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EE 267 (3 Units)

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<div align="center">First-person VR Ball Game</div>

Introduction/Related Work

The main goal of this project was to learn how to build a working first-person shooting (FPS) VR game, taking advantages of cheaper and more accessible devices developed recently [1]. The project utilizes various online VR game tutorials and resources [2] [3] to build the basic gameplay while allowing the opportunity to design a unique virtual environment from scratch. It also applies concepts from this course like transformations, lighting, and object tracking.

Game/Interaction Design

The game was implemented using Unity and Arduino. The virtual environment was designed and built from scratch, with only image information detailing the object materials and depth textures imported into Unity. This was then used to build custom asset prefabs such as balls, boxes, and walls, which were subject to real-life forces like gravity. A navigation mesh was used for automatic box movement towards the camera and capsule colliders were created to determine hit or missed throws. An aiming object was also created to help line up the ball throw with the incoming boxes, with directional lighting added to illuminate the scene.

Reference code from HW 5/6 and the provided Unity Serial Reader script [4] were modified with more transformations to accurately stream orientation and position tracking data from the View Master. This was used to dictate the camera orientation and thus the direction of the ball throw. By aiming at the incoming boxes using the reference point in the camera view, the player would be able to throw a ball at a box and earn a point destroying it, before another box spawns in a random location within the room. Sample images from the game are shown in the Appendix.

Conclusion/Future Work

The main objectives for this project were achieved in that I was able to learn C# and Unity to design a virtual environment from scratch, implement a basic gameplay, and synchronize with existing hardware while applying concepts from this course. Future work could include further polishing the GUI and also modifying the streaming script to be multithread to reduce game lag.

References

1. https://thinkmobiles.com/blog/virtual-reality-gaming/
2. https://gamedevelopment.tutsplus.com/tutorials/creating-a-vr-game-in-unity--cms-29936
3. https://www.youtube.com/watch?v=kIATVY0sXuU
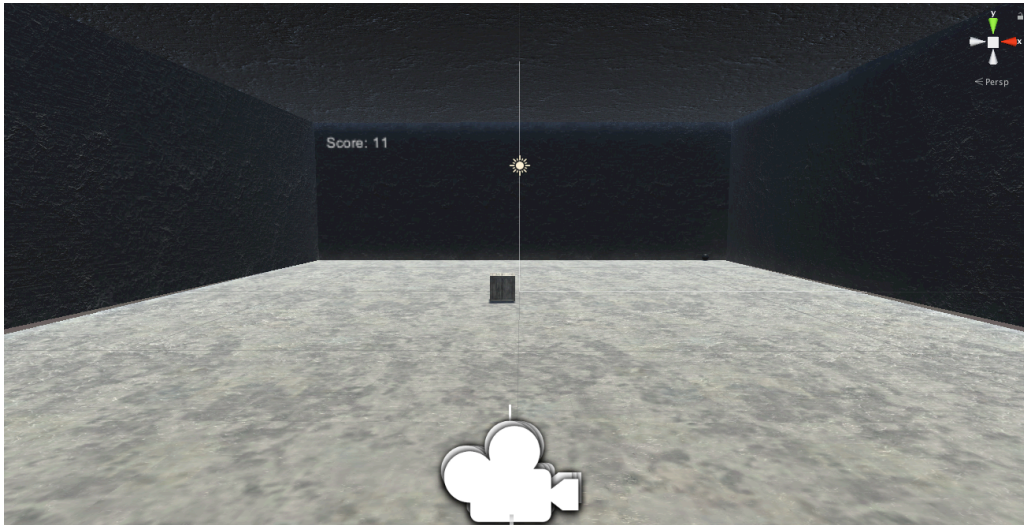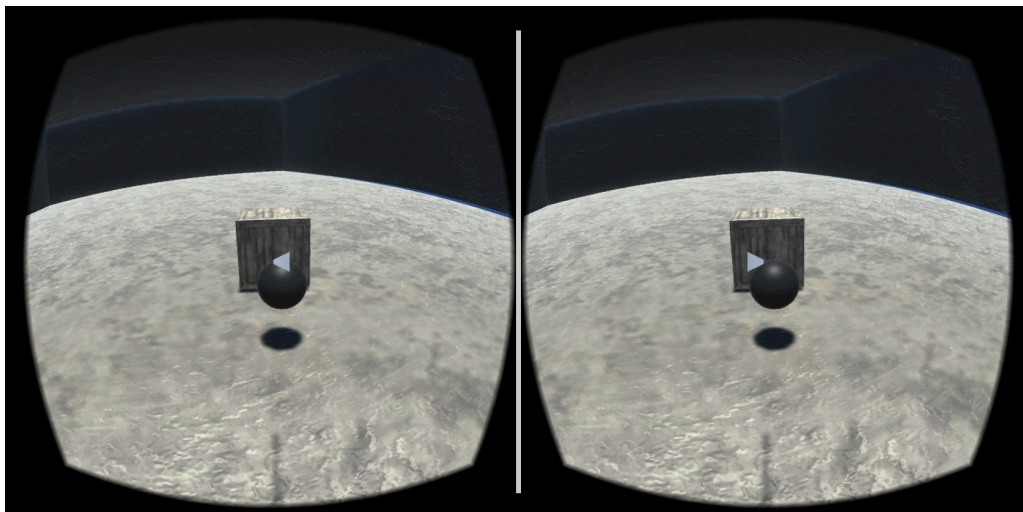4. Reference code from HW 5/6 and Unity Serial Reader script from EE267

Appendix

Figure 1: Scene View

Figure 2: Stereoscopic View with Thrown Ball