

Project 1 Phase 2

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Remainer

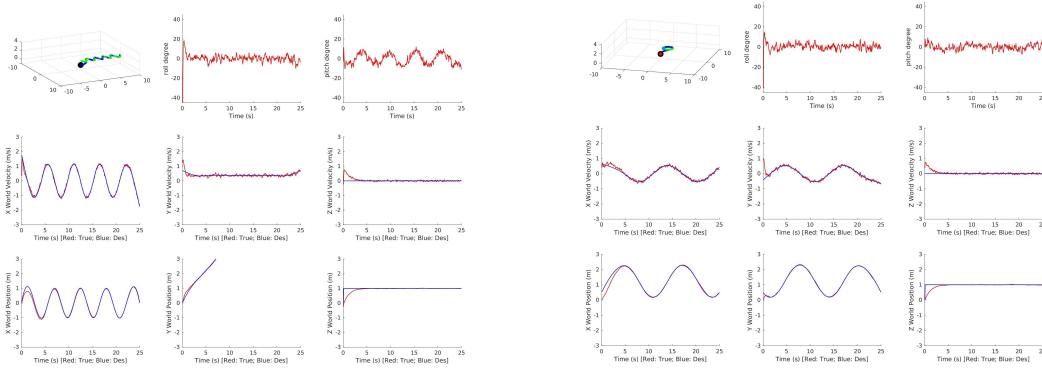
I used **global variables** in my PID controller implementation, hence simply using original test_trajectory.m cannot run my code successfully. **Please use my test_trajectory.m to verify the result.** Thank you.

Brief introduction

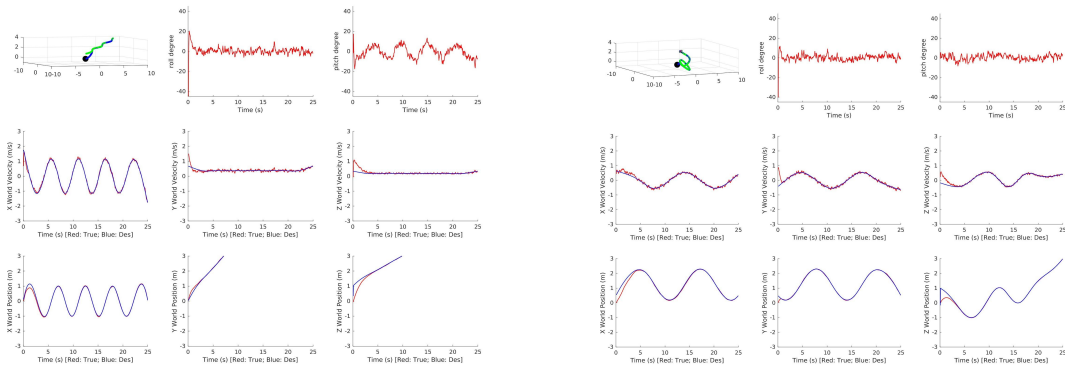
I adopted the optimization-based method to generate the minimum snap trajectory. More specifically, with given waypoints and total time of the trajectory, I formulated the problem as a constrained QP problem to minimize snap subject to 0th order derivative and continuity on position, velocity, acceleration and jerk. I used the **quadprog** to solve this optimization problem.

Figures

Path1 and Path2



Path3 and Path4



Statistics

	Position RMS	Velocity RMS
Path1	0.2009	0.2085
Path2	0.2333	0.2177
Path3	0.1952	0.2050
Path4	0.2245	0.2122

Analysis

Parameters:

The trajectory generated with 0th order derivative constraint and continuity constraint on position is not very smooth even for the position. Adding continuity constraint on velocity makes the trajectory much more smooth in terms of position and velocity. Adding continuity constraints on acceleration and jerk does not improve the performance much.

Additional stuff

The project stipulates the total time of the entire trajectory, but I think timing is also an important parameter, and it needs to be optimized in trajectory optimization. Need to do some extra work to get the best time for the trajectory.