

Motivation

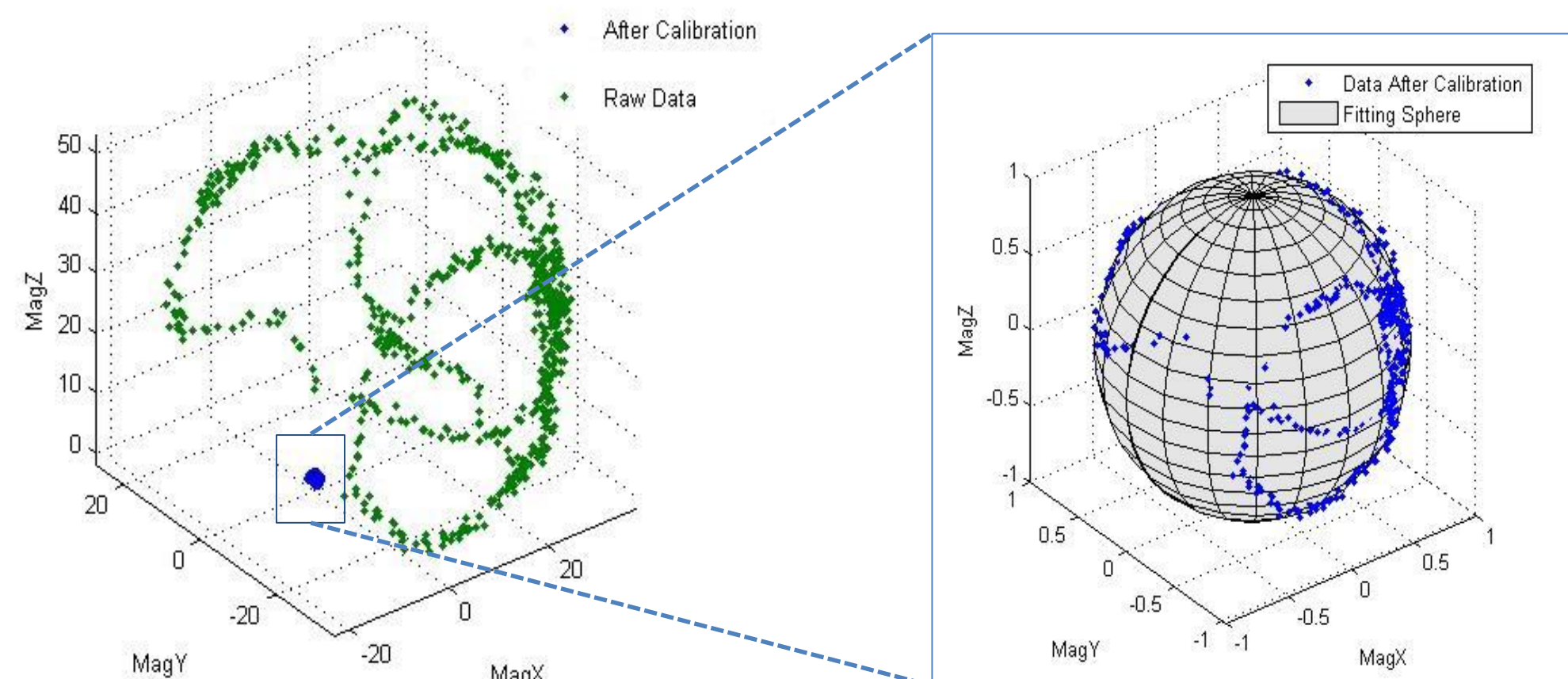
For the modern state of art VR (Virtual Reality) headset, the controller being used like joy sticks, keyboard, or mouse are either bulky or not intuitive to use. To provide a solution for this problem, we proposed a magnet ring motion controller with intuitive gesture control.



