Unity-Based Fighter

Contributors
Brayden Tremper
Cameron Markwell
Gauge Hartwell
Aaron Koffel

Table of Contents

Introduction

This report provides information regarding the overall plan for our project. Our project consists of developing a full scale video game using Unity3D in an attempt to explore the relationship between an enemy AI and a human player. With this, the report outlines the overall vision and requirements for this project alongside our measures for success as well as constraints and risks which may affect the success of the project. Branching off this, the overall plan for the project is displayed based on the desires of the stakeholders while considering the overall constraints and taking them into account while developing an iteration plan for the project.

1 Background

When considering the idea of a video game, they are often made as an escape from reality. The player often takes the form of the protagonist who must face a number of obstacles and challenges. This causes the player to often recognize this protagonist as themselves bringing forth the need for immersion, allowing this experience to be supported. Often in games this immersion is supported by a dance. Boss fights explore this idea heavily. The player must wait until the boss is done attacking before attempting to attack themselves. With this, it allows the player to get into the boss's rhythm, creating the opportunity for a dance between the player and boss to be implemented. This game seeks to explore this relationship between the virtual boss and the player.

Many games have boss fights, they have been a staple of video games since arcade games. Boss fights are generally fights at the end of a level in which the enemy being fought is stronger, larger, has more health, faster, or any varying combinations of abilities that make the enemy a powerful foe. Some bosses attack in predictable patterns that are telegraphed at the beginning of their attack, and some of these bosses attack with a particular rhythm. The player, usually too weak to simply take the full force of the attack, then has to move, block, deflect, or perform some other moves in time with the bosses attacks in order to minimize the damage taken. Bosses of this type will often then hesitate before attacking again in order to allow the player to attack them and deal some damage. This relationship, communication, and mutual respect between the player and the enemy is reminiscent of the relationship of two dancers. However, there are not many games that emphasize this relationship, or explore it in detail. We aim to change this by building a combat system to produce a fight that evokes feelings similar to those evoked while dancing.

2 Vision Statement

Our goal is not one of financial interest, or one that improves humanity in a direct way as a whole. Rather, our goal is more similar to that of a piece of art in that we want to evoke a particular feeling within the user. We want to develop a game that gives the feeling of dancing to the users and explores that feeling. This will be accomplished by the use of rhythms, telegraphs, predictability in attack sequences, shifting who can be on the offense, and syncing actions with the music.

In addition to this we want to make a game that feels good to play and is fun. This will be accomplished by interesting gameplay choices, unique bosses, allowing for different play-styles, and impactful gameplay mechanics.

In order to limit ourselves and ensure that we have the time to develop a viable product, we aim to only develop a proof of concept to start with. This would consist of only a single boss-fight. This is all that is needed to show that such a game could actually evoke the feelings we aim to evoke with gameplay that is fun and interesting.

2.1 Hypothesis

2.1.1 Growth Hypothesis

Our project will offer a unique take on third-person fighting games. By taking an in-depth dive into the similarities between the combat and dancing, our game will differentiate itself from other, similar games.

2.1.2 Value Hypothesis

When viewing the value of this product, it seeks to provide an engaging, immersive, and unique experience to the end user. The immersion applied through dance by the use of telegraphed fights seeks to simulate a real world dance. If this simulation is accurately tracked according to the game's rhythm with the player and boss dancing to the rhythm, emulating a real world dance, then this section can be considered to provide a valuable and immersive experience to the end-users. Following this, the product seeks to be unique through the emulated dance but also other elements such as limb damage, if this damage can accurately be tracked with damage being applied to that specific limb its value can be recorded. Branching off this, the end user ultimately seeks to have an overall enjoyable experience such as having the previous elements above but also ideas such as appealing graphics, smooth movement, a variety of moves, and well tracked attacks. In order to test the value of this, every element needs to be accounted for allowing the user to have an overall beneficial experience.

2.2 Requirements

2.2.1 Functional Requirements

- The project will be implemented using 3D graphics.
- The player character will respond to inputs given via either a keyboard and mouse or a controller with the appropriate action.
- Opponents in the game will utilize a simple Artificial Intelligence to choose which action to take.
- Opponents in the game will telegraph their attacks, follow predictable attack sequences, give the player opportunities to attack back, and sync all of this with the music.
- The player will have a variety of movement styles such as walking, running, jumping, dashing, and attacking.

