Design and Development of a Saint Martin Battlefield Game

DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

DECEMBER 2019

Design and Development of a Saint Martin Battlefield game

BY

Md. Abdur Rashid
ID: 151-15-364
AND

Md. Motasim Billah
ID: 151-15-372

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

Mohammad Monirul Islam
Senior Lecturer
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

DECEMBER 2019

APPROVAL

This Project titled "**Design and Development of a Saint Martin Battlefield game**", submitted by Md. Abdur Rashid, ID: 151-15-364 and Md. Motasim Billah to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 26th November 2019.

BOARD OF EXAMINERS

Dr. Syed Akhter Hossain — **Chairman**
Professor and Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Dr. S M Aminul Hoque — **Internal Examiner**
Associate Professor & Associate Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Saif Mahmud Parvez — **Internal Examiner**
Lecturer
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Dr. Mohammad Shorif Uddin — **External Examiner**
Professor
Department of Computer Science and Engineering
Jahangirnagar Universit

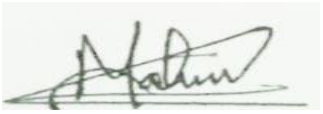
DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Mohammad Monirul Islam, Senior Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:

Mohammad Monirul Islam
Senior Lecturer
Department of CSE
Daffodil International University

(Md. Abdur Rashid)
ID: 151-15-364
Department of CSE
Daffodil International University



(Md. Motasim Billah)
ID: 151-15-372
Department of CSE
Daffodil International University

ACKNOWLEDGEMENT

First we express our heartiest thanks and gratefulness to almighty God for His divine blessing makes us possible to complete the final year project/internship successfully.

We really grateful and wish our profound our indebtedness to **Mohammad Monirul Islam**, **Senior Lecturer**, Department of CSE Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of "*Field name*" to carry out this project. His endless patience ,scholarly guidance ,continual encouragement , constant and energetic supervision, constructive criticism , valuable advice ,reading many inferior draft and correcting them at all stage have made it possible to complete this project.

We would like to express our heartiest gratitude to **Dr. Syed Akhter Hossain**, **Professor and Head,** Department of CSE, for his kind help to finish our project and also to other faculty member and the staff of CSE department of Daffodil International University.

We would like to thank our entire course mate in Daffodil International University, who took part in this discuss while completing the course work.

Finally, we must acknowledge with due respect the constant support and patients of our parents.

ABSTRACT

"Saint Martin Battlefield" is a name of the game that was developed for the final project of B.Sc. in Computer Science and Engineering at Daffodil International University. This is a multiplayer Third Person Shooter (TPS) game. The goal of our project is to design a 3D computer game using Unity engine. The concept of our game is that multiple players will be able to connect on our game and can fight with each other. The winner will be the player who will survive till end of the game. Players can be connecting through LAN. Maximum 20 players can add to the game and they have to fight with each other and in the end the last man standing is going to win .The Networking of this game is very high. So we used just a LAN to LAN connection in this game. In our game players can run, jump and walk. Players can also shoot the enemy with Pistol, AK47 rifle and also we have added Knife. We've added aim bar in our game so that player can easily aim the enemy and can shoot the enemy. We have made some house using "Blender". We have added small design such as wagon, barrel, and the bench. The map or the environment of our game is very nice. We have made that stage using blender. Our game is a 3D game. Every assets of our game are 3D assets.

TABLE OF CONTENTS

CONTENTS	PAGE
Title Name	i
Board of examiners	ii
Declaration	iii
Acknowledgements	iv
Abstract	v
Chapter of Contents List	vi-viii
Figure List	xi-x
CHAPTER	
CHAPTER 1: INTRODUCTION	**1-3**
1.1 Introduction	1
1.2 Motivation	2
1.3 Objectives	2
1.4 Scope of the project	3
CHAPTER 2: BACKGROUND	**4-6**
2.1 Introduction	4
2.2.Unity Engine	4-5
2.2.1 Unity	4
2.2.2 Overview	5
2.3 Blender 3D Modeling Software	5-6
2.4 2D/3D Theories	6

Chapter 3: ENVIRONMENT **7-19**

3.1 Bangladesh Saint Martin Island 7-8

3.2 Tree 9-10

3.2.1 Palm Tree 9

3.2.2 Conifer Tree 10

3.3 house 11-15

3.4 Rock 16

3.5 Water Prefab 17

3.6 Wagon 17

3.7 Barrel 18

3.8 Camera 18-19

CHAPTER4:NETWORK MANAGER **20-21**

4.1 Network Manager 20-21

CHAPTER 5: PLAYER PREFAB **22-26**

5.1 Player 22

5.2 Player Prefab 22

5.3 Player Components 23

5.4 Registering The Player Prefab 24

5.5 Player animator Controller 25

5.6 Player Movement And Controller 25-26

5.7 Damage System 26

CHAPTER 6:WEAPONS **27-28**

6.1 Weapons Design Model 27-28

6.1.1 Daigle Pistol 27

6.1.2 AK-47 Assault Rifle 28

6.1.3 Knife 28

6.2 Weapon Properties 29-30

6.2.1 Weapon Properties of Pistol 29

6.2.2 Weapon Properties of AK-47 30

6.2.3 Weapon Properties for Knife 30

CHAPTER 7: LIMITATION, CONCLUSION AND FUTURE WORK **31-32**

7.1 Limitation 31

7.2 Conclusion 31-32

7.3 Future Work 32

REFERENCE ***33***

Figure list

Figure	Page
Figure 3.1.1: Saint Martin Resolution	7
Figure 3.1.2: Saint Martin Blender Model	8
Figure 3.1.3: Saint Martin in Unity	8
Figure 3.2.1.1: Palm Tree	9
Figure 3.2.2.1: Conifer Tree	10
Figure 3.3.1: House Prefab	11
Figure 3.3.2: House Prefab	12
Figure 3.3.3: House Prefab	12
Figure 3.3.4: House Prefab	13
Figure 3.3.5: House Prefab	13
Figure 3.3.6: Two House Prefab	14
Figure 3.3.7: House Prefab	14
Figure 3.3.8: House Prefab	15
Figure 3.3.9: House Prefab	15
Figure 3.4.1: Mossy Rock Prefab	16
Figure 3.4.2: Realistic Rock Prefab	16
Figure 3.5.1: Water Prefab	17
Figure 3.6.1: Wagon Prefab	17
Figure 3.7.1: Barrel Prefab	18
Figure 3.8.1:Game View camera	19
Figure 3.8.2:Mini Map View Camera	19
Figure 4.1.1: Network Manager	20
Figure 4.1.2: Network Manager HUD	21

Figure 4.1.3: Network Manager GUI 21
Figure 5.2.1: Player Prefab 22
Figure 5.3.1: Player Controller Component 23
Figure 5.3.2: Player Animation Component 23
Figure 5.4.1: Registering the Player Prefab 24
Figure 5.4.2: Registering the Player Connection 24
Figure 5.5.1: Player Animation Style with Weapon 25
Figure 5.6.1: Player Movement Script 25
Figure 5.6.2: Player Behavior Script 26
Figure 6.1.1.1: Daigle Pistol 27
Figure 6.1.2.1: Ak-47 Assault Rifle Model 28
Figure 6.1.3.1: Knife Model 28
Figure 6.2.1.1: Pistol Property 29
Figure 6.2.2.1: AK-47 Property 30
Figure 6.2.3.1.: Knife Property 30

CHAPTER 1

INTRODUCTION

1.1 Introduction

This project mainly deals with the development of a 3D game application with the Unity 5 game engine for Windows OS. At the present time, the video game market appears to be of an unprecedented stage, which means the springing up of more platforms lead to more competition. The video game market is not just serviced for PC and Xbox. The mobile platforms basis on iOS, Android and Windows Phone increase very sharply. As a result, "cross-platform" come into people's eyes.

Real time 3D games have been existed for approximately ten years now. We have played them, created assets in the style of our favorites, and maybe even "moded" a few of them. However until recent time, the cost of licensing one of the premier game engines has ranged from several hundred thousand to several million dollars per title, relegating the dream of creating one's own 3D game to an unattainable fantasy. With Unity's move to offer a strongly featured free version of their engine, a radical change in the pricing models of the high-end engines has shocked the industry which be willing to take high cost to make games or Computer Graphics.

Unity 3D game engine is one of the most powerful professional, steady and efficient game engines, and Unity 3D game engine supports Web, PC, and Mac, iOS, Flash, Android, Xbox360, PS and Wii platforms. The project used the Unity 3D game engine to develop a 3D game, which the case of the game is a third person shooter (TPS) game. The report is aimed at people who are beginning to learn Unity and possess at least basic knowledge of the Unity 3D game engine. It does not discuss the whole process of the creating the game.

1.2 Motivation

The game development in Bangladesh is quite new. However the amount of players of this country is increasing day by day. Children, adults all have an interest in enjoying video games whether or not it's computer games or mobile games. Learning in computing and engineering, this project has given us the chance to develop a game. We have developed this game for people of all ages so that they can play this game with friends and family. Our game is very much user friendly so we hope that users will enjoy playing our game and this game will provide them entertainment.

