

README

Please find the following files/folders along with this file:

- **code**

- **config**

- *bot_params.yaml*

- Contains configuration of the bot like chassis and arm dimensions, joint limits, joint and wheel velocity limits and initial configuration of the bot

- *trajectory_params.yaml*

- Contains configuration of cube wrt space frame and trajectory information like type of trajectory (Screw or Cartesian), max linear and angular velocity which determines number of configuration between two end effector configuration and tuning parameters.

- *simulate.py*

- Python file which computes odometry

- *trajectory.py*

- Python file which computes the trajectory of end effector wrt space frame

- *feedback_controller.py*

- Python file which computes required joint and wheel velocity to achieve the desired configuration from a given current configuration.

- *main.py*

- Python file to execute to generate required results (config.csv and plot.png)

- **results**

- **best**

- **overshoot**

- **newTask**

- *readme.txt*
 - Contains information regarding cube configurations and tuning parameter
- *config.csv*
 - Csv file to be inputted to the vrep simulator to animate the bot
- *animation.mp4*
 - Animation video of executing config.csv
- *error.csv*
 - CSV file having Xerr data along with time
- *plot.png*
 - Plot of Xerr as a function of time
- *log.png*
 - Image showing the execution of main.py

Description

To animate the bot, add config.csv to hbox in V-REP GUI. To generate the csv file, we need to run main.py. The parameters required for the python file are as listed above. Some of the notable details are as follows:

1. There is a speed limit check for velocity of both wheels and joints in simulate.py. The parameter to set the limit can be found in bot_params.yaml.
2. testJointLimits is also implemented in feedback_controller.py to ensure that the joints after timestep and the given joint speeds do not violate the joint limits. For this the violating joint limits are noted and their corresponding column in the Je matrix is set to zero so as to ensure that the constraint joint do not contribute further to achieve the desired configuration
3. In order to avoid singularity, the pseudo jacobian inverse is given a tolerance of $1e-3$

4. Also provision to change the time scaling and trajectory type is also added in parameters in config folder