

# **Subjugation**

A game of st\*rat\*egy and warfare

## **Semester One Report**

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**Bsc(Hons) in Applied Computing with Games Development**

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# Introduction

What is Subjugation?

Subjugation is a 3<sup>rd</sup> person 1 vs 1 MOBA

What is a MOBA?

A MOBA or Multiplayer Online Battle Arena is a genre of game where players choose a “Hero” or “Champion” to control in a long match (20mins – 1hour) that is typically five vs five. Usually a team wins when they destroy a core structure in the enemies base. In order to reach the core structure players need to ferry minions at enemy turrets to distract it while the player character attempts to destroy the turret, players need to kill enemy minions and fight opponent player characters to prevent them from destroying their own structures. MOBAs are very team orientated with team battles over map objectives being a common occurrence.

Similarly, to other MOBAs Subjugation’s map has two bases at opposing sides of the map and players fight to capture the enemy’s base. Players control a Conqueror and can use their unique strengths/abilities along with an armada of minions they command to help dominate the map and win the game.

Before entering a match, players can select a Conqueror to play and four different minion types to command, this allows for a large variety of playstyles and strategies to be used.

## Why Subjugation?

The map in Subjugation is broken down into tiles and many of these tiles have randomly generated points of interest/areas that can be captured/controlled by players to reap bonus resources and/or gain strategic advantages to help over their opponent.

Other MOBA’s such as League of Legends & Dota 2 use a fixed map that does not change, these fixed maps can become stale after some time. This is where Subjugations random generation offers players a fresh new map for each and every match they play.

Lol & Dota make up for their fixed map design by having very mechanically intricate characters that takes hundreds or even thousands of hours of gameplay to master, as each character is unique they come with different strengths/weaknesses and all interact with each other and the map differently. This creates a very steep learning curve which turns away many of the new players.

Subjugations characters are much simpler and designed to be easy for new players to pick up, as the map is randomly generated players must adapt to their surroundings and develop strategies in the moment, this style of game where players are exposed to shifting environment rewards those who are quick thinking and observant instead of those who have more hours to some degree.

## Game Concept & Mechanics

The game has several core mechanics: Conquerors, Minions, The Map, Match Time Scaling. Players gain “Shinies” (rat gold) overtime, shinies is a currency used by the rats to purchase minions for warfare. Players must capture tiles and control points in order to increase the rate that they gain shinies.

One of my main goals with this project was to create a very diverse game where players of many different playstyles could enjoy the game by using any combination of characters they like. Typically

in games over time players discover the more effective strategies and methods of play, players will then usually be drawn to playing this way as it reaps the most reward. As players witness others performing better they too will want this and follow the other players strategies, this is universal between almost every game.

This is what we refer to as the “meta”, often in games that have a prominent meta players will feel less rewarded for trying new things and be less likely to try them as they will not be as easy to succeed with as the meta.

This problem is almost completely unavoidable and really can only be reduced, not stopped entirely. The issue can be tackled by making character designs simple and using a template to ensure that characters have similarities in ability. For example in Subjugation every character has one move dedicated to survivability whether it be a speed boost to flee with or a health boost.

## Conquerors

Conquerors as said before are player controlled characters, five are planned for when then the project is finished and each has their different play styles. Their abilities and attributes are detailed within the game design document.

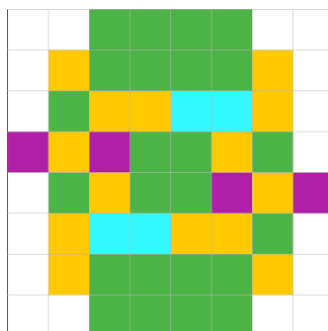
## Minions

Minions are AI controlled characters that follow the player, players choose four minion types to bring into the match. Minions are purchased for shinies at a players base and act on what their owning player commands such as attack, defend and recall. There are twelve planned to be implemented and likewise to the Conquerors their information is also contained within the game design document.

