ELEC 5660 Project 1: Phase 1

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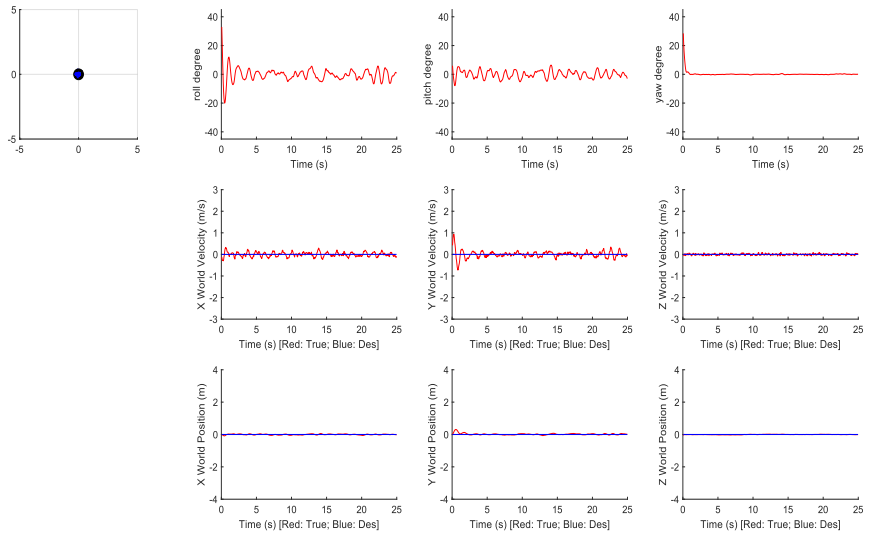
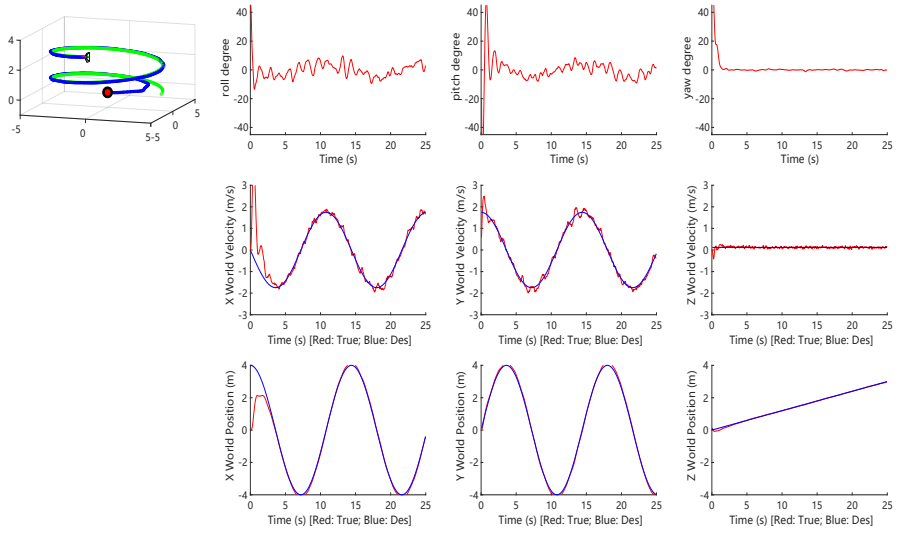
Figures

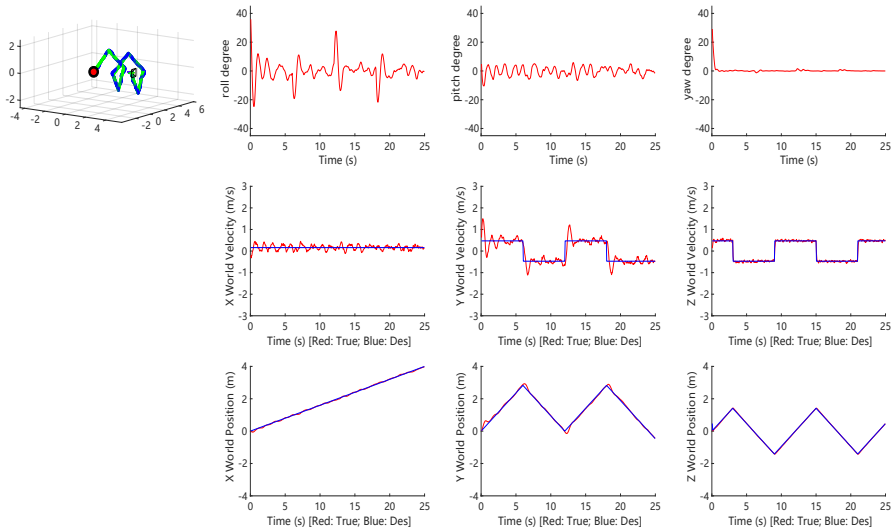
hover:



circle:



diamond:



Statistics

Trajectory	RMSE, position, (m)	RMSE, linear velocity, (m/s)
Hover	0.0618	0.1983
Circle	0.6490	0.6570
Diamond	0.0927	0.2976

Analysis

Tuning of the parameters

The parameters are tuned in attitude loop and position loop separately.

Ziegler-Nichols Method is used to determine the order of magnitude of the parameters, and manual tuning is used to balance the overshoot, settling time etc.

Miscellaneous

1. When tuning the attitude loop, the parameters Ks can vary in a large interval while having almost same control responses to human eyes.
2. When tuning the position loop, the Ziegler-Nichols Method seems not working, as the diverging oscillation starts at $K_p = 0.01$.
3. In the circle trajectory, the true trajectory's radius is somehow always larger than the desired one.
4. It is possible to have smaller RMSE, but at a cost of larger quadrotor tilt.
5. A Gaussian-smoothed position random walk trajectory is also provided in the submitted code.

Note

The file `test_trajectory.m` is also provided in the `code.zip`, as some global variables are defined in this file and are used in other places.