AR BASED
GAME

*Experience horror
creatures in real life*

AR - FPS

OUR TEAM

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A full FPS game experience in world around you.

Turn your world into a gaming arena of zombies

Make the game objects interact with the real world

To make Augmented Reality familiar with the users

OBJECTIVE

INTRODUCTION

We used Augmented Reality Foundation Package of Unity3D to create an engaging Evil Game which uses our device camera to spawn enemies in our real world and we have to kill maximum of them using vintage weapons like bow and arrow, shotgun, axe and revolver.

Kill as many enemies as you can before they kill you.

Difficulty increases in level 2 when dead boar also attacks you along with dead cannibals.
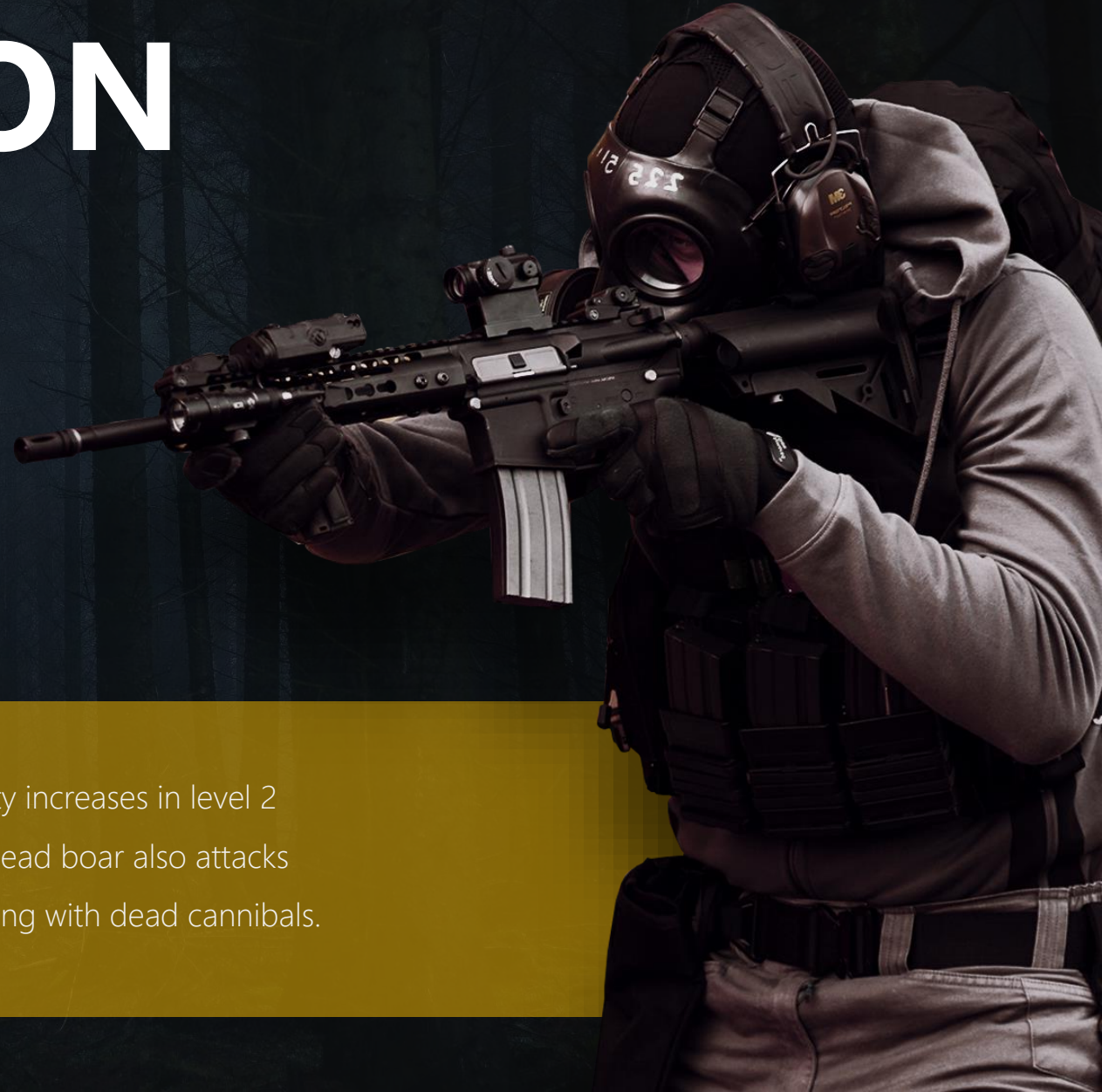
PROBLEMS FACED

Since we were not familiar with the Game Development environment and also using AR was another challenge so we faced a lot of problems and bugs which took a lot of time to get resolved. Major ones include enemy spawning and script writing.