## The Map

The base map planned to be in Subjugation uses an eight by eight of mostly random generated tiles to create a different map for every match which will change how players interact with the map and cause players to adapt their strategies in every time. The map also is mirrored through the centre so that players have the same tiles on their side ensuring that no player gets an unfair advantage from map generation.

Below is a simple view of the map and has different coloured tiles to show each different tile type:



Green – Fixed or Constant Tiles

Yellow – Cosmetic Tiles

Purple – Wall Tiles

White – Outer Tiles

Light Blue – Inner Tiles

## Fixed/Constant Tiles

These tiles remain functionally the same in each match they have minor cosmetic changes . These tiles are where Bases and Control Points are located.

## Cosmetic Tiles

Cosmetic tiles are tiles that are almost functionally the same in every match with generation effecting how players traverse them. All yellow tiles have Paths on them that Base Minions follow to get to Control Points and Bases.

## Wall Tiles

Wall tiles have a wall stretching from east to west in the middle of the tile preventing all traffic through them, they also have some generation for aesthetics. The yellow tile between these wall tiles is where Gates are located.

## Outer Tiles

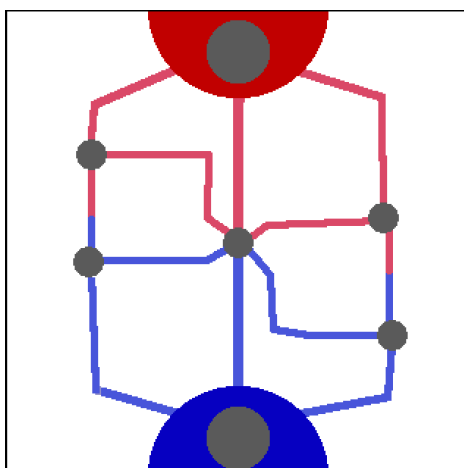
Outer generation tiles contain most of the generated parts of the game, these tiles will contain the bulk of capturable Structures, that when captured offer small bonus for the player who owns them.

## Inner Tiles

Inner generation tiles contain more powerful combat orientated Structures which have a large bearing on combat in surrounding tiles

# Control Points & Paths

The map in Subjugation contains 7 control points, 1 in each base, 2 on either side of the map and finally 1 in the very centre of the map. Below is an illustration of the map showing the paths, the bases and the control points.



Red/Blue Lines – Paths

Small Grey Circles – Map Control Points

Larger Grey Circle – Base Control Points

Red/Blue Semi-circle- Respective Bases

(All of the following control point/ minion values are subject to change)

Initially the only control point a player owns the one located inside their base (Large Grey Circle).

At the start of the match both player Bases will send out a group of 10 Base Minions to the control points on the left and right side of the base, these minions will follow the paths to the control points and proceed to capture them.

## Capturing Points

Control points require 70 “Charges” (C for short) for a team to change a control point capture state,

Map control points have a neutral state between team states so capturing a point from the enemy team will take 140 C, 70 C to neutralise and a further 70 C to capture.

Minions generate 1 C/s while on a point and Conquerors generate 10 C/s, for example a group of 10 minions and their Conqueror would capture a point from neutral in 3.5 seconds.

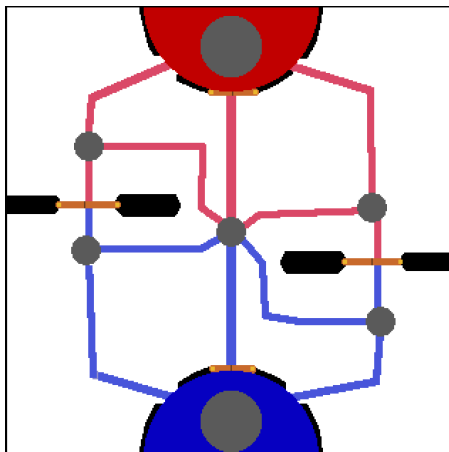
At the start of the match minions who trek from their base to the first 2 neutral points will take roughly 7~ seconds to capture the points while there.

