ME449 Modern Robotics Milestone 2

Probem Description

This miletone aims to find the trajectory for a gripper of the KUKA yobot to pickup a cube in the world and place it in another place. The function called `TrajectoryGenerator` will solve the problem and outputs the planned trajectory. The `code` directory contains all code used for generate the `m2.csv` file used for simulating in `CoppeliaSim`. And `m2.csv` file contains the data used for simulation. The `m2_allen.mp4` is the video for simulation.

TrajectoryGenerator function

Inputs

This function takes 6 positional arguments:

- `Tse_init` : The initial configuration of the end-effector in space frame.
- `Tsc_init` : Initial configuration of the cube in the space frame.
- `Tse_final` : The final configuration of the end-effector in space frame.
- `Tce_grap` : The configuratino of the cube in end-effector frame when it is being graped by the gripper.
- `Tce_standoff` : The configuration of the cube in end-effetor frame when the end-effector is in standoff position.

Outputs

This function has one output:

- `config_mat` : config_mat: The matrix representing the configuration at each timestep.

Example usage

```
Tse_init = [1,0,0,0.1992;0,1,0,0;0,0,1,0.7535;0;0;0;1];
Tsc_init = [1,0,0,1;0,1,0,0;0,0,1,0.025;0;0;0;1];
Tsc_final = [0,1,0,1;-1,0,0,-1;0,0,1,0.025;0;0;0;1];
Tce_grasp = [-0.7071,0,0.7071,0;0,1,0,0;-0.7071,0,-0.7071,0,0,0,0,1];
Tce_standoff = [-0.7071,0,0.7071,0;0,1,0,0;-0.7071,0.2,-0.7071,0,0,0,0,1];
k = 10;
config_mat = TrajectoryGenerator(Tse_init, Tsc_init, Tsc_final, Tce_grasp, Tce_standoff, k);
writematrix(config_mat, `m2.csv`)
```

Then the `m2.csv` file should contain all data used for simulation.

Or you can go to the directory `code`, which contains the file `script_final_project_m2.m` and then in the MATLAB command window, run

```
script_final_project_m2
```

It will give you the same output.