

## **ME 410 – Week 8**

### **Christopher Luey**

#### **(a) Text Description**

##### **Milestone 4 – 2ft Sphere Control**

Our objective is to achieve stable flight of the quadcopter within a 2ft sphere for 5 seconds.

Gains are as follows:

- **Pitch Amplitude:** 4.5
- **Pitch Gain:** 12.0
- **Pitch Derivative Gain:** 1.9
- **Pitch Integral Gain:** 0.3
- **Pitch Integral Saturation:** 100
- **Roll Amplitude:** 4.5
- **Roll Gain:** 12.0
- **Roll Derivative Gain:** 1.9
- **Roll Integral Gain:** 0.3
- **Roll Integral Saturation:** 100
- **Yaw Amplitude:** 100
- **Yaw Gain:** 6.0

Yaw control is now stable. However, the robot still drifts considerably—affected by takeoff behavior and inconsistent battery output.

After struggling with unforceful lift, we switched drone bodies to investigate potential mechanical causes. However, further testing revealed that it is not the drone but battery health and charge levels that significantly impact thrust and flight performance.

#### **(b) Task Assessment**

### Successes

- Tuned yaw control to a stable gain.
- Determined that thrust variability was primarily due to battery health, not hardware.

### Challenges

- *Persistent drift, direction and magnitude vary per flight.*
- *Battery discharge lowers thrust and affects tuning mid-flight.*

### Planned Improvements

- Standardize battery charge levels before flight.
- Adjust integral gain to reduce drift.
- Refine takeoff protocol for more consistent hover initiation.

### (c) Team Member Effort

Both members were tuning and controlling together.

- **Jason (65%):** Performed milestone in class and an additional 2 hours of tuning
- **Christopher (35%):** Performed milestone in class