Final Project Design Document

Team 20

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Project Name: Antibody

Project Synopsis: A 3D shooting mobile app using Unreal Engine 4

Project Description:

This project is being undertaken because we want to spread the knowledge of how cells interact with the human body. We also want to explore more on how to make an app.

We believe this project will be beneficial to all ages and will act as a very good education tool. We believe that the game will be very beneficial to others wanting to understand how cells work.

We decided to create a game rather than a platform to research about cells because we believe that a game is more interactive causing the user to be more engaged making the users learn more. By the end of this project, we will have implemented a game that can be played on PC. We aim to make this project friendly for all ages. Although there will be gun violence in the game, we want it to be as friendly as possible because we want everyone to have the opportunity to learn more about cells.

Project Milestone:
FALL:
- Initial Project Description (Sep 27)
- Project Proposal (Nov 1)
- Enemies working (Nov 20)
- Proposal Video (Nov 29)
- Game working on PC (Dec 3)

date	milestones	status	changed
9/24/2021	brainstorming on ideas, getting familier with unreal engine	completed	
10/1/2021	splitiing roles to individual, getting familer with our jobs	completed	
10/8/2021	setting up the base of the game 1 - map	completed	
10/15/2021	setting up the base of the game 2 - character	completed	
10/22/2021	setting up the base of the game 3 - enemies	completed	
10/29/2021	setting up the base of the game 4 - enemies	completed	10/31
11/5/2021	setting up the base of the game 5 - props and game logic	completed	
11/12/2021	develop menu	completed	
11/19/2021	bug fixing	completed	
12/3/2021	final test	completed	

SPRING:
- Finalize menu design (Jan 21)
- Character customization (Jan 30)
- Final Project Design Document (Jan 31)
- Finalize levels (Feb 15)
- Finalize Documentation (April 1)
- Deploy game (April 13)

date	milestones	status	changed
1/21/2022	Game Improvement - characters 1	in-progress	
1/26/2022	Game Improvement - characters 2	in-progress	
2/2/2022	Game Improvement - enemies 1	planned	
2/9/2022	Game Improvement - enemies 2	planned	
2/16/2022	Game Improvement - game logic 1	planned	
2/23/2022	Game Improvement - game logic 2	planned	
3/2/2022	UI Improvement	planned	
3/9/2022	Implementing onto mobile platform	planned	
3/23/2022	Implementing onto mobile platform	planned	
3/30/2022	Implementing onto mobile platform	planned	
4/6/2022	final test	planned	

Gantt Diagram:
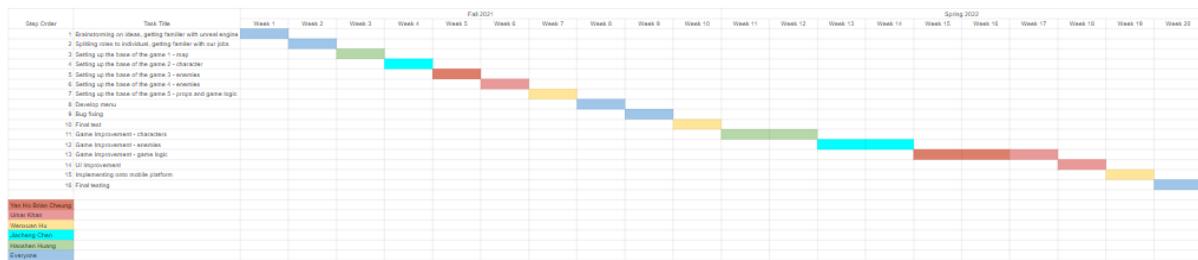
Project Budget:

Name	Estimated Cost	Vendor	Special Training	when it will be required
Unreal Engine Subscribtion	($20/month) * 5	Epic Games	Videos on how to use Unreal Engine	10/1/2021
Unreal Engine map pack	$40	Epic Games	N/A	10/8/2021
Maya	Free	Autodesk, Inc.	N/A	10/15/2021
Unreal Engine sound pack	$20	Epic Games	N/A	11/5/2021

Final Project Design:

