Beatdown Spider

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

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APPROVAL

This Project titled "**Beatdown Spider**", submitted by Arafat Ullah Nur (ID: 171-15-9372) 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 27-01-2021

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DECLARATION

I hereby declare that this project has been done by me under the supervision of Prof**. Dr. Syed Akhter Hossain, Head, and Department of CSE** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for an award of any degree or diploma.

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I would like to thank my entire coursemate at Daffodil International University, who took part in this discussion while completing the course work.

Finally, I must acknowledge with due respect the constant support and patients of my parents.

ABSTRACT

"**Beatdown Spider**" is a 2D Shoot'em Up subgenre game among many Top-Down Shooter (TDS) game genres. TDS is one of the genres among many popular video game genres. This is a Unity (Game Engine) based 2D game created with C# programming language for final year project in Computer Science and Engineering at Daffodil International University. Top-Down Shooter or Top-Down, in general, is a genre of video games where the player's point of view is from above, like, if a drone were scouting over one person only, off of their movement or actions. Shoot'em Up subgenre consist of players trying to end enemies while running from the enemy. This game tells the story of a spider including interesting 3 different levels.

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CHAPTER 1

Introduction

1.1 Introduction

The Video Game industry has been one of the mainstream entertainment sources along with films and sports for a long time now. In recent years, this industry has grown in such length that in today's economy Video Game industry is bigger in terms of monetary value comparing the films and sports industry combined [1]. Even though most of today's games are AAA (produced and published by mid-ranged or a big company with a big-budget) title, Indie (small developer group or single developer) games are gaining recognition more these days. Few of the most known Game Companies with their known games are Ubisoft (Assassins Creed Series), Xbox Game Studio (Halo Series), Naughty Dog (Tomb Raider), EA (Electronic Arts) (FIFA Series), Rockstar Games (Grand Theft Auto [GTA] Series). A few of the Indie companies with their notable games are Supergiant Games (Hades), Toby Fox (Undertale), Dodge Roll (Enter the Gungeon), Mojang (Minecraft) [currently owned by Microsoft]. Both the Corporate and Indie game companies make 2D games even though in today's standard more photorealistic and real life-like are the catch. In this chapter, I will discuss motivation, objective, and expected outcome.

1.2 Motivation

I have been a video gamer since I was a kid. But I didn't think of making one until almost 6 years ago. I decided to study in CSE so I won't have to deviate from my goal. The idea of making a game stood out but making an actual game became a far cry, due to a lack of consistency. In our country there not many game company let alone great ones. In recent years, there have been sightings of a few startup companies who are trying hard to make name for themselves. This is such good news. But for me, when there was no company and now there are few companies, none bothered me. I wanted to make games for people to

enjoy and have fun with life. And earning a livelihood through it is a second priority. If I can make a good game to enjoy first, and make people happy and then I think as good a game if it is, it certainly will earn the livelihood.

1.3 Objectives

1.3.1 Player Engagement

My priority is to make this game engaging towards the player. As this tells a small story, the goal is to make sure players are understanding off of the story.

1.3.2 Complete Game Experience

The goal is to make sure gamers from our country are interested in playing this local game as the tendency is not playing or supporting local developers at all.

1.4 Expected Outcome

1.4.1 Accessibility

Anyone with a desktop or laptop that has Windows operating system will be able to play this game. This game does not require an internet connection to play once the download is completed.

1.4.1 For Better Future

This game is not only for gamers to enjoy but also for developers to take notes from. Many developers in our country are afraid to take the first step. As gamers engage with the gameplay and give feedback on this game made by a local developer, others will surely try. This will ultimately inspire our country's game developers to improve and make this a better game development country.

CHAPTER 2

2.1 Introduction

This chapter is to show the working environment of this development process. This includes related works, comparative studies, and obstacles. To think of making a game and researching the processes is one thing but to make one is a difficult task. Especially to make it alone is challenging. But it has its perks too. I learned all basic requirements for game development i.e. graphic design (concept art, asset designing, level design), story writing, programming, sound design, video editing. My experience of playing video games certainly helped a lot to try and make this game, hopefully, attractive to gamers.

2.2 Related Works

Even though this is a sub-genre of a videogame but this genre has many games especially considering top-down 2D. But in the same settings of this game, however, there are only a few I found on keypoint with Spider and top-down 2D. But those are the only match as the game design are different.

2.3 Comparative Studies

It is impossible to make a proper system without any flaws. Through an analysis of the game, I found both advantages and disadvantages of my game. Here are the Advantages and Disadvantages:

2.3.1 Advantages
- The playing system requirement is low. Any laptop or desktop with windows operating system is capable of running this game.
- No internet connection is required for playing
- Small file size
- Easy to use

2.3.2 Disadvantages
- This is an offline game so, you cannot play it with your friend
- This is my first completed game so some bugs and issues are expected. But can be fixed based on reviews.

2.4 Obstacles

Any kind of work comes with some challenges along it. For creative works, the obstacles are complex and need more work put to it. I too faced many obstacles over the development time but I overcame those thanks to Almighty **"Allah"** for giving me patience and consistency. The key challenges were:

- Implementing A* algorithm
- Making a proper design for all the characters (Player and enemy)
- 2D lighting
- 2nd Level Design
- Main Menu Design
- Scene to Scene proper transition

CHAPTER 3

Requirement Specification

3.1 Requirement Collection and Analysis

This chapter covers the requisites of the game. Details of a specific requirement for development, a general portrayal of the system model.

3.1.1 Tools/ Software Requirement

- Windows Operating System
- Unity 3D
- C#
- Visual Studio
- Adobe Photoshop
- Adobe Illustrator ☐ Vegas Pro

Windows Operating System (OS)

Windows Operating System is the most popular OS currently. Not the most popular among game developers but affordability and accessibility make it my choice.

