Lab 6

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Mean value for accel x - y - z

-0.021433063829787238 -0.009010478723404257 -0.0166708468085107

Standard deviation for accel x - y - z

0.0026857994729115047 0.0016618590405999849 0.002392128835700027

Mean value for angular speed x - y - z

0.5831968085106384 -0.5718031914893619 -0.4974840425531916

Standard deviation for angular speed x - y - z

0.19837325416632606 0.05008111601495875 0.04374657750307139

Chart, histogram

Description automatically generated

Chart, bar chart, histogram

Description automatically generated

Seemed to work well – no real issues!



Chart, line chart, histogram

Description automatically generated

Using equation derived in prelab:

w(theta)= (2 \* g \* (L\_2-D/2)\*(1-sin(theta))^(1/2)/(L\_2-D/2)

W(90) = (2 \* 9.81 \* (7.65\*.0254-4\*.0254/2)\*(1-sin(0))^(1/2)/(7.65\*.0254-4\*.0254/2) = 19 rad/s

Whereas the graph here shows 450 deg/s, which is 8 rad/s. This is off by half, but is the right order of magnitude, which could be caused by friction and other factors.

2. Predicted peak accel: assuming accel is sinusoidal across the 2” of travel, and acting at 120 bpm, you can use this equation: 0.5\*Dpp\*(2\*pi/T)^2.

Plugging in: 0.5\*2\*(2\*pi/(60/120))^2 = 157 in/s^2 -> 0.41 g



Chart

Description automatically generated

Acceleration in g’s for the x direction appears to peak at approximately 0.4g, making it quite close to the prediction.

1. Predicting peak angular velocity. 0.5\*Tpp\*(2\*pi/T) where Tpp is 90 degrees; 120 bpm.

Plugging in: 0.5\*90\*(2\*pi/(60/120)) = 565 dps.



Chart, line chart

Description automatically generated

The peak values are about 580 dps, which puts it very close to the expected 565 dps from calculations.