Hardware Assignment

IITB Mars Rover Team

June 17, 2022

This assignment involves some lab-related activities. Please coordinate with the seniors to match their availability.

Deadline: 11:59 PM, 18/06/2022
Note: A small report is expected at the end of this assignment. Please do not overthink it, it is not a course report. Keep it brief and to-the point. No need for verbosity (unless asked for - eg. Part 3)

Part 1 - Understanding the Joystick

In this part, you'll need to do some exploratory work. Use the joystick present in the lab and write a small script to print the data onto a terminal.

Look at the data to create a mapping from the different buttons on the joystick to the data you see on-screen. Add this mapping as a table in your final report.

Choose 4 keys on the joystick of your liking (document which keys in the report) to use as the 4 directions of control. Modify the earlier written script to send the data `'FORWARD', 'BACKWARD', 'LEFT', 'RIGHT'` onto the topic `\joy`.
Helper link

Part 2 - Interfacing the Drivers

The above data sent by the joystick needs to be converted into something the motor drivers can understand. Your task is to do exactly that.

Boiler plate code (`roboclaw.py, full_drive_run.py`) has been provided in the link below along with `autonomous.py` which contains an empty class structure. You must implement the function `drive_callback` to command the RoboClaws according to the input. Provide logging here as to the command driven and the direction of each individual motor.
Code Files Link

Note: Please fork this repository onto your own personal Github accounts (make one if you haven't). Fill in the code according to the assignment and add launch files as well. At the end of the assignment, your repo should contain two packages:

- One for the base-station where the joystick will be run.
- Second for on-board the rover.

Document the commands that need to run to launch both scripts within your final report. Include a link to your repo in the report.

Part 3 (Bonus) - Safety Feature - Limiting the Current

The Motor Drivers also provide information on how much current the motors are using. Have a look on how to obtain this information.

Use that information to fill out the `current_limiter` function.
How will you decide what current limit to set? This requires some thought and some research into the current limits of the wires, motors and batteries. Please document your research and thought process and the final limit in your final report.

Part 4 - RUN!

Come down the lab and seniors will help you in uploading your code and starting up the rover. Try running your scripts and see if the rover behaves as expected!!

Take videos and photographs! Good performances will be shared on our social media page!

Curiosity | Perseverance | Ingenuity
Good Luck!