How the software works

Unreal Engine uses the inputs provided from the user such as key presses and button presses to execute actions based off of our code implementation. Unreal Engine also keeps track of the game progress and rules which are designed by us. We are using Unreal Engine 4 which is the latest version of Unreal Engine. Unreal engine is a cumulative and revised version of all the previous Unreal Engine editions. Unreal Engine integrates rendering, collision detection, AI, visibility, networking, scripting, and file system management. The projects can be implemented using the blueprint template or C++ template. To initialize the project, you need to specify the template and the users POV. We chose to do this project in third person. The level editor is used to create, view, and modify by modifying the props and characters and placing the props onto the map/canvas. Can also customize the props geometry and physics inside the level editor. A layout of the functionality based on events can be used to understand the game logic. (TeXplaNIT)

Design constraints
- Technical:
  - Platform such as Unreal Engine to implement project
 - Models for characters, weapons, maps, props, AI
  - Sound effects

This project is mostly based on using Unreal Engine, and this is one of the technical constraints we encountered while developing our project. As we are mainly using open source models from the Unreal Engine's existing library, the models that we can choose from are limited. Things that require a model in our projects are characters, weapons, the props, the map, the enemy AI and sound effects of the game. We are still searching for an appropriate model for the character and the enemy, and this is one of the constraints that we face while developing the game.

- Business:
  - Not exceeding budget while searching for an appropriate model

- Monetization while deploying the game

Following the technical constraint that we have, as we are searching for our models for the game, most of the better fitted models cost money for their copyrights, and not exceeding our original budget would be one of the business constraints. Another business constraint that we will face would be monetization while deploying the game. We intend to make the game free at launch, and we will have to control our budget while developing the game in order to do so.
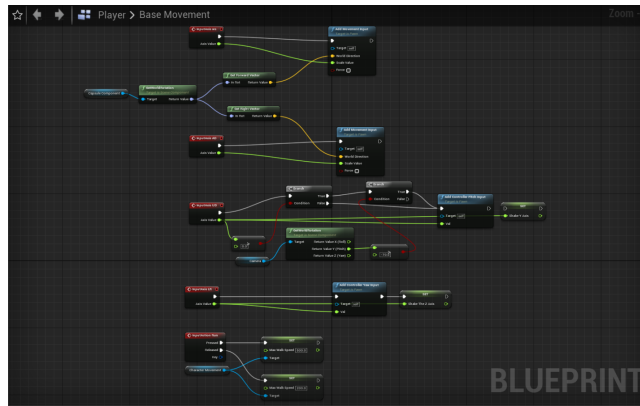
Backend
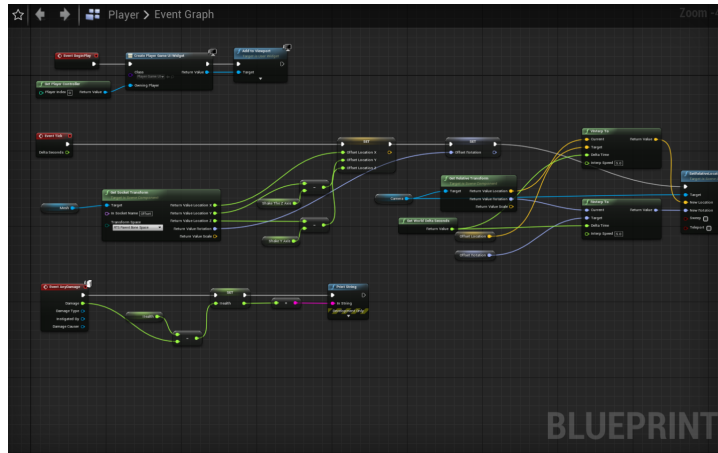
Figure 1. Player event graph

