Air Motion Mouse
(Team H.A.M)

Durhack 2018 Topic:

Changing Human Computer Interactions

Project Purpose:

V1:

Using Oculus Rift to create an VR Desktop and use Leap Motion sensor to move objects around. This was supposed to be set on a desktop setting, and because of hardware incapacities, this idea was later abandoned and changed into the current project we have right now.

V2:

The current V2 version is set to use the Leap Motion sensor as a mouse on our laptop, the Oculus Rift was abandoned because our laptops' graphic cards was incapable of running the simulation it provides.

Project Description:

For this year's Durhack challenge, we were asked to create something related to the topic "Changing Human Computer Interactions". Our team did a virtual mouse for a computer using the Leap Motion sensor. It can carry out various functions such as: move mouse, Click, scroll up and down, move cursor between texts, halt all mouse movements, and an enter function.

Project Log:

1. Figure out tracking range

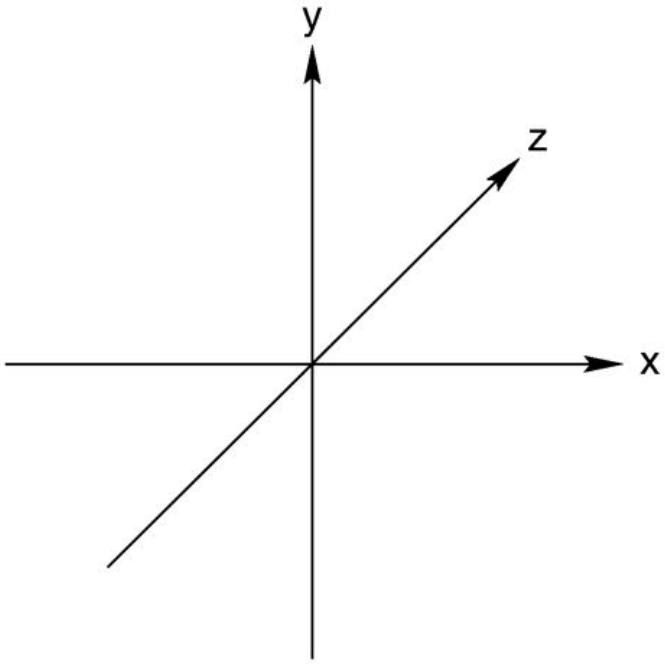


Figure 1 (Tracking Range)

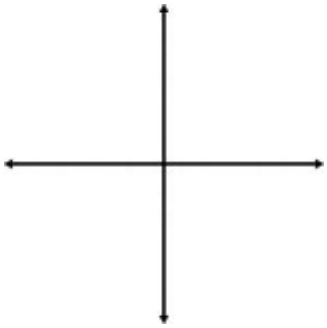
2. Palm Facing Direction
3. 

Figure 2 (Palm Direction Middle Threshold)

4. Table of Value of Possible Situations

The Value of Variables when Palm is Facing in a Certain Direction

Situation	Value #1	Value #2	Value #3
Down	0	-1	0
Up	0	1	0
Left	-1	0	0
Right	1	0	0
Towards	0	0	-1
Away	0	0	1

Figure 1 (Normal Values)

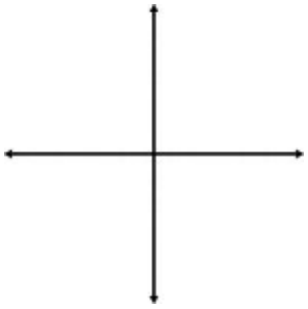


Figure (The Possible Coordinates the hand can be in)

5. Compare Computer Pixel to value range
    a. Computer Pixel: 1440 x 900
    b. Leap UI: 400 x 275
    c. Ratio:
        i. x axis: 1: 3.6
        ii. y axis: 1: 3.27

*Note that we used system pixel count after to increase accuracy

*While troubleshooting, refer to next page for changes

6. Major Changes and Features Log
    a. Fixed Sensor
        i. Problem: Not calibrated before use
    b. Python Package installed
        i. Problem with VirtualENV
    c. Added Feature:
        i. Can move cursor
            1. Move Right Hand
        ii. Can click
            1. Grab Left Hand
        iii. Can scroll up and down
            1. Turn Left Hand
        iv. Can move cursor through text
            1. Circular motion with Left Hand
        v. Can Stop cursor movement
            1. Create Fist with Right Hand
        vi. Can press Enter button
            1. Tap with Left Hand

Project Summary:

Overall, this is a successful project considering the 24 hours time limit. We learnt project management, efficient use of git, as well as the ability to fix various problems from hardware calibration to software debugging.

At the moment, we still have some bugs and errors that we do not have enough time to fix. For example, the delete function is not stable as it will often delete more than desired. Despite that, we still consider this a really successful project overall with in the 24 hours time limit.