2.2.2 Non-Functional Requirements

- The game controls and functions will be intuitive to the players and beta-testers.
- The game will run smoothly given computers capable of smoothly running games of similar complexity.
- The scripts compiled will run in a fast manner with low run-time complexity.
- Enemy AIs will respond in a timely manner when applicable according to the telegraph of attacks.
- The final game file will be a size less than 10GB.
- The loading time between different scenes in the game will be less than 1 minute.

3 Success Measures

Because our goal is to evoke a particular feeling, our success measures are subjective. The best way to measure our success, then, is to use beta-testers and listen to their reviews. Throughout the development of the game, we will reach out to friends and those interested and search for volunteer beta-testers. These beta-testers can then give short answers to a few survey questions to determine if they feel like the game is fun, if it feels nice to play, and if it evokes a feeling of dancing.

At the time of project completion, success will be measured as a minimally “complete” or playable game - at least one “boss” is completed as a fully working entity within the game, a limb damage mechanic will be fully implemented within the game for all characters, the player will successfully interact with the world around them as befits a fighting game, and all player-enemy interactions will feel as though the player is “dancing” with the enemy. A “boss” within the game will be considered complete when the character is operating as intended (correctly interacts with player - fights player, limbs react to taking damage, character is synchronized with the background music). The “limb damage” mechanic will be considered complete when each character within the game successfully reacts to having one of their limbs damaged. As far as the feeling of “dancing” with the enemy is concerned, completion will be measured subjectively (i.e. does the fight feel like a dance or just another fight?).

4 Prioritized Project Constraints

Time

This project is constrained by a 9-month (minus spring and winter break) project time. It is intended to be completed and ready for showcasing at the end of the 9-month period given for its completion. If it does not appear that the project will be completed before the time-limit given, more man-hours will be brought to the project in order to assist with completion of the project in the time given. This will mostly consist of everyone in the group devoting a larger portion of their time to the project. The scope of this project is intentionally minimal so that the project team has a clear and concise target to achieve in order to call the project “done” at the end of the 9-month period.

Resources

The resources for this project can be changed as needed to meet deadline requirements and project scope. The main resource needed for this project will be the time investment of the project developers. Both during the 3 terms, and during breaks. There is no project budget, so monetary constraints are not considered here. Other resources that will be needed for this project include outside expertise (provided partially by the project partner), documentation on the tools needed for the project development (such as Unity 3D documentation, Github documentation) and the development software/tools themselves (Unity 3D, Github).

Scope

The scope of this project is not as flexible as the resources available for the project, but more flexible than the time allocation for the game. The scope currently includes the things outlined in the “success measures” section of this document. If the project can not be completed (e.g. the scope is too large for the project), then some features will need to be omitted.

5 Stakeholders

- **Outside experts**
  - Helps development team with assistance based on their expertise on a given subject, such as music, dancing, graphic/character/environment design.
- **The Players**
  - Plays the game and enjoys their time with it. Enjoys the feeling of "dancing" with their opponent within the game.
- **The development team**
  - Creates the game to the specifications outlined in this document.
- **The project partner**
  - Benjamin Brewster, a professor at Oregon State University, outlines the vision for the game and how it should look/feel. Wants the fully-completed project at the end of the 9-month project development time.