The event graph is a graphical representation of events that will happen in response to the user input. The event graph describes the functionality player mesh when the player runs and walks, shoots a weapon, and when the player is dealt damage or is being damaged. There are also events that describe what will happen when the time reaches a certain time limit.
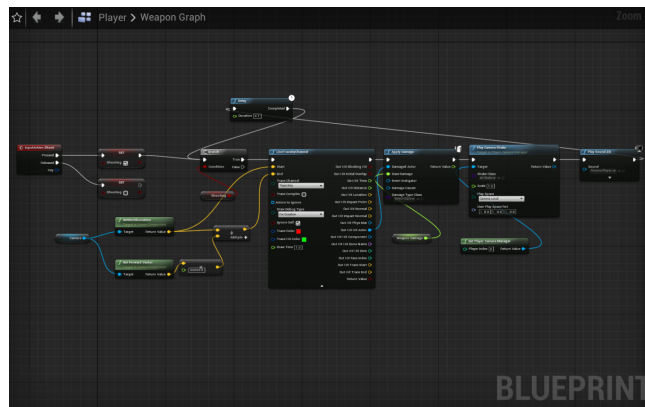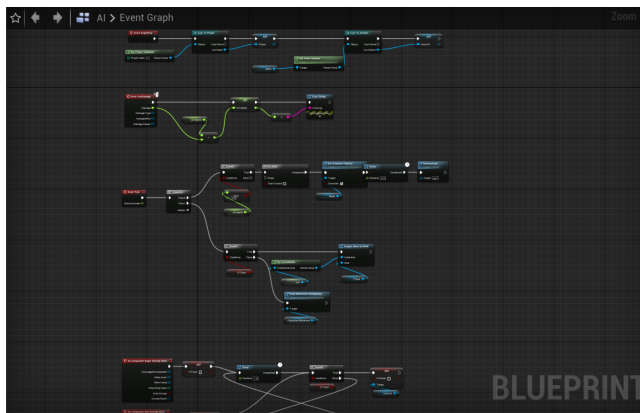

Figure 2. Weapon graph

The weapon graph is a graphical representation of events that will happen in response to the user input. The weapon graph shows events when the weapon is shot, when the weapon is reloaded, when the weapon is reloading, when the weapon is out of ammo, when ammo is picked up, and the tracker for the number of bullets in the weapon.

Figure 3. Base movement

The base graph is a graphical representation of events that will happen in response to the user input. The base graph shows events when the player moves left, right, forward, and backwards, when the player is running, when the player has ran for too long and is only able to walk for a set period of time, and when the player is walking.


Figure 4. AI event graph

The AI graph is a graphical representation of events that will happen in response to the user input. The AI graph shows events when the AI detects a player within a certain distance, when the AI is supposed to shoot, when the AI is not supposed to shoot, when the AI picks up ammo, and when the AI dies.
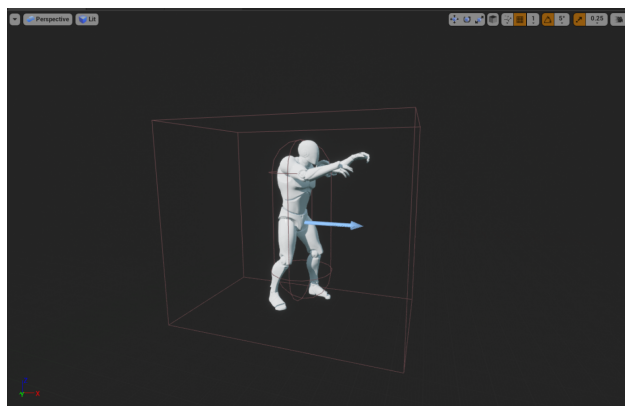

Figure 5. AI enemy

The AI represents the harmful cells that the users will try to destroy (the enemy). The AI has a distinctive stance that resembles that of a zombie. We chose to have the enemy stand like this to signify that the enemies are evil.
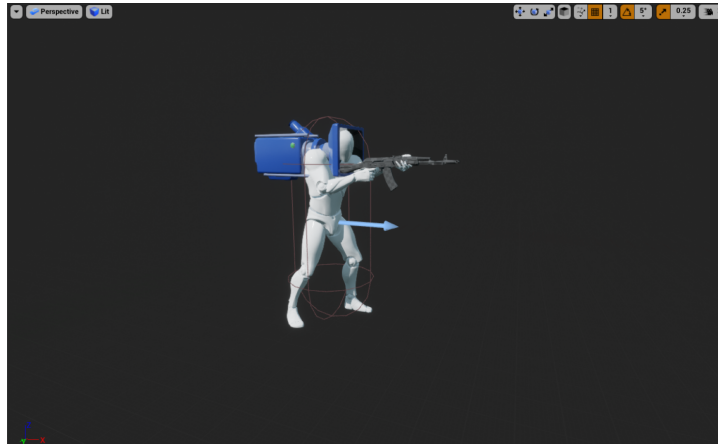
Figure 6. Temporary Player model