### Control Point Win Condition

Players are only able to capture the enemy base and win the game if they own the central control point and at least one control point on their side of the map and their opponents side.

## Gates

Gates play an important role in the evolution of combat and the movement of Base Minions throughout a match in Subjugation. Overall, there are 4 gates on the map, 1 on the central path from each base and 2 in the middle of the map between the wall tiles. Once a gate has its opening condition filled it will open and will remain permanently open for the rest of the match. Below is an illustration of the map with gates and walls in place:



Brown Lines with yellow dots – Gates

Thick Black bars – Wall Tile walls

Thin Black Bars – Base walls

### Opening Conditions

**Side Gates** - One of the Gates on the side of the map will open if a team owns both control points on either side of it. Once the gate is open minions and Conquerors are able to pass through it to reinforce the control point on the opposing side or to advance into enemy territory.

**Base Gates** - Both player Base Gates will open 10 seconds (condition and value subject to change) after the central control point is captured. Enabling the player Bases to Reinforce or Advance on the central control point.

### Base Minions

Base minions are spawned 1 by 1 to from a group of minions which will advance along a path to a control point to fight and capture it. They are not selected by the player before the match and are the same for everyone. There are 2 kinds of base minions, melee and ranged.

**Melee** – Base Melee minions are the grunts of the game and only serve to attack and soak damage for other minions/Conquerors. They regenerate health slowly and have a relatively high health pool.

**Ranged** – Base Ranged minions hide behind the melee minions and deal most of the damage. They are significantly weaker than melee minions. They fire small projectiles from their weapons dealing a small portion of damage.

The ratio of ranged to melee minions will attempt to be 3 melee to 2 ranged

## **Base Minions Spawning & Control Point Limiting**

The number of minions spawned by a base is affected by two things, Match Time Scaling and control points assignment / limits.

At the start of the game bases send an initial wave of 10 minions to both side control points and will then continue to spawn a wave minions every 20 seconds, these waves are called “spawn waves”.

The waves then shrink spawning up to 3 minions per wave and slowly this will scale up by 1 minion every 90 seconds up to a maximum of 10 minions per wave. (Values subject to change)

When spawning a wave of minions the base will spawn minions 1 second apart so they proceed in a line toward a control point. Bases will also see what kind of minions are assigned to a point and will try to spawn different minions to hit the 3 : 2 melee to ranged ratio. For example: If a side control point has 2 melee and 3 ranged it will try to spawn 4 melee and 1 ranged to fill the numbers.

In order to prevent bases from continuously spawning minions and lag out the game there are limits placed to control the spawning, the side control points have a limit of 10 base minions and the central point has a limit of 20 minions. Base control points are not assigned minions and have no effect on minion spawning.

Finally minions are spawned based on assigned position: So if 10 minions on a side control point are assigned to advance through a gate and get attacked before they leave it is possible that 10 base more base minions spawn to defend the point as there is no minions assigned to that point and 20 minions could be on the same point “defending” it.

## **Advancements & Reinforcements**

Every 20 seconds when a base spawns minions the base also checks if minions can do any advancing or reinforcing. Reinforcing is sending minions to a point you own to replenish numbers and advancing is sending minions to enemy control points to capture them.

Unlike bases which spawn minions 1 by 1 advancing is an entire control point of minions moving forward as one unit, reinforcing is similar but the number of moving minions is determined by minion type and number of minions that need to move to hit the control point limit, control points will rather satisfy the next control point than fulfil their own minion needs. When reinforcing the game will attempt to keep the 3:2 minion ratio but will still send minions if it cannot.

## **Match Time Scaling**

Match time scaling is a core system of Subjugation which effects how the game ramps and becomes more intense over time. The things effected by MTS are: Respawn Times, Gold Income per second, Horde Size, Signature Ability Unlocks and Conqueror Stats. Time scaling starts after 1 minute and

ramps up overtime stopping at its maximum at 15 minutes. This splits the game up into 3 parts Early Game, Mid Game and Late Game.