1.3 Objectives

The Purpose of this game is to make a Multiplayer game using Unity 3d Game engine. Nowadays Multiplayer game is the most played game in the world. Every gamer wants to play Multiplayer games, because in Multiplayer game each gamer can compare with other gamers about their skills. In Bangladesh there is not a single multiplayer game available. So, we are the first team to introduce our country with our own made multiplayer game. Players can connect through LAN in this game and after connection they can check around the map and they have to find each other and have to kill each other. The last one standing is the winner. The main reason to select this project is that no one in Bangladesh ever made this type of TPS multiplayer game. So want to encourage the future game developer and we wanted to make an awesome multiplayer gaming future in Bangladesh. We wanted to tell the world that Bangladesh also can make multiplayer game. Most of multiplayer games are built in Russia, China, USA or Europe and they monetize their games through advertise and earn money. So we are giving our money to their country by playing their games. That’s a huge lose for our country. That’s why we wanted to create this TPS Multiplayer game.

1.4 Scope of the project

This Report describes all the requirements for the project. The purpose of this report is to provide a visual image for the combination of both structured and unstructured information of our project “Saint Martin Battlefield”. “Saint Martin Battlefield” is a Multi-player survival game on the PC platform.

At the starting of the game, a player will create a server through his/her PC then every other player which is connected to the same local area network will be able to access. To access the game the players other than the server creator has to use the server – PC IP address.

After starting the game, every player will access the game through jump. During this time, a player only has a default knife but the other weapon he has to collect from game environment. Then they will start killing each other. After killing everyone the last survivor will be the winner of the game.

The scope of the project is developing a 3D virtual game. The project will be based on creating an action game with the goal of the mind being fun.

Listed below are the scopes that can be covered in the development of this game:-

- 3D Game
- Third Person Shooter
- Multi-Player Game.
- Animation
- PC Game

CHAPTER 2

BACKGROUND

2.1 Introduction

Despite the economic instability and crisis deeply poignant the globe, the analysis revealed that the sport trade is growing astonishingly. When we analyze this trend, variant individuals are taking part in game industry as a living. The explanation of this growth may be explicit that the sport trade will charm any users with totally different tastes. Realizing these opportunities Unity technology developed the Unity game engine. The idea of developing game isn't new for USA. Being a gamer continuously we had the curiosity of making one game among our very own. During our study in B.Sc. in Computer Science and Engineering, We first learnt about the Unity game engine. Actually, at the beginning of the project we don't have experience in developing a game. As everyone knows, there are several types of computer games.

A game which makes the player feels within the game world, as if the main character has the game camera fixed at his eyes. Consequently, we decided to create this game using Unity engine, as our final project.

2.2 Unity Engine

2.2.1 Unity

Unity 3D is a cross-platform game engine with an implicit. It is mainly used to create computer games for PC and Mobiles and is applied by a few million game developers on the planet. The game engine is made in C++, and can be develop using codes written in C# and JavaScript. It developed from an OS X game improvement device in 2005 to the multi-stage game engine that it is today. The free form of Unity enables individuals to explore, learn, create, and market games without spending any of their well deserved money. Unity is truly moderate, it helps a game developer very easily and budget cheaply make game and showcase or market them.

2.2.2 Overview

Unity is a cross platform, and thus bolsters both 2D and 3D games, it boost its usefulness through scripting in 3 custom programming dialects. Inside 2D games, Unity permits importation of sprites and a progressed 2D world renderer. For 3D games, Unity permits let us use bump mapping, reflection mapping, parallax mapping, screen space surrounding impediment (SSAO), dynamic shadows utilizing shadow maps, render-to-surface and full-screen post-processing. Unity additionally offers various things to designers and game publisher as well, these are: Unity Ads, Unity Analytics, Unity Certification, Unity Cloud Build, Unity Every play, Unity IAP, Unity Multiplayer, Unity Performance Reporting and Unity Collaborate. Unity is prominent for its capacity to target games to various platforms. As of now these platforms are Android, Android TV, Face book Game room, Fire OS, Gear VR, Google Cardboard, Google Daydream, HTC Vive, iOS, Linux, Mac OS, Microsoft Halogens, PlayStation VR, Samsung Smart TV, Wii, Wii U, Windows, Windows Phone, Windows Store, WebGL, Xbox 360, and Xbox One. Unity is the default programming improvement pack (SDK) for Nintendo's Wii U computer game platform, with a free duplicate included by Nintendo with each Wii U engineer permit. Unity Technologies calls this packaging of an outsider SDK an "industry first".

Unity utilizes the element segment framework engineering design.

2.3 Blender 3D Modeling Software

Blender is 3D computer graphics software for developing visual effects, animated movies, 3D games. Its a free and open source 3D creation suite. It offers many features including 3D modeling, texturing, rigging, skinning, fluid, smoke simulation, animation, rendering, and video editing. Blender software allows you to do polygonal 3D modeling and animations.

Blender software helps you:

- Create realistic 3D objects
- Design 3D objects quickly and efficiently
- Customize 3D objects
- Edit and create animations
- Sculpt models with 20 different brushes
- Easily unfold mesh in order to customize it
- Simulate liquid, hair, smoke, clothing, etc. from particles

2.4 2D/3D Theories

A comprehension of a movement and the math theory is pivotal in making games. Without movement or player interaction it's nothing but a still image. To make a game we need to move many things from one place to another, for this reason we need to understand the concept of 2d and 3d space and the corresponding geometry for making it intractable. Vector math, graph theory and a lot other mathematics is required for successfully making a game.

CHAPTER 3

ENVIRONMENT

We have used various objects that were built in unity engine along with other objects that were downloaded or designed. All of these objects are listed.

3.1 Bangladesh Saint Martin Island

In this game we used Saint Martin Island as a game playing environment. We try to make the exact replica of the **Saint Martin Island** as game playing ground.

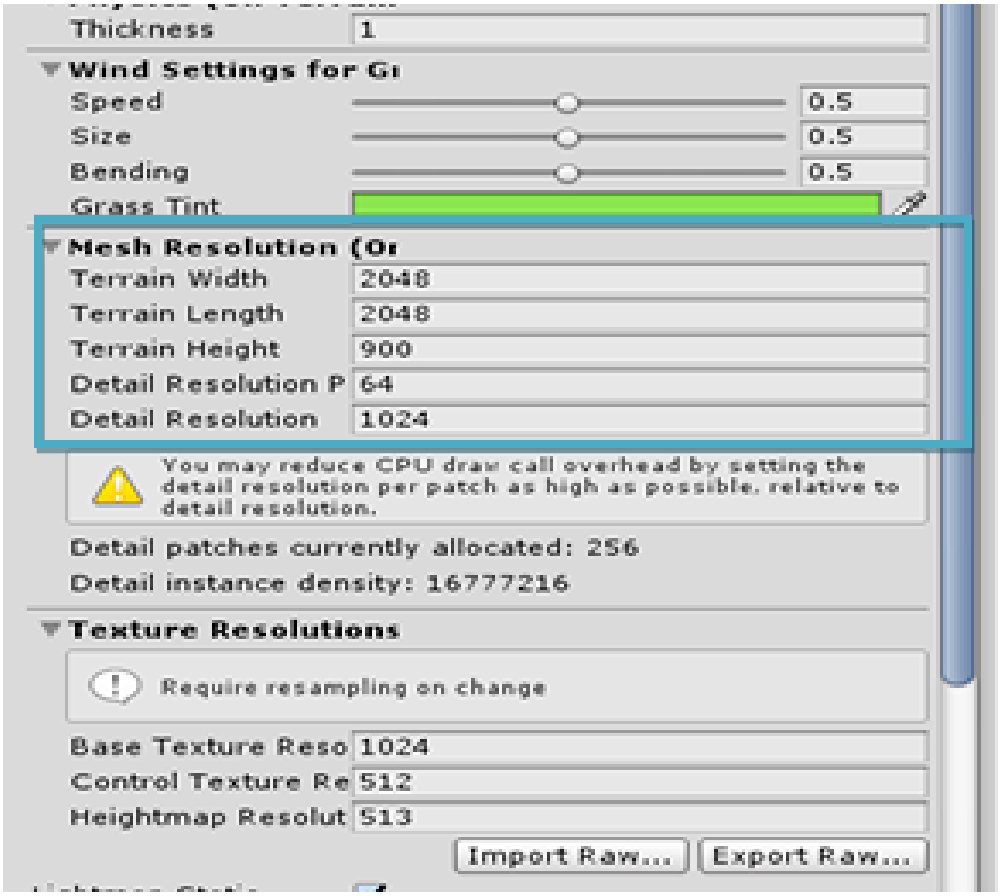


Figure 3.1.1: Saint Martin Resolution

We made the game playing ground map through blender software.

