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Advanced Computer Lab Winter 2019

Final project: Titanfall

Due: 11:59 pm December 10th 2019



1 Guidelines

This project should be done in groups of minimum 4 and maximum 6 students. We will use the Bold letter "X" to refer to the number of team members throughout this document. You can share ideas, consult the manual, and search online. However, all work done in this project must be done by the team members and the team members only. All team members should work on this project equally and no work should be done by anyone outside the team. Individual evaluations **WILL** be conducted at the end in order to verify that.

All external assets used (including those from unity asset store) must be credited in the credits section of the main menu.

Use Unity and C# to create this project. Once you are done, build the project into a .exe and compress the whole folder in a zip file. The zip file should be named in the following format StudioName_Project (Ex: UniSoft_Project). If the total size of the submission exceeds 250MB, please submit the zip file containing the .exe only and upload the _Data folder to your own google drive and provide us with the shareable link (can edit enabled) when you are submitting. Use the following link to submit your .zip file: <https://forms.gle/8zL4xR89PyLjmVMR7>

2 Description

Titanfall is a first person shooter (FPS) game. The player plays as a free-running foot soldier "Pilots" who can command agile, mech-style robots called "Titans". Pilots are agile with great mobility options and weaponry. While Titans are significantly less mobile than the pilots, they have stronger firearms and superior protection. The player initially starts as a Pilot, but can later deploy and enter a Titan after killing enough enemies. If you are unfamiliar with the game, you can check out the entire gameplay by following these links:

- <https://www.youtube.com/embed/hbQPrfft2gM>
- <https://www.youtube.com/embed/caiIamHIzBY>
- <https://www.youtube.com/embed/FeqA161rVuE>

Note: The entire gameplay of the game from the first level until the boss is defeated should take 5 to 10 minutes.

3 Rules of Play

3.1 Player

3.1.1 Pilot

1. A pilot is controlled in a 1st person perspective.
2. A pilot can move using the movement buttons.
3. A pilot can move faster by pressing the sprint button while pressing the movement buttons.
4. A pilot can jump using the jump button.
5. A pilot can double jump in mid-air while being airborne.
6. A pilot can **wall run** by pressing the forward and sprint buttons while being airborne and close to a vertical surface.
7. A pilot can toggle between standing and crouching by pressing the crouch button.
8. A pilot **CAN NOT** sprint while crouched. Pressing the sprint button while crouched automatically un-crouches the pilot.
9. A pilot initially has 100 health points.
10. A pilot can use the fire button to fire their currently equipped weapon as long as it currently contains ammunition (Ammo).
11. Some weapons require holding the fire button, while others require a single press. Kindly, refer to section 5 for more details.
12. A pilot can reload their currently equipped weapon as long as its ammunition (Ammo) is not full. Note: We are assuming infinite reserve ammo.

13. A pilot can switch their currently equipped weapon.
14. A pilot initially has an empty titanfall meter.
15. A pilot fills up their titanfall meter by killing enemy pilots and enemy titans.
16. Whenever the player kills an enemy pilot, the titanfall meter increases by 10 points.
17. Whenever the player kills an enemy titan, the titanfall meter increases by 50 points.
18. The maximum value the titanfall meter can have is 100.
19. A pilot can call in their titan (performs a titanfall) by pressing the "call in titan" button **if and only if** their titanfall meter is full (reaches 100) and the titan is not already deployed.
20. After calling in the titan (performing titanfall), the titanfall meter should be reset to zero.
21. A player pilot can call in their titan (performs a titanfall) if their titan was already destroyed and they have successfully refilled their titanfall meter.
22. A pilot can enter their titan by pressing the embark titan button while being close to their titan.
23. Whenever the pilot gets hit, he/she loses an amount of health points based on the weapon used to attack him/her.
24. If the player does not get damaged for 3 seconds, the health increases by rate of 5 health points per second. The regeneration stops once it reaches the maximum amount of health or get damaged.
25. Whenever the pilot's health points reaches zero, the player dies and "Game Over screen" is displayed.

3.1.2 Titan

1. A player titan is controlled in a 1st person perspective.
2. A player titan can move using the movement buttons.
3. A player titan can move faster by pressing the sprint button while pressing the movement buttons.
4. A player titan **CAN NOT** jump, double jump, crouch, wall run or change weapons.
5. A player titan can dodge bullets (evade) in a particular direction by pressing space along the corresponding movement key (Dash: moving in a given direction to avoid getting hit).
6. A player titan can dash if and only if they have at least 1 dash available in their dash meter.
7. A player titan's dash meter has a maximum of 3 dashes.