### **Respawn Times**

Respawn times are how long it takes a Conqueror to respawn after being slain in battle, initially this time is only 15 seconds and slowly ramps up over time up to 40 seconds over the match.

### **Horde Size**

The maximum number of minions that can follow a Conqueror increases though out the course of a match beginning at 8 minions this amount scales to a maximum of 25 minions.

### **Gold Income per Second**

As the Horde size increase so too must the amount of gold a base generates to accommodate this, at Late Game a player should have enough gold to summon about 70%+ of the maximum horde size and the other rough 30% should require captured map structures to be afforded more frequently.

### **Signature Ability Unlocks**

As detailed in the Abilities section Signature abilities are very powerful and are unlocked after some time, the time to unlock signatures varies from Conqueror to Conqueror but usually it is around the Mid Game at roughly 3 minutes.

### **Conqueror Stats**

With the increase in the number of minions on the map over the course of the match Conquerors can start feeling weaker as time goes on, to compensate this some Conqueror stats increase slowly over time. The main stats that increase are health and damage, increasing by a factor of 30% from 5 to 15 minutes (1% every 20 seconds).

## **Technologies**

### **Unity**

The game is being created in Unity 2021.1.21f1 using C#, I intend to use no packages outside of Mirror.

### **Mirror**

Mirror is a networking library for Unity that will be used for implementing networking

### **Blender**

All 3D assets will be created by me in Blender, this includes everything from the map props to the characters and buildings

### **GIMP (GNU Image Manipulation Program)**

All 2D assets such as sprites, textures and particle effects will be made by me also in GIMP which is a free alternative to photoshop.

### **BFXR, Audacity & Bosca Ceoil**

For the music and sound in the game I want to record/create my own sound effects using BFXR, for music creation I plan on using Bosca Ceoil and sound editing I am going to use Audacity.



## Problem Solving

There is a series of problems that I have needed to solve during the development of this project already, below I have listed the major ones and what steps I took to solving them.

**Modelling** – Creating many high poly assets for a game by oneself is impossible given the time constraint of the final year project, I opted to change how I am modelling and create a large range of low poly assets which are very useful for rapid game prototyping.

**Quaternion Mathematics** – In order to get better at quaternion maths I just had experiment and read online guides so that my understanding of them improved.

**Networking Inexperience** – This problem was a difficult one and one that I am still improving on, it is important that this is fully solved as the game is only online. The only way to improve is to read the Mirror Docs, follow online tutorials and also to experiment myself

**Navigation Mesh** – The units in the game are locked to the ground and use a special mesh called a nav mesh to calculate paths to follow, the only issue is that these nav meshes are baked ahead of time before objects can move around on them. This created an issue as the map is different each time I need to generate a new nav mesh for every match. This issue was solved by following guides and tutorials online.

## Plan for Semester Two

For the development of the project I am using Trello to keep track of my progress and am using draw.io to create Gantt charts to stick to. In Semester two I plan to release six large updates, each update brings one Conqueror, two ~ three minions, one inner structure, two ~ three outer structures, several map props and additional game features.

The features planned to be added and when are as follows:

**Week 0 -> V1** - Map generation, Money System and Tooltip system

**Week 2 -> V2** – Status effect System and UI

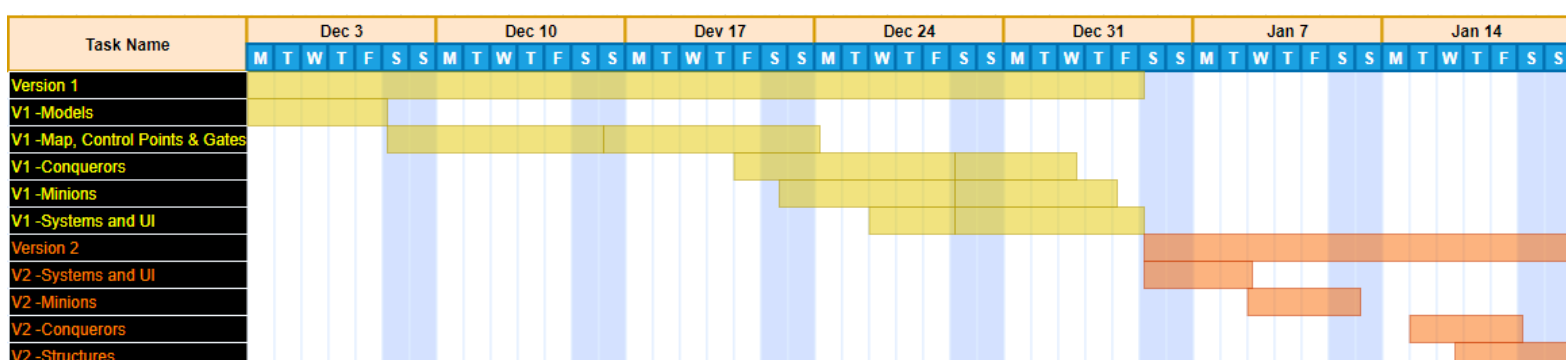
**Week 5 -> V3** - Minion purchasing and Control Points

**Week 7 -> V4** – Base Minions and Gates

**Week 9 -> V5** - Structure capturing and bug fixes/unimplemented features

**Week 12 -> Final Release** – Post Processing, Sound, Music

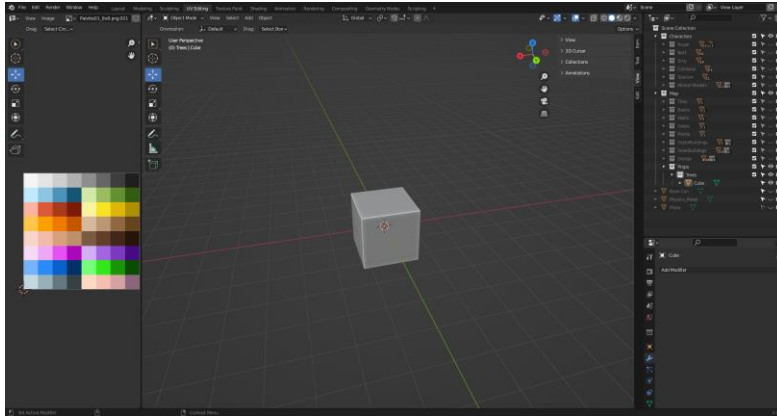
At all stages of the project Bug Fixing will be done, but if any bug is proving to be too difficult/time consuming to solve it will be pushed back to the final release or the feature will be dropped/alterd. Below is the Gantt Chart for V1 and V2.