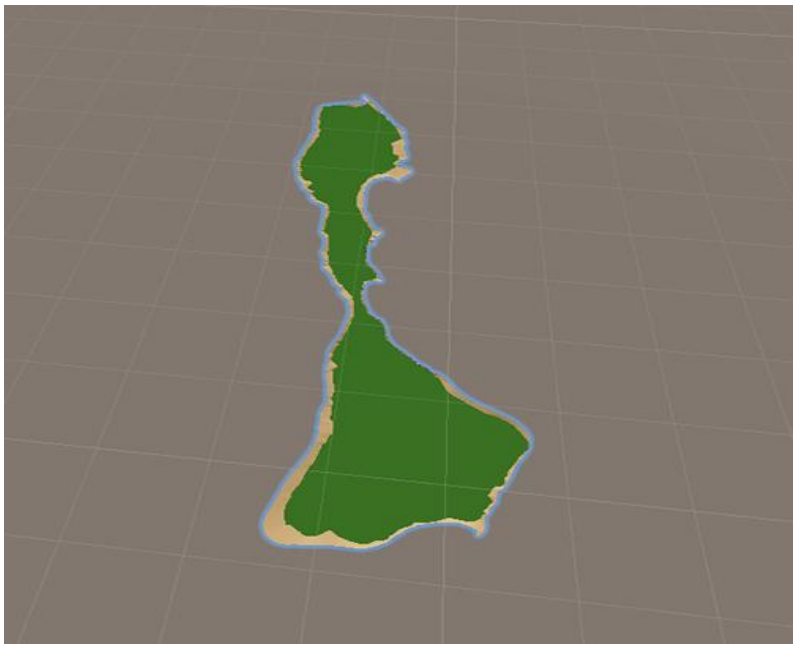


Figure 3.1.2: Saint Martin Blender Model

The other works like making tree, hill, sea etc were done by unity engine.

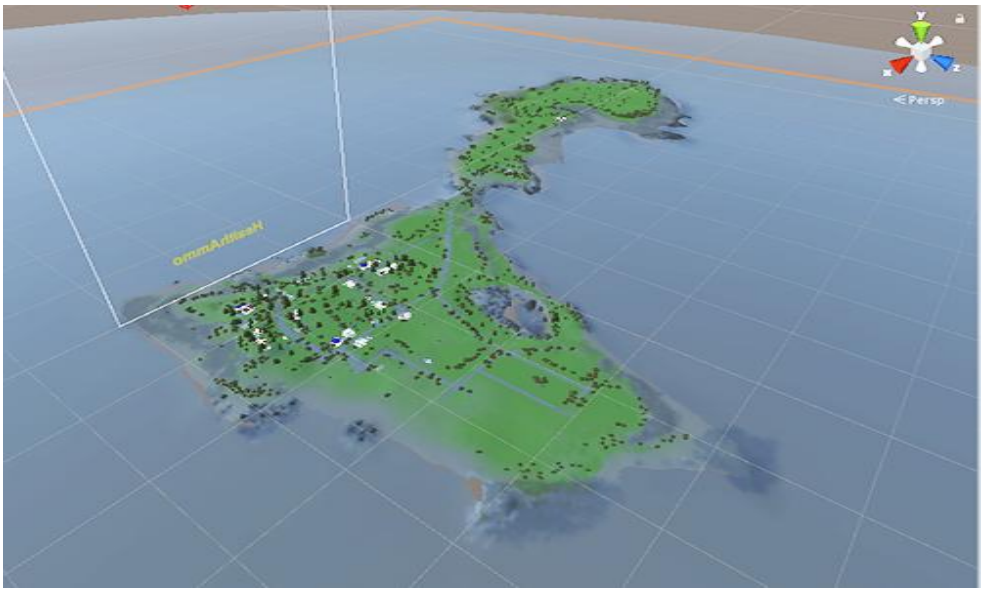


Figure 3.1.3: Saint Martin in Unity

3.2 Tree

We implemented two types of tree in our environment.

3.2.1 Palm Tree

Palm tree was used as a prefab in our game.

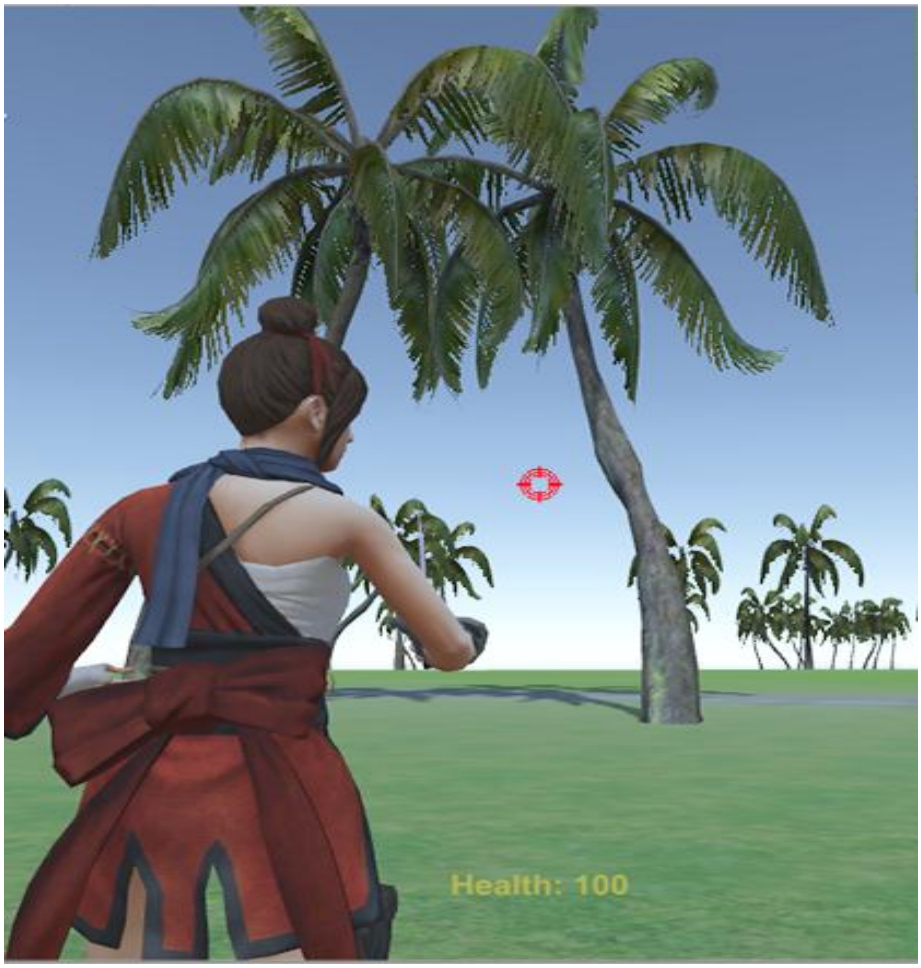


Figure 3.2.1.1: Palm Tree

3.2.2 Conifer Tree

Conifer tree was used as a prefab in our game.