Unity 3D

Second, to the requirement list, Unity 3D is also the most popular of its kind, which is a game development tool/ game engine. This tool is free. The premium version provides few features but the free version is enough for the development I did. Unity documentation [2] is great resource for programming as well as visualization of a game.

C#

C# is an Objected-Oriented Programming Language (OOP). This is among the top languages for game development. This is a high-level language so it is relatively easy to learn the basics. Unity 3D usages C# for scripting.

Visual Studio

Unity 3D used to have an integrated development environment software of their own. For a while now, Unity made Microsoft Visual Studio their integrated development environment (IDE). Visual Studio is free of charge and is compatible with many languages along with C#. And Visual Studio is the most compatible IDE with Unity 3D as of now.

Adobe Photoshop

Adobe Photoshop is the most popular raster graphics editor inside and outside the video game industry. This tool is used in the game industry for mostly texturing 3D models, 2D character modeling, 2D assets, 2D game environment, etc. **Adobe Illustrator**

Similar to Photoshop this is also a graphic editor but in vector format. This software is used for assets or game icons or logos that are scalable to any resolution without losing quality.

Vegas Pro

Vegas Pro is a video editing software. This is used for editing non-linear videos.

3.2 Use Case Modeling and Description

Use Case Modeling, UML (Unified Modeling Language) is used to demonstrate system processes.

3.3 Use Case Model

Use case model is like a map. Without showing the detailed version of a place or in this case a system, it shows how the system's core mechanics work.
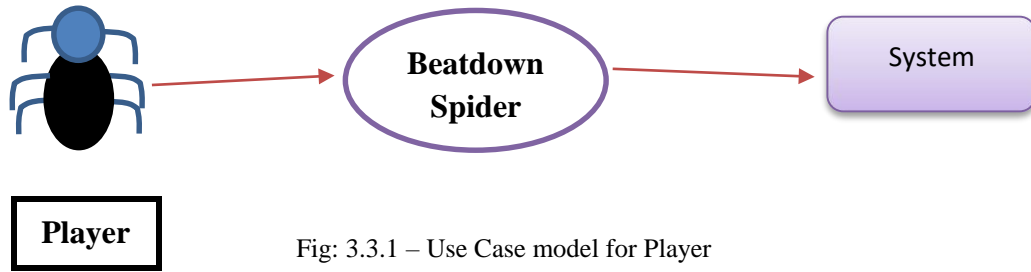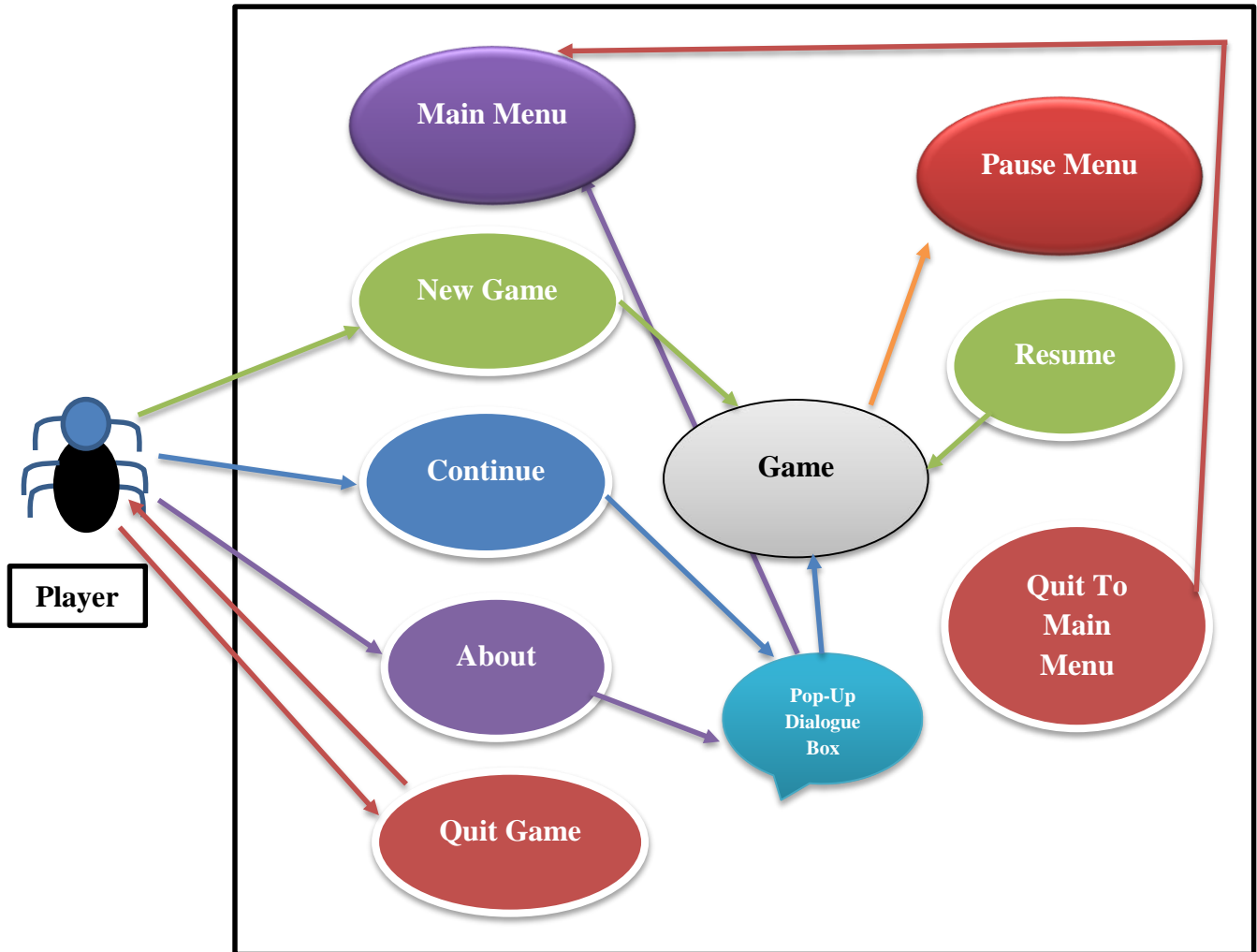
Fig: 3.3.1 – Use Case model for Player