6 Risk

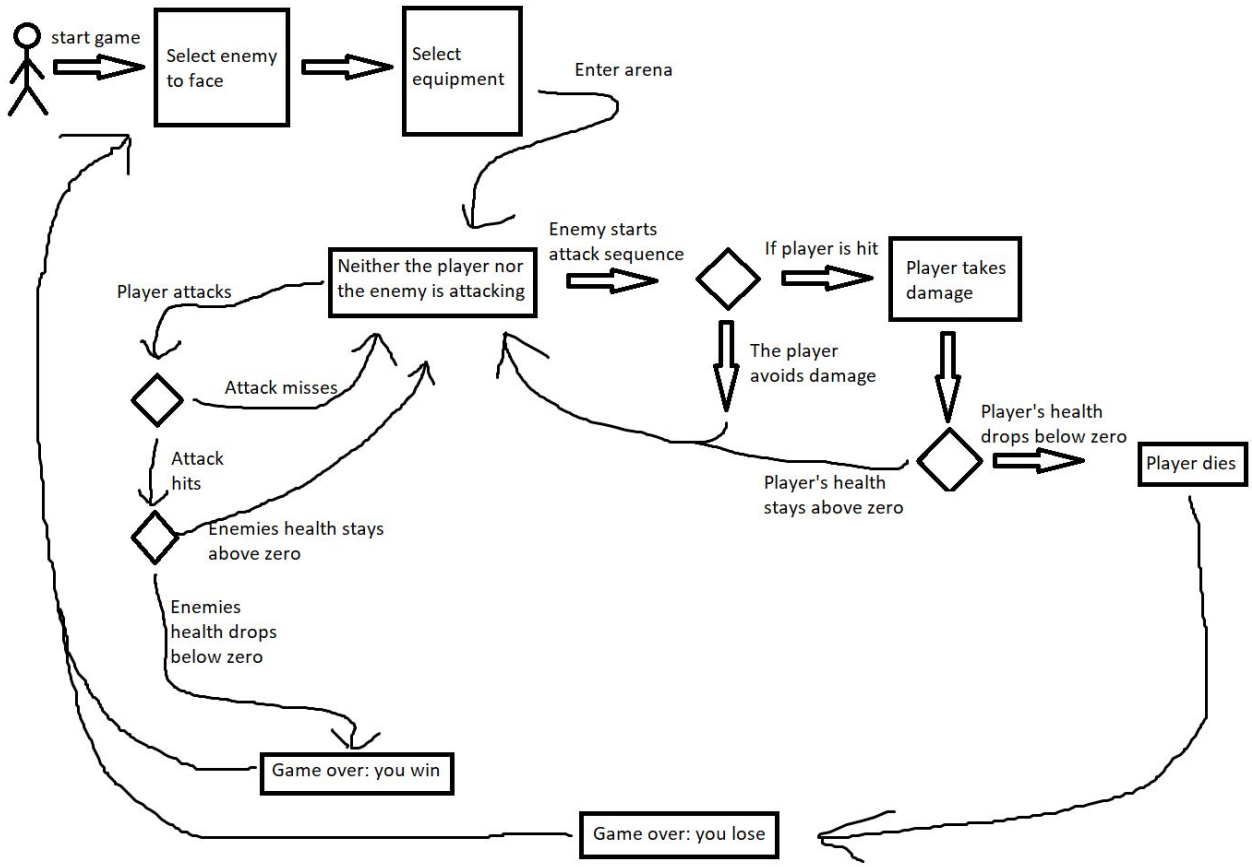
Risk	Likelihood	Impact	Mitigation Strategy	Early Detection	Consequence
The deadline may not be possible with the size of the minimal required scope of the project.	Unlikely	High	To mitigate this, a review of current progress and an update to the plan will be done on a bi-weekly basis so more resources can be brought in if required to accomplish the minimal required scope on time. Each update will provide an opportunity to assess current progress and decide if the project should move forward or if it should be scrapped or postponed	Bi-weekly plan updates result in an iteration plan that goes beyond the deadline.	Should the mitigation strategy fail to prevent/avoid the risk, the project scope may be reduced in order to allow for minimum project completion.
The project is not satisfactory to the stakeholders after completion.	Unlikely	Medium	To mitigate this, an awareness of the vision of the project partner (through meetings/regular communication) will be maintained.	Bi-monthly updates/meetings with the project partner to help maintain focus and direction of the project.	Should the finished project not conform to the vision of the project partner or the players, the project will be completed anyway to create a deliverable/base for the project team to possibly improve.
The project developers do not have the same vision of what the	Unlikely	Low	To mitigate this, regular meetings among the project development team will be held in order to keep each team member on the same	Weekly meetings will be held among the project team so that the current goal and	Should the project team fail to come to an understanding on the project vision

project will be upon completion.			page with the rest of the team.	project vision can be understood among the team.	or goal, the team (including project partner) will come together to discuss the goal/vision of the project to re-align themselves with the project goal.