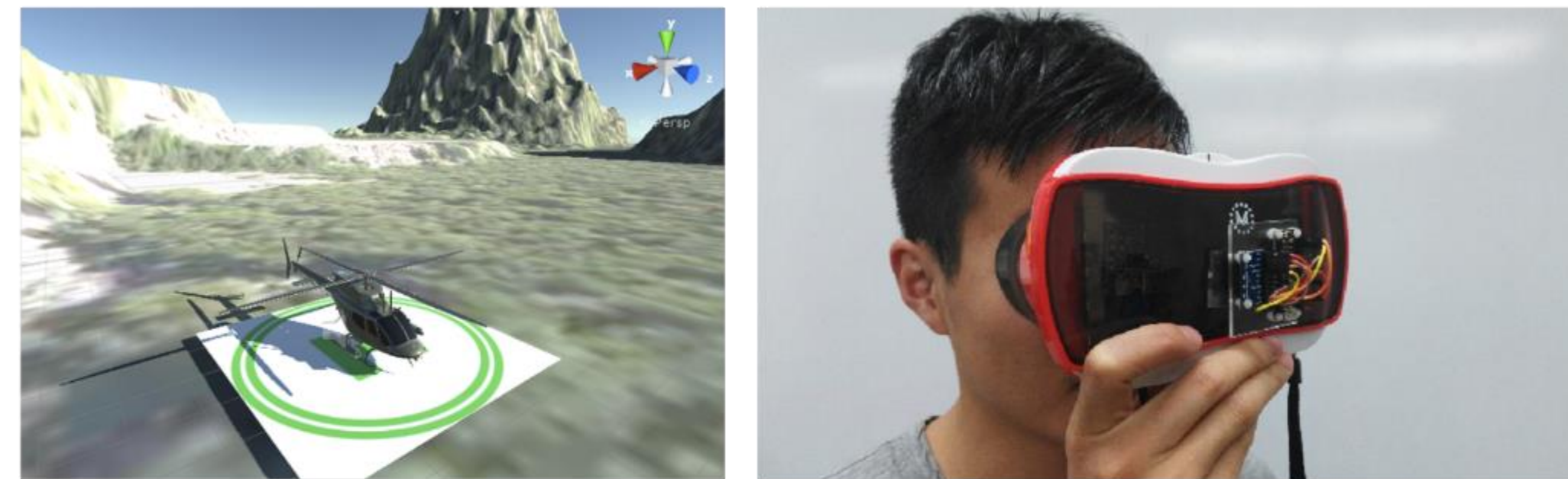
Magnetometer Calibration

The magnet ring movement is detected by the IMU (Inertial Measurement Unit) which is mounted on the VR headset, and further recognized as gestures to control the virtual object.

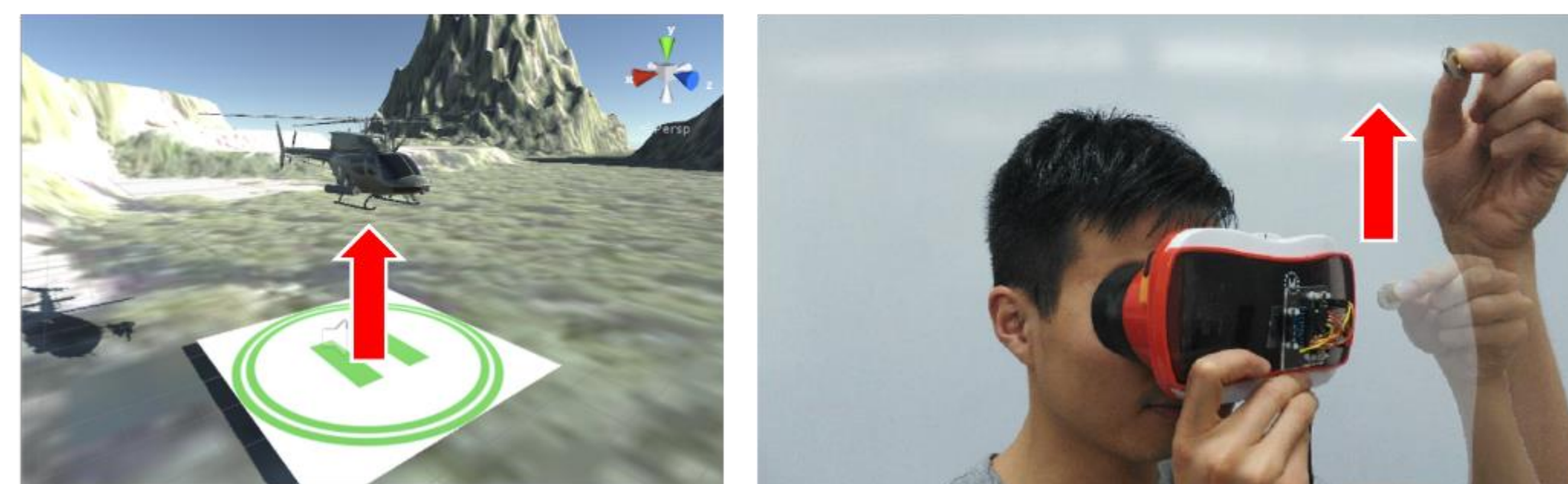
Because of the background magnetic field, the measurement from the magnetometer in the IMU should be first calibrated.