Fig: 3.3.2- Use case for player and game

Figure 3.2.2 shows use case of this system (game). When A player opens the game they are directed towards 'main menu'. In the main menu player can choose one of the four options. 'New Game' starts the game. Continue and About both pops up a dialogue box. Exit Game quits the application to the desktop.

3.4 Design Requirements

Design Requirements for game design refers to a process of how user-friendly the game is through intractable to the player. To reach such a goal, I made sure to design a system with the below key points:

- Simple Navigation
- Easy to understand
- Visually Appealing

CHAPTER 4

Design Specification

All the models (assets) are created using Photoshop and Illustrator. There are mainly two types of assets i.e. Visible in the scene and Visible via code. Those are listed below:

4.1 Visible in the Scene

4.1.1 Main Menu

Fig: 4.1.1- Main Menu

Figure 4.1.1 shows the first interactable scene players are going to face. Players are given choice to select from four options.

4.1.2 Player View (Top- Down)

Fig: 4.1.2- Player View (Top-down) Figure

4.1.2 shows players point of view (POV) for level 1.

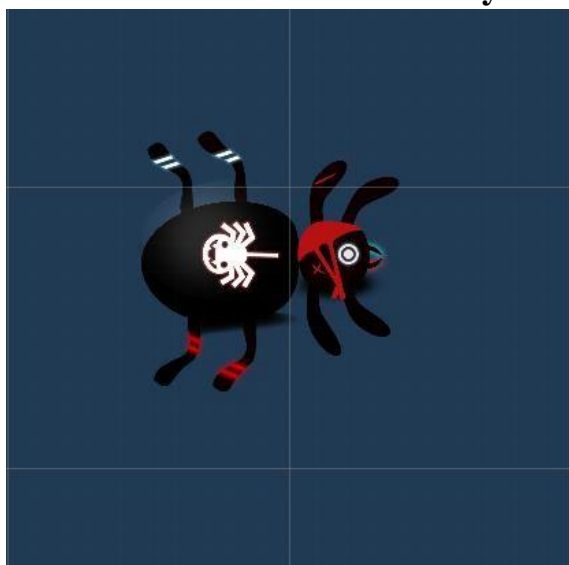## 4.1.3 Common Assets in Different Levels 4.1.4 Player

Fig: 4.1.4- Player (Hero Spider)

Figure 4.1.4 shows the 'Hero Spider'. Players are going to play as him.
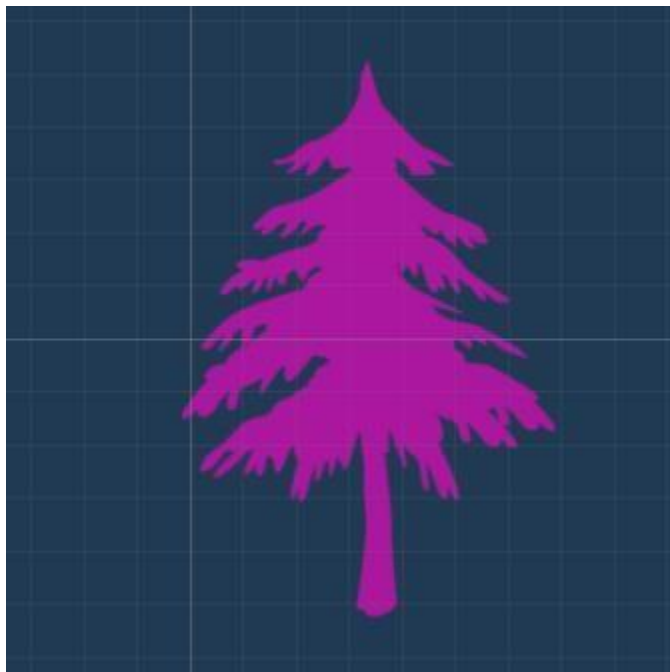
4.1.5 Pine Tree

Fig: 4.1.5 Pine Tree

Figure 4.1.5 shows Pine tree. Pine tree is one of the few decorative asset from the game.

This is a non-intaractable and static object. This tree is animated in game.

