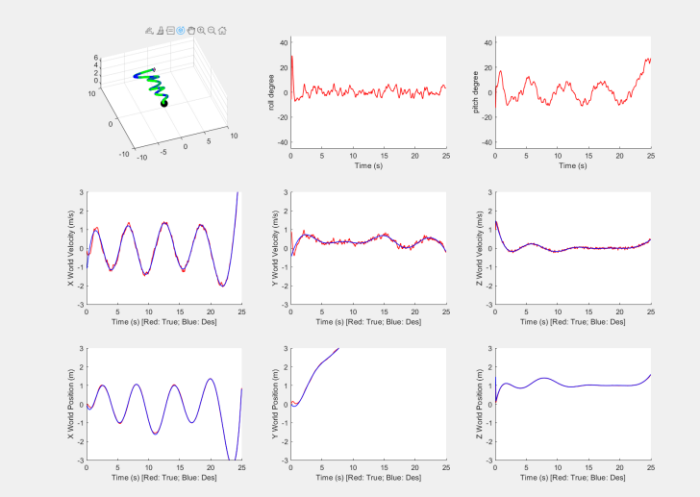
Project 1 phase 2

Trajectory generation method

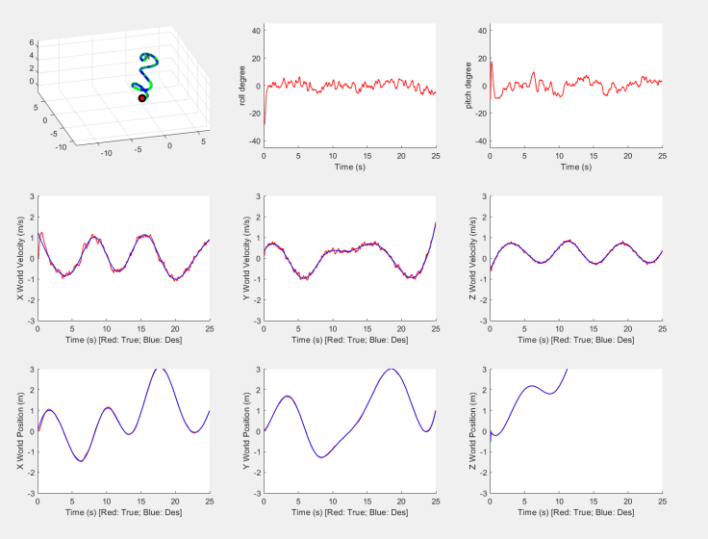
I chose an optimization-based method for this project. I used minimum snap with 7^{th} order function to describe the trajectory. And I use Matlab quadprog function to solve the constrained QP problem.

Figures

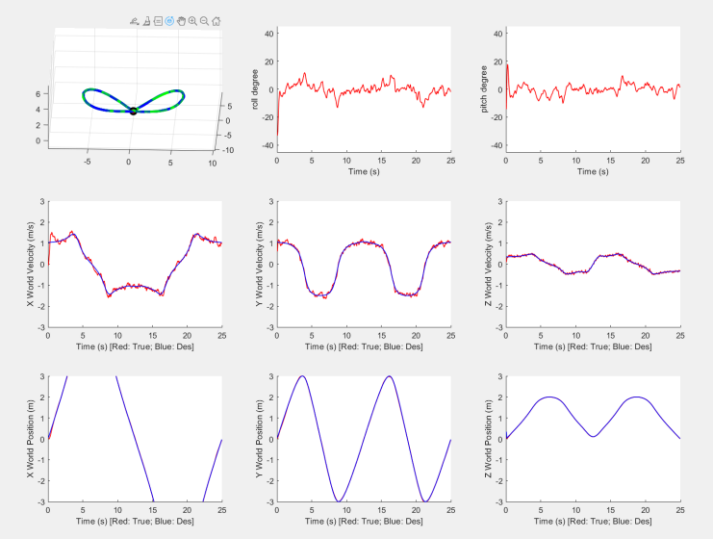
Path1:



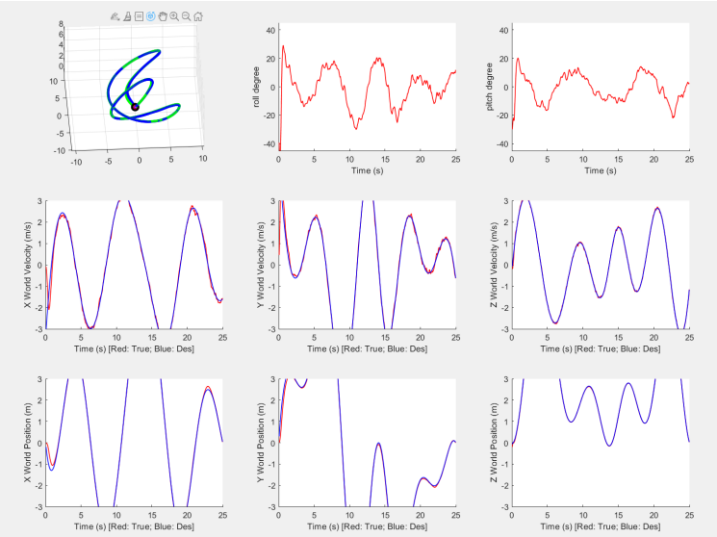
Path2:



Path3:



Path4:



Statistics:

	Pos_RMS	Vel_RMS
Path1	**0.11124**	**0.13928**
Path2	**0.076159**	**0.10056**
Path3	**0.025347**	**0.094464**
Path4	**0.0916**	**0.271**

Analysis

I choose minimum snap trajectory generation method, and set two sets of constraints, waypoints and continuity for QP problem formulation. I found that waypoints constraints are subset of derivative constraints when there is no setting for velocity and acceleration for waypoints. I also found that there are two ways to deal with the time for each trajectory segments, one is T start at 0 and calculate T for each trajectory, the other is use universal T for every segments. The only difference of these two methods is how to set the constraints. The first method requires set start points to equal, while the second method only requires putting every start point and end points together.

Some Ideas

If we want to use the trajectory generator with path finder in an incremental manner later on, B-spline may be a better choice as its local adjustment does not affect global trajectory and its convex hull property make it better for obstacle avoidance. But if we choose to optimize B-spline for our trajectory, the minimum snap strategy is not usable and makes no sense anymore. We need to think of another strategy to optimize the trajectory.