8. Once the dash meter is not full (less than 3 dashes), it takes 5 seconds to regenerate 1 dash.
9. A player titan is invincible during the dash.
10. A player titan initially has 400 health points.
11. A player titan can press the fire button to fire their weapon.
12. A player titan presses the defensive ability button to activate their defensive ability.
13. The defensive ability will be active for the specific duration specified in section 6.
14. After the duration of the defensive ability, a cool-down period of 15 seconds starts. During which, the defensive ability cannot be used.
15. A player titan presses the core ability button to activate their core ability **if and only if** the core ability meter is full (reaches 100).
16. A player titan initially has an empty core ability meter.
17. A player titan fills up their core ability meter by killing enemy pilots and enemy titans.
18. Whenever the player titan kills an enemy pilot, the core ability meter increases by 10.
19. Whenever the player titan kills an enemy titan, the core ability meter increases by 50.
20. The maximum value the core ability meter can have is 100.
21. The core ability meter cannot increase while core ability is active.
22. After activating the core ability, the core ability meter should be reset to zero.
23. A player can disembark their titan by pressing disembark button.
24. Whenever the player titan gets hit, he loses an amount of health points based on the weapon used to attack him.
25. Whenever the titan's health points reaches zero, the player is automatically disembarked from the titan and the titan is destroyed.

3.2 Enemies

3.2.1 Pilot

1. Enemy pilot can either stand idle or walk in patterns around the arena.
2. Enemy pilot should go after and attack the player whenever the player enters his/her range.
3. Enemy pilot can use their primary weapon to attack the player.

4. Enemy pilot **CAN NOT** wall-run, jump, double jump, crouch, change weapons or call in a titan (perform titanfall).
5. Enemy pilot initially has 100 health points.
6. Enemy pilot should have a health bar above them.
7. Enemy pilot attacks every fixed interval (e.g: every 3 seconds) while the player is in range.
8. Whenever an enemy pilot gets hit, he/she loses an amount of health points based on the damage amount of the weapon used to attack him.

3.2.2 Titan

1. Enemy titan can either stand idle or walk in patterns around the arena.
2. Enemy titan should go after and attack the player whenever the player enters his/her range.
3. Enemy titan can only use its primary weapon to attack the player.
4. Enemy titan **CAN NOT** dash, use core ability, or use defensive ability.
5. Enemy titan initially has 400 health points.
6. Enemy titan should have a health bar above them.
7. Enemy titan attacks every fixed interval (e.g: every 3 seconds) while the player is in range.
8. Whenever the enemy titan gets hit, it loses an amount of health points based on the damage amount of the weapon used to attack it.

4 Controls

4.1 Pilot Controls

1. The player controls the camera with the mouse movement (Pilot Look At).
2. The player controls the pilot walking movements forwards and backwards using the up and down keys as well as the "W" and "S" keys respectively.
3. The player controls the pilot walking movement right and left using the right and left keys or the "A" and "D" keys respectively.
4. The player runs/sprints by holding down left-shift along with one of the movement keys.
5. The player jumps by pressing space.
6. The player double jumps by pressing space mid air.
7. The player crouches by pressing "C".

8. The player fires bullets from their currently equipped weapon using left mouse click.
9. The player can reload their currently equipped weapon using "R" key.
10. The player can switch between different weapons using "Z" key.
11. The player can embark titan by pressing "E".
12. The player can pause the game by pressing ESC.

4.2 Titan Controls

1. The player controls the camera with the mouse movement (Pilot Look At).
2. The player controls the titan's walking movements forwards and backwards using the up and down keys or the "W" and "S" keys respectively.
3. The player controls the titan's walking movement right and left using the right and left keys or the "A" and "D" keys respectively.
4. The player runs/sprints by holding down left-shift along with one of the movement keys.
5. The player can "Dash" in a particular direction by pressing space along the corresponding movement key.
6. The player fires bullets using left mouse click.
7. The player enables "Defensive Ability" by pressing "F".
8. The player can activate "Titan core" by pressing "V".
9. The player can disembark titan by pressing "E".

5 Pilot Loadouts

Loadouts are preset configurations of weapons and gear for you to choose before combat in Titanfall. You are required to have 2 heavy weapons. You are required to have $\text{int}(X/2)$ different primary weapons in your game (e.g $\text{int}(5/2)$ returns 2 which means you will have to choose 2 heavy weapons to create in your game). The player gets to choose 1 primary weapon and 1 heavy weapon to equip before starting the game, and they can be switched within the game.

5.1 Primary Weapons

Each weapon has the following properties:

- **Damage Amount:** The amount of damage each bullet deals.
- **Firing Mode:** Automatic (fires by holding)/ Single-shot(Fires on singles press)
- **Fire Rate:** How many bullets are fired per second.
- **Ammo Count:** The maximum amount of bullets a magazine can hold.
- **Range:** The distance the bullets is effective for, after which no damage is dealt.

