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## Homework 2 – Report

### **Objective:**

Create Simulink animation of quadcopter

### **Matlab Setup:**

I do not normally use Matlab in my research applications, so some learning was required to get re-acquainted with the language. Some notes for future reference:

- Matlab is installed on an external hard drive due to space limitations on built-in memory. Hard drive must be connected to run Matlab
- Matlab user interface requires that you change the environment to the directory you are currently working in (where your scripts are located).

### **Model Vertex Generation**

The quadcopter model displayed by Simulink is made up of polygonal faces that are in turn made up of specified vertices. Quadcopter faces include: 4 rods in an “X” pattern to make the “arms” of the quad and 4 circles centered at the ends of the arms to represent the rotors.

The array storing the vertices of all faces requires that all faces have the same number of points. This was accomplished for the above described shapes by having the 2-point rod arrays extended to the same length as the circle arrays by repeating the last of the two points.

Arm vertices were generated manually based on a common radial distance from the center of the quadcopter. Rotor vertices were generated at a constant rotor radius from the end of each arm in a loop. A specified number of vertices were generated in equal angular segments around this center point.

### **Model Performance**

All translational and rotational inputs were tested to confirm proper functionality in reference to the following color-coding:

Rotor Color coding:

front=north=green

back=-north=red

right=east=blue

left=-east=cyan

All 6 degrees of freedom are tested in the video file associated with this report.

The second portion of the video file demonstrates the difference in motion between first translating North, then pitching down and visa versa. For both cases, the end position and

orientation was the same. The difference was the orientation of the quad during translation: level in the first case and pitched down in the second.

The current state of the model does not allow for rate-dependent changes. The simulation clock input is located in the “drawVehicle” Simulink model tab, but there are no calculations relating current time and rates to position and orientation in the model. Thus, non-zero translational and rotational rates currently have no effect on the animation.

### **Instructions for Screen Recording**

Screen recording on Mac:

1. Launch Quicktime
2. File --> New Screen Recording
3. Click record button (doesn't start recording yet)
4. Click and drag screen to create recording window, or click to record whole screen
5. Click to start recording
6. Click stop button to stop