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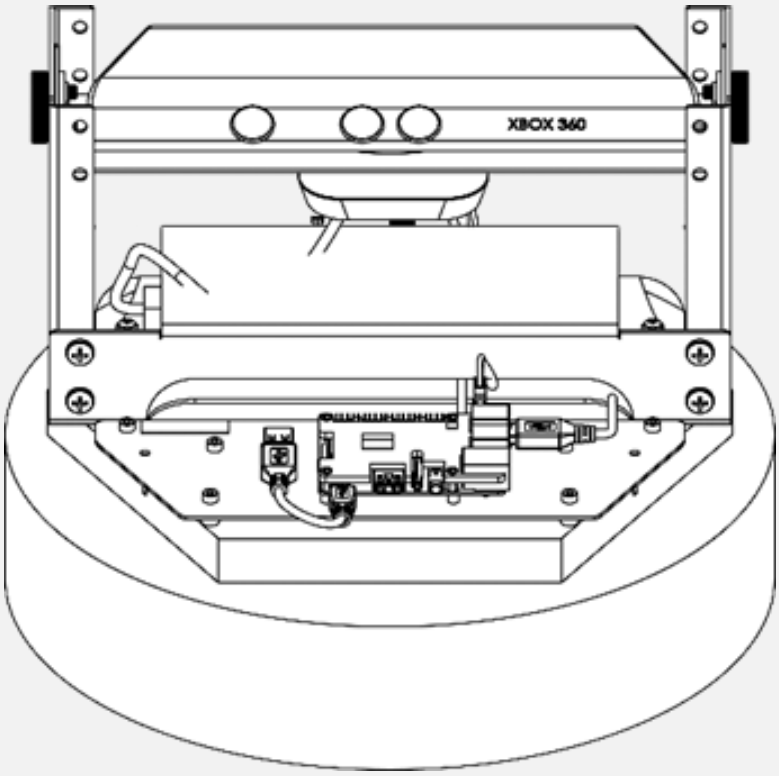

Autonomous Vehicles Research Studio

Setup Guide – QBot 2/2e I/O Check

v 2.0 — 18*th April* 2023

For more information on the solutions Quanser Inc. offers, please visit the web site at: http://www.quanser.com

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FCC Notice This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Notice This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Waste Electrical and Electronic Equipment (WEEE)

This symbol indicates that waste products must be disposed of separately from municipal household waste, according to Directive 2002/96/EC of the European Parliament and the Council on waste electrical and electronic equipment (WEEE). All products at the end of their life cycle must be sent to a WEEE collection and recycling center. Proper WEEE disposal reduces the environmental impact and the risk to human health due to potentially hazardous substances used in such equipment. Your cooperation in proper WEEE disposal will contribute to the effective usage of natural resources.

CE Compliance CE

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Warning: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Caution

This equipment is designed to be used for educational and research purposes and is not intended for use by the public. The user is responsible to ensure that the equipment will be used by technically qualified personnel only. While the end-effector board provides connections for external user devices, users are responsible for certifying any modifications or additions they make to the default configuration.