AR camera was not functioning initially which took a lot of time to get rectified.

Weapons and hands were not moving along with the camera.

Game objects were stuck with the screen which did not give an experience of that being in the real world.

Interaction of game objects with the real world was not up to the mark initially but was later improved.

Major issue was spawning enemies on the ground of the real world which did not looked like getting spawned on the ground rather looked floating in the air.
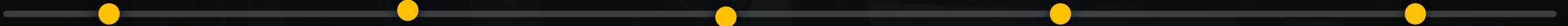
Overview

- The main objective of the game is to kill as many enemies as you can before they kill you.
- You score 10 points for each enemy you kill.
- The game starts with level 1 and after scoring 150 points, you reach level 2 where you face new enemies.
- You have three lives before the game gets over.
- A health bar shows the health for each life.
- The weapons available are:
  - Axe
  - Revolver
  - Shotgun
  - Bow and Arrow
- You have no limit of time or ammo.
- In level 1, enemies (dead cannibals) are spawned every 6 seconds which run towards you once you come in their range and starts attacking you. After scoring 150 points, you reach level 2 where at every 5 seconds one of the enemies (dead boar or dead cannibal) are spawned. The game becomes more intense in level 2.
- For a better experience, we have introduced non interactive bats in the game which gives a creepy experience.

Overview

- The enemies have a detecting range of 7 meters. If we come in that range, or from outside the range if we shoot at the enemy using a revolver, shotgun or an arrow, it detects and chases us. The cannibal stops at 1.5 meters whereas the boar stops at 2 meters to attack us.
- If after the enemy starts attacking us, we move away from their attacking range i.e. 2 meters for cannibal and 2.5 meters for boar, they chase us again to come in the attacking range.
- To kill the enemies, we need to attack it 2 times, after the 2nd attack the enemies show a dead animation and lie flat on the ground. We have to attack it a third time after which the enemy disappears and we score points.
- We have added blood effects when hit both for the enemies and the player. For the player we showed blood marks on camera when the enemy hits us.
- The game starts with a main menu with options to play, adjust volume, about and quit.
- The gaming screen contains a health bar, number of lives indicator (hearts), weapon switching icons, score indicator, shoot button and a crosshair for aiming.
- Instructions for playing the game will be available at the top of the screen.

Working

AR works by merging both the coordinates of virtual and real world hence we can spawn the virtual object in real world.
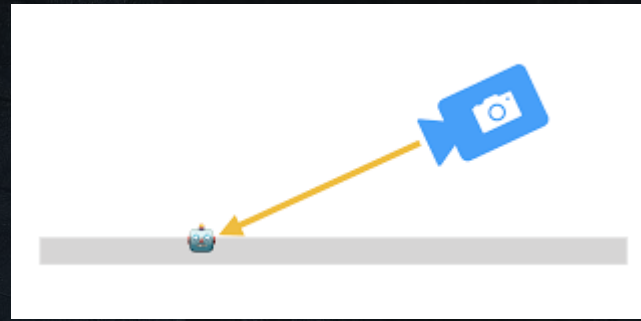
Raycasting

Raycasting is a process of shooting a Ray which is an invisible line (it can be made to be visible too) from a point in space into a specific direction. This Ray when it hits something, for example, an object that is in its path, can then gather information about that object. Raycasting is used everywhere in games, for shooting a bullet in an FPS, TPS or even adventure game. There is also the Physics Ray caster that works against all 3D and 2D objects that have a rigid body or a collider component on them. The rigid body and collider components are used to achieve physics interactions inside Unity.

How ground gets Detetced in AR Foundation:

By using the raycasting the collision points (coordinates) of the ray with the ground is been found and then the normal of the plane can be easily found by taking cross product of any two vectors from the collision points preferably the nearest one. Next a plane prefab can be place perpendicular to the normal which can be expandable. After the plane got placed it keeps extending and for every update in area the distance is calculated from the centre of the plane to the new coordinate under the plane and if it found that there is any sudden increase in the coordinates then the expansion of the plane gets stopped and thus the plane is detected. And there will be creation of plane for every frame.