4.1.6 Grass

Fig: 4.1.6 Grass

Figure 4.1.6 shows Grass. Grass are commonly seen asset throughout the game. This is also a non-intaractable object. This grass is also animated in game.
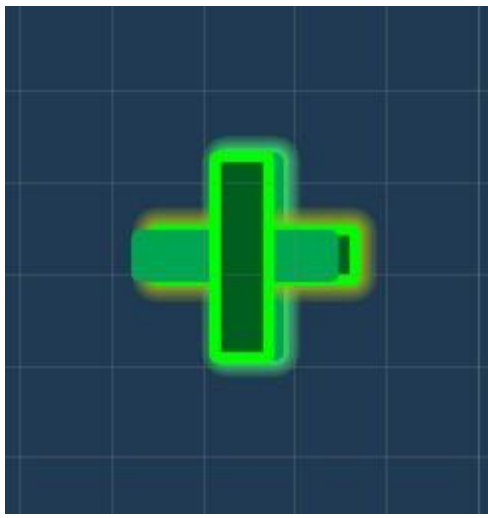
4.1.7 Health Pack

Fig: 4.1.7- Health Pack

Figure 4.1.7 shows Health Pack. ' I just need healing'- said every gamer ever. You'll need this in your journey. Yes! It heals you. This asset is intaractable and animated.
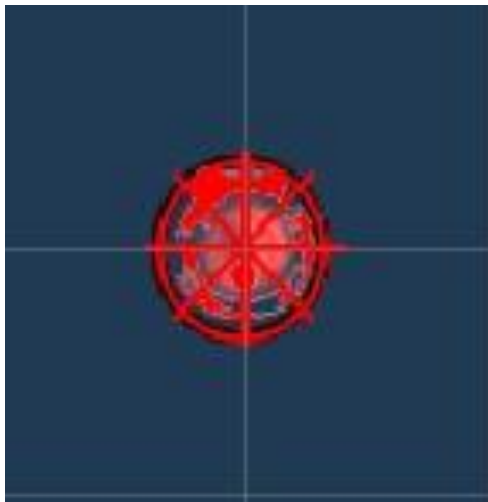
4.1.8 Game Cursor

Fig: 4.1.8- Game Cursor

Figure 4.1.8 shows the main navigation marker. This is attached to mouse pointer.

4.1.9 Health and Mana Bar

Fig: 4.1.9- Health and Mana Bar

Figure 4.1.9 shows health and mana bar. Red one shows health point and blue one shows mana point. Non-intaractable but dynamically changes based on players current condition in game.

Shown 4.1.4 - 4.1.9 figures are common among all the levels. They are prefab (a reusable asset that's property can be changed to unique identity/ looks/ behavior), so for different levels asset property will be different like color, size, animation, etc. There is only one asset, a tree (4.1.10), which is used in 2 levels out of 3.

4.1.10 Tree

Fig: 4.1.10- Tree

This tree can be found only in Level 1 and Level 2. Not animated and static asset.

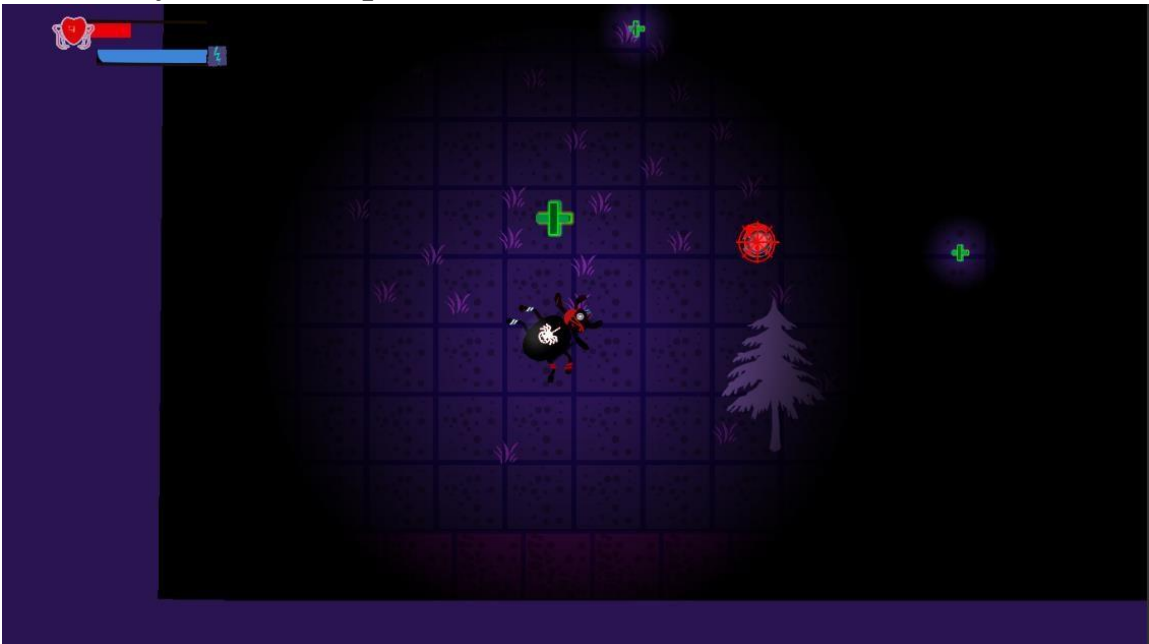## 4.1.11 Player View (Top- Down)

Fig: 4.1.11 Player View (Top-Down)

Figure 4.1.11 shows POV of player for level 2. This level features night time.

4.1.12 Player View (Top- Down) –Final Level

Fig: 4.1.12- Player View (Final Level)

Figure 4.1.12 shows POV of player for final level (Level 3). You fight the boss.