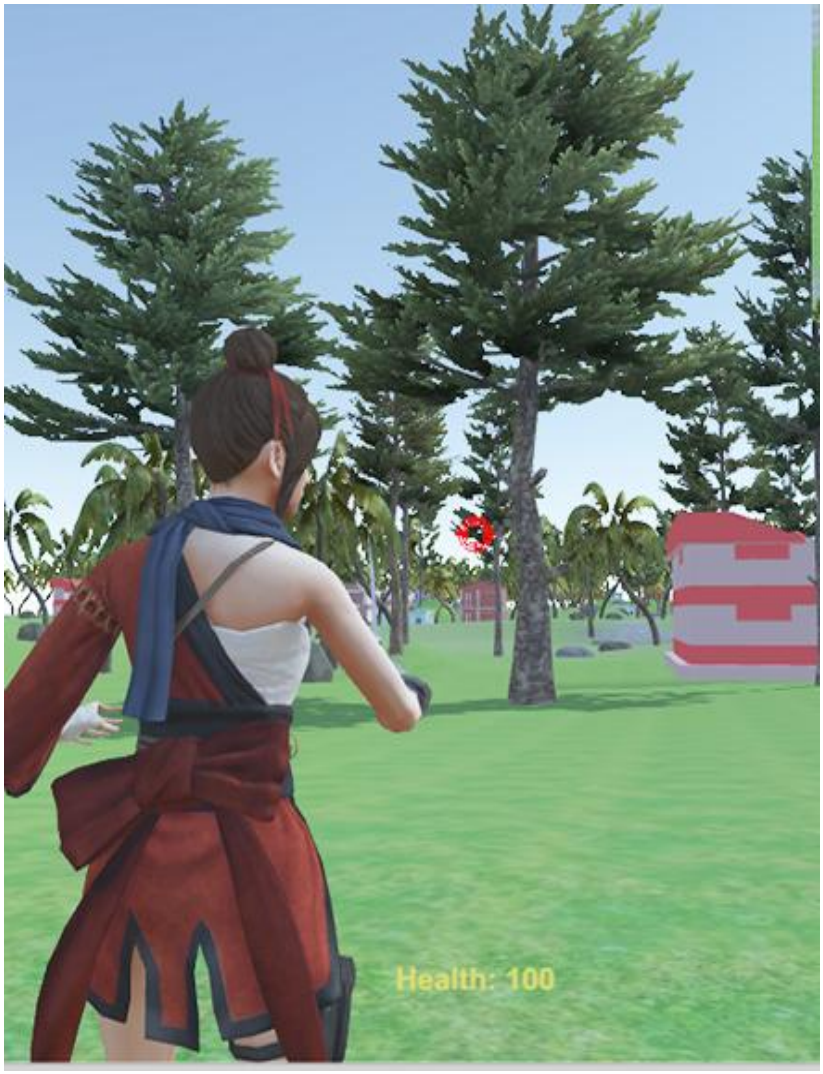


Figure 3.2.2.1: Conifer Tree

3.3 House

House was created by blender software**.**

Figure 3.3.1: House Prefab

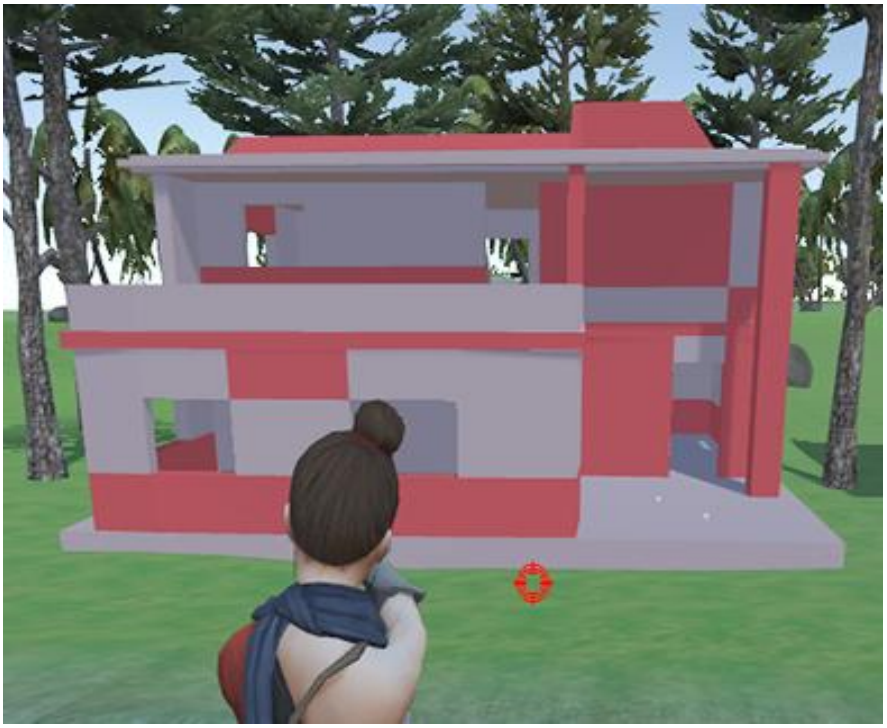


Figure 3.3.2: House Prefab

Figure 3.3.3: House Prefab

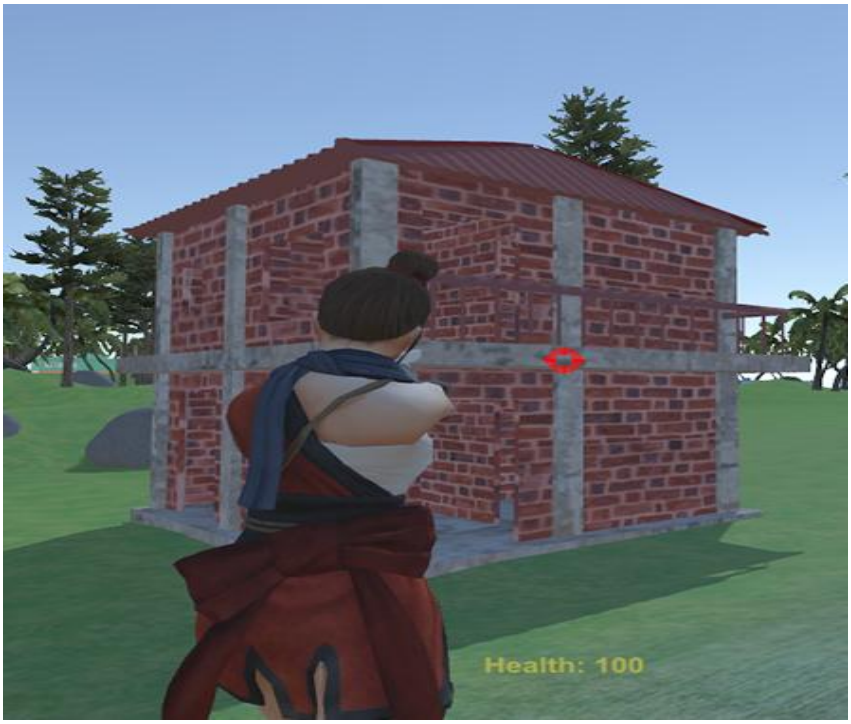


Figure 3.3.4: House Prefab

Figure 3.3.5: House Prefab

Figure 3.3.6: Two House Prefab

Figure 3.3.7: House Prefab

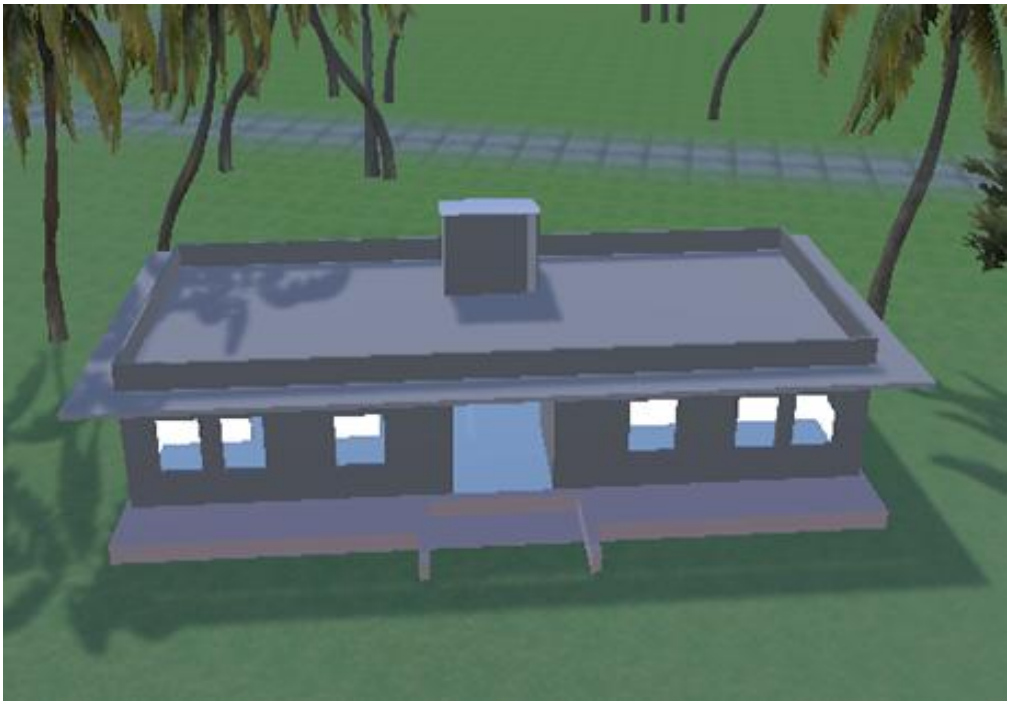


Figure 3.3.8: House Prefab

Figure 3.3.9: House Prefab

3.4 Rock

Rock was created by blender software**.** There are two type rocks.

