

Miniclip Challenge

Project Report

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Project Detail

Project name	Miniclip Challenge (3D tower defense game)
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Summery

Miniclip Challenge is a mobile 3D game (tower defense) developed by use of the unity engine this game contains 2 main scenes (Main Menu and Game scene), 3 different defense towers with unique features, and 3 types of enemies with different abilities.

This Challenge contains some Mandatory and optional features that **all of them are completely implemented** in the game and will be explained in detail in the next sections.

Mandatory Features:

- | | |
|---------------------------------------|------|
| • Basic 3D graphics | Done |
| • Three different towers | Done |
| • Planning and fighting gameplay | Done |
| • Basic UI (Main menu and game scene) | Done |
| • Mobile version with touch inputs | Done |
| • Mines | Done |

Optional Features:

- | | |
|--|-------|
| • Advance enemies (3 different enemies with different range, health, attack speed and power) | Done |
| • Fences and Obstacles (Fences, rocks, trees and towers) | Done |
| • Speed up Button (Taggle game speed between 1X and 2X) | Done |
| • Advance Graphics (Advance graphics and UI design for Menu and Game scene) | Done |
| • Special Effects (Explosion, smoke and blood effects) | Done |
| • Sound Effects (Background music, shot sound and unit sounds) | Done |
| • Unit Information (A panel in main menu to display towers abilities) | Done |
| • Coin (used for creating towers in game) | Done |
| • Crown (used for improving player level) | Done |
| • Player Level (A panel to display player level) | Done |
| • Enemy Waves (A slider to show attacking enemy waves) | Done7 |

In the next section, we will explain all these features and their implementation according to the scenes (Main menu and Game scene).

Main Menu

● Mandatory features

In the Main Menu scene, we have 3 buttons. Battle Button for entering the game scene, shop button (which has no functionality in this version and I just put it in the scene to complete the UI design), and unit label (blue button) to open the unit panel.

● Optional features

- **Unit Panel:** we have two panels, first one is for displaying the tower icons and if you select one of them, the second panel (info panel) will be displayed to show the selected unit abilities.
- **Player Level:** the top toolbar contains the player level, crown, and coin counts.
the player level contains the level number (inside the shield), player ID, and a slider that shows the

needed crowns to reach the next level. By increasing the crowns, the value of the slider increases, and by reaching 20, the player level will increase.

- **Crown:** The number of crowns increases according to the number of enemies that you kill during the game.
- **Coin:** during the game, you will be given an amount of money to use to build the tower. If you save some of it and don't use it, after finishing the game, this amount will be added to your money in the main menu and you can use it to upgrade your towers.



Game Scene

In the game scene, the most important object is the Game master object which contains the scripts for managing the game. These scripts are:

- **Player State:** this script controls the status of the player such as money (used for creating the towers), the crown (increases with killing the enemies), and the health of the base.
- **Build Manager:** this is the script that controls the building of the towers. I defined the needed functions for controlling the building (CanBuild function) and needed money for building the towers (HasMoney func), BuildTurrentOn function for instantiating the towers and finalizing or canceling the building.
- **Enemy Spawner:** this script manages the spawning of the enemies. It includes the attack points, waves, and other fields related to the enemies.

- **Nude Script:** this is the script for detecting the selected nude for building the towers. By use of this, we detect the nude and send it to the Build manager as the selected nude to build the tower.
- **UI Controller Script:** this is the script for controlling the UI section of the scene and music sounds.



● Mandatory features

- **Enemy behavior:** this is game enemies detect all the targets (Objects with "Tower" tag) and calculate the distance to them to find the nears target. Then they try to get close to the target and shoot it. To control the path of the enemies, I used Nav Mesh Agent to find the path to the target. To set the target the "Move To" script finds the nears target and sends it to the Nav Mesh component as the target. Also, I set 30 as the stop distance for the enemies for shooting the targets. In addition, Enemy Script attached to the enemies control their heath of them.



