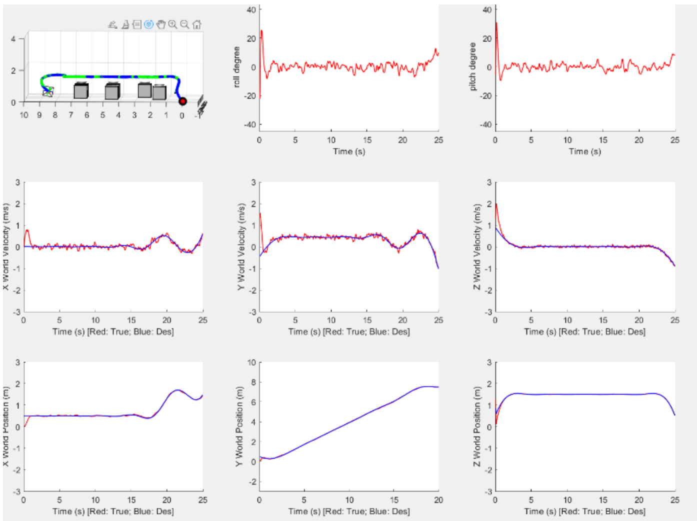
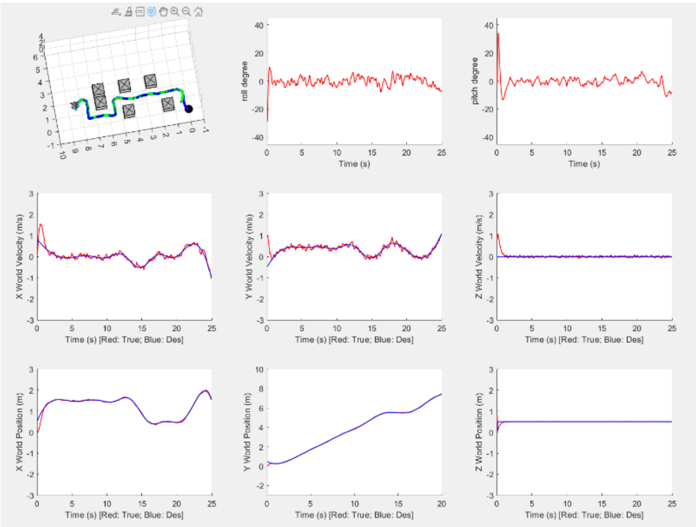
Project 1 Phase 3

Figures:

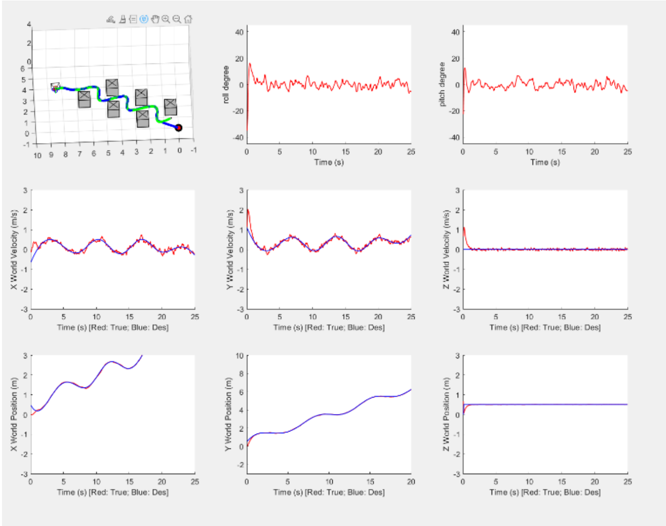
1. Map1 && Euclidean Distance Heuristic



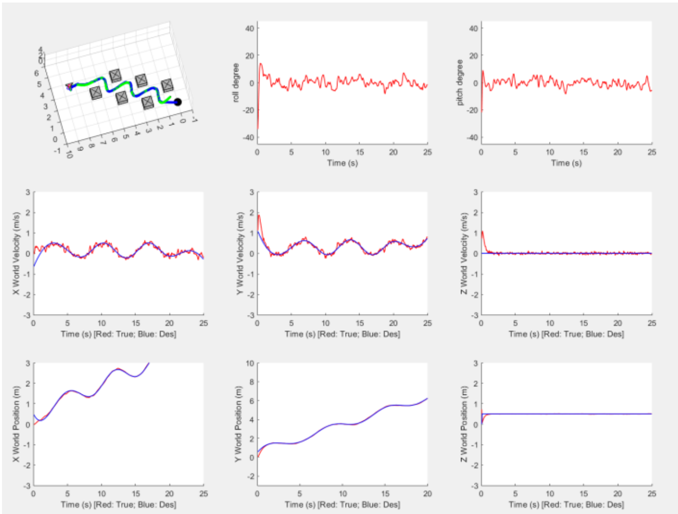
2. Map1 && Manhattan Distance Heuristic



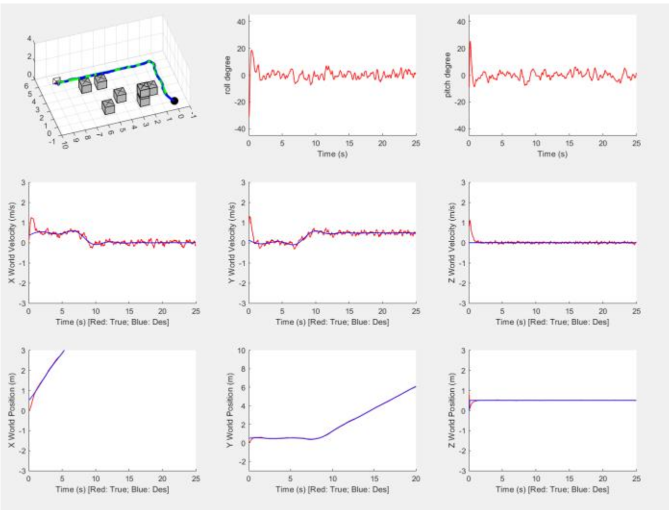
3. Map2 && Euclidean Distance Heuristic

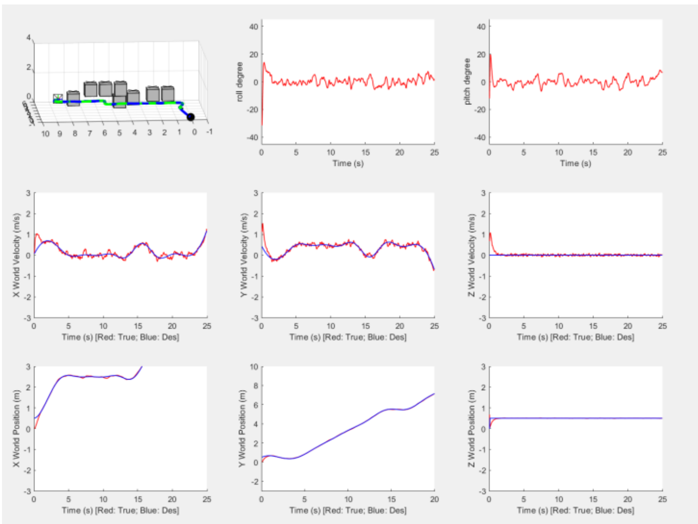


4. Map2 && Manhattan Distance Heuristic



5. Random Maps





Analysis:

In this setting, the agent only allowed to move in neighboring 6 direction, So Manhattan distance can describe the distance between target and current position. Here Manhattan distance and eucilidean distance are both admissible. If the heuristic is admissible, A* finds the optimal path, while overestimates the true cost, A* may become **greedy** and risk missing the optimal path. A more informed one , in this case Manhattan distance, improves efficiency by guiding the search more directly to the goal.

While the grid map in matlab code is given, I choose to construct another voxel grid map with adjustable resolution, which make the A* algorithm find path on grid map instead of edges. I also add adjustable inflation on obstacles to make the path collision free.

Thoughts:

The A* path are optimal in theory but the path is not optimal for drone flying in some way. So kinodynamic A* search using dynamic heuristics function optimized by speed, acceleration and jerk are more reasonable solutions for drone path planning.