4.2 Visible via code

4.2.1 Enemy Spider

Fig: 4.2.1- Enemy Spider

Figure 4.2.1 shows Enemy spider for level 1. This enemy type only appears in level 1.
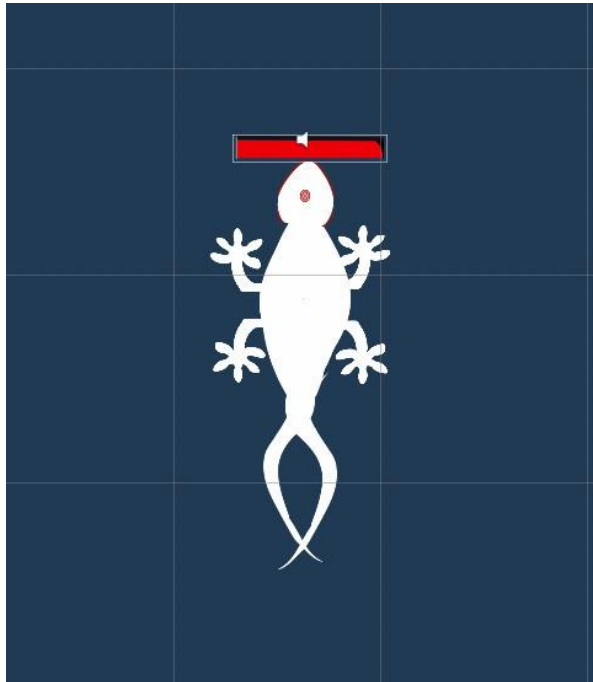
4.2.2 Enemy Lizard

Fig: 4.2.2- Enemy Lizard Figure

4.2.2 shows Lizard Enemy for level 2.
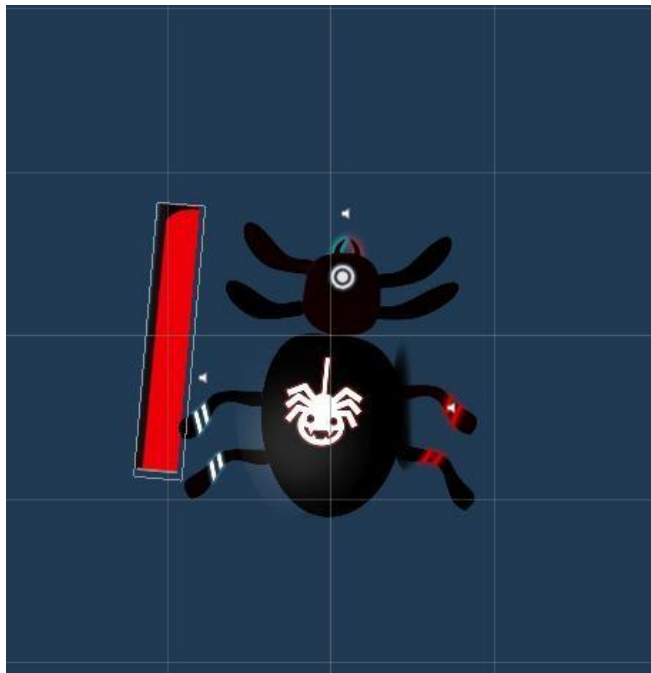
4.2.3 Enemy Boss Spider

Fig: 4.2.3- Enemy Boss Spider Figure

4.2.3 shows Boss Enemy Spider for Final Level.

All the enemies in this game are carefully selected based on research. As the spider hero has fallen, the enemy is his kind, that is spiders. This is a nod to how the life of people works as well as how actual spiders can be preyed over by other spiders. For the obvious enemy, I choose lizard for level 2. Lizards are spider's common enemy. Now, for the final boss, the '**VHiLEn**' is the worst version of spider hero. It is a metaphor for how people are their worst enemy.

For enemy AI, I used A* algorithm package[3].
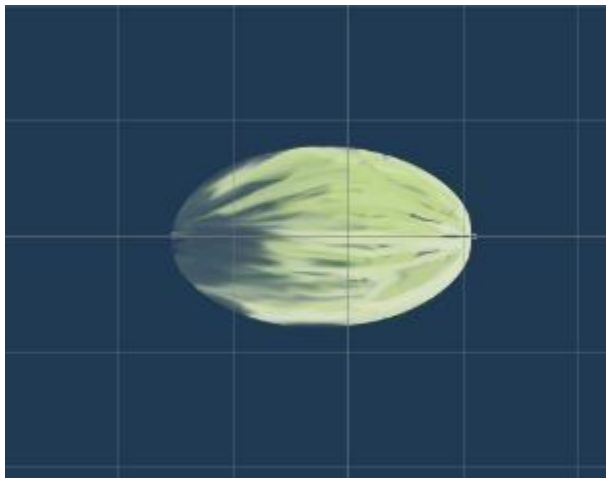
4.2.4 Hero Bullet

Fig: 4.2.4- Hero Bullet

Figure 4.2.4 shows Hero BulletSpider hero is equipped with gun. He shoots this bullet. This bullet is animated and intaractable.
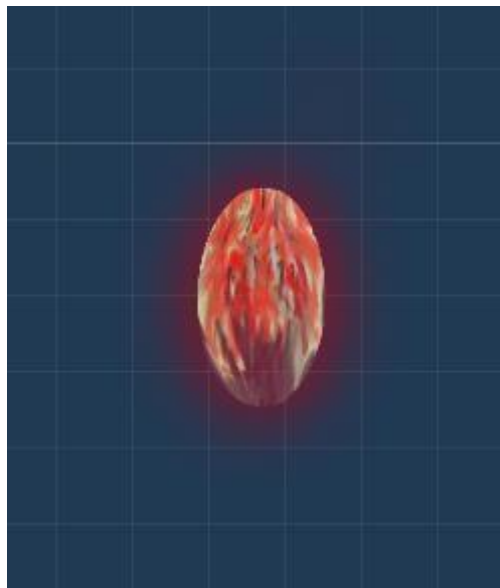
4.2.5 Enemy Bullet

Fig: 4.2.5 Enemy Bullet

Figure 4.2.5 shows Enemy Bullet. It's only far to equip the opponent with weapon when hero has one. This bullet is shot by enemy. This is intaractable but not animated.
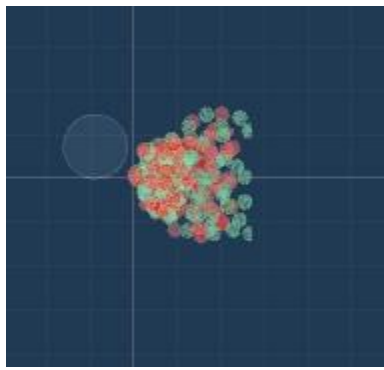
4.2.6 Bullet Impact

Fig: 4.2.6- Bullet Impact

Figure 4.2.6 shows Impact Effect. When either enemy or hero bullet hits this effect shows. This is animated asset.