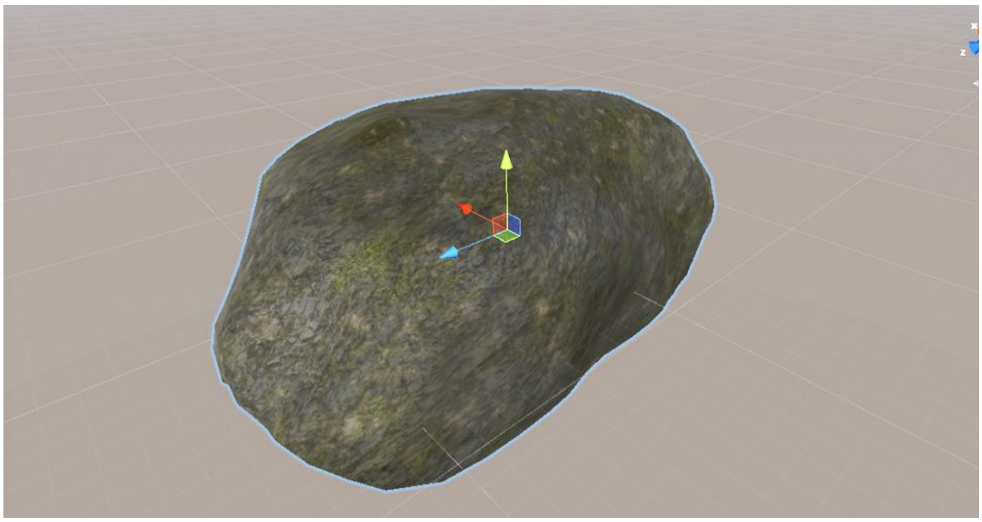


Figure 3.4.1: Mossy Rock Prefab

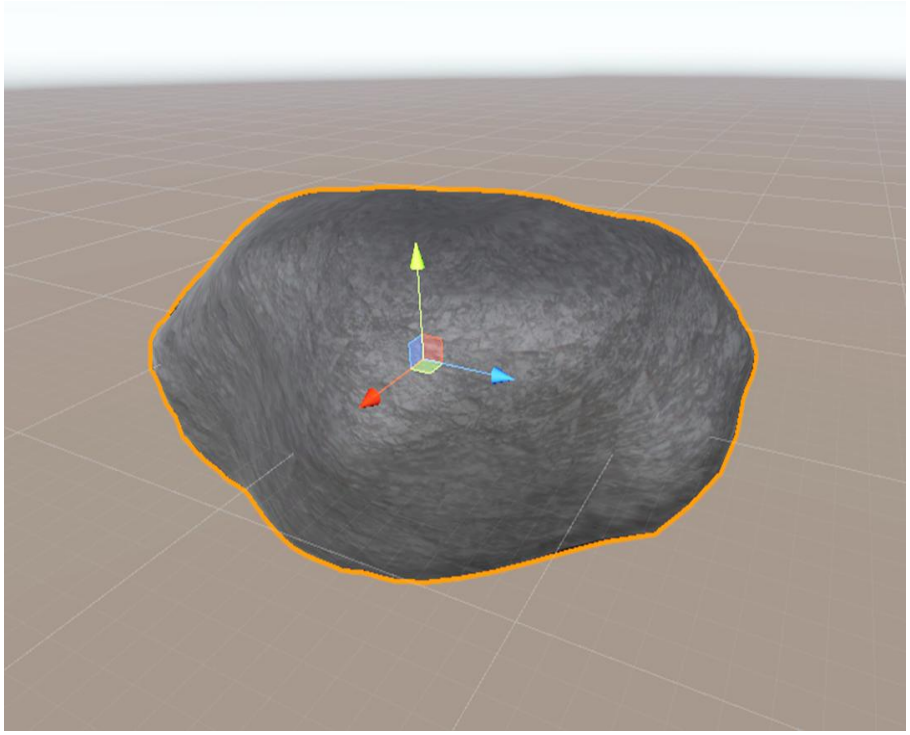


Figure 3.4.2: Realistic Rock Prefab

3.5 Water Prefab

Water prefab used from Unity standard assets.

Figure 3.5.1: Water Prefab

3.6 Wagon

Wagon was created by blender software.

Figure 3.6.1: Wagon Prefab

3.7 Barrel

Barrel was downloaded and then modified by Blender software.

Figure 3.7.1: Barrel Prefab

3.8 Camera

In this game we have used two cameras. One camera is used to render mini map and other is the main camera for the game view.

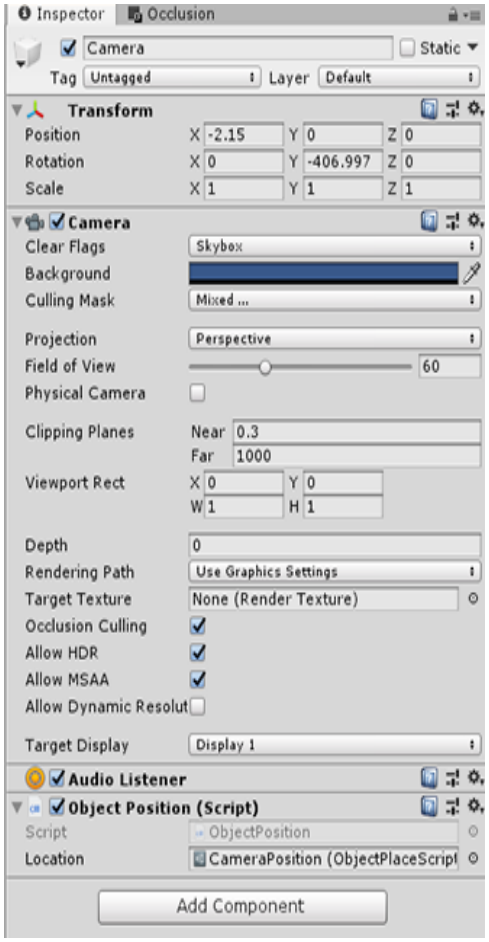


Figure 3.8.1: Game View camera

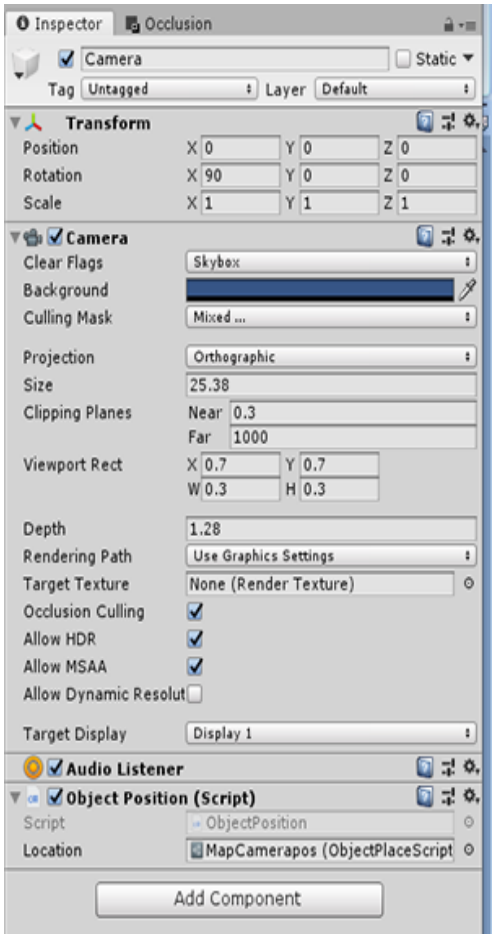


Figure 3.8.2: Mini Map View Camera

CHAPTER 4

THE NETWORK MANAGER

4.1 Network Manager

The duties of the network manager are:

1. Create the server.
2. Establishing the network with the client.
3. Monitor all the response and behavior of the client.

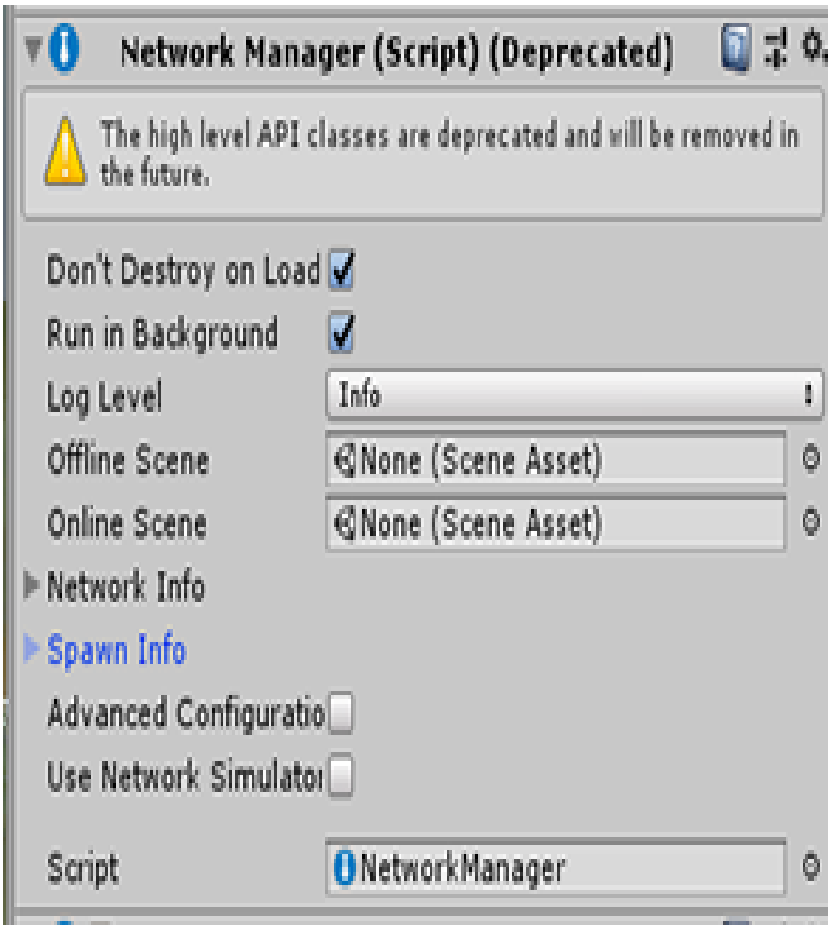


Figure 4.1.1: Network Manager

The NetworkManagerHUD component works with the Network Manager and provides a simple of user interface to control the network state of the game when the game is running.

