

ELEC 5660 Project 1 Phase 3 Report

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Abstract—This report presents results, figures and numbers of the Project 1 Phase 3

Index Terms—Optimal Control, UAV

I. RESULTS

Paths:

1) Map 1:

- (1, 1, 1)
- (1, 1, 2)
- (1, 2, 2)
- (1, 3, 2)
- (1, 4, 2)
- (1, 5, 2)
- (1, 6, 2)
- (1, 7, 2)
- (1, 8, 2)
- (2, 8, 2)
- (2, 9, 2)
- (2, 9, 1)

2) Map 2:

- (1, 2, 1)
- (2, 2, 1)
- (2, 3, 1)
- (2, 4, 1)
- (3, 4, 1)
- (3, 5, 1)
- (3, 6, 1)
- (4, 6, 1)
- (4, 7, 1)
- (4, 8, 1)
- (4, 9, 1)

3) Map 3:

- (1, 1, 1)
- (1, 2, 1)
- (1, 3, 1)
- (2, 3, 1)
- (3, 3, 1)
- (3, 4, 1)
- (3, 5, 1)
- (3, 6, 1)
- (3, 7, 1)
- (4, 7, 1)
- (4, 8, 1)

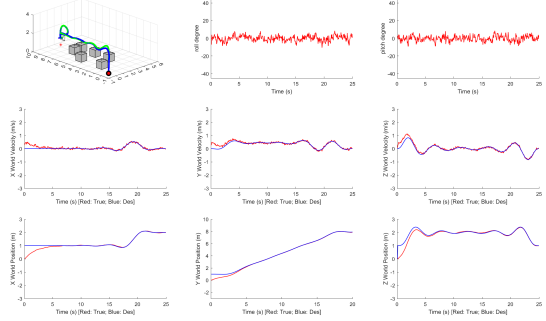


Fig. 1: Map 1 before correcting start point.

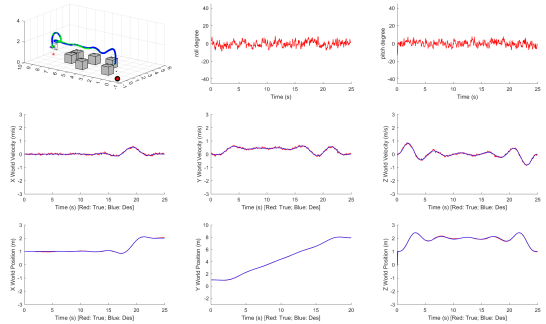


Fig. 2: Map 1 after correcting start point.

- (5, 8, 1)
- (5, 9, 1)

II. ANALYSIS

There was a flaw in *run_trajectory_readonly.m*. The start point defined by the map input is (1,1,1), but in *run_trajectory_readonly.m* the initial position is (0,0,0).

The positions are also defined as corners of the voxel cells, but the obstacles in the visualization occupy the whole cells, and their centers are not the coordinates. This is illustrated in Fig. 4, as the optimal path is actually collision-free, but in the visualization it looks like the path is touching the edge of some obstacle representations.

A. Algorithm

Efficiency is quite high since we are essentially searching in a DPS manner.

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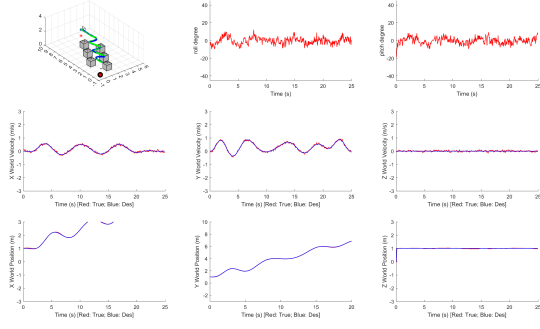


Fig. 3: Map 2.

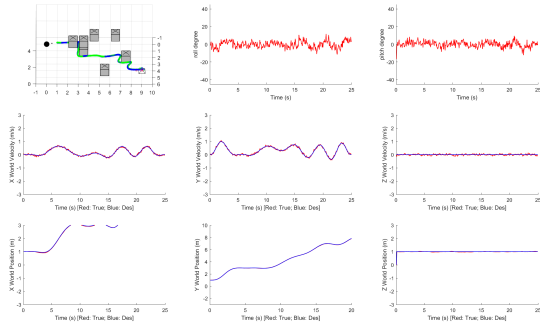


Fig. 4: Map 3.

Optimality is guaranteed since the heuristic score is guaranteed to be larger than the future cost.

However, since we are only considering 6 directions excluding diagonal motions, this is definitely not optimal in the continuous Euclidean space.

And it would be better if we formulate an optimization program with the space as a component, like convex optimization if we assume the obstacles are spheres.