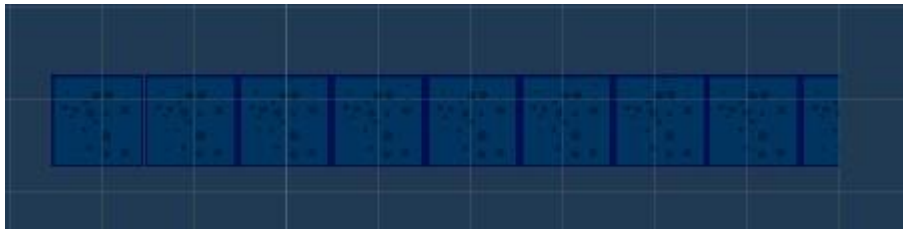### 4.2.7 Level 2 First Door

Fig: 4.2.7- First Door

Figure 4.2.7 shows First door. At the start of the 2nd level this door appears close and opens only when player is able to complete first wave of enemy. This door is animated

4.2.8 Level 2 Last Door

Fig: 4.2.8- Last Door

Figure 4.2.8 shows Last door.This door appears close at the star of 2nd wave of level 2. Closes when 2nd wave is deafeated. This door is also animated.
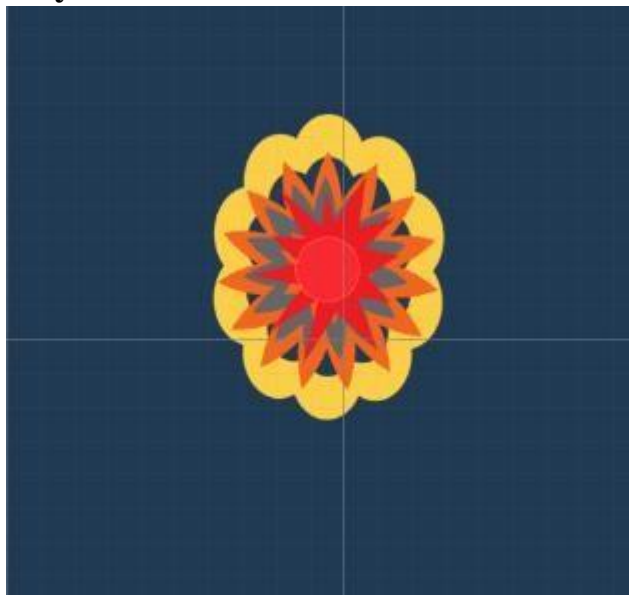
4.2.9 Enemy Destroy Effect

Fig: 4.2.9- Enemy Destroy Effect

Figure 4.2.9 shows Enemy Destroy Effect.When a players is able to kill an enemy this effect shows. This asset is animated.

4.2.10 Hero Death Effect

Alive   Dead

Fig: 4.2.10 Hero Death Effect

Figure 4.2.10 shows Hero Death Effect. When enemy is able to take 'Hero Spider' down, this is shown. The transformation is animated. Eye light is a metaphor for death (light of life is gone).

4.2.11 Dialogue Box

You've fallen. But hope
is not over. Try again

Proceed

Fig: 4.2.11 Dialogue Box

Figure 4.2.11 shows Dialogue Box. Whenever any conversation, message is needed to be displayed, they appears in this dialogue box form.

4.2.12 Pause Menu
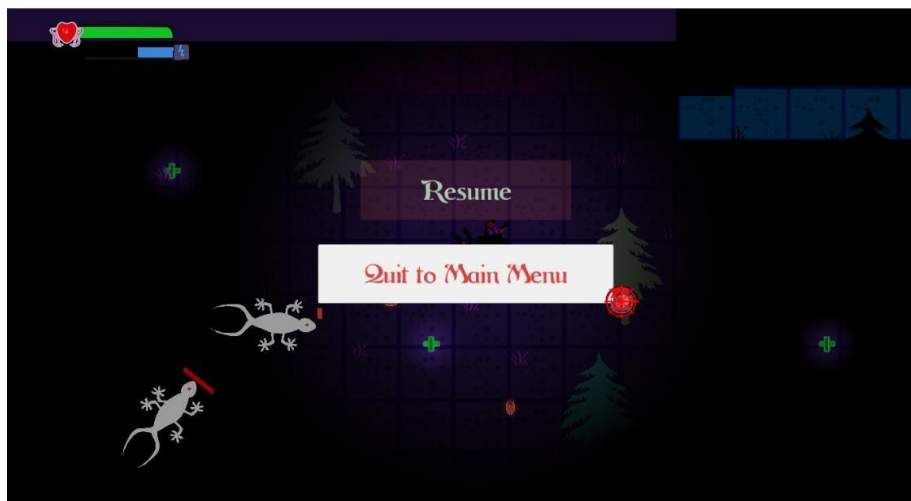

Resume

Quit to Main Menu

Fig: 4.2.12 Pause Menu

Figure 4.2.12 shows Pause menu. This functionality available in all levels.

4.3 Sound

For sound, I downloaded some free audio assets from the Unity store[4]. I created the rest of the sounds and the main theme.