- **Defensive Towers:** In this game, we have 3 types of towers. **1- Hunter** (sniper) with high range, low resistance, high power, and medium fire speed **2- Robot (Guard)** with medium range, medium resistance, low power, and high fire speed **3- Tank (Mortar)** with medium range, high resistance, high power, and low fire speed. They cannot shoot enemies under a cert. All these towers find all objects with the tag "Enemy" and calculate the nearest one as the target (tower shoot script).



- **Building Phase:** in the building phase, we have a certain amount of money to use for building towers so we should try to manage it by selecting the best towers (to perform limitations on creating towers). To build a tower, we should click on one of the tower icons and then click on the place where we want to build the tower. If the selected node has the "Nude" tag and there is no tower on it, we can build the tower there. And they can move it to another place by clicking on another node, accept it or reject the building. When we accept the building, the price of the tower will be paid with our coins.



- **Battle Phase:** when we created all our towers, we can click on the battle button to start the fighting phase. When we start this phase, we cannot create towers anymore. All enemies will be instantiated in 3 waves and attack the nearest tower. The battle phase will end when all enemies of our tower are destroyed.
- **Game scene UI:** In the game scene, in addition to towers icons and battle button, we have a toolbar at the top of the scene that includes these items: **1- Base health:** this slider shows the base health **2-Enemy wave:** this slider shows the number of enemy waves during the fight phase **3-Speed button:** to use for

increase the speed of the game **4- Crown:** which will be increased by killing the enemies **5- Coin:** the amount of money that we have for creating the towers.



- **Finish page:** When we complete the level or lose, we see the finished page, and "UI Controller Script" will calculate the rewards of the game. The received crowns and the money (if it is not zero) will be added to the crown and coin of the player.
- **Pan and Zoom the Camera:** To move the camera we can touch the screen with two fingers (Double touch) and move the camera and for zooming the camera we can pinch the camera with double touch. The important issue about these features is that we can not do them when we have selected a tower to build.
- **Mine:** one of our defense tools is the mine. We can select it and deploy it on the ground and when an object enters its scope (on trigger enter method) it will explode and kill the enemy.



● Optional features

- **Advance Enemies:** As I explain before we have 3 types of enemies with different health, range, fire speed, and power.
- **Obstacles:** In the project, we have some obstacles that enemies should avoid during the path. Fences, rocks, and trees are the obstacles in the game. To define them as obstacles, I used the Nav Mesh Obstacle component.
- **Speed up Button:** As I explain before, we have a button in the top toolbar of the game scene to toggle the speed of the game between 2X and 1X.

- **Advance Graphics:** In this project, I tried to deploy advanced graphics and also beautiful UI for the game which is easy to use for the player. For enemy and tower models and the environment, I bought some model packages from the asset store and I will attach the link to these packages here:

<https://assetstore.unity.com/packages/3d/environments/world-green-pack-160115>

<https://assetstore.unity.com/packages/3d/environments/fantasy/meshtint-free-turret-tower-03-mega-toon-series-157654>

<https://assetstore.unity.com/packages/3d/characters/battle-pack-213263>

- **Special Effect:** To use special effects I used particle system to simulate explosion (for mines and towers when are destroyed), smoke (for destroyed towers), and blood when enemies get damaged.
- **Sound Effect:** In this game, I use sound effects for these parts: 1- background music: 2 background music for building and fighting phase 2- shot sounds: when towers shoot enemies 3- unit sound: we a tower is built or at the end of the level, we hear a sound to tell the situation like "We complete the mission successfully sir". I use these voices from one of my previous projects.
- **Coin and Crown:** In the game scene I used coins for limiting the number of creating towers. Also, we have crowns which increase when we kill an enemy. We use crowns to improve the level of the player in the main menu.
- **Enemy Wave Counter:** In the battle phase, enemies attack the tower in 3 different waves to show the current number of the wave I use a slider so The player can find out how much is left until the end of the level.

Conclusion

The base of this project was completed in 5 days and after that, I tried to add additional features. I tried to do my best and send you the best result But I believe that I should have a lot of issues with your developer and I really hope this project is accepted by you and give me the opportunity to collaborate with you and start an important stage of my professional life.

Hope to cooperate in the future.

Peiman Ataei

15/7/2022