The Player model is what the user will be playing as. The Player has a unique distinction from the harmful cells being that the users will have a backpack. The backpack will be used to carry props the user finds on the ground. The player also carries a weapon. This is not the final character design. We will work on the design once we are further into the project.
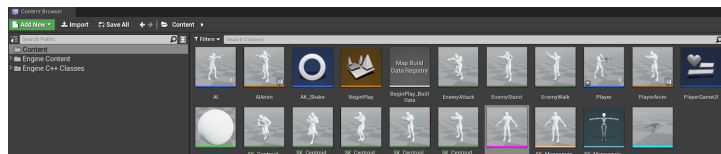
Figure 7. Models

This image shows all the current models we have for the project. If we click these models , we will go into the blueprint of each model. There are different stances that will be used based on certain events.

User interface
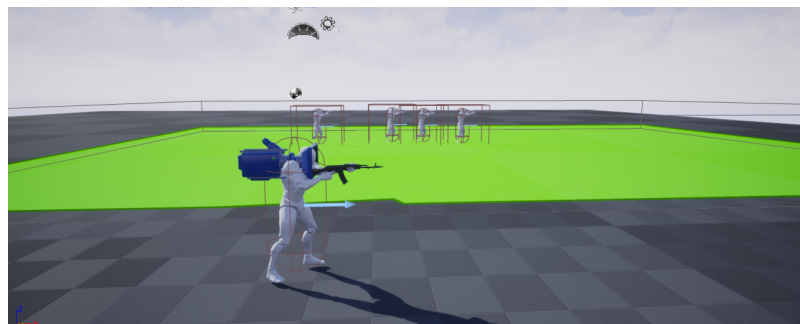
Figure 8. User POV

We decided to make this game in third person POV. We believe this game is best suited for a third person POV because there will be a lot of things the user will need to keep track of and it would be hectic if we chose to use first person POV.

Game concept

In the beginning of the game, users will be asked to select a game mode and level of difficulty. Once the player has selected the option, they will be prompted to a screen telling them the game is loading/ queued in game. Once the game is loaded, the user will be put into a game. When the game starts, the player will try to find harmful cells and try to eliminate them within a certain time limit (based on the level of difficulty chosen by player and game option). The player also needs to be cautious when running around the map because there could be props and enemies that can harm the user. If the user gets infected, then the user loses.

Ethical Issues:

- 2.4 Accept and provide appropriate professional review.

Code of ethics 2.4 is one of the ethical rules that we have to be aware not to violate. As the game we are making is a First Person Shooter game, we have to make sure that the game won't be too violent to the targeted age group of players, which we intend to be people of all ages. Hence having appropriate review is essential to our project, we have to make sure the game is reviewed by at least one of the professionals, in this case the teaching assistant of our class, and we have to accept his review before having our game launched.

- 2.8 Access computing and communication resources only when authorized or when compelled by the public good.

Before implementing this project, we needed to make sure we did not violate the ACM code of Ethics "2.8 Access computing and communication resources only when authorized or when compelled by the public good". We made sure to find models that were open to the public so we do not run into any copyright issues. In this project we used the free sources provided by UnReal Engine to obtain the characters, weapons, and other props. We also made sure that we did not violate any of the terms before using the UnReal Engine software.

Intellectual Property Issues:

Unreal Engine is a free to use software used to implement many things such as games. If we were to deploy this project to the public, we understand that the license will incur 5% of the monetized income and other products sold within the game. We also understand that the projects we create can be made for clients but not for "off-the-shelf" deployment.

Unreal Engine, as stated above in the "Ethic issues", provides us with free models, props, and other resources that can be used to develop and implement our project. These models do not violate any copyright issues. We also looked at some other models such as the "soldier" model which can be used for this project only if we pay the $50 fee. We did not decide to use these models because there would be some copyright issues if we were to deploy the project.

Change Log:

- Updated project milestone and changed Gantt diagram accordingly
- Updated project name to better fit genre of the game
- Updated table for project milestone
- Pushed up game deployment date for final presentation