7 Scope

By the end of the capstone sequence, we hope to have a fully functional game with one boss-fight. This game should demonstrate each part of the full game. The player should possess a varied moveset which can be built upon to create an extremely varied moveset. There should be at least two melee weapons and two ranged weapons so that all the weapon mechanics are built, and all that is needed is to add more weapons. There should be at least one boss that demonstrates what a boss-fight should be, and all that needs to be done is to design more bosses.

7.1 Process Flows



The essential components of the game are the player and the enemy. These two characters interact and attempt to kill each other throughout the bulk of the game (the rest of the game is choosing which enemy to face, and what equipment to use). Throughout a fight, either character may attack the other. Should one of the characters be hit by the others attack, that character will receive damage and, if they've taken enough damage, die. Alternatively, seeing an attack coming, a character may dodge and avoid taking damage. When one character dies, the match ends and a new match may begin.

7.2 User Stories

7.2.1 Player

1. As a player I want to be able to move around in the world so that I properly engage in the battle.
2. As a player, I want to be able to make my character jump so that there is another dimension available to me during a fight.
3. As a player, I want the camera to smoothly follow my character and always face the correct direction so that I can quickly and easily get a bearing of my surroundings.
4. As a player, I want enemies to fight so that I have a clear goal and a way of beating the game.
5. As a player I want every weapon to have a simple attack that's relatively easy to execute so that I can always have an acceptable default for an attack.
6. As a user, I want to switch weapons so that I can have a wider arsenal available at any time.
7. As the player, I want to have a movement speed faster than the standard movement so that I can quickly maneuver long distances around an enemy.
8. As a player I want to quickly move a short distance so that I can dodge oncoming attacks.
9. As a player I want to quickly move a short distance and be invulnerable for a moment so that I can dodge oncoming attacks.
10. As a player, I want to be able to jump in mid-air so that I gain extra height.
11. As a player, when hitting some things with a melee attack in mid-air, I want to be pushed back in the opposite direction they were looking so that I can bounce off of enemies and their attacks.
12. As a player, I want to be able to sync my actions with the universal rhythm tracker so that I can sync my actions with the enemies.
13. As a player, I want each weapon to have a special attack so that I have an interesting extra option with each weapon.
14. As a player, I want to have the option to quickly jab at the enemy so that I can damage him in cases where I might not be able to otherwise.
15. As a player, I want to be able to deflect an oncoming attack without moving so that I have an interesting option when being attacked.
16. As a player, after taking damage to a particular limb, I want penalties applied to things the limb is used for for a short time.
17. As a player, I want to be able to easily see how much health I have left so that I can gauge how riskily I am willing to play and see when I need to heal.
18. As a player, before going into a fight, I want to be able to choose which weapons, items, and abilities I have active so that I can equip myself in a variety of ways for different bosses and different playstyles.
19. As a player, I need to have a visual representation of the player, opponent, and environment so that while I play I know what I am controlling, attacking, and how to interact with the environment.
20. As a player, I want to be able to move my character in different directions so that I can interact with the game world.

21. As a player, I want to be able to defend myself against my enemies so that I can prevent them from damaging me.

22. As a player, I want to be able to use items from my inventory to heal myself so that I can continue to interact with my enemies.

23. As a player, I want to see my character's health so that I can decide whether I should change how I play.

24. As a player, I want to see my character's currently equipped weapons and items so that I can decide what to do with them.

25. As a player, I want to see the current status of my character's weapons so that I can make informed decisions on what my next action should be.

26. As a player, I want to see my enemies' health so that I can make an informed decision on whether to attack them.

27. As a player, I want to see the player character as a person and enemies as identifiable things (humans, robots, animals, whatever) so that I can empathize with them and understand what's happening.

28. As a player, I want enemies to exist within the game environment so that I can enjoy fighting them.

29. As a player, I want my enemies to die when they have taken enough damage to reduce their health to 0 so that the game is not impossible to beat.

30. As a player, I want my enemies to be able to focus on me so that I can have a meaningful fight/interaction with them.

31. As a player, I want my enemies to react to my actions within the game world and attack me based on when I am vulnerable.

32. As a player, I want the other characters within the game to move based on the game soundtrack so that I can feel like I am dancing with the enemies while fighting them.

33. As a player, I want my enemies to take damage specific to their various limbs and receive debuffs to provide a unique experience for the player.

34. As a player, I want my enemies to have health bars that are visible to me so that I can properly estimate their current health.