Gesture Control



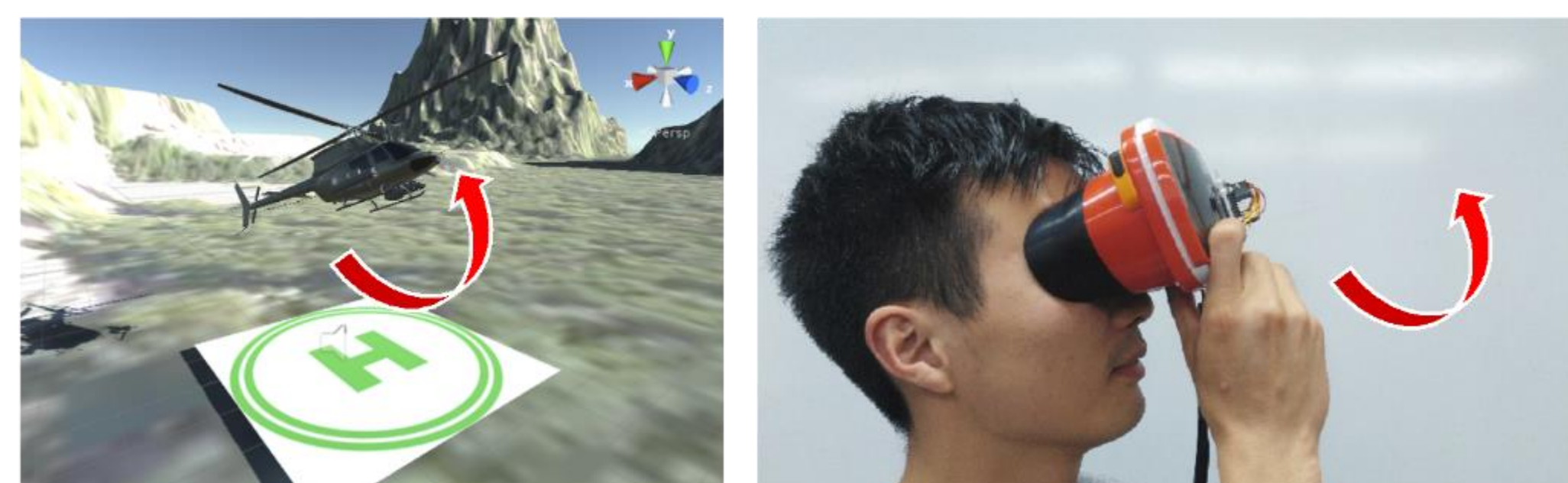
(a) Original Position



(b) Hand gesture to lift helicopter up



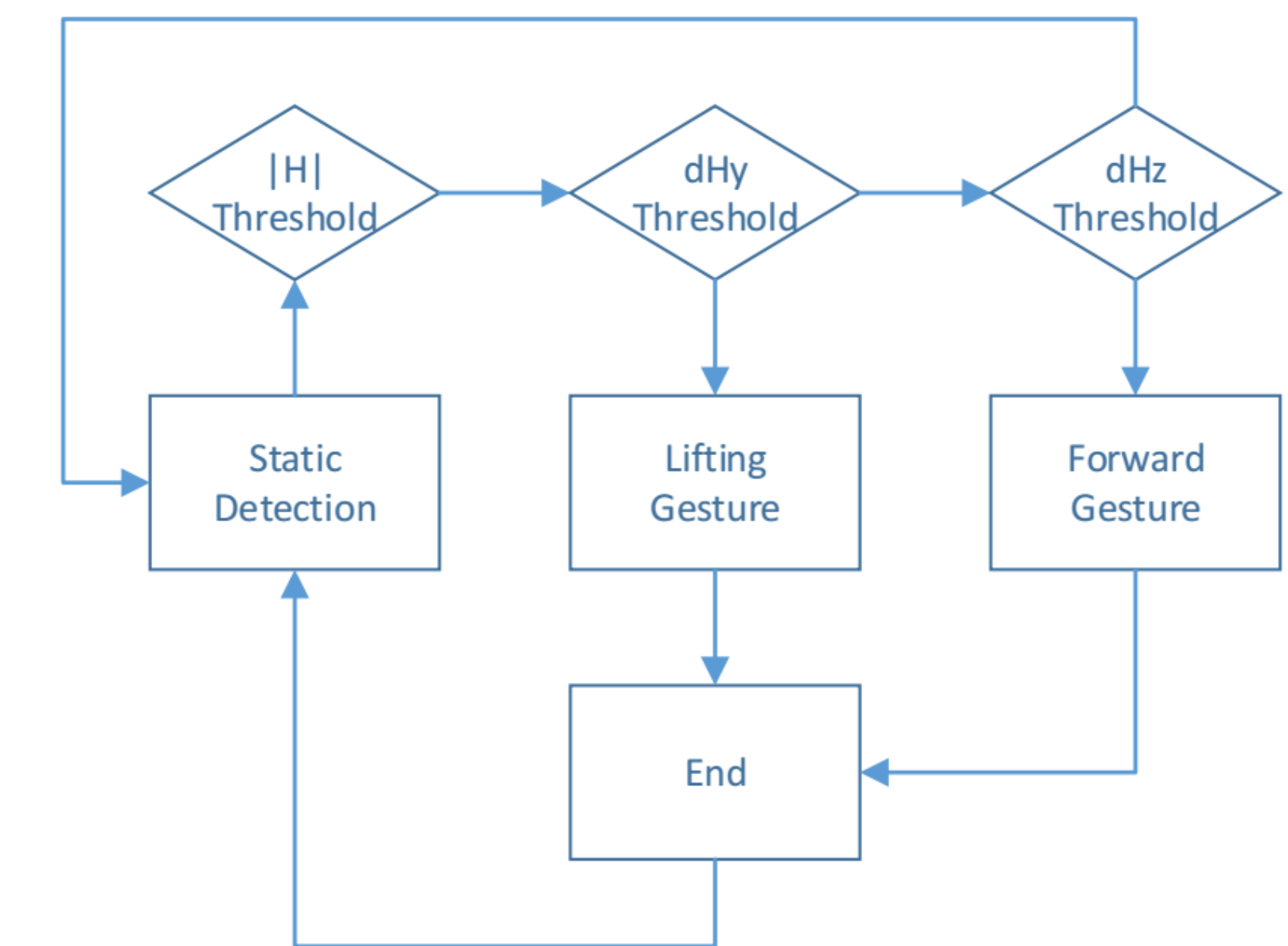
(c) Hand gesture to move helicopter forward



(d) Head movement to tilt plane

Using a magnet ring together with head rotation to perform the 5 DOF (xyz rotation + lifting & forward motion) control of a VR helicopter.

Control Diagram



Using the three-axis measurements H_x , H_y , H_z reading from the magnetometer, a gesture detection algorithm is developed.

Discussion and Future work

Compared conventional VR controller, our design have several advantages:

1. No need of additional controller, no extra sensor and less battery consume
2. Small form factor suitable for mobile VR
3. Covering multiple DOF with intuitive gestures

For future work, the control system need to be more robust for detection, and more gesture could be incorporated by machine learning.