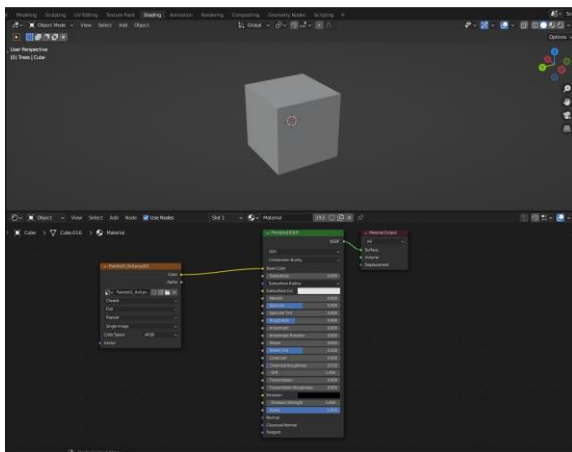
# Appendix

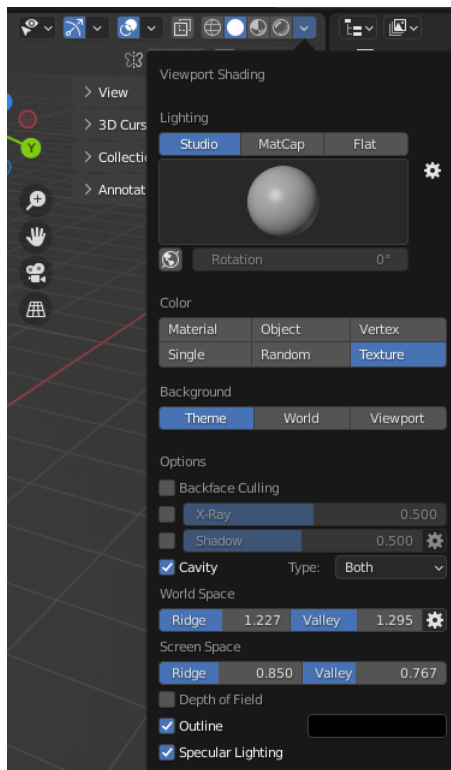
## My Modelling Pipeline

This section details how I am making all of the models in Subjugation, as stated before all the models were created in Blender. I do most of modelling in the UV Editing view as it allows me to change the colours of faces with minimal effort.



In order to change the colours of faces on the fly I need to first apply a material to the object, as this is a low poly project a simple pixel palette is sufficient.

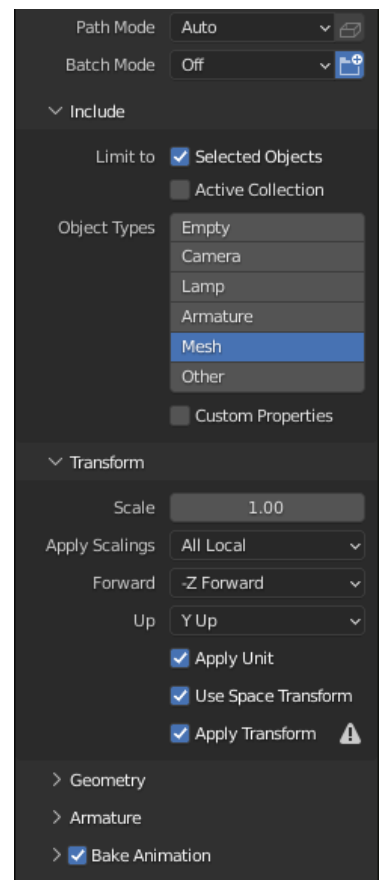




And before I start modelling I go into the viewport shading and turn on the “Cavity” setting. This setting adds a subtle highlighting effect on the edges of objects which very aesthetically pleasing.

I use a variety of Blenders tools while modelling I commonly use the extrude, bevel, edge loop, smooth, inset and transform to name a few. One important thing when modelling is to keep track of object scale and positioning, it is good practice to try and keep an objects scale at 1 and to only scale in edit mode, this is also true for keeping an objects position at the world origin

The final part of the pipeline is exporting, here are my export settings, its mostly just the defaults except I apply the transform and only export the selected objects and their meshes:



Here’s an example where I made and exported a simple tree



## Creating a Character

This section details how characters are conceptualized and then created for subjugation, I start with thinking of a character for this example I will be using the conqueror Colossus.

**Design Concept** - As described in the game design document Colossus is a large tank-like slow character that is designed to essentially be a mobile base. The character needs to stand out on the battle so opting to make the character a very large model is fitting.

**Abilities** – The abilities the character possesses would need to be slow and powerful, the abilities of the character need to be felt by their opponent after each usage while at the same time not too powerful and require skill to use properly.

Passive – As the character is a mobile base a that is slow and easy to swarm it is good to give the character some base kit survivability, I decided to give him resistance to slows and stuns.

