Mobile Manipulation Capstone

Introduction

This project plans a trajectory for the end-effector of the youBot mobile manipulator, performs odometry as the chassis moves, and performs feedback control to drive the youBot to pick up a block at a specified location, carry it to a desired location, and put it down.

Code

This project consists of 3 matlab files, FinalProject_Best.m, FinalProject_NewTask.m and FinalProject_Overshoot.m. After runing each file, you will get 9 .cvs file in total, 3 from each .m file, i.e. Best_Trajectory Generation.csv, Best Trajectory Generation Gripper.csv, and Xerr data.csv. after running FinalProject_Best.m. Best Trajectory Generation.csv is the configuration of the youbot for task Best. Best Trajectory Generation Gripper.csv is used to verify milestone2: Reference Trajectory Generation. Xerr data.csv records the error.

3 milestone functions are as same as indicated on the capstone project website, except the FeedbackControl function, it was added an output, Xerr_k. This is used for logging Xerr data file.

Tasks

Best:

The Kp is 3*eye(6) and the Ki is 0.1*eye(6)

Overshoot:

The Kp is 5*eye(6) and the Ki is 90*eye(6)

NewTask:

The initial and goal configurations for the cube are

```
Tsc_init = [0 1 0 0
            -1 0 0 -1
            0 0 1 0.025
            0 0 0 1];

Tsc_final = [1 0 0 1
             0 1 0 0
             0 0 1 0.025
             0 0 0 1];
```

The Kp is 3*eye(6) is and the Ki is 0*eye(6)