Physical to Virtual Reality Mapping

Dakota Pease
Advisor: Dr Ju Shen

Research Objective: To design a system that maps aspects of the physical world to a virtual world which would allow physical interaction with objects within the virtual world.

Example Implementation: This system could be used to implement a virtual game of catch. In this system, a user would throw a ball into a net and a pitching machine would return the ball for them to catch. The ball would be tracked and projected into the virtual reality where it would look like the user is throwing the ball to another player and that same player is throwing it back to them. This is different from current systems because it allows the user to interact with a ball.

Technology Used

Leap Motion Sensor

The Leap Motion Sensor tracks hand position and motion which allows projection of hands into the virtual world

Unity 3D Engine

The Unity 3D engine hosts the virtual world in which the hands and objects tracked by the Kinect Camera are projected into. It also interfaces with the Oculus Headset to allow users to see the virtual world.

Kinect Camera

The Kinect Camera provides both an RGB camera and an infrared camera that provides depth information. This allows tracking of real-world objects in 3D space

Oculus DK2

The Oculus DK2 is a virtual reality headset that provides users with an interface to view the virtual world.

Results: The finished product used color tracking to track a single object in 3D space. This object was projected into the virtual reality and its position was updated as it was moved. The Leap Motion's projected hands allows users wearing the headset to maintain hand-eye coordination so that they could still grab the object even though they were looking at it in virtual reality instead of in the real world.

Improvements: Future improvements should allow the system to track more objects without requiring special coloring by using more advanced tracking methods. The system could also be improved by increasing the accuracy of the tracking system to allow smoother interaction with objects.