the main poster of the game called Doom. This is one of the best aim and shoot game.

Figure 4.2

According to figure 4.2 the type of lighting is ambient light and directional light. The ambient light for this game according to figure 4.2 is low bright the chosen style. It shows that the time of this scene is at the evening. The directional light for this game world according to figure 4.2 is to show where the light is coming from which in this case the light is sunlight. It came from right down side of the scene which mean

in the evening. In conclusion, the mix of lights between ambient and directional give an effect of horror place at the evening.

Figure 4.3

According to figure 4.3 the type of lighting is ambience light. The ambient light for this game according to figure 4.3 is cartoonish the chosen art style. It also shows the time is at the late evening. In conclusion, this ambient light gives an effect of open field at the late evening.

4.3.2 Destiny 2

Figure 4.4

Figure 4.4 show that this is the main poster of the game called Destiny 2 forsaken. This is one of the best aim and shoot game.

Figure 4.5

According to figure 4.5 the type of lighting is ambient light and directional light. The ambient light for this game world according to figure 4.5 is dark shadows the chosen art style. The directional light for this game world according to figure 4.5 is to show where the light is coming from which in this case the light is sunlight. It

came from left down side of the scene which mean early in the morning. In conclusion, this mix of lights between ambient and directional give an effect of abandon place in the morning.

Figure 4.6

According to figure 4.6 the type of lighting is directional light and ambient light. The directional light for this game according to figure 4.6 is the sources that come from outside the range of this game world. it also shows the time of this scene is at the afternoon. The ambient light for this game according to figure 4.6 is bright the chosen art style. In conclusion, this mix of lights between directional and ambient give an effect of abandon place in the afternoon.

4.3.3 Titan fall 2

Figure 4.7

Figure 4.7 show that this is the main poster of the game called Titan fall 2. This is one of the best aim and shoot game.

Figure 4.8

According to figure 4.8 the type of lighting is directional light and ambient light. The directional light for this game world according to figure 4.8 is to show where

the light is coming from which in this case the light is sunlight. It came from above side of the scene which mean at lunch time. The ambient light for this game according to figure 4.8 is dark shadow the chosen art style. In conclusion, this mix of lights between directional and ambient give an effect of small space in the dark.

Figure 4.9

According to figure 4.9 the type of lighting is directional light, ambient light and spot light. The directional light for this game world according to figure 4.9 is to show where the light is coming from which in this case the light is sunlight. It came from right side of the scene which mean in the early evening. The ambient light for this game according to figure 4.9 is low bright it shows dark shadow the chosen art style. The spot light for this game according to figure 4.9 is a small area of the scene and create dramatic lighting effects. In conclusion, the mix of lights between directional, ambient and spot give an effects of sense of direction.

4.4 Table The top 3 aim and shoot game according to type of lights.

	Doom	Destiny 2	Titan fall 2
Spot light			
Directional light	✓	✓	✓
Point light			✓
Ambient light	✓	✓	✓

Table 4.1

The top 3 aim and shoot games according to type of lights

Table 4.1 show that the top 3 aim and shoot games according to type of lights – spot light, directional light, point light and ambient light.

The game which has most type of lights is Titan fall 2 which is directional light, point light and ambient light. The two aim and shoot games which is Doom and Destiny 2 has similar type of lights which are directional light and ambient light. The type of lights that have in every aim and shoot games is directional light and ambient light. However, in contrast spot light do not have in every aim and shoot games.

In conclusion, it seems that the most use type of lights in aim and shoot game is directional light and ambient light.

4.5 Chapter Summary

This chapter has covered and analysed few case studies. The researcher analysed the criteria on the type of lighting that apply on the top aim and shoot game. Throughout the research, lighting play an important part in virtual reality game.

CHAPTER 5: DISCUSSION AND CONCLUTION

5.1 Introduction

This chapter is to wrap up the findings rom this research paper. The purpose of this chapter is to conclude the answers of the research questions. In Chapter 4, the researcher has attempted to answer research question one and two, which are:

1. What are the type of lighting?
2. How does lighting improve virtual reality game?

From there, the researcher has successfully achieved the research aim and objective of this research.

5.2 Discussion

This research paper mainly relies on secondary data analysis which consist of online articles, journals and dissertations. Below are the two findings of both of the research questions.

5.2.1 Question 1: What are type of lighting?

In chapter two, researcher has investigated and studied on the type of lighting and understand that lighting improve virtual reality game. It turns out that there are many type of lights which is spot light, directional light, point light and ambient light. On each light it has a different effect on an environment. Lighting can have a good effect on game. It just the matter on how the user use it.

5.2.2 Question2 : How does lighting improve virtual reality game?

In chapter four, researcher has studied on using lighting to improve virtual reality games. By showing the top 3 aim and shoot games that different type of lighting

have different effect on the environment. The most type of lights in aim and shoot game is directional light and ambient light. This show that lighting play an important part in virtual reality game.

5.3 Research Limitations

Although the study has reached its research objectives, there were few inevitable limitations. First of all, there is time limit for this research which is around fourteen weeks for this study. Therefore, the researcher could not detailed study and analyse for more advantages on lighting which the researcher should have collected more. Secondly, the researcher found that there were limitations of secondary data and findings as there are not many researchers who are doing the topic chosen. Finally, as the researcher had been doing qualitative research and gathering case studies, the study my have biased views that probably influenced the findings. This is one of the limitations of self-reported data.

5.4 Recommendations for Future Studies

This research may benefit further researcher who aim to look at similar areas and focus other specifications. There are a few recommendations derived from this study that other researcher can take into considerations. There are great importance of studying the type of lighting and how does lighting improve virtual reality game.

5.5 Summary

In a conclusion, the researcher has understood the effect of lighting can change the mood of the scene. The researcher also gain information about the most use type of lighting in top 3 aim and shoot games is ambient light and directional light.