Guides and Resources: Basic IO - QDrone
Motors

This document will summarize how to write commands to the QDrone's motors.

Writing to Motors

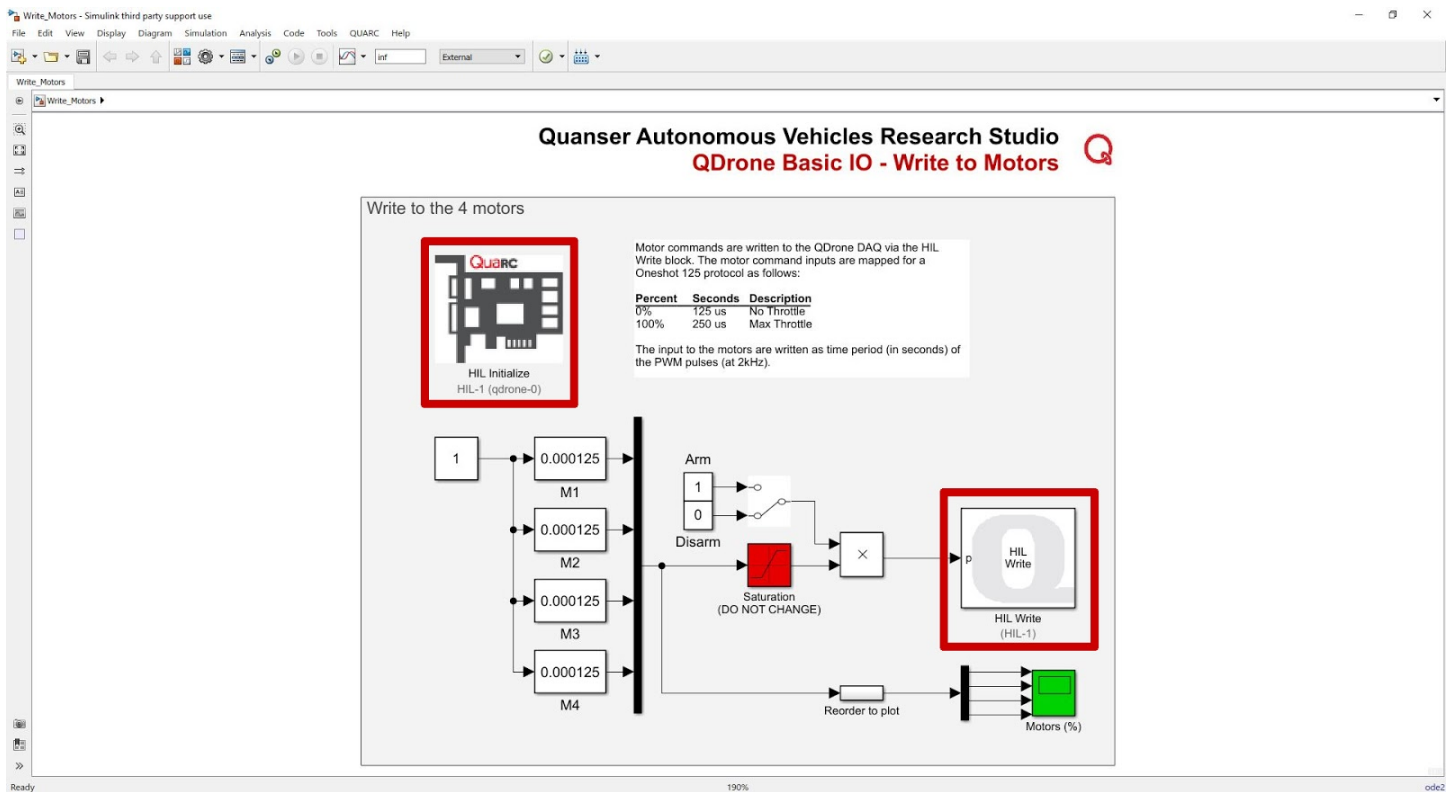Figure 1: Write_Motors.slx model, highlighting the HIL Initialize and HIL Write blocks

1. Under the Guides and Resources > Basic IO > QDrone > Software folder, open Write_Motors.slx (Figure 1)

Autonomous Vehicles Research Studio Resources weblink:
https://www.quanser.com/products/autonomous-vehicles-research-studio/

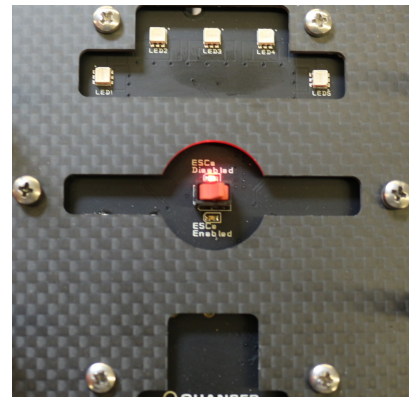2. Under Model Configuration Settings, input the correct QDrone hostname.

3. Ensure that the ESC disable switch is turned OFF (that is, the ESCs are enabled) indicated by an active **green** LED next to the switch (Figure 2a). Place the QDrone **inside** the workspace.

⚠ **Caution**: Do **NOT** turn on the QDrone/motors outside the workspace netting.

a. ESCs Enabled (motors allowed to spin)   b. ESCs Disabled (motors not allowed to spin)

Figure 2: ESC Disable switch and its two positions

4. Build the model (QUARC menu > Build).

5. Start the model (QUARC menu > Start).

6. The QDrone will emit 2 beeps signifying that the ESCs are enabled.

7. Move the Arm/Disarm manual switch in the model to the Arm position.

8. One by one, double click on the slider gains labelled M1 to M4 and slide them between 0.000125 s and 0.000250 s to change each motor's throttle between 0 and 100%. These values are written to the PWM channels in the HIL Write Block, where the channels are configured in the HIL Initialize block (Figure 1).

Figure 3 - Motor numbering on the QDrone

⚠ **Caution**: The Saturation block in the model limits the command PWM values written to the QDrone to a maximum of 0.0001375s (10% of max throttle) for safety reasons. These are direct motor commands without any stabilization controller. The drone's response cannot be predicted in such an open loop state.

Note: A HIL Initialize block must always be present and configured correctly for any IO to take place. The HIL read/write blocks allow you to read from and write to the channels configured in the HIL Initialize block. See Guides and Resources > Concepts for more information.

9. Disarm the QDrone by moving the Arm/Disarm manual switch to the Disarm position.

10. Stop the model.

This completes a tutorial on how to write commands to the Motors. This involves use of the Oneshot 125 protocol, which is covered in more detail under Guides and Resources > Concepts.