QDrone 2 – Hardware Test
IMU

What to expect in the IMU Tests?

An IMU or an inertial measurement unit has both an accelerometer and a gyroscope to measure the objects rotational speed and acceleration. QDrone 2 has a two IMUs to be able to measure how it is moving in space. This document will guide you through running IMU tests and confirming the results of both the accelerometer and the gyroscope.

IMU Test – MATLAB/Simulink

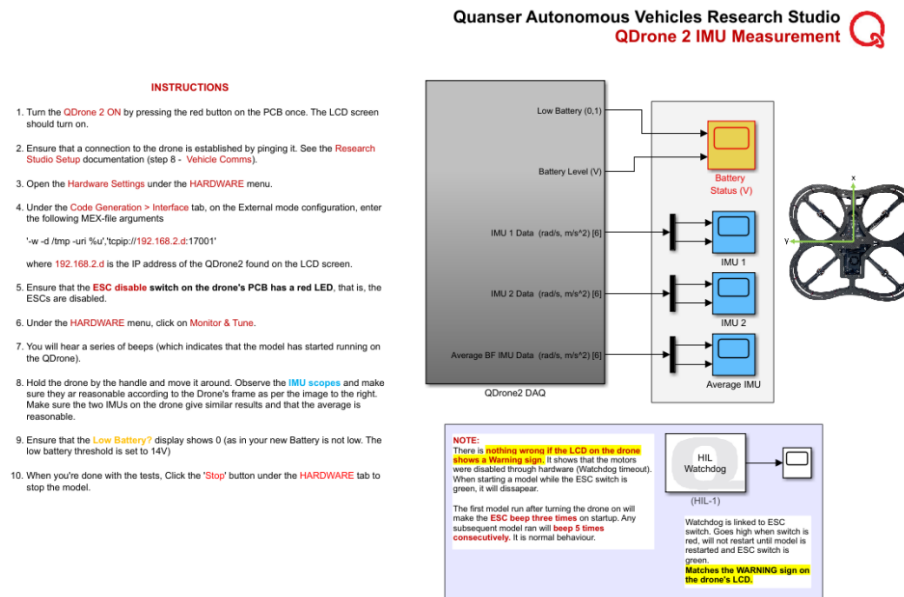Open the QD2_IMU_2021a.slx file from the same folder containing this file.

Figure 1. IMU Measurment model

Follow the instructions on the left of the the Simulink model (figure 1) to make sure the motors are disabled and that the model has started succesfully. Look at the output of the Average IMU scope. This takes the data from IMU 1 and IMU 2 and averages it out.

Hold the drone by the top handle and rotate it along all three axis using the figure to the right of the model to understand its reference frame, where the Z axis is going up on the drone. Figure 2 shows the expected output when rotating the drone along the positive and negative X, Y and Z axis in order. Notice the accelerometer output in Z is right under 10 since gravity acting on a still drone should be 9.8 m/s^2.
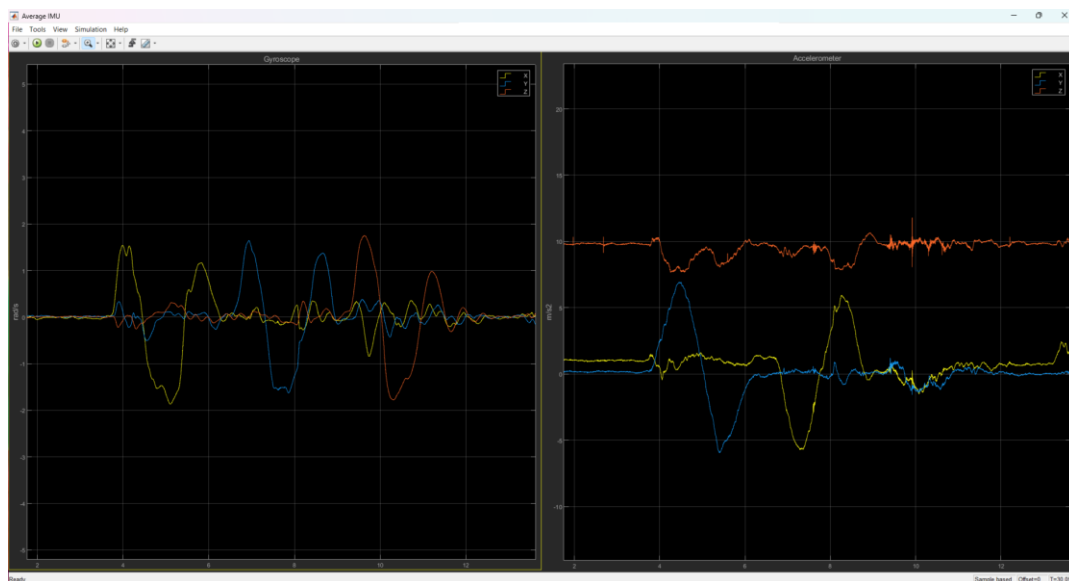

Figure 2. Average IMU gyroscope and accelerometer readings

Confirm both IMUs individually are working properly by opening the IMU1 and IMU2 scopes and confirming that the results are very similar (as shown in figure 3). Small variations may occur due to noise and/or their different locations on the drone. However, big changes in movement should be reflected similarly in both IMU plots.
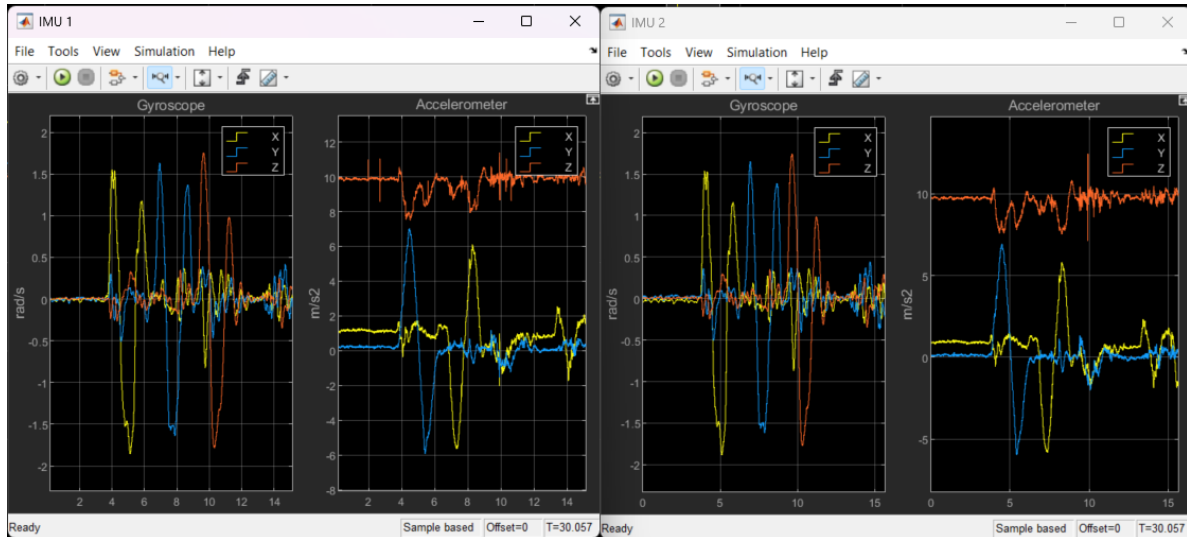

Figure 3. Plots of IMU 1 and 2 measurements