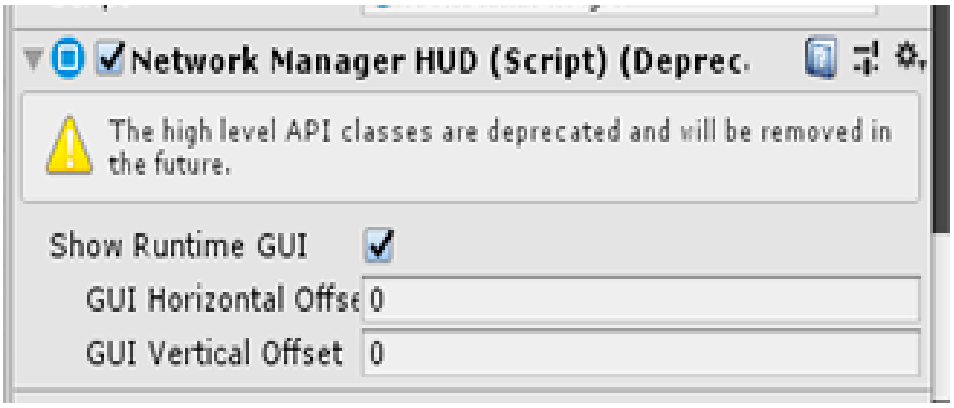


Figure 4.1.2: Network Manager HUD

And when we start the network manager will show us a GUI like this.

Figure 4.1.3: Network Manager GUI

CHAPTER 5

PLAYER PREFAB

5.1 Player

In this game we have only one player model. Every player has to connect on the same LAN to play. Most of the animation and networking tools and even the camera are also situated in the player. A player can pick or drop weapon. At a time, a player can carry only one weapon and also limited ammo. Player has auto regeneration system.

5.2 Player Prefab

The Player prefab asset will represent the player. By default, the Network Manager Component instantiates a Game Object for each player that connects to the networked game by cloning the player prefab and spawning the clone into the game. Network Spawning and the details of synchronizing player Game Objects over the Clients and Server are also based in the player prefab.

The final Player Game Object in the scene looks like this:-

Figure 5.2.1: Player Prefab

5.3 Player Components

We have added several of components in player prefab.

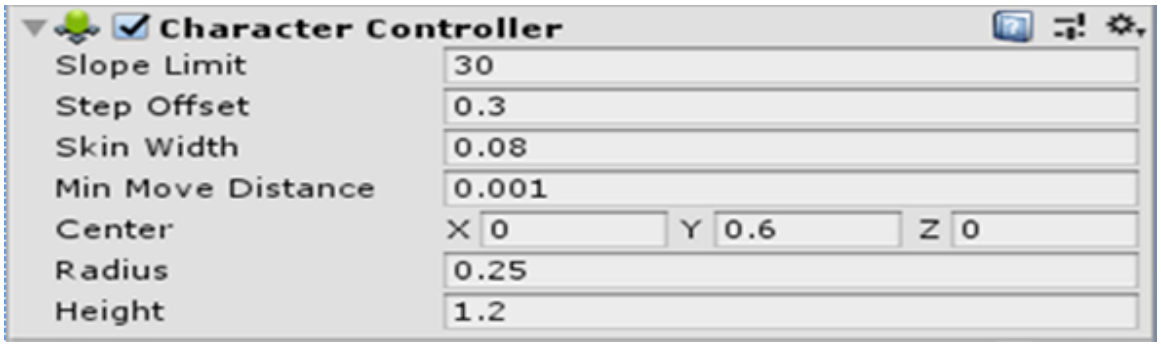


Figure 5.3.1: Player Controller Component

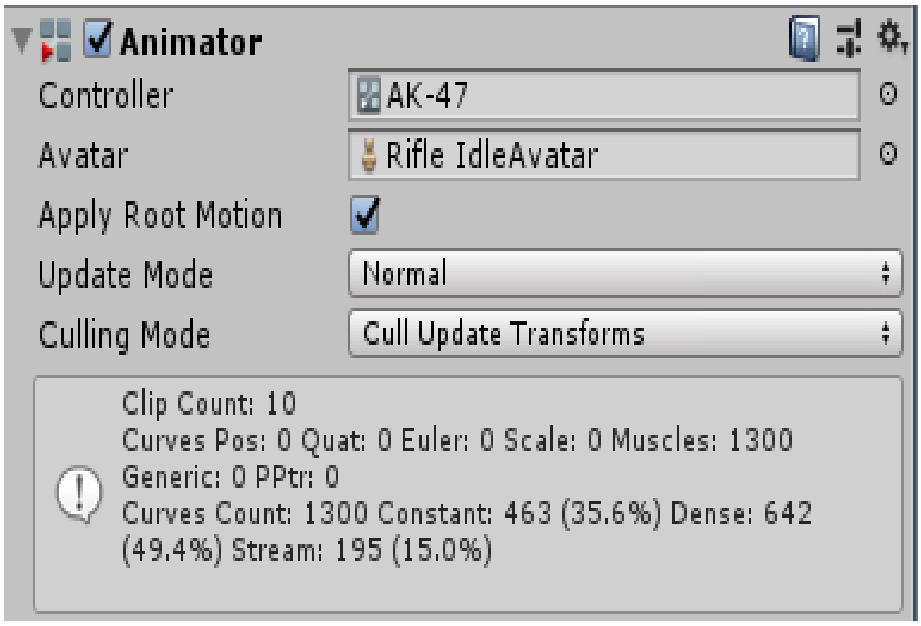


Figure 5.3.2: Player Animation Component

5.4 Registering the Player Prefab

Once the Player prefab has been created, it must be registered with the Networking system. The Network Manager will use this prefab to spawn new Player Game Objects into the scene, but the Player prefab needs to be registered with the Network Manager as the prefab to spawn for the player**.**

