

Lighting and Rendering in the Unity Game Engine

Project Proposal

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Contents

[Introduction 1](#_Toc117200636)

[Who will benefit? 2](#_Toc117200637)

[Supervisors 2](#_Toc117200638)

[Gamers 2](#_Toc117200639)

[Motivation 2](#_Toc117200640)

[Objectives 3](#_Toc117200641)

[Objective 1 3](#_Toc117200642)

[Objective 2 3](#_Toc117200643)

[objective 3 3](#_Toc117200644)

[objective 4 3](#_Toc117200645)

[objective 5 3](#_Toc117200646)

[objective 6 3](#_Toc117200647)

[objective 7 3](#_Toc117200648)

[objective 8 4](#_Toc117200649)

[objective 9 4](#_Toc117200650)

[objective 10 4](#_Toc117200651)

[Optional Objectives 4](#_Toc117200652)

[objective 1 4](#_Toc117200653)

[objective 2 4](#_Toc117200654)

[Development Requirements 4](#_Toc117200655)

[Methodology 5](#_Toc117200656)

[Gantt Chart 6](#_Toc117200657)

[Logbook 6](#_Toc117200658)

[Appendix A: Logbook (Tasleem, 2022) 0](#_Toc117200659)

[Appendix B: Gantt Chart Tutorial (officetimeline, 2021) 0](#_Toc117200660)

# Introduction

The main aim of this project is to understand how lighting and rendering works in games and how it can help the gameplay and atmosphere for the player. I will also try to learn how the new Unity Render Pipeline works for lighting to see how fast and more optimized games become so that my game can run on lots of older and slower hardware such as older graphics cards like the Nvidia GTX 750ti or even smart phones and use resources on new and faster hardware such as the new Nvidia RTX 4090 in a more efficient way to get higher quality graphics and lighting.

I will hopefully use lighting in a way that enhances the gameplay visually where it can be used in guiding the player or to show items or places of interest and to make the game look more realistic and, I will be able to learn how to optimize my game to run on different platforms.

# Who will benefit?

## Supervisors

The supervisors will benefit from my project as it will show them the different parts of game development and how each part goes together. It will also show them the security aspect of games and how the security of a game is very important to its success and how a game that is full of cheaters and hackers can kill a player base of the game which will reduce the future potential of the game. It will also show them what the different methods of DRM protection companies use to stop piracy happening of their games.

## Gamers

Gamers who will play my game will benefit the most because the lighting will make the game feel high quality and it will also make the graphics look better. They will also be able to use the lighting as a game mechanic to traverse the map. Lighting can also increase the fun factor of the game by allowing the player to use the lighting to their advantage, such as a reflection on a piece of glass to see an enemy or object that is hidden around a corner.

# Motivation

I wanted to make a game with good graphics for a long time as I have made games in the past that are on the google play store and on my website ([Awais Tasleem's Portfolio (awaist7860.github.io)](https://awaist7860.github.io/Awais-Portofolio/)These games looked basic and were mostly made for smart phones. The main issue that I had when developing my games was the time needed to make them as I was in high school and college studying for my GCSE’s and A-Levels, I didn’t have enough free time to make the games look higher quality and with better graphics. This project will allow me to spend more time on learning more about game development and the different practices that are used in the industry and to improve the skills that I have already learnt over the years whilst developing games to make a higher quality game with better game mechanics.

# Objectives

## Objective 1

Learn how to use the Unity 3D game engine by watching Brackey’s unity tutorials on YouTube then make a game map. This should take me 2 weeks.

## Objective 2

Learn how to make 3D models using Blender by watching Blender Guru on YouTube and make a character model. This should take me 2 weeks.

## objective 3

Learn how to code in C# by watching a YouTube tutorial from Barnacules Nerdgasm and make a first-person controller script. This should take me 2 weeks.

## objective 4

Learn how to use Audacity for the music and sounds in the game by looking at video tutorials online and looking at the software’s documentation and make sound effects. This may take 2 weeks.

## objective 5

Learn how lighting and rendering works in unity by using the Unity Engine’s online documentation and watch tutorials on this topic. This could take me 2 weeks to learn.

## objective 6

With the knowledge from learning the Unity Game engine, I should make a minimal viable product that has a basic scene, a basic user interface and some basic game mechanics, such as camera movement and player interaction with the environment and show this to my supervisor and get feedback on it. My aim for this is to be done by January/February.

## objective 7

Add sounds to the game, such as walking sounds, also add some music to the games and then show it to my supervisor for feedback. This will take a few days to do and my aim for this is the end of January.

## objective 8

From the knowledge learnt from researching the lighting, add good lighting to the game and then show it to my supervisor for feedback. My aim is to get this done and show it to my supervisor by mid-February.

## objective 9

Get a complete game working with all the different parts added together and try to fix as many bugs as possible. I aim to get this done 2 weeks before the demo deadline date.

## objective 10

Show the game to my supervisors and other people so they can give feedback to me about the game.

# Optional Objectives

## objective 1

Research Ray Tracing to see what it is and how it works, then I will try adding it to the game.

## objective 2

Research DRM and security measures and try to add it to the game.

# Development Requirements

The project will be developed on my pc. The specifications are (May change in the future):

CPU – Intel Core i5 8400 2.8ghz.

GPU – Nvidia GeForce GTX 1060 6gb.

RAM – 16gb DDR4.

OS– Windows 11.

Storage – 500gb SSD and 4tb Hard Drive and 1tb Hard Drive.

Monitor 1 – LG Ultrawide monitor @ 2560 X 1080

Monitor 2 – Lenovo HD Monitor @ 1920 X 1080

The software that I will use to make this project will be, Unity Game Engine for the game mechanics and graphics, Blender for the 3D models that I will need to create, photoshop for making textures and Visual Studio 2022 Community or Visual Studio Code for coding the game in C#. The sound and game music will be developed using Audacity and (Waveform 12 or LMMS) music software. I will also use Trello.com to organize the project to make sure I know what needs to be worked on. I will use Microsoft’s office suite for report writing, making charts, and making presentations.

# Methodology

The agile methodology is a way to manage a project by breaking it down into smaller parts and then you work on those parts, once the smaller parts are done, you then combine it all to get the entire project. Many game development studios use these methodologies to make their games. You must continuously talk with your stake holder or supervisor to get feedback from them in the project to make sure you are meeting their requirements at every stage of the methodology. The main parts for this methodology are planning, executing, and then evaluating.

The agile methodology isn’t just a single framework, it has many frameworks within it such as scrum, extreme programming, and Kanban. For this project, I will be using the scrum framework to complete the game. Scrum allows the developer to address complex and constantly changing problems, whilst allowing them to deliver the highest quality product that they can make.

As I am developing my game, I will be working on a small part of it at a time until I get to the final product. This way of working is better and less complex than working on a big part or multiple parts at the same time, as this will make it harder for me to test and it will be harder to debug when issues come up.

I will instead follow the scrum methodology and break the problem down into smaller steps. I will plan what needs to be done, this will allow me to stay on track on what needs to be done and not waste time on what doesn’t need to be done. Then I will work on the step either by coding or making a 3D model or making some game sounds. Once this is done, then it will be tested and then shown to my supervisor for feedback. Then I will repeat this until the game’s made.

# Gantt Chart

Chart

Description automatically generated with medium confidence

# Logbook

link to my logbook - <https://docs.google.com/document/d/1o11IuZP_nEYD1oTxOLe4G3Y3979H4QoLYbT0rMf0VLA/edit?usp=sharing>

1. Logbook (Tasleem, 2022)
2. Gantt Chart Tutorial (officetimeline, 2021)