4.4 Lighting

Lighting in 2D is hard. But luckily Unity got a new Light Shader Render Pipeline (Render method) for 2D which allowed me to make lighting the 2D interface of Level 2 [5].
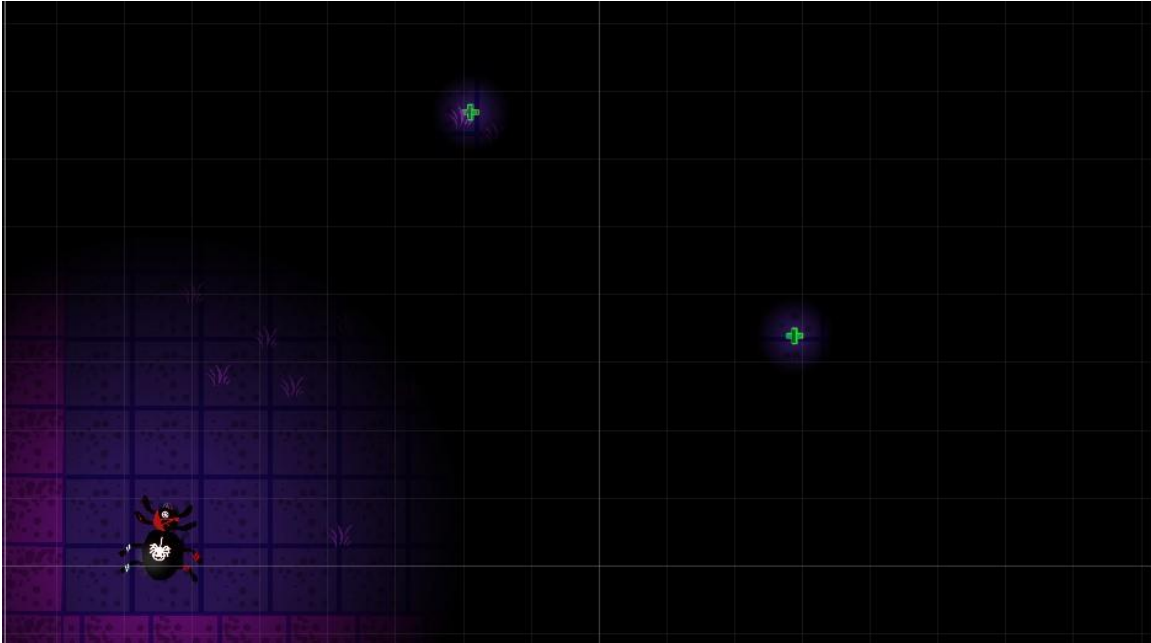

Fig: 4.4- Use of 2D Light

Figure 4.4 shows 2D light. In level 2, I introduce players to new an environment and make it challenging via adding night mode. Use of 2D ligh is perfect.

Almost all the assets are animated and animates based on conditions in this game.In 'Main Menu' there is an animation playing, that is the story of the spide hero, how the 'Spider Hero' is in the spot.

CHAPTER 5

Gameplay

5.0 Target Platform

This game only runs on Windows Operating System (OS).

5.1 Game Start

Fig: 5.1- Start Menu

Figure 5.1 shows Start Menu/ Main Menu. After launching the game player will see this window after an intro. Players are given to choose either of the four option buttons:

- New Game
- Continue
- About
- Exit Game

5.1.1 New Game

Upon clicking on this button player will be taken to the first level. And will be guided through interaction.

5.1.2 Continue

Figure 5.1.2 shows functionality of continue button. This game does not have a save game feature. If a player chooses this button they will be shown a dialogue box. Then upon proceeding, it will take back to Main Menu.

Fig: 5.1.2- Continue Button functionality

5.1.3 About

Fig: 5.1.3- About Button functionality

Figure 5.1.2 shows functionality of about button. This option allows players to see the credits for the game.

5.1.3 Exit Game

This button allows players to closes the game to the desktop.

5.2 Level 1

This is the first level where you fight off some spiders.

5.3 Level 2

This is the second level where you fight off lizards.

5.4 Level 3 (Final Level)

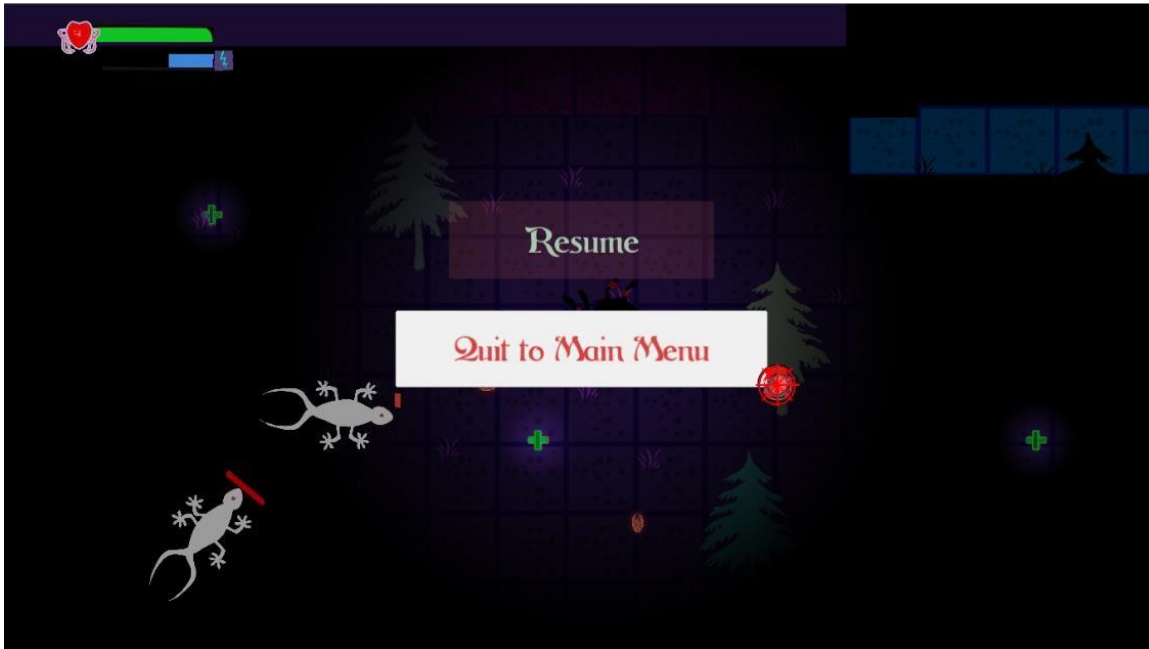At this level, you fight against your worst self.