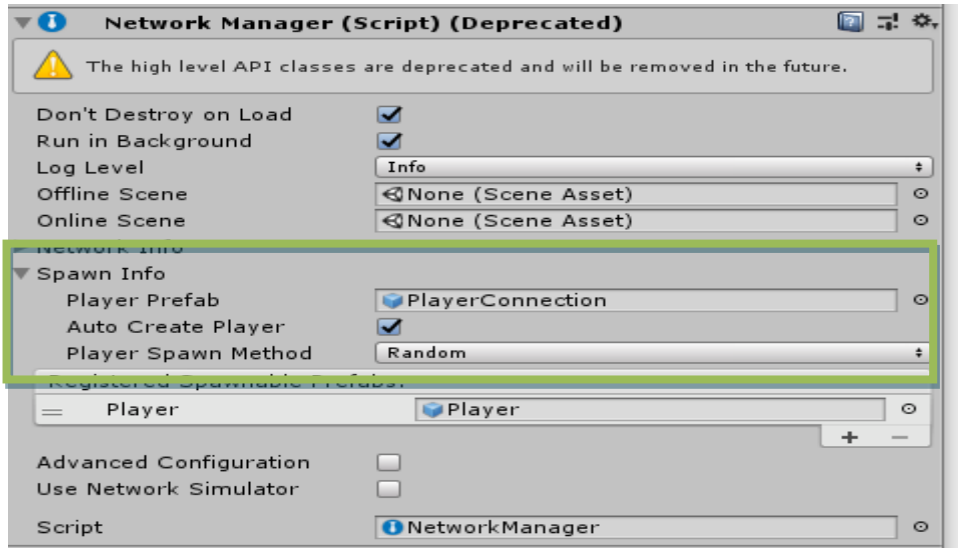


Figure 5.4.1: Registering the Player Prefab

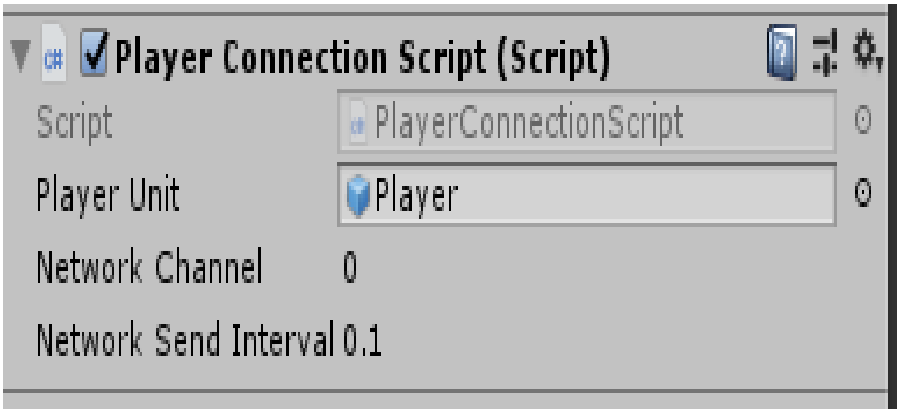


Figure 5.4.2: Registering the Player Connection

5.5 Player Animator Controller

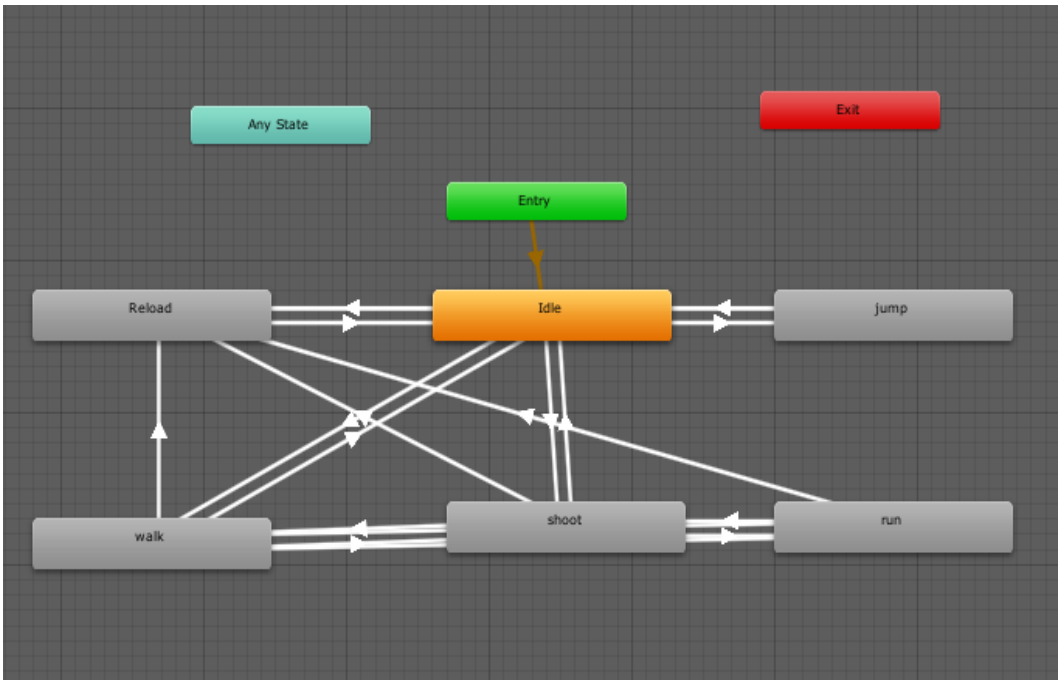


Figure 5.5.1: Player Animation Style with Weapon

5.6 Player Movement and Controller

For moving or control the player character behavior we have added some scripts.

Figure 5.6.1: Player Movement Script

Figure 5.6.2: Player Behavior Script

5.7 Damage System

Health is a finite value used to determine how much damage (physical injury) a player can take. When a player is attacked, or is hurt from another player, the total damage dealt is subtracted from their current HP. Once their HP reaches 0, the player will be unable to fight. The damage system is used to reduce the HP of other player according different weapon property. There are normal ways to design the damage system in a game.

CHAPTER 6

WEAPONS

6.1 Weapons Design Model

6.1.1 Daigle Pistol

We have added a pistol into our game which made by Blender software.

Figure 6.1.1.1: Daigle Pistol

6.1.2 AK-47 ASSULT RIFLE

Ak-47 Assault Rifle was made by Blender software.

Figure 6.1.2.1: Ak-47 Assault Rifle Model

6.1.3 Knife

Knife was made by Blender software in our game.

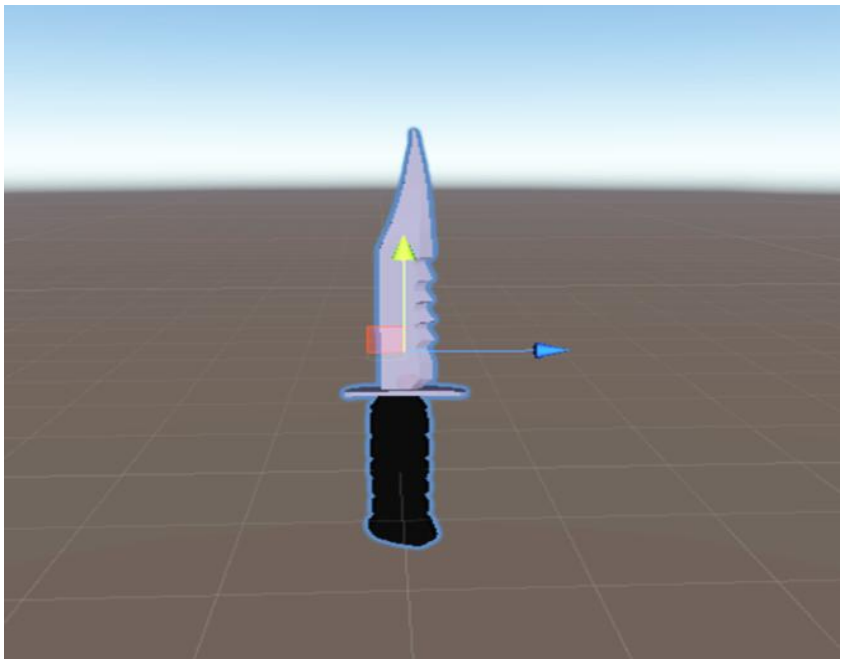


Figure 6.1.3.1: Knife Model

6.2 Weapon Properties

6.2.1 Weapon Properties of Pistol

The damage power of pistol is 10, pistol magazines load amount is 15.

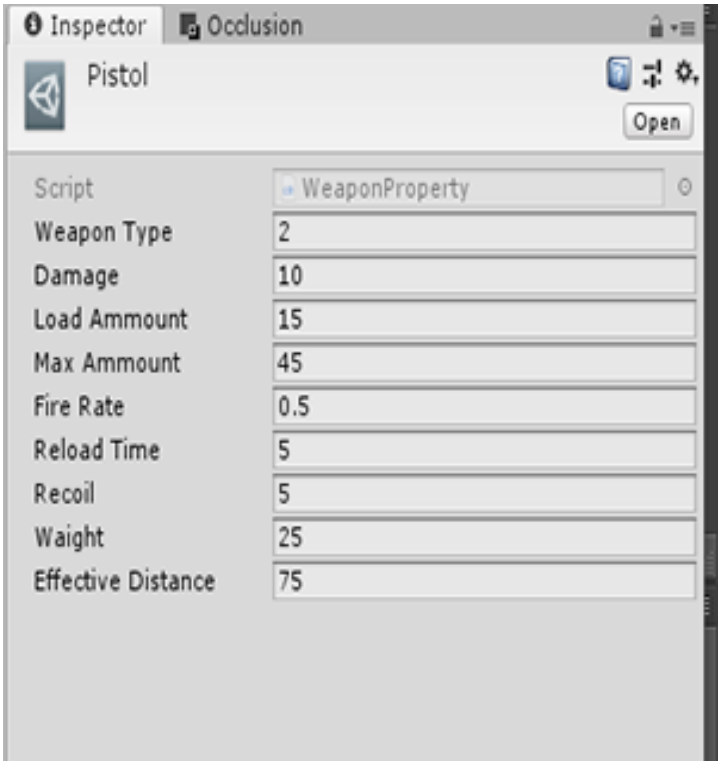


Figure 6.2.1.1: Pistol Property

6.2.2 Weapon Properties of AK-47

The damage power of this weapon is 15 hp. The player presses the left button of the mouse for firing to kill the enemy player.

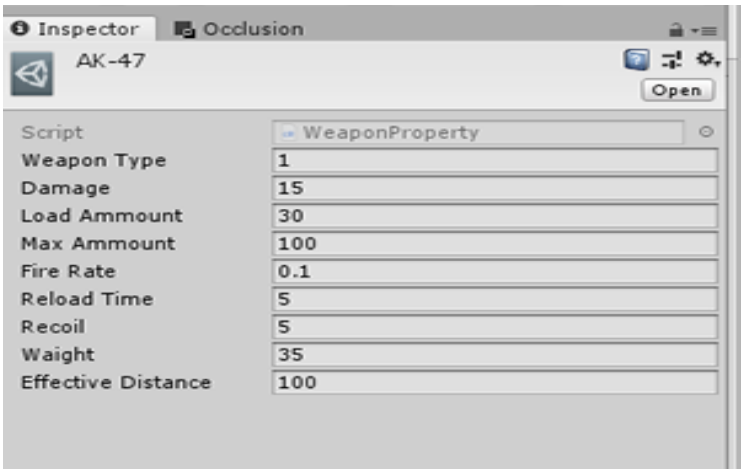


Figure 6.2.2.1: AK-47 Property

6.2.3 Weapon Properties for Knife

The damage power of the knife is 35 hp. The player has to click the left button of the mouse to damage the enemy player.

