Lab 6

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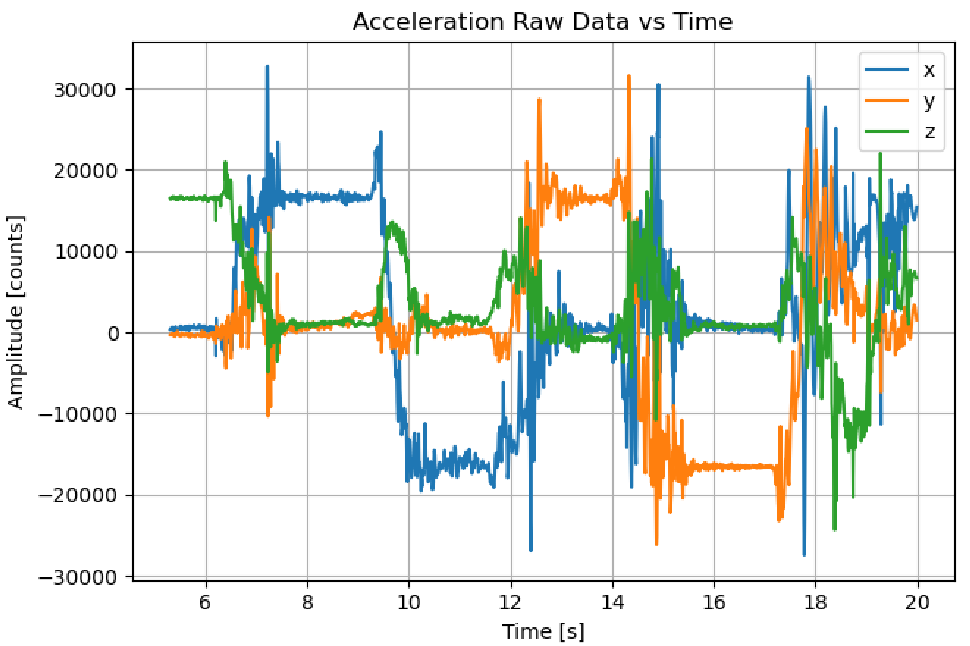
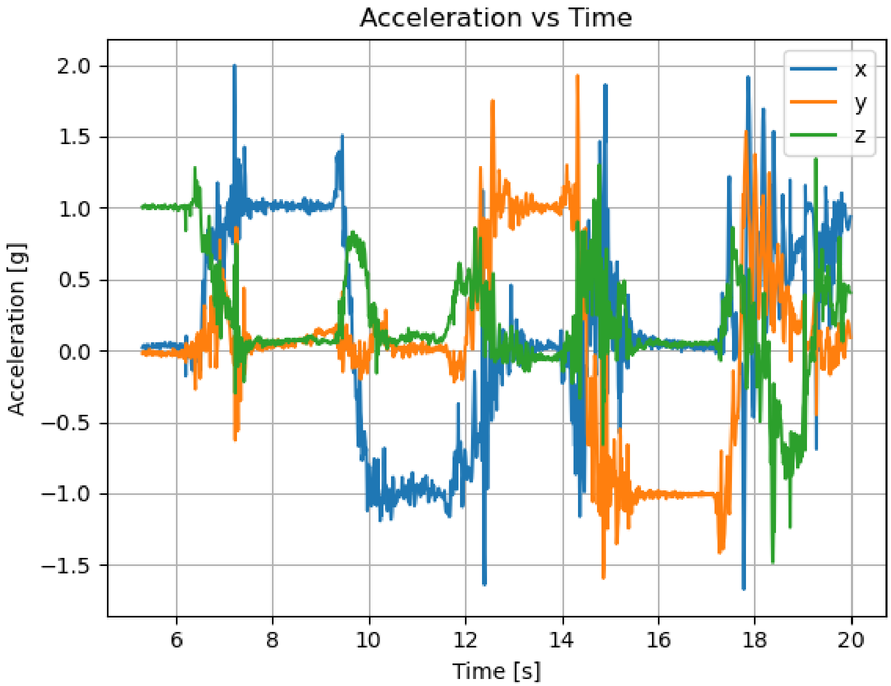
1.

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

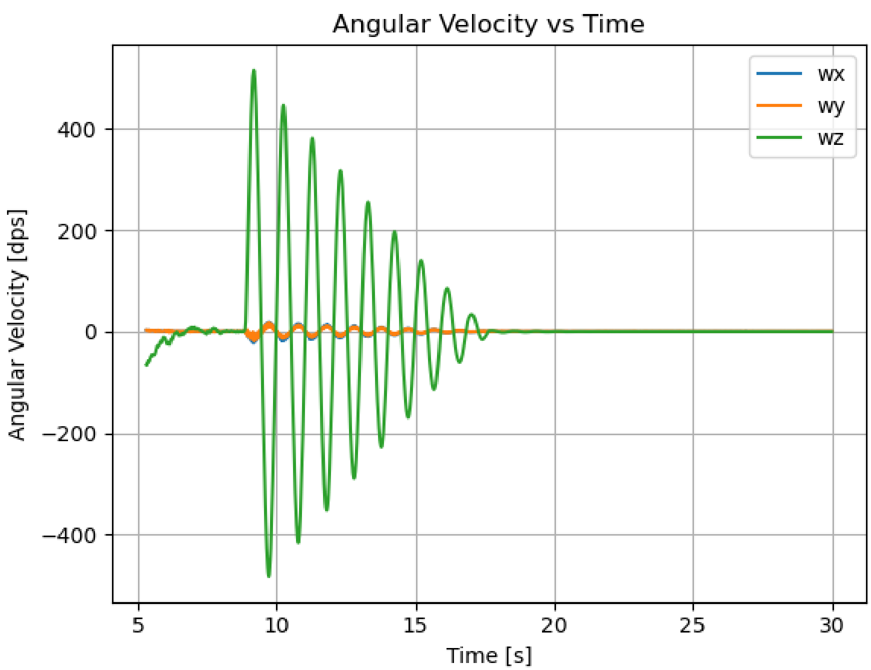
2.





Seemed to work well – no real issues!

3.



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