Working

Raycasting

A Image of the AR Default plane

In our project we used this feature of AR Foundation to spawn the enemies perfectly on the ground. So we used a indicator instead of the default AR plane which is used to be placed on the detected plane and then based on the coordinates of the indicator we made some changes to x and z coordinates of the indicator so that the object is not exactly placed of the indicator (exactly at the place where camera is looking) but at some random point almost close to coordinates of the indicator. This procedure of spawning is being called for every 6 seconds in Level 1 and for every 5 seconds in Level 2. So, by this we were able to spawn the enemies exactly on the ground.

We used raycasting to detect the enemies while the enemy is being killed such that enemy can be killed only when the ray hits the enemy which is in the real world and that collision coordinate is noted and then it is checked if the name of the object which was collided with the ray is with name given by us to that object and if that is matched then according to the number of shoots the enemy gets dead. So inorder to help the virtual object to be get collided with the ray we use box colliders which we attached to the body of the enemies. The green colour cube around these prefabs is the box collider.
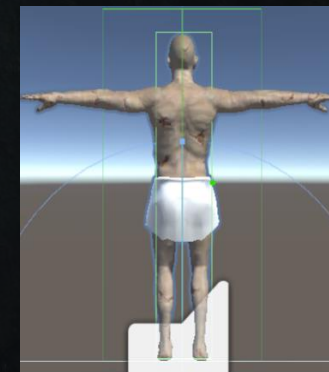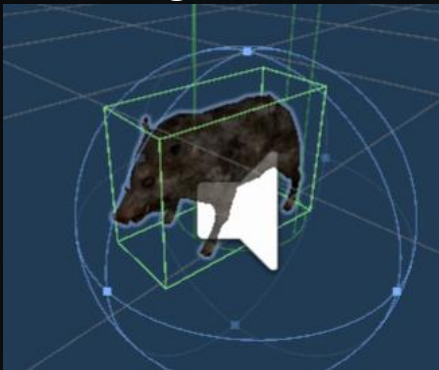
Device Compatibility

Android v 9.0 pie or newer

Minimum API level 28

Playing Arena

Preferred for playing in an open space
and flat ground for better experience

Good Lighting

For proper spawning of enemies, the
ground should be clearly visible. So this
game cannot be played in dark.

REQUIREMENTS

SPECIAL EFFECTS

ANIMATIONS

HORRIFYING BGM

CREEPY BATS

To give a realistic touch, we have added animations for drawing weapons, attacking enemies, enemies attacking, chasing and dead animations.

An intense BGM has been used to make the game look scary and horrifying. Screaming and attacking sounds of enemies can be heard too.

The bats make a creepy sound and keep flying in air to give a horrifying experience.

Future Addons

- Weapons to be spawned in the world around us which have to be found to kill the enemies.
- Improve shooting effects
- Adding more weapons (like throwable axe) or attacking with fist.
- Reduce bugs and make the game more stable.
- Improve the graphics and animations.
- Customizable graphic settings.
- Introduce more game objects to make the game look more scary and attractive, creating portals in the game.
- Improving and making the UI look more attractive.
- Creating more levels with higher difficulty and more different types of enemies.
- Creating different modes of game like time bound or limited enemies.
- The blood effects on camera after getting hit gets removed by shaking the device.
- Detecting vertical planes which should act like a hindrance for movement of enemies.
- Other changes in damage value of weapons and enemies to be modified.
- Make it compatible for iOS too.

Project links

✉ [the-brawler/AR-Based-Game (github.com)](github.com)

🌐 https://drive.google.com/drive/folders/1NdjlZpeUuY7cGokTRWRNxncN5c9vDTZM?usp=sharing

Resources

- https://www.youtube.com/watch?v=Sqb-Ue7wpsI&t=17652s
- www.mixamo.com
- https://drive.google.com/drive/folders/1L2oJ8p5TppPiQD7Vw-KtCbtAPYDjI8l1?usp=sharing
- https://www.answers.unity.com/index.html
- https://www.youtube.com/watch?v=Y2ewpLX6M_s

THANK YOU