

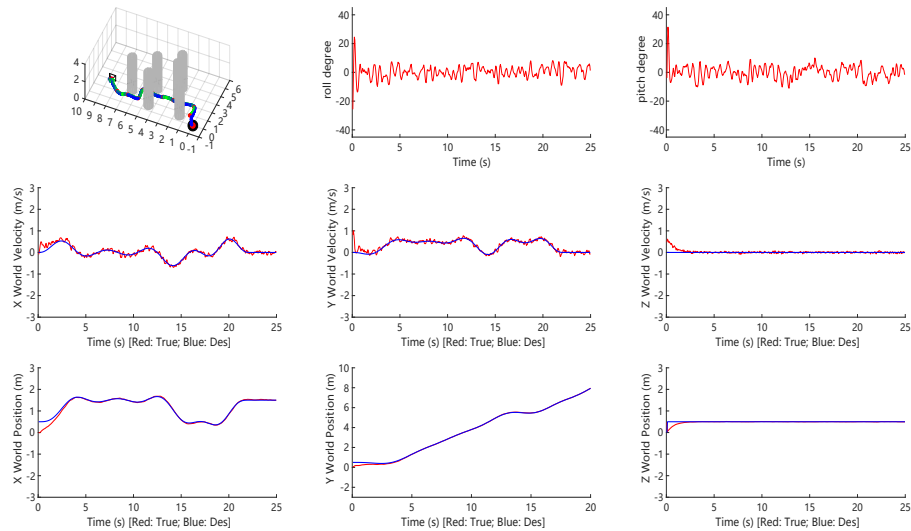
ELEC 5660 Project 1: Phase 3

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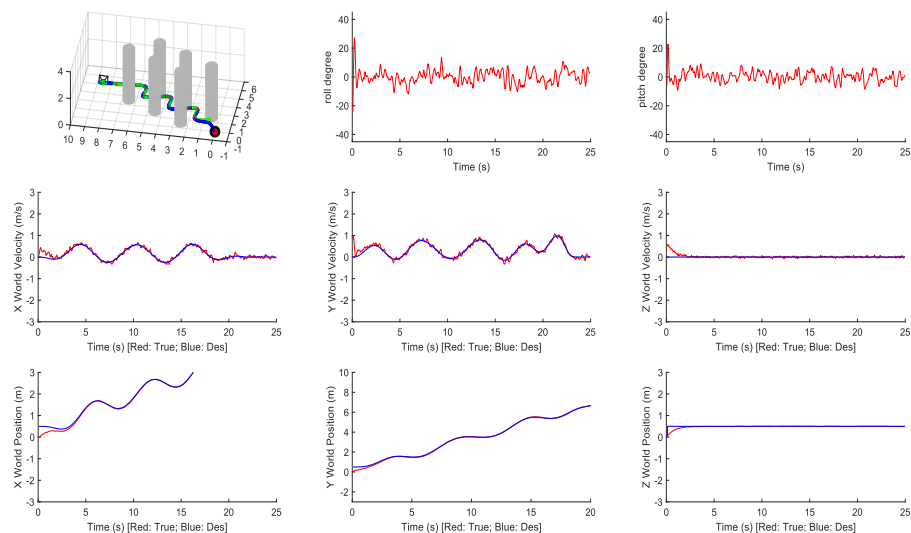
Figures

Waypoints are shown as red dots connected with red lines.

map 1

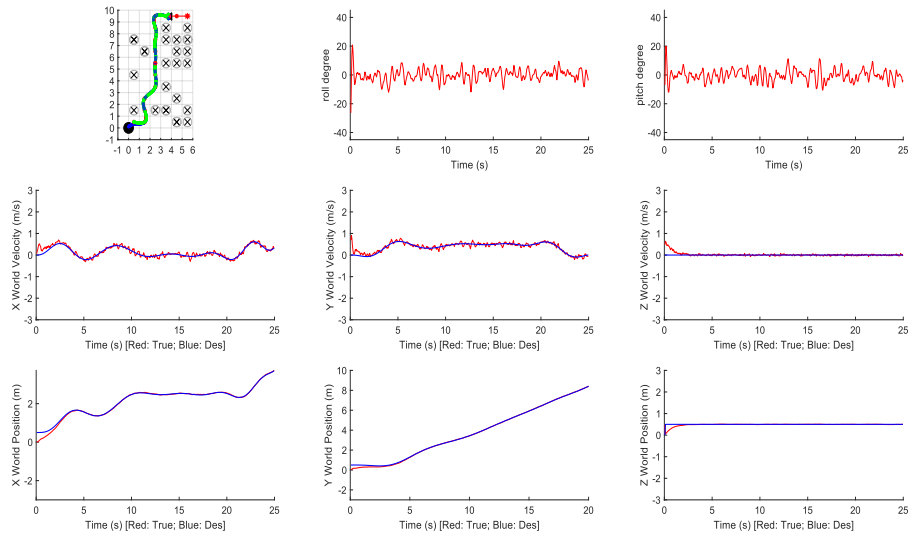


map 2



map 3

A map with randomly generated obstacles. The trajectory is not finished due to timeout.



Analysis

1. Waypoint generator generates integer waypoints. When using it in the trajectory generator, 0.5 is subtracted in every dimension.
2. A* search by tree is used.
3. In A* search, the node interconnection is restricted to 26 cubes around the source node in the space.
 1. Nodes to the direct left, right, front, back, up, down of the source node are only accessible when they are not obstacles.
 2. A corner is only accessible when all the nodes traversed by all the possible shortest Manhattan paths are not obstacles, and the distance is calculated as Euclidean distance instead Manhattan distance. e.g. from (0,0,0) to (1,1,1) is possible when the $2 \times 2 \times 2$ cube with (0,0,0) to (1,1,1) as diagonals are accessible, and the distance from (0,0,0) to (1,1,1) is $\sqrt{3}$.
4. In case of inaccessible target, the drone will hover around the start point.

Note

1. My submission can run on 3D map (i.e. cubic obstacles instead of pillars), just change the maximum Z value in line 7 of `path_from_A_star.m` from 1 to the actual maximum Z. Make sure the obstacle coordinates are all positive integers.
2. `test_trajectory.m` is included to generate random 2D map `map3`.