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Guides and Resources: Basic IO - QDrone

IMU

This document will summarize how to read data from the QDrone's IMU sensors (gyroscope, accelerometer, magnetometer and barometer) as well as the battery voltage.

Reading from the IMU

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.

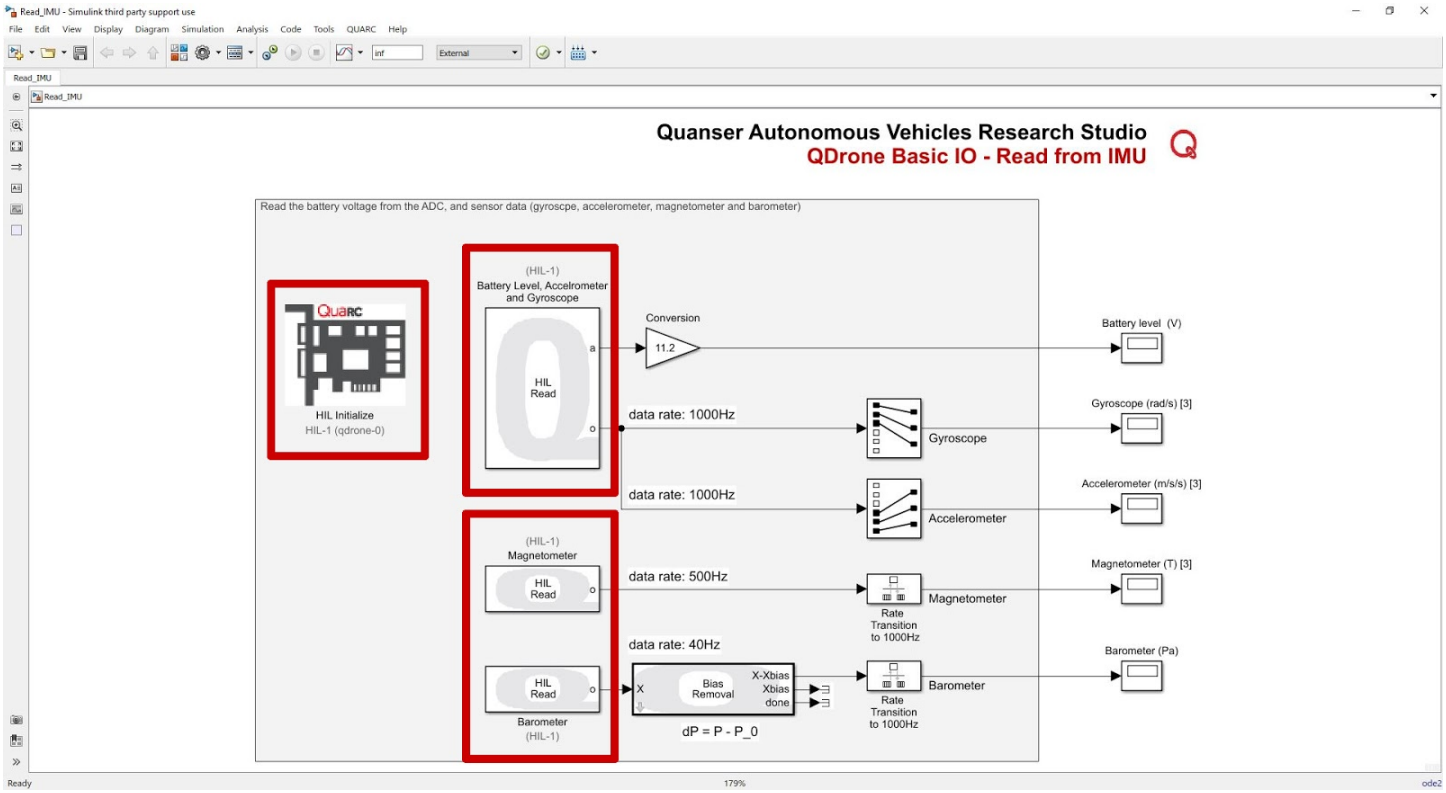


Figure 1: Read_IMU.slx model, highlighting the HIL Initialize and HIL Read blocks

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

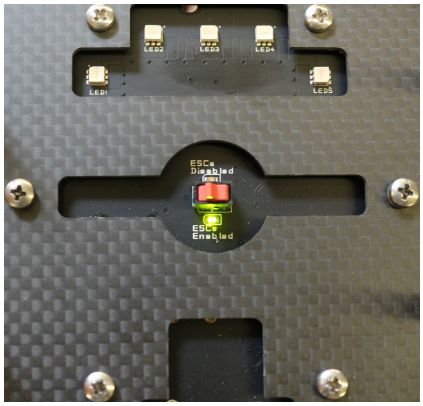
Note: For the latest documentation and controllers, please visit Autonomous Vehicles Research Studio Resources.

