

An interactive virtual office with Leap Motion

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1 Project Idea & Motivation

An emerging technology as it is, empowering a user to interact with the virtual environment is a necessity of making virtuality 'real'. While controllers of various kinds have become ubiquitous as user inputs now, it will be better if we can interact with the virtual world just as we do in the real world: with our natural body movements.

Motivated to add this facility to a VR experience, we have worked on creating an interactive virtual office environment in Unity using Leap Motion sensors that offer optical motion tracking.

The Leap Motion controller is an USB peripheral device that uses two monochromatic IR cameras and three infrared LEDs, which when coupled with the accompanying software synthesizes 3D position data by comparing the 2D frames generated by the two cameras. With Leap Motion, you can dive into a seamless experience with your bare hands without the need to hold a controller device and enjoy interacting with your own office world.

Our project also uses an IMU to capture user orientation for enhanced experience.

Want to play a game while sitting on your desk by getting scored for throwing paper balls in the dustbin and penalized for inadvertent landing of important devices like phone?

Or just had a bad day at work and want to destroy everything in the office, including your computer?

Just step into this VR experience and do as you like!

2 Requirements

Software	Hardware
Unity	VR Headset with LCD Display
Leap Motion Core Software	Leap Motion
Arduino	VRduino with IMU and Teensy

3 Method

The VR headset at our disposal was a self-made VR device with a strapped housing and LCD display to extend visuals from the computer. Connected to it was an IMU that relayed orientation

information through the microcontroller. The Leap Motion was mounted on the headset for optical tracking of hand movements.

The environment/game was developed in Unity where stereo distortion and lens distortion corrections were achieved using Google VR SDK. The hand control was interfaced using Leap Motion Unity Core Assets and the orientation information captured by the IMU was read into unity. The game was scripted to give a +1 for throwing paper ball in the dustbin and -2 for having mistakenly thrown other items. The environment objects were made interactive to simulate a real office feeling and an office sound source was added for auditory reality.

You can access a demo video here: [Demo Video](#)

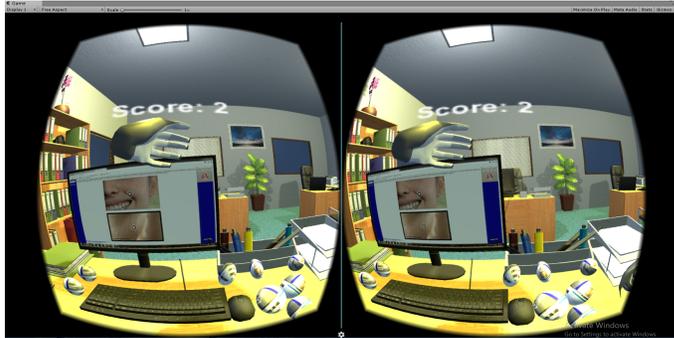


Figure 1: A demo screenshot

4 Challenges

Though our hands are the fundamental and universal human input device, getting them to work for a Virtual Environment is a challenging task. We initially wanted to use Leap Motion with a mobile platform as in Gear VR. We tried using Unity Remote and establishing wireless communication, but network latency was a huge hindrance to a good experience.

Moreover, there are incomplete outdated documentations and paucity of resource support, especially for Leap Motion on Mac devices. For instance, the firmware reset tool for MAC is broken to be used, the latest unity core assets are incompatible with MAC, etc.

Also, Leap Motion only provides support for HTC Vive and Oculus. Integrating Leap Motion for other devices is left to self.

5 Wish to do!

Given more time, we would have loved to add to the reality of the environment and more fun games. Also, integrating position tracking and improving orientation tracking was a desire that can be taken forward.