Project: VR Dungeon Crawler

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Project Description:

In the academic year of 2018-2019, a student by the name of Aaron Santucci created a generation program that will create a randomly generated map for a VR dungeon crawler. To be honest, it wasn't much of a game when we started, and it's not even as far as we wanted it to be. When we started , it was very clunky, empty, dark and bugged. We would like to have expanded upon his code more than we did to create more of a full demo/game for use in the Calvin University CS Department.

Thanks to a well-known global pandemic, we had a few wrenches thrown into our project. Thankfully we have learned how to work around it and we will be splitting this project up into pre-COVID-19 and post-COVID-19.

What we hoped to accomplish:

We planned to add features such as: locked doors, keys, a map, chests, weapons, enemies and more. We intended for there to be a concrete goal for the game by adding enemies, finding

weapons to take down said enemies, and solving puzzles all progressing towards a final boss to defeat and end the game. We wanted to record scores and times as well for speedrunning potential to give the game competitive potential.

Additionally, we wanted to have the time to perform user tests with our classmates and professors who were interested. Doing user tests would allow us to get a better understanding of where we could make our game more user friendly and also help us see where there were potential bugs that we may have overlooked.

What we accomplished before COVID-19:

We spent the first two-three months learning how to use unity and how to be able to change things in the expected ways. This took a lot of time seeing as neither of us had created games before, let alone use Unity. Unity was just not in our skill set but it was something we both wanted to learn. We got in contact with the project's original creator to ask for tips and tricks he had learned when creating the game originally. This helped significantly.

Once we learned the ropes, we changed the way lighting was implemented. It started off as a few torches on the walls every here and there, but the player also had a fixed flashlight in their left hand, meaning that they were only allowed one hand to use. We removed the flashlight from the left hand, gave them a second hand to work with, and made all torches a bit brighter and also grabbable. So now the player could choose which hand to have light in, in the case of left-handedness.

We changed the way the hands interacted with the objects in the world. At first you would be able to push things around with just your hand, but it felt clunky when trying to grab items. Your hand would start pushing the object and trying to get the indicator to be able to grab said item/object proved to be very difficult, as you would be pushing it away whilst trying to grab it. So we made the hand collisionless. No longer do the hands interact with objects, so in order to push things you now have to hold an object and push with it. Grabbing became superbly easy. Still clunky but better overall.

We added more weapons and hitboxes for those, and started working on a health system but we were abruptly brought to a standstill with COVID-19. More on that later.

The issues we ran into before COVID-19:

Prior to the COVID-19 pandemic, we ran into the issue of understanding the code that someone else had written. It took us some time to go through and understand the code that had been given to us, but after some time and meeting with Aaron to go over his code we better understood what the code did. Another issue that we ran into was time and space restrictions. The CS department VR equipment was set up in one of the department's project rooms which was only accessible a certain times since the academic buildings are locked during some hours and days of the week. This meant that we had certain times that we could not work on the project.

Limitations due to COVID-19:

After the COVID-19 pandemic forced us off campus, we ran into a list of new problems and limitations. The most impactful limitation was that we no longer had access to the CS department's VR equipment. This meant that we no longer had a way to test the changes that we made to the game or to play it. Additionally, we had to change the focus of the game from being for VR to PC. This introduced a number of new challenges, as the game was built with a library meant for VR usage, not PC usage. We lost most of our progress since a lot of the game did not function at all or properly. Things like the player's hands, grabbing objects, the lighting, random weapon generation, and a proper player point-of-view were all lost in the initial transition from VR to PC.

Progress made after COVID-19:

First we had to get the code and editing platform available to the both of us in our different locations. Thankfully, before Calvin shut down all academic and residential buildings, we both went to the lab and got copies of the project on flash drives to continue working away from the project room. This gave us both the entire project without needing to contact anyone with access and have them get us the files or access to the files. Sadly, this only worked out well for Caleb. Jordan's machine could not load 95% of the assets in the game, and rendered Jordan's development environment incapacitated.

Despite this setback, we did manage to enlist the help of a new feature that we never needed before remote development: Unity's Collab feature. Not only did this help us, but it will help future CS students who wish to do a VR project as well. Now they can get progress done

without needing to enter the Science Building. This means being able to get development done on Sundays as well, although still no testing using the headset, but that's still more than there was before.

What we would do if we had more time:

If we had more time to work on this project, our main focus would be to regain access to VR equipment and further develop that side of the game to get it to where we were satisfied. We would want to finish adding randomly placed enemies into the dungeon to give the player something to do and a challenge to overcome. Along with this, we would like to finish implementing a health system for the player so that there is a way for them to lose, thus giving the game some sort of risk. We would also like to add consumable items that are randomly placed in the dungeon to help give the player a boost, like health potions and food. As a sort of final objective, we would like to add a final boss to fight at the end of the dungeon which would serve as a sort of peak to the game's progression.

If we had more time and no access to VR equipment, we would want to implement all of the above mentioned features in addition to fixing some of the issues that came up when transitioning the game from VR to PC. The first thing we would want to fix is the player's hand interaction with the objects in the randomly generated dungeon. The interactions worked fine in the pregenerated menu room, but not in the randomly generated areas. Then, we would add some sort of outline to the objects when a player is aiming at them and is close enough to grab them. Additionally, we would want to add some sort of visual for the player's hand.