

## Prelab 7

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### 1. Key Specifications

Range Accelerometer	+/-2 to 16 g depending on model
Sensitivity Accelerometer	0.061 to 0.488 mg/LSB depending on model
Bandwidth Accelerometer	Low pass / high pass available depending on model
Rate Accelerometer	1.6 to 6664 Hz depending on model
Range Gyro	+/-125 to +/-2000 mdps depending on model
Sensitivity Gyro	4.375 to 70 mdps/LSB depending on model
Bandwidth Gyro	12.5 to 6.67 kHz depending on model
Rate Gyro	12.5 to 6664 Hz depending on model

2. To create a 2g test, you would accelerate the sensor across the table in difference directions to get the sensitivities. The acceleration the sensor undergoes would be 2g, and you would do this by measuring a set distance & time and repeatedly accelerating the sensor until you get 2g from the setup. As mentioned in the datasheet, taking the average of the directional sensitivities is how the one can be obtained.
3. The expected angular velocity would be a function of theta as it rotates around is pivot. This angular velocity can be modeled from the following set of equations:
  1.  $Mgh = \frac{1}{2}mv^2$  reduces to  $v = (2 * g * h)^{1/2}$  where  $h = L (1 - \sin(\theta))$  and  $L = L_2 - D/2$
  2. Also,  $w * L = v$ . Therefore,  $w(\theta) = (2 * g * (L_2 - D/2) * (1 - \sin(\theta))^{1/2}) / (L_2 - D/2)$

This gives angular velocity as a function of position. This could be compared directly against the data measured from the sensor. You would need to overlay the data such that the starting & ending velocity end up at 0, as the above formula is a function of theta and not time.

4. The SPI via SDA/SDI pins and ground/3.3V connections will need to be made to work the sensor.