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Collaborative Development of Spatial Audio Virtual Environments

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Access to the newest features of virtual reality headsets has become increasingly more available to student developers in recent years. Manufacturers are competing to support all available device features not just through their Software Development Kits (SDKs), but also integrated into industry-standard game engines. One particular feature, spatial sound, can now be deployed without directly accessing the SDK but instead modifying deployment settings and selecting checkboxes. This access to new VR developers has opened up new opportunities for interdisciplinary collaborations within constrained development cycles like an academic semester.

In this presentation, we will outline a synchronized multi-course collaboration between music production and computer science students. As the final project, the students produced multiple music-based VR games where players navigate a world filled with spatial audio sources. Each spatial audio source produces a unique stem of music, and can be rearranged to recreate the original composition. This presentation details our exploration with spatial audio with and without visual feedback, as well as how we implemented this project across two Spring 2020 courses: CS 3950: Virtual Reality Apps and TYMU 2251: Music Technology.
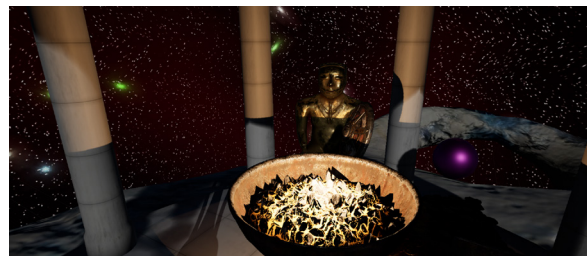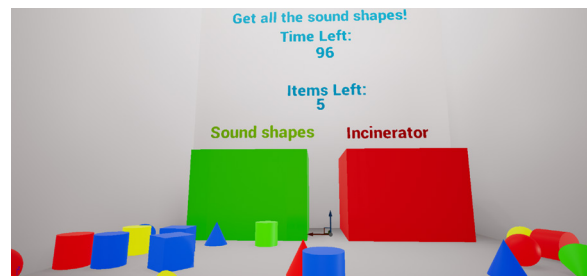

Fig. 1. Three example screenshots of the six spatial-audio apps developed by students during Spring 2020 in CS 3950 and TYMU 2251

At the beginning of the project, guest lectures were given in both of the courses. Music students were instructed on typical workflow for game assets and basic VR requirements.

CS students were instructed on introductory concepts of sound design and music theory. The music students composed and produced a piece consisting of four looping stems. The CS students then used these stems as direction for developing a virtual environment. Using Unreal Engine 4, Oculus Quest SDKs, and Logic Pro, six different applications were developed and deployed to the Quest VR headset.

Our future work will focus on developing a set of recommendations for further collaborations and a set of best practices for audio-only VR using modern headsets.