### Yueyang Cheng (1533989)

### **Question 1: How many addressable registers are in the MPU-6050? (refer to the datasheet, register reference and example code)**

There are 84 addressable registers based on the PDF version register reference.

There are 110 addressable registers based on the online version register reference.

### **Question 2: What is the data format of I2C messages written to the MPU-6050?**

The data format is an unsigned integer of 8 bits. The I2C messages written to the MPU6050 must contain the address of the MPU6050 on the I2C data bus, the address of a register, and the data byte.

### **Question 3: What factors affect the smoothness of your spinning cube sketch when using the raw data from the MPU-6050? Is averaging the data any help?**

The frequency of sampling the MPU6050 will affects the smoothness of the spinning cube sketch. If we move MPU6050 very quickly, systems can not do sampling for whole movement. After we averaging the data, systems can capture values within a movement and generate more reasonable values for better quality of display.

### **Question 4: What is the performance cost of the Quaternion-based approach in part 3 over using raw data in part 2? Explain your measurement procedure.**

The performance cost is the time. The way we test is to call millis() at the beginning of the loop and print out the time since program started. It is easy to see that a quaternion-based approach takes about 200 ms longer to execute than the raw data approach.