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

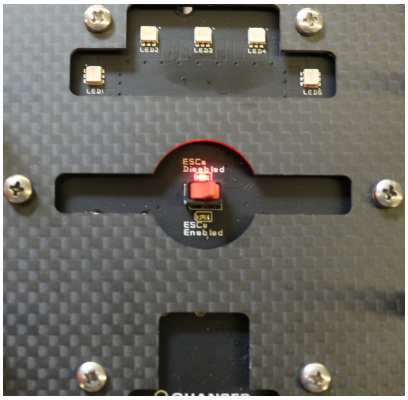
2. Under Model Configuration Settings, input the correct QDrone hostname.

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. Ensure that safety glasses are worn. Enter the workspace and move the drone along the three axis, and rotate it about the 3 axis. The Gyroscope (rad/s), Accelerometer (m/s/s), Magnetometer (T) and Barometer (Pa) scopes should display data. Sample data has been shown in Figure 3.

Note: For more information on how to interpret the sensor data received, see Guides and Resources > Concepts.

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. The Battery Level (V) scope should display the battery voltage, which can be confirmed using the Battery Voltage Tester provided (see Charging Vehicle Batteries in the Research Studio Setup Guide). Sample data has been shown in Figure 3.

9. Stop the model.

This completes a tutorial on how to read IMU and battery voltage data from the QDrone. More information on configuring the HIL Initialize and HIL Read blocks can be found in detail under Guides and Resources > Concepts.

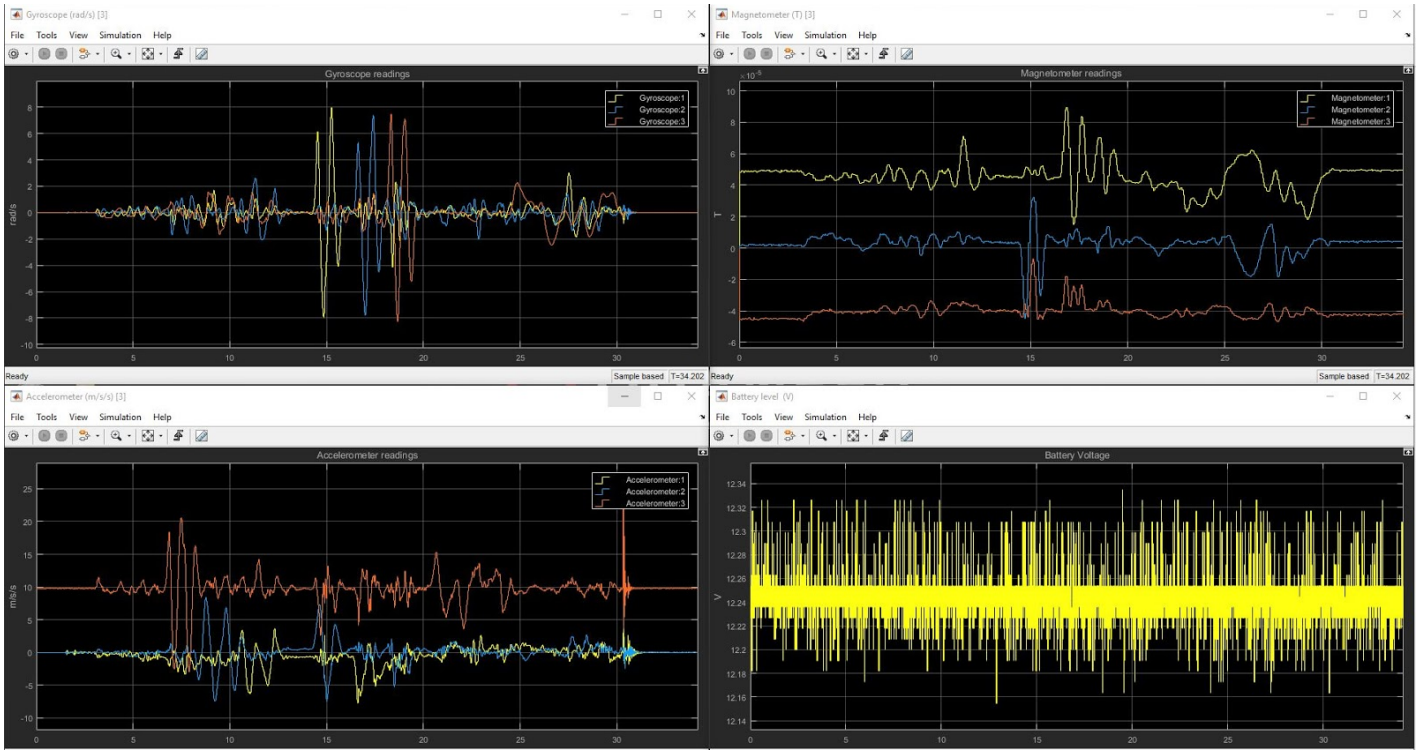


Figure 3: Sensor Data received from the QDrone's IMU