This sensor proved to be the most difficult to test with the materials we had success to, still we tried our very best to make do with what we had, as mentioned before the gyroscope was our main focus due to the materials we had.

The ground truth was one whose reliability we could trust to an extent: that is the angular velocity gotten from the encoder. We went with this based on the assumption that the encoder had higher accuracy due its counting method.

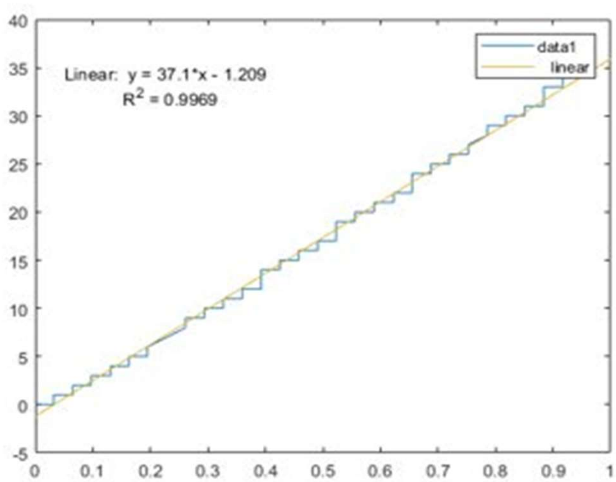
To extract the information we needed: angular acceleration, we used the formulas

- $a_c = \frac{v^2}{r}$ and $v = \omega r$ $which$ $turns$ $into$ $a_c = \omega^2 r$

It is important to note that the angular acceleration was measured in g's

Ground truth calculation

Angular Velocity estimation of ~37.1 counts/second

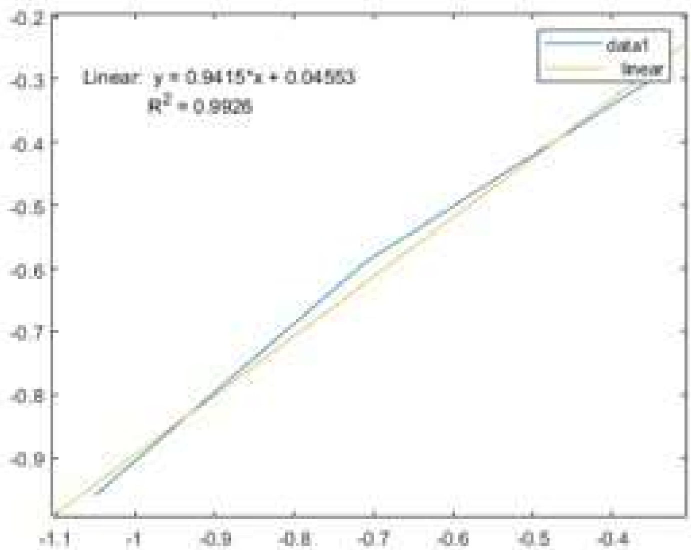
- 20 counts per rotation according to data sheet
- $\omega = \sim 11.65 rad/s = 667.8 dps$
- 

Results (of the characteristics measured to quantify the performance of the sensor)

- Repeatability
  Measurements along Y axis
  1 inch: [-0.28g, -0.29g, -0.33g] with average of -0.30g, expected -0.35g
  2 inch: [-0.61g, -0.54g, -0.63] with average of -0.59g, expected -0.71g
  3 inch: [-0.84g, -0.92g, -1.13g] with an average of -0.96g, expected -1.05g

- Range
  Unable to test due to wires

- Sensitivity



  Sensitivity which is the slope of the graph (0.9415) is expected
- Resolution
  Needed to accurately control the sensor/setup to be able to quantify

Summary and Conclusion

The setup we had for this sensor proved to be too complicated due to lack of proper testing materials not only that but this sensor requires complex calibrations and just like any other inexpensive sensor is prone to interference which contributes to some of the errors in the readings, all in all as mentioned before, this sensor can be assigned to complicated tasks if we can properly and fully quantify its weakness.