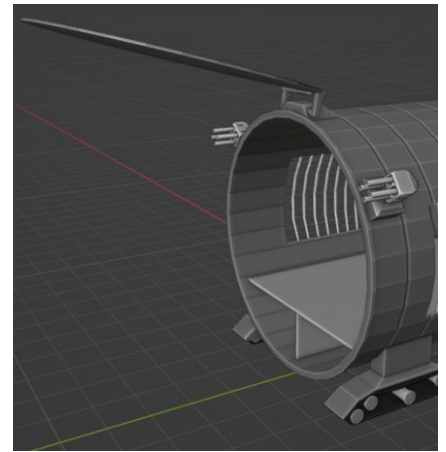
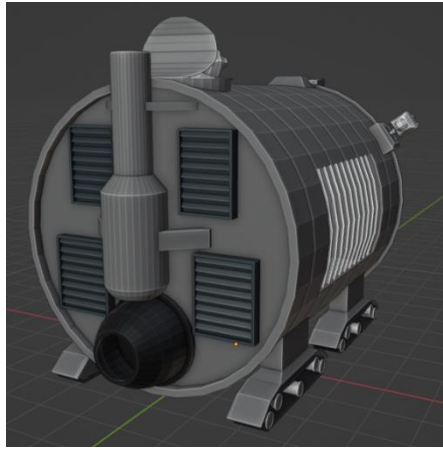
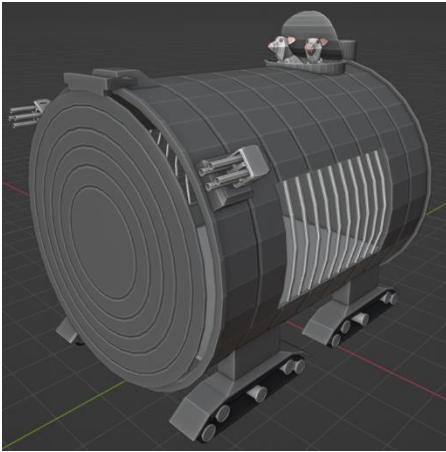
As the character is slow and will not very easily be able to pick fights with their opponent having the ability to have extra follower minions so that Colossus can push objectives and force their opponent into unfavourable battles.

**Ability-1 – Smog** – Smog is an ability that can be toggled on and off which allows Colossus to create a toxic trail behind itself while moving, this ability slows Colossus by 10%, this ability is intended to be used to punish grouped up enemy minions and also as a survivability tool when fleeing battle, the smog damages enemies and also slows them by 15%.

**Ability-2 – Devouring Charge** – Another ability which acts both an offensive move to punish grouped enemies and as an escape tool. This ability allows Colossus to charge forward and temporarily take some enemy minions out of the fight by holding them within itself. The enemy minions devoured are held for a few seconds and then regurgitated at velocity dealing damage to themselves and surround enemy minions on contact. This ability is a good example of risk and reward, using this ability properly can reduce the enemy minion count giving Colossus even more minion advantage, but using it incorrectly can cause Colossus to misposition and potential be slain.

**Ability-3 – Release the Horde!** – This ability is designed to overwhelm the enemy temporarily by adding an additional fifteen trap minions for Colossus, the trap minions are not command-able and explode three seconds after latching onto an enemy. This ability is intended to create wide disruption for the enemy player, this can also be used to catch a fleeing player as the trap minions are faster than a player and can allow Colossus to catch up while they are immobile. For the sake of balance these trap minions are very easy to kill and cannot help capture control points, also Colossus only spawns one per enemy so if that if there is less than fifteen enemies present Colossus won't chain stun them.

**Model** – For designing the model and keeping to the theme of “Rats in Tin Cans” I decided to go with a very larger can with a smaller can on top, as the character has two weapons I also thought it would be best if the character was piloted by two rats so I decided to make them identical albino twins. In the screen shots below we can see the final creation of Colossus front, back and with its lid open



## References

Unity - <https://unity.com/>

Mirror - <https://mirror-networking.com/>

BFXR - <https://www.bfxr.net/>

Bosca Ceoil - <https://boscaceoil.net/>

Blender - <https://www.blender.org/>

GIMP - <https://www.gimp.org/>

Trello - <https://trello.com/>

Draw.io - <https://app.diagrams.net/>