Guides and Resources: Basic IO - QDrone

LEDs

This document will summarize how to command the QDrone's 6 LEDs.

Writing to LEDs

> **Note:** Ensure that your QDrone is powered ON (charged battery plugged in) and that a connection has been established to it. Follow the steps under Charging Vehicle Batteries and Communicating with the QDrone in the Research Studio Setup Guide.

> **Note:** Ensure that you have read and understood all the safety procedures and guidelines regarding charging Lithium Polymer batteries as well as guidelines on using the QDrone in a safe manner outlined in the Research Studio Setup Guide. If you have any concerns or questions, please contact Quanser technical support (tech@quanser.com).

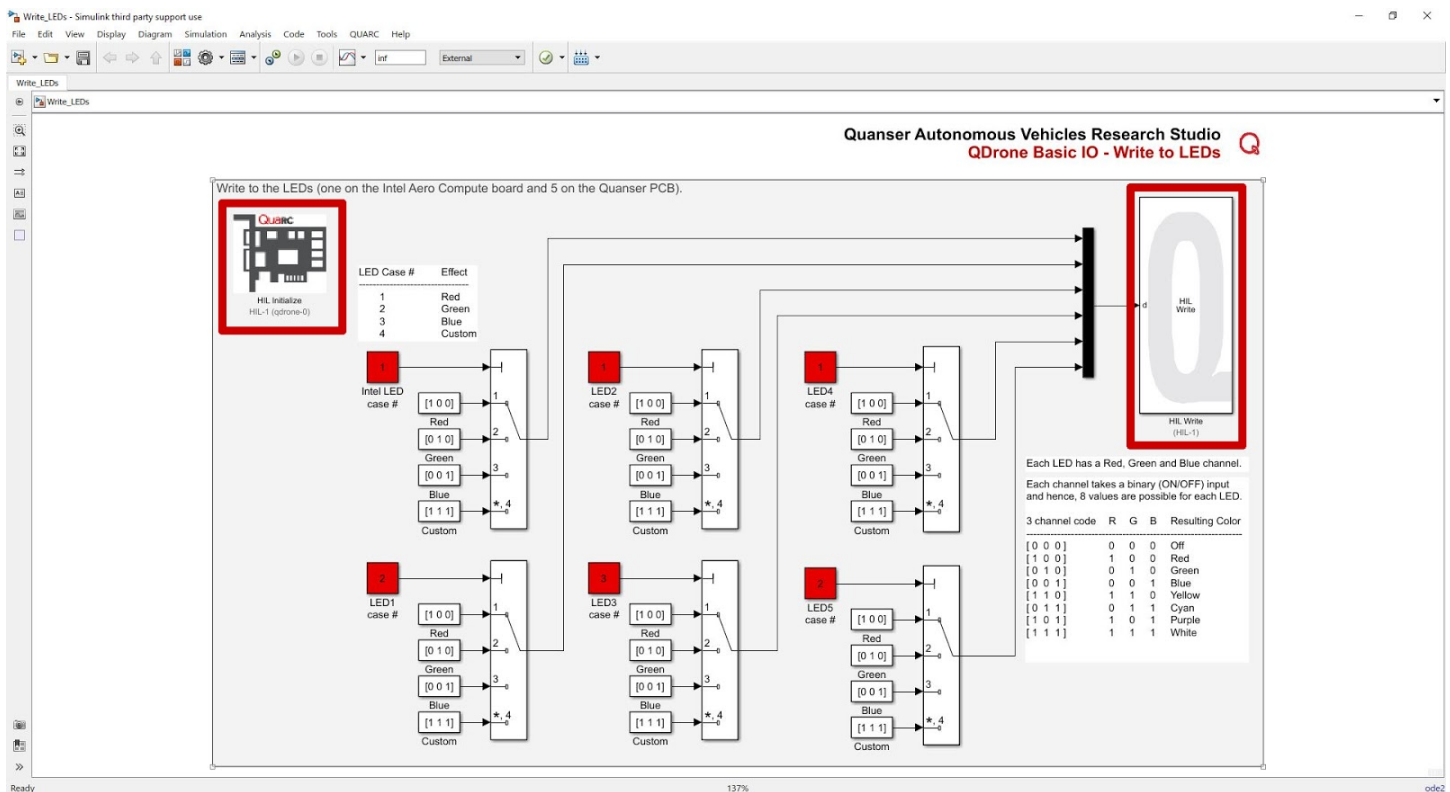> **Note:** Safety eye glasses should always be worn, even outside the net.

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

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

> **Note:** For the latest documentation and controllers, please visit Autonomous Vehicles Research Studio Resources.

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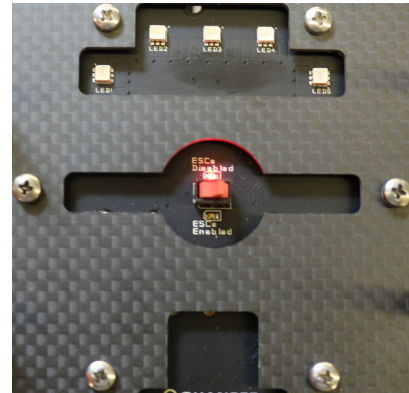https://www.quanser.com/products/autonomous-vehicles-research-studio/

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

> **Note:** See the QDrone IO Check section in the Research Studio Setup Guide for more information.

3. Ensure that the ESC disable switch is turned ON (that is, the ESCs are disabled) indicated by an active **red** LED next to the switch (Figure 2b). Place the QDrone inside the workspace.

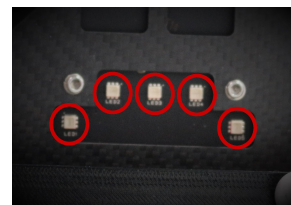a. ESCs Enabled (motors allowed to spin)   b. ESCs Disabled (motors not allowed to spin)

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 no sound, which signifies that the ESCs are disabled.

7. One by one, change the value of the red constant blocks in the Quarc model between 1, 2, 3 and 4. When set to 4, you can set the Custom constant blocks to any of the 8 values presented in the description box in the model below the HIL Write block (and in Table 1 below). The corresponding LED on the QDrone should change its color accordingly.

a. User programmable LED on the Intel Aero   b. User programmable LEDs on top of the QDrone
Compute board (back-right near Motor #1)

Figure 3: User programmable LEDs on the QDrone

> **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.

8. Stop the model.

LED Color	R sub-LED	G sub-LED	B sub-LED	Code	Picture
Off	0	0	0	[0 0 0]	
Red	1	0	0	[1 0 0]	
Green	0	1	0	[0 1 0]	
Blue	0	0	1	[0 0 1]	
Yellow	1	1	0	[1 1 0]	
Cyan	0	1	1	[0 1 1]	
Purple	1	0	1	[1 0 1]	
White	1	1	1	[1 1 1]	

Table 1: 8 states of each of the 6 LEDs on the QDrone

This completes a tutorial on how to write values to the LEDs. The 6 LEDs each consist of three sub-LEDs (a red, green and blue). Turning these RGB sub-LEDs ON/OFF by writing a 1 or 0 to them respectively, makes each of the QDrone's LEDs toggle between the 8 possible states in table 1 below. With the 5 LEDs that are visible on top of the QDrone, a total of 8^5 (or 32768) color patterns are achievable.