5.1.1 Assault Rifle

- Damage Amount: 10
- Firing Mode: Automatic
- Fire Rate: 10
- Ammo Count: 35
- Range: 65

5.1.2 Sniper Rifle

- Damage Amount: 85
- Firing Mode: single shot
- Fire Rate: 1
- Ammo Count: 6
- Range: 100

5.1.3 Shotgun

- Damage Amount: 70
- Firing Mode: single shot
- Fire Rate: 3
- Ammo Count: 12
- Range: 4

5.2 Heavy Weapons

Heavy weapons can be used to break down and destroy enemy Titans.

- **Rocket Launcher:** it launches a rocket projectile that fires in a straight line, and creates an explosion of a radius of 3 units upon making contact with an object. The explosion causes damage of 150 points to the enemies within its range.
- **Grenade Launcher:** it launches a grenade projectile, that fires in a curve downwards, and creates an explosion of a radius of 4 units upon making contact with an object. The explosion causes a damage of 125 points to the enemies within its range.

6 Titans

In this section you will find a detailed description of different titans available. Each titan is defined by its "Primary Weapon", "Defensive Ability" and "Titan Core". You are required to have $\text{int}(X/3)$ different titans in your game (e.g $\text{int}(5/3)$ returns 1 which means you will be choosing one of the titans mentioned below). Please note that you **do not** need to implement the utility or offensive abilities shown in the demonstration videos.

6.1 Ion

<https://www.youtube.com/embed/IM019o8vZIE>

Primary Weapon	Splitter Rifle	Rapid single-fire energy rifle which fires a burst of 3 deadly shots at once. Each shot (bullet) causes 70 points of damage to whatever it hits.
Defensive Ability	Vortex Shield	Captures incoming bullets and fires them back ahead of the titan. After 5 seconds of the shield activation, the shield fires all bullets back forwards.
Core Ability	Laser Core	A deadly oversized laser beam fired from the chest of the Ion and instantly kills any type of enemy it hits. Once the laser core is activated, it shoots for 3 seconds and is then disabled. You will have to wait for the core ability meter to charge up to be able to re-use the laser core.

6.2 Legion

<https://www.youtube.com/embed/cAAyHn58KPw>

Primary Weapon	Predator Cannon	Powerful mini-gun. It fires with a shot rate of 20 bullets per second. Each shot (bullet) causes 15 points of damage.
Defensive Ability	Gun Shield	Small shield deployed only around the Predator Cannon which protects the titan from any damage for 10 seconds.
Core Ability	Smart Core	Automatic aims at the nearest targets within 10 unit radius.

6.3 Scorch

<https://www.youtube.com/embed/jG-rWOGAIUE>

Primary Weapon	T-203 Thermite Launcher	Fires a single shot thermite projectile that sets anything within range on fire. Upon touching an object, the projectile explodes into a fire ball which deals 50 damage to the enemies inside it. The fire stays for 3 seconds before being put out.
Defensive Ability	Thermal Shield	Destroys incoming bullets and causes 80 points of damage to enemies touching the shield. The shield is active for 8 seconds.
Core Ability	Flame Core	Creates a giant rectangular path on the ground that expands to a maximum size of 15 units and deals 100 damage to enemies inside it.

6.4 Tone

<https://www.youtube.com/embed/gwe1ZnYPgrY>

Primary Weapon	40mm Tracker Cannon	The cannon fires explosive projectiles. The projectile creates an explosion of a radius of 4 units upon making contact with an object. The explosion causes a damage of 100 points to the enemies within its range.
Defensive Ability	Particle Wall	The Particle Wall creates a concave force field which blocks all projectiles from one side and lets all projectiles through from the other. The wall is placed on the floor of the level and is independent of the player. The field lasts for 8 seconds before it disappears.
Core Ability	Salvo Core	Slow moving rockets that target the titan's look at. Upon activating the ability, 10 slow moving rockets are fired and the rockets fly towards the points where the titan is looking at and following its gaze. The titan is able to guide those rockets for 10 seconds.

7 Level Design

You are required to have at least two levels throughout the game; one combat level and one parkour level. You can create your own levels or use some of the original ones from the game as a reference.

7.1 Combat Level

- A combat level is a level where the player **must** kill all enemies before reaching the end.
- A combat level must contain both enemy pilots and enemy titans.
- A combat level must contain a minimum of **2X** enemy pilots.

- A combat level has **int(X/2)** different types of enemy pilots where each type has a particular primary weapon equipped.
- A combat level must contain a minimum of **X** enemy titans.
- A combat level should have **int(X/3)** different types of enemy titans, each with its specified abilities.
- When the player kills all the enemies, and enters a particular trigger area, he/she goes automatically to the next level or the game ends and credits roll.