5.5 Pause Menu

Fig: 5.5- Pause Menu

Figure 5.5 shows Pause Menu. While playing the game, a player can pause the game and enter the pause menu. There are two buttons.

- Resume
- Quit to Main Menu

5.5.1 Resume

Allows a player to continue from the pause point

5.5.2 Quit to Main Menu

Allows a player to exit from the level and go back to the main menu.

5.6 Game Over

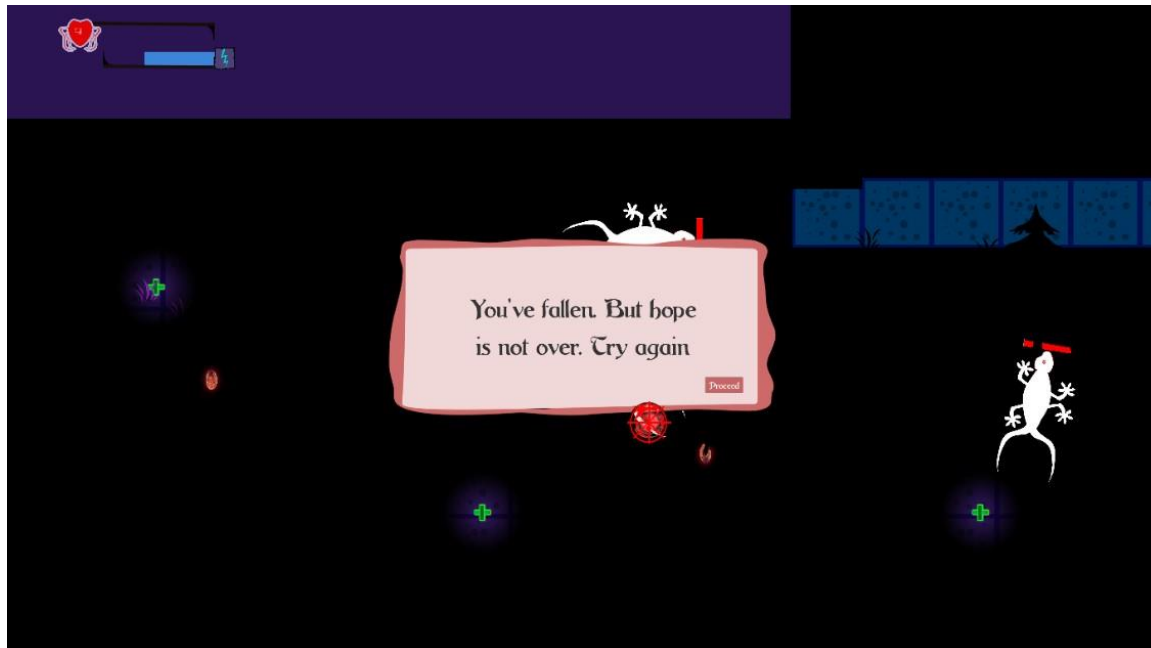When the player dies, this dialogue box pops up and shows this message.

Fig: 5.6- Game Over

Figure 5.1 shows Game Over. This happens when player is dead.

5.7 Game Complete

After completing the final level. You have answered the most important question of this game. Then taken back to Main Menu.

CHAPTER 6

Conclusion

During this time of development, there were many obstacles. I learned many things about game development I never knew. I learned about the developing process altogether. I tried my current best to make the game playable. I tried to make this game as much user-friendly as possible.

It took me almost a year of research and almost two months to complete the game. As much as difficult it sounds. I enjoyed every part of the development process from bitter times when I was stuck in a simple problem to the smallest achievement of being able to click with a mouse that made me happy.

The most difficult part of the development was time. This year has been 'not a normal' year, from Covid-19 to my loss of family members, it has been tough. Thanks to Almighty **Allah** for giving me enough patients to continue my work through this rough time.

For the project itself, I am satisfied with what I came up with. Considering my first complete project, this is huge for me. This surely will encourage me to work towards better

game development. To be noted, the initial idea and title of the game were different but circumstances changed which in turn changed the idea and title.

As of now, this game is completely free of charge. Anyone with a Windows-operated computer will be able to run this game and enjoy it.

CHAPTER 7

Future

Even though, the initial plan was to make this game and publish it in a known videogame digital distribution service. But due to current circumstances, the publishing part is delayed. I will work on this game to improve and add features then publish it. Currently, this game only runs on the Windows platform, in the future, I am hoping to make this game port to Android and publish it.

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[5]   2D lighting searched and found at <<https://youtu.be/nkgGyO9VG54>> Last Accessed on 30-1220, 02:47pm