Autonomous Vehicles Research Studio

Setup Guide – QDrone 1 I/O Test

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A. QDrone 1 I/O Check

1. From the same folder containing this file, open the folder QDrone IO Check, and open QDrone_IO_Check.mdl. (This file checks all the sensors that are needed for flight, if you want to also see the other sensors, use the QDrone_IO_Check_Full.mdl file after running through these instructions.)

2. In the model that loads, from the **HARDWARE** tab on top of your Simulink model, click on **Hardware Settings** (Gear Icon). (If using an older version, click on **Model Configuration Properties** under the **Simulation** drop menu.)

3. Expand **Code Generation** on the left side of the window, click on **interface** and set the **MEX-file arguments** (Figure 1) as follows

   ```
   '-w -d %d -uri %u','tcpip://QDrone0xxxxx.local:17001'
   ```
   where QDrone0xxxxx refers to the hostname of the QDrone 1 you are using (found below the battery compartment plate). If you have a fixed IP for your QDrone or know its IP v4 address, use that instead. Press OK.
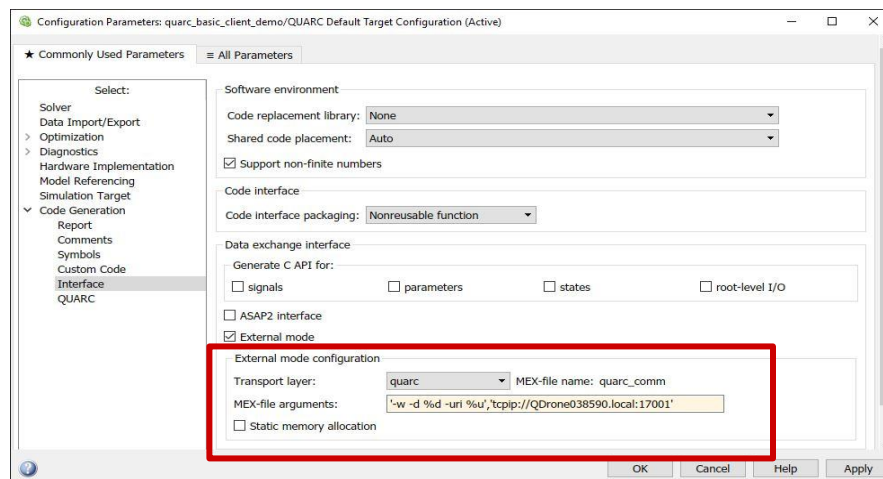

Figure 1. Setting up the MEX-file arguments

4. Plug in and secure a battery to turn ON the QDrone. Place the drone at the center of the workspace ensuring the ESC disable switch has a green light (which means the ESC is enabled), as shown in figure 2.

Figure 2. ESCs enabled (motors can spin)

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5. Ensure that a connection to the drone is established by pinging to it. See the vehicle communication document for more information.

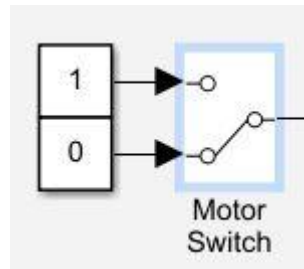6. At the root level in the model, ensure the Motor Switch is set to 0. (Figure 3)

Figure 3. Motor Switch set to off in the QDrone IO check model.

7. Ensure both the SAFETY GOGGLES and PROTECTIVE GLOVES are worn.

8. Click on the **HARDWARE** tab on the top menu, and then click the green play button (**Monitor & Tune**), It should build and start the model. If you have an older version of Simulink that does not have a Hardware tab, under the **QUARC** drop down menu, click **Build** and once it finishes click **Start**.

9. After you hear 2 beeps (which indicates that the ESCs are enabled and that the model is running on the drone), set the **Motor Switch** to 1. The four motors should start spinning sequentially (one at a time in clockwise order). Ensure that the motors are turning on and off in a clockwise cyclical order and each motor is spinning in expected directions: bottom right (motor 1, clockwise), bottom left (motor 3, counter-clockwise), top left (motor 4, clockwise) and then top right (motor 2, counter-clockwise).

10. Set the **Motor Switch** to 0.

11. Step into the workspace and set the **ESC Disable** switch on the QDrone to **ON** (that is, the ESCs are DISABLED, which is indicated by a **red LED lit next to the switch**). Move the drone around manually by holding it using the handle on the top frame of the QDrone. Check the attitude of the drone in the **Attitude Estimates (deg)** scope to ensure that the readings are reasonable.
CAUTION: DO NOT handle the drone with spinning motors.
CAUTION: Ensure that the motors are not spinning (Motor Switch is set to 0).

12. Ensure that the **Low Battery** display is 0 (i.e., battery is charged, low battery threshold is 10.5V).

13. Ensure that the **Sensor Failure** display is 0 (i.e., no sensor issue).

This completes the **QDrone IO check** task and confirms that your QDrone is functioning correctly. The **QDrone IO Check** model can be used to confirm basic functionalities whenever you run into unexpected behavior, to isolate software from hardware issues. If you have any errors, make sure that all the steps prior to this checkpoint have been followed. If further issues persist, please contact Quanser technical support (tech@quanser.com).

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