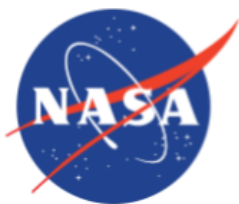


Open Source Rover Calibration



Jet Propulsion Laboratory
California Institute of Technology

Contents

1	Calibration	2
1.1	RoboClaw Setup	2
1.2	Drive Motor Calibration	4
1.3	Corner Motor Calibration	4

1 Calibration

In order for the motors to all work correctly to drive the rover we must calibrate the motors and encoders. We will use a program called Ion Studio to assist with this, which can be found at

- <http://www.ionmc.com/downloads>

One at a time we will go through and check the encoders and motors for each RoboClaw, beginning with the Drive motors, which will be RoboClaw #1

1.1 RoboClaw Setup

1. Connect to the RoboClaw via USB-micro USB cable
2. Open Ion Studio
3. If necessary update the RoboClaw Firmware

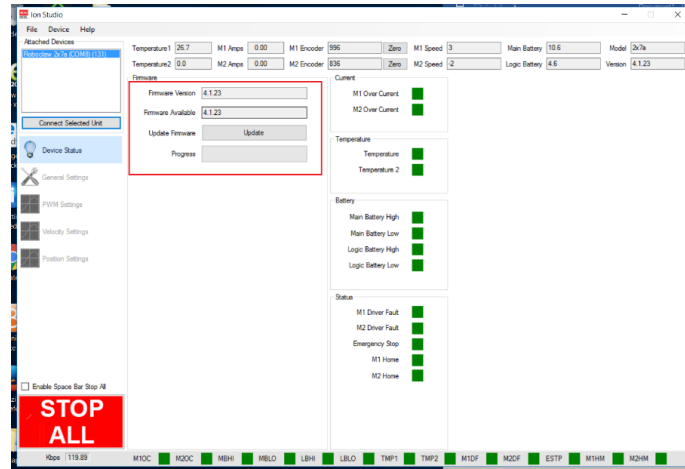


Figure 1: Ion Studio Firmware Update

4. Select Connect Selected Unit in the upper left box
5. Under the General Settings Tab you'll need to change the following settings for each RoboClaw:

(a) **Setup:**

- i. Control Mode: Packet Serial
- ii. Multi-Unit: Check Enable Multi-Unit Mode

(b) **Serial:**

- i. Set the address to 128,129,130,131,132 for each respective RoboClaw
- ii. Baudrate: 115200

(c) **Battery:**

- i. Max Main Batter: 12.5V
- ii. Min Main Batter: 11.5V
- iii. Max Logic Battery: 5.5V
- iv. Min Logic Battery: 4.5V

(d) **Motors:**

- i. M1 Max Current: 1.05A
 - ii. M2 Max Current: 1.05 A
- (e) **I/O:**
- i. Encoder 1 Mode: For addressed 128,129,130 Quadrature, for addresses 131 and 132 Absolute
 - ii. Encoder 2 Mode: For addressed 128,129,130 Quadrature, for addresses 131 and 132 Absolute

1.2 Drive Motor Calibration

6. Perform the following for the **RoboClaw addresses 128,129, and 130**

- (a) Go to the PWM settings tab
- (b) Under the control pane slowly move the slider bar up for M1 and make sure that the M1 Encoder value increases. If it decreases it means that the +/- leads are backwards from the RoboClaw, consult the wiring diagram
- (c) Repeat for M2 motor
- (d) If once both motors are spinning the correct direction and encoders respond accordingly when commanded through PWM signal tab move on the the next drive motor.

1.3 Corner Motor Calibration

7. Perform the following for the **RoboClaw addresses 131 and 132**

- (a) Perform Calibration steps 6(a) - 6(d)
- (b) Now we need to set the location of the absolute encoders such that the system knows where the corner steering wheels are at:

- i. Using the Control pane move the slowly motor to its' lower physical limit
- ii. Loosen the set screw attaching the bronze gear to the encoder shaft, just enough to allow the shaft to rotate freely, but that the gear is still held in place
- iii. Rotate the shaft using a pair of pliers until you get an Encoder value of around 100 or 200. It should be almost at the end of the readable encoder values (these will individually depend on resistor values/ voltage division in place at the absolute encoders).
- iv. Using the Physical notches on the 3D printed encoder mount and the physical hard stop align each angle using the PWM settings to move the motor, and record those values.

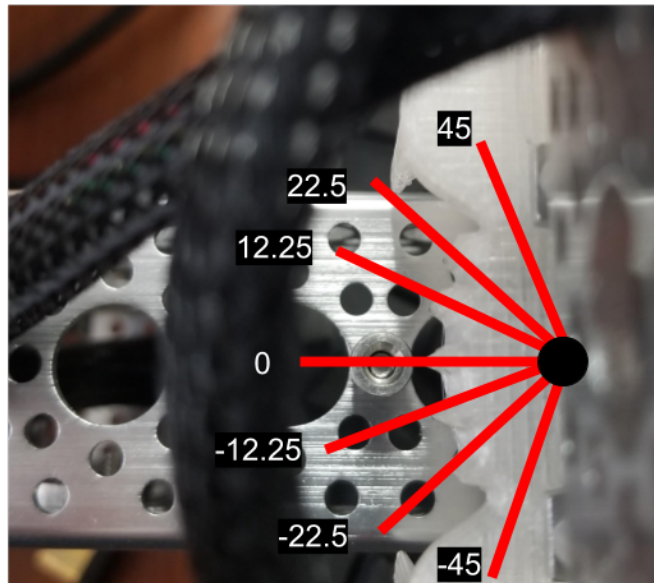


Figure 2: Calibrating the Corner steering

Important Note: If the encoder ticks reaches its' max and resets before the wheel has traveled its' full distance then the shaft has to be rotated further. If it still is happening it could potentially be a voltage issue, check the voltage coming from the Encoder with a multi-meter, it should be a range of roughly 0-2V.

- v. Input the recorded values into the Encoder Calibration excel sheet to obtain the necessary mathematical calibration equation.
- (c) Once all the motors are calibrated and the equations are obtained the calibration process is complete.