CSCI 5460 Virtual Reality Final Project Report

Title:

VR Zombie Game

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Introduction:

Virtual Reality enables us to experience some unreal fictions. One of the exciting themes is the zombie apocalypse. In this project, the goal is to implement that environment and make players thrilling. The game is made in Unreal Engine 4.26.2. The game is tested and developed using Oculus Quest (which is different from the proposal stated using Oculus Quest 2). The game’s goal is to escape from a specific area under a certain path, with interactions with the environment, i.e. making noise by throwing objects, or by guns.

Implementation Goal:

* Implementing locomotion
* Spatial sound effect
* Interactive level and objects

Evaluation results:

1. Locomotion:



After learning UE4, there is a plugin called VR extensions. The plugin has 6 kinds of locomotion method already by default, which obtains the target goal stated in the proposal. Therefore, I have studied the scripts and trying to implement a Half-Life: Alyx typed locomotion system.

But that was failed. The plugin default one will teleport to any place the navigation map you could see, like passing through windows, which is unrealistic for a real life simulation, meanwhile we could see Valve has done lot’s of effort on this problem, they do not only check for visibility, but using the laser beam to check if it is ground, and if players could go to that position, and limiting short teleportation as human cannot do.



After I have messed up the default script, the left joystick controls the teleport laser and camera at the same time; the right joystick controls the trigger for teleportation. But, this is not comfortable actually for players playing both standing or sitting on a chair.

Meanwhile, I have implemented climbing in the game, so that players could feel more realistic, which will be further discussed in session c: interactive level and objects.

* Spatial Sound Effect:



The sound effect without calculating spatial attenuation will be awkward and not realistic. Therefore, the effect is implemented with a Steam Audio plugin. Each sound source will be calculated under the spatial relations inside the level. It is calculated by defining attenuation to the walls, and physical materials in the environment manually, and considering the reflection. Then it will be applied with baking or realtime. With the baking method, a space sound sampling method for covering all traversable areas .

* Interactive level and objects

Initially, I would like to make a part of CUHK by myself, but I think that it is too time-consuming as signature buildings or artifacts take time to polish, and 3D modeling is not really related to VR topics in terms of learning. Thus, the level is built with free packages from Epic Store and Quixel while maintaining a good looking resolution and realistic style.



The plugin provides different grab functions for ease to be interactive. The level is also made with interactive doors. Doors could be opened and closed by the door handle. The trash in the environment could be picked up and thrown away. Players could even climb up. Some special stuff could have different effects, i.e. alarms. All of them are developed with the VR Extension plugins.

A gun system is implemented by myself. The reloading is all processed by your own hand. Magazine (bullets) has to be found from exploring the drawers I made.



A melee system is implemented by the plugin and modified by myself. Knife can penetrate and stick on dead bodies.

Flashlight is done by me for exploring the atmosphere.

Dead Bodies could be gripable.

* Other Essentials:

Zombies AI are made by myself. It is just some simple AI, patrol and chase AI, with a sound distracting functions.

To have a more game’s feel, a post-processing effect is added, which is a function provided by UE4.

Discussion:

For the spatial sound effect,

There are two flaws, that is, all sound sources are considered as point sources, which in real life usually is spotted, i.e. human voice, speaker etc.

The baking methods are too time-consuming even for a simple level, 1 days for a truly simple environment literally, which I have wasted some days.

My game doesn’t have an inventory system, menu, and sufficient guidance.

Light baking always crashed with unknown reason. These problems make the game not so playable.

Conclusion:

Comparing to the best VR game: Half-Life Alyx, there is so much to learn to make a great VR game, which is more time-consuming than usual PC game, but at the same time, the reward to me is really impressive.

To conclude, in the project, I have made an acceptable spatial sound effect, and interactive level. But the changed locomotion is still trash when you have experienced the best locomotion and camera from Valve.

Anyway, I am glad to take this course and make this final project.