7.2 Parkour Level

- A parkour level is a level where the player must use the pilot's platforming abilities (i.e. Wall-running, jumping, double-jumping, crouching) to reach a goal area.
- In this level the player dies by falling into an endless void if they fail to platform correctly.
- Choose from one of the levels of the original game or create your own.
- When the player finishes a level by reaching a particular trigger area, he/she goes automatically to the next level or the game ends and credits roll.

8 Screens

1. Main menu

- Start : takes the player to the choose loadouts screen which allows him/her to choose his/her primary weapon, a heavy weapon to start the game with, and a titan which sticks with the player throughout the game.
- Options
 - Audio
 - * Music level
 - * Effects level
 - How to Play
 - Credits
- Quit Game

2. Choose Loadouts

- Choose primary weapon: allows the player to choose a weapon from the available weapons to start the game with. This weapon can be switched within the game.
- Choose Anti-titan weapon: allows the player to choose an anti-Titan weapon to start the game with. This weapon can be switched within the game.
- Choose Titan : allows the player to choose a Titan character. This Titan cannot be changed throughout the game.

3. Pause Screen

- Resume
- Restart
- Quit to main menu

4. **Game Over Screen**

- Restart Level
- Quit to main menu

9 **Heads-Up Display (HUD)**

The HUD is the display area where players can see their character's vital statistics such as current health, bonus attributes, armor level, ammunition count, and more.

9.1 **Pilot's HUD**

- Health bar
- Ammo count (Ammo Count/Maximum Ammo)
- Titanfall bar
- Weapon selected (Name)

9.2 **Titan's HUD**

- Health bar
- Dash bar/counter/meter
- Defensive ability cooldown timer
- Core ability bar

10 **Graphics**

10.1 **Models**

You will need models for the environment, characters and weapons. You can use models from the game, or alternative models as long as they are fairly representative of the requirements.

10.2 **Animations**

1. Player Titan Animations
 - Falling (During Titanfall)
 - Idle
2. Enemy Pilot Animations

- Idle
- Walking
- Sprint/Run
- Firing Weapon
- Hit Reaction
- Dying

3. Enemy Titan Animations

- Idle
- Walking
- Sprint/Run
- Firing Weapon
- Hit Reaction
- Dying

11 Sounds & Music

11.1 Sound Settings

The audio in your game should be divided into at least two independently controllable categories; Music and Sound effects (SFX). The easiest way to achieve that in unity is to create at least one audio mixer with at least two groups other than the master. Each group should represent one of the two categories and all the clips belonging to that category must pass through it. This way, you can control the entire audio category by controlling its mixer group.

11.2 Sounds Needed

1. Effects

- Footsteps of player pilot as he moves.
- Footsteps of player titan as he moves.
- Footsteps of enemy pilot as he moves.

2. Feedback

- When player is hit.
- When player dies.
- When an enemy is hit.
- When an enemy dies.
- When bullets are fired.
- When bullets hit an enemy.
- When bullets hit the player.

- When calling titan.
- When activating titan core.
- When activating defensive ability.

11.3 Music Needed

- Slow-paced track for the main and pause menus.
- At least **two tracks** for the game levels depending on the atmosphere.

12 Cheats (Optional)

Implementing cheat codes is **optional**. However, We highly recommend you do them as this will help us to test individual aspects of your project, just in case we were not able to test it throughout the game.

12.1 General

- Spawn enemy pilot (with AI)
- Spawn enemy pilot (without AI)
- Spawn enemy titan (with AI)
- Spawn enemy titan (without AI)

12.2 Pilot

- Invincible mode.
- Max titanfall meter.
- Force titanfall. (Destroys currently deployed titan).

12.3 Titan

- Invincible mode.
- Force max core power.
- Infinite dash
- Zero second ability cool down

13 Useful Resources

The following links might be helpful to you during your implementation:

- [Unity Standard Assets \(Asset Store Version\)](#)
- [Standard Assets Characters \(Github Version\)](#)

13.1 3D Models

- <https://assetstore.unity.com/3d>
- <https://free3d.com>
- <https://mixamo.com>
- <https://www.blendswap.com>
- <https://sketchfab.com>
- Ion Titan 3D Model
- Ronin Titan 3D Model
- Modern Weapons Pack
- Pilot 3D Model

13.2 Textures

- <https://assetstore.unity.com/?category=2d%2Ftextures-materials>
- <https://www.textures.com>
- <https://quixel.com/megascans/library>

13.3 Audio

- <https://assetstore.unity.com/audio>
- <https://freesound.org>
- <https://filmmusic.io>
- <https://www.bensound.com>
- <https://www.purple-planet.com>
- <https://www.bfxr.net>