35. As a player, I want my character's and my enemies' limbs to be susceptible to damage so that the game has a unique experience.

7.2.2 Developer

1. As a developer. I need to have a visual representation of the player, opponent, and environment so that I can create and debug both the movement and animation system.

2. As a developer, I want the enemy boss to take offensive/defensive actions based on the current and history of the players past actions so that the AI can have accurate data to train on.

3. As a developer, I want to be aware of which direction the camera is facing so that I can make the player move effectively and play correct animations.

4. As a developer, I want the player and enemies to have smooth animations so that I can debug collisions and be aware of the current state of the characters collider.

5. As a developer, I want the environment in the game to contain boundaries so that the player cannot leave the map in an unexpected manner potentially breaking the game.

7.2.3 Project Partner

1. As a project partner, I want the game to have appealing graphics, smooth animations, and responsive colliders so that the end user can enjoy their experience.
2. As a project partner, I want the game to follow a rhythm so that the combat can feel like a dance for the final users.
3. As a project partner, I want all the user stories to be implemented so that the final results are as expected.
4. As a project partner, I want the player and boss to be susceptible to limb damage so that an interesting and difficult game mechanic can be implemented.

7.3 Iteration Plan and Estimate

Term	Sprint #	Category	User story / Addition
Before the start of Fall	N/A	Movement	As a player I want to be able to move around in the world so that I properly engage in the battle.
			As a player, I want to be able to make my character jump so that there is another dimension available to me during a fight.
			As a player I want to quickly move a short distance so that I can dodge oncoming attacks.
		Graphics	As a player, I need to have a visual representation of the player, opponent, and environment so that while I play I know what I am controlling, attacking, and how to interact with the environment. (partial)
		Setup	Initialize Unity project and distribute with other members through GitHub. Also, begin watching Unity tutorials to better understand commands and workflow.
Fall term	Sprint 1	Movement	As a player, I want the camera to smoothly follow my character and always face the correct direction so that I can quickly and easily get a bearing of my surroundings.
		Graphics	As a player, I want to see the player character as a person and enemies as identifiable things (humans, robots, animals, whatever) so that I can empathize with them and understand what's happening. (partial: character model)
		Enemies	As a player, I want enemies to fight so that I have a clear goal and a way of beating the game.
		Weapons	Worked on weapons. Made progress on the gun
		Testing	Test that the camera follows the player correctly from various input directions and rotations.
	Sprint 2	Movement	Improve and expand upon player movement
		Enemies	Set up deterministic movement for enemy AI
		Graphics	Improve player character and enemy graphics and animations.
		Weapons	Add in melee weapons and perhaps a new type of gun

		Testing	Test that the updated movement system doesn't interfere with previous, graphics don't interfere with game functionality, and animations correspond with character movement.
Winter term	Sprint 3	Movement	Improve and expand upon player movement
		Enemies	Update enemies to behaver non-deterministically so that they can respond to the player's actions
			Expanding on enemies abilities
		General	Add more weapons and items
		Testing	Take time to more thoroughly test what has been done thus far and its interactions with everything else.
	Sprint 4	Movement	Finish character moveset
		Enemies	Expanding on enemies abilities
		Graphics	Add in any missing animations and smooth out existing ones
		Environment	Add in arena to fight in
		Music	Add in soundtrack
			Start work on synchronizing the enemy, the player, and the music.
	Sprint 5	Environment	Upgrade map and environment to be visually appealing and to provide interesting gameplay
		Sound effects	Add in player and enemy sound effects
		Choreography	Begin work on fight choreography
			Adjust movement, attack, and defense actions of the player and of enemies to fit choreography
		Testing	Take time to more thoroughly test what has been done thus far and its interactions with everything else.
			Start beta-testing
Spring term	Sprint 6	Choreography	Ensure that everything is synchronized
			Continue work on fight choreography
		Screens and menus	Start work on the title screen menu, the boss select menu, the item and weapon equip menu, and the victory/death screens
		Testing	Continue beta-testing
	Sprint 7	Choreography	Finish work on fight choreography
			Adjust animations to match choreography
		Screens and menus	Finish work on menus
		Testing	Continue beta-testing
			Take time to more thoroughly test what has been done thus far and its interactions with everything else.