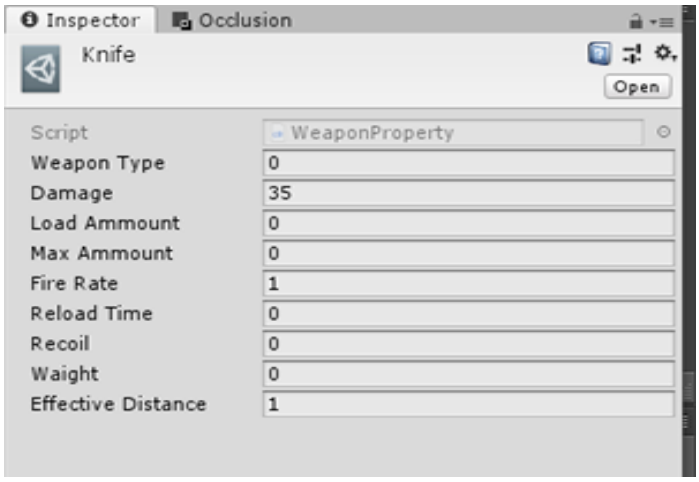


Figure 6.2.3.1: Knife Property

CHAPTER 7

LIMITATION, CONCLUSION AND FUTURE WORK

7.1 Limitation

We tried to make this game as good as possible**.** But we have still some limitations. There are some limitations we have faced in this game:-

- For making playable lower end devices. We had to limit our environment object count and object details.
- Computing different players actions and transfer them throughout server was very challenging.

7.2 Conclusion

In this game we've created a game environment that features 3D viewing and objects with a moving camera, lighting and material variations, and texture mapping. The key option makes the game a lot of realistic and difficult however gratifying.

Throughout the project, the most important downside was restricted time facilities. Through the project was hard enough to complete within this short time but we make it possible. Besides we tend to had examinations addition to our project work caused us to require breaks. Once these breaks, we tend to have some difficulties in adapting to the project once more. Sometimes, whereas operating several files got missing then we've got to repair that by doing an equivalent work once more. Developing this game for the primary time, we tend to thought that the choice on game genre is one in every of the foremost appropriate selections that we tend to had created throughout the project. There exist such a large amount of alternatives to look at within the game market attributable to intense interest of the third person games. Therefore, it was a good start for us.

As a result, eight months we gained new nice experiences and these experiences that we've gained can help us in our approaching future projects. Finally, the concept of developing game that was a dream for us since our bachelor of education has been fulfilled. We've made it possible by our hard working and we feel proud of creating such a unique project as a part of our education.

7.3 Future Work

We did our best to create this game but despite our best attempt there are shortcomings. Our main future target is to solve these shortcomings. For example, the graphics of the game, we have a future plan to improve the game graphics. Also the overall game performance, we are still trying to improve the overall game performance of the game. But after our entire main future target is to make the game capable of perform through online internet. Our game now can only perform through local area network; we are trying to make it worldwide.

REFERENCES

[1] Learn about 3D model basic, available at << https://docs.blender.org/manual/en/latest/getting_started/index.html/, https://docs.blender.org/manual/en/latest/getting_started/about/introduction.html/, https://docs.blender.org/manual/en/latest/getting_started/about/history.html>>Last accessed date: 21-11-2019 at 11.15pm

[2] 3D textures for Model design, available at <<https://www.textures.com/latestTextures>> Last accessed date: 19-11-2019 at 10.00pm

[3] Learn about Unity 3D engine, available at <<https://docs.unity3d.com/Manual/index.html>> Last accessed date: 22-11-19 at 10.00pm

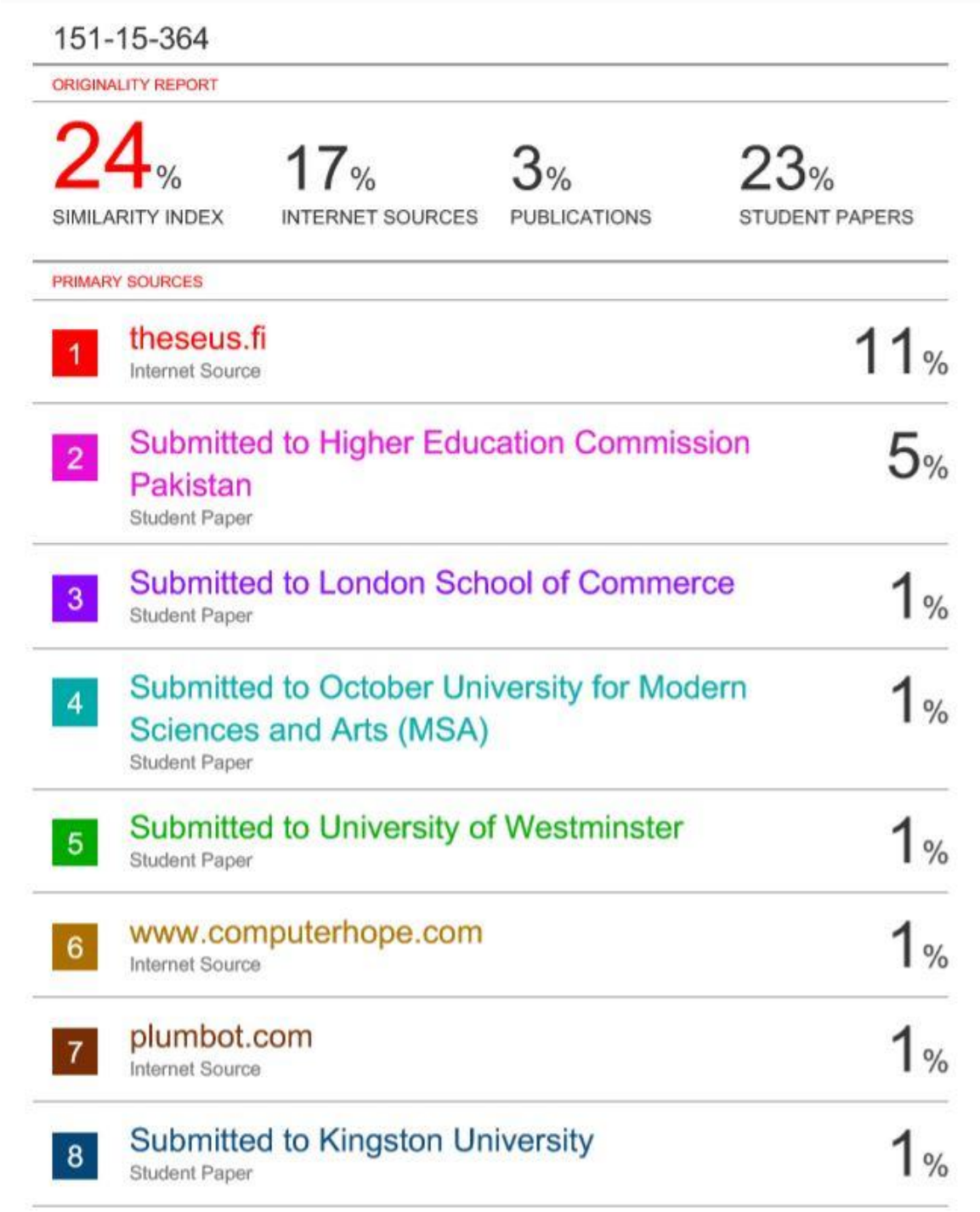
[4] Learn about Unity 3D game, available at <<https://learn.unity.com/search?k=%5B%22tag%3A5812919d32b306001d309490%22%5D>> Last accessed date: 22-11-2019 at 11.00pm

[5] Download Blender software, available at <<https://www.blender.org/>> Last accessed date: 22-11-2019 at 10.00pm

[6] Download Unity engine, available at <<https://unity3d.com/get-unity/download>> Last accessed date: 19-11-2019 at 10.21pm

[7] Unity Asset Store, available at <<https://assetstore.unity.com/lists/top-free-3d-models-5063>> Last accessed date: 19-11-2019 at 1.35am

Plagiarism Report



151-15-364

ORIGINALITY REPORT

24%	17%	3%	23%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	theseus.fi Internet Source	11%
2	Submitted to Higher Education Commission Pakistan Student Paper	5%
3	Submitted to London School of Commerce Student Paper	1%
4	Submitted to October University for Modern Sciences and Arts (MSA) Student Paper	1%
5	Submitted to University of Westminster Student Paper	1%
6	www.computerhope.com Internet Source	1%
7	plumbot.com Internet Source	1%
8	Submitted to Kingston University Student Paper	1%

9	Submitted to Amity University Student Paper	1%
10	patchivic.com Internet Source	1%
11	Submitted to The Robert Gordon University Student Paper	1%
12	Submitted to Middle East Technical University Student Paper	<1%
13	www.gixmi.com Internet Source	<1%

Exclude quotes	On	Exclude matches	< 10 words
Exclude bibliography	On		