Table of Contents

A. QBot 2/2e I/O Check

1. From the same folder containing this file, open the folder for your vehicle, QBot 2 or QBot 2e IO Check, and open the Stabilizer_*vehicle*.slx file.
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 /tmp -uri %u -URI_Host tcpip://192.168.2.H:18000','tcpip://192.168.2.X:17001'
   ```

   where 192.168.2.X refers to the IP address of the QBot 2/2e you are using (found on the side of the robot), and 192.168.2.H refers to the IP address of the ground control station PC (default IP is 192.168.2.5, but you can find this by typing ipconfig in the command prompt). Press OK.

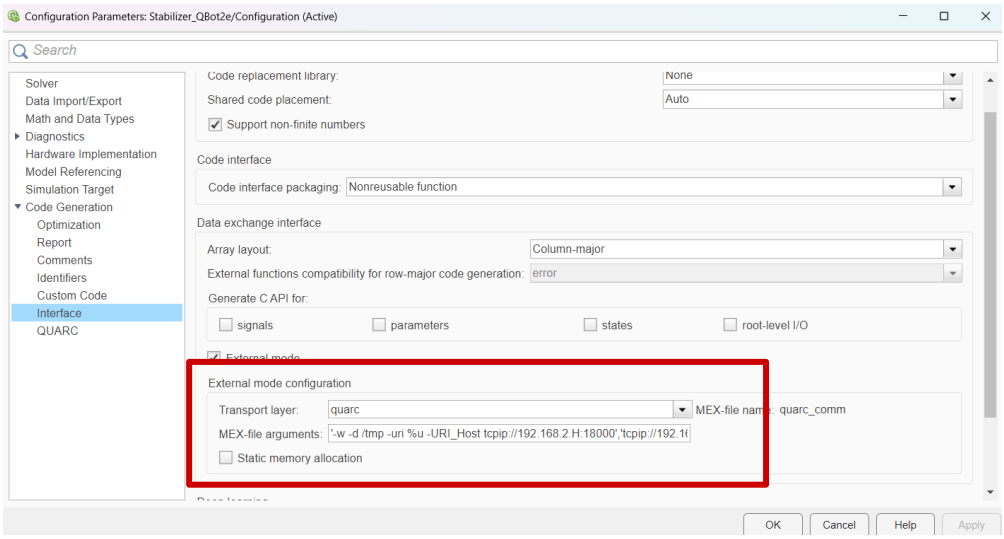
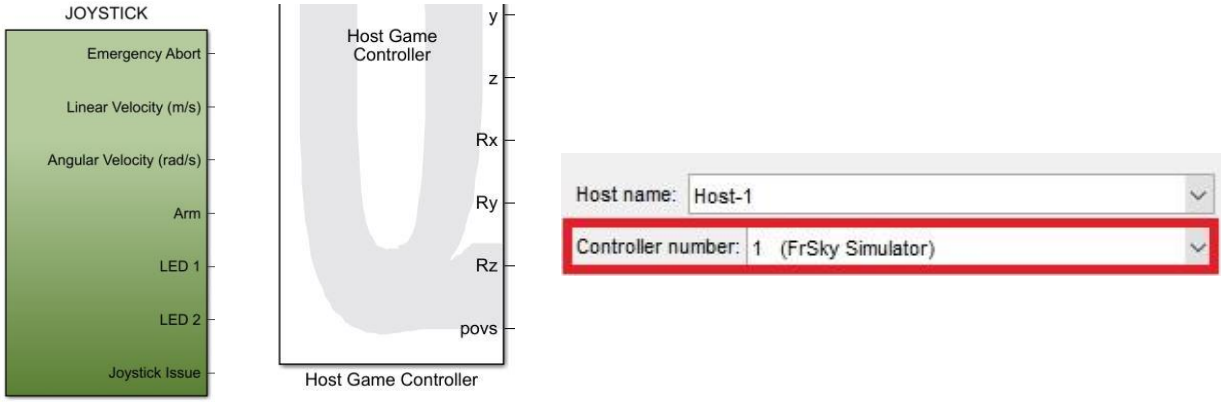


Figure 1. Setting up the MEX-file arguments

4. Turn on the vehicle and ensure that a connection to the vehicle is established by pinging to it. See the vehicle communication document for more information.
5. Open another MATLAB instance.
6. In this new MATLAB window, open the file in the same folder called Mission_Server_*Vehicle*_IO_Check.mdl. If you have an FrSky joystick (silver with a screen at the bottom) open the one that says _FrSky.mdl
7. Ensure that the joystick is turned ON and the USB dongle is plugged into the ground control station PC.

8. In the model that loads, open the **MISSION SERVER QBOT2 IO CHECK** subsystem. Under it, open the **JOYSTICK** subsystem (Figure 2a), and double-click on the **Host Game Controller** block (Figure 2b). Ensure that the Controller number (Figure 2c) drop down menu has selected the item labelled **FrSky RECEIVER**



a. Joystick subsystem

b. Host Game Controller

c. Controller number set to FrSky

Figure 2: Selecting the FrSky receiver in Simulink/Quarc

9. On the Mission Server model, 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**.

10. Ensure the mission server starts running by checking the simulation time bar at the bottom right of the model (figure 3).

Figure 3: Simulation Time bar showing current time stamp

11. Ensure that the **Joystick Issue** display reads 0 (no joystick issues). Ensure that all the toggles are set away from the user (see FrSky Joystick documentation). Make sure that the joystick's Arm/Disarm toggle is set as in Figure 4a and LED toggle is set as in Figure 4c.

a. Disarm

b. Arm

c. Ready LED Green

d. Ready LED Red

Figure 4: Joystick Arm/Disarm toggle (a and b) and LED toggle (c and d)

12. Follow step 9 again but run the **Stabilizer** model instead.
13. You should hear a sequence of beeps to signify that the **Stabilizer** model is running on the QBot 2. The user programmable LED (LED #2) on the QBot 2 should turn ON a solid green.
14. Move the Takeoff/Land toggle to the 2 position (Figure 4d) (Move the toggle all the way towards you). The LEDs should now switch to a solid red.
15. Switch the Arm/Disarm toggle to 2 (Figure 4b) (Move the toggle all the way towards you). This should arm the QBot 2. Use the Roll/Pitch stick on the joystick to move the QBot 2 forward/backward and make it turn. The commands from the stick are mapped to the linear and angular velocity of the QBot 2.
16. Move the Arm/Disarm toggle to 0 (Figure 4a). Move the LED toggle to 0 (Figure 4c). The QBot2_Stabilizer and Mission_Server_QBot2_IO_Check models can now be stopped.

This completes the **QBot 2 IO check** task and confirms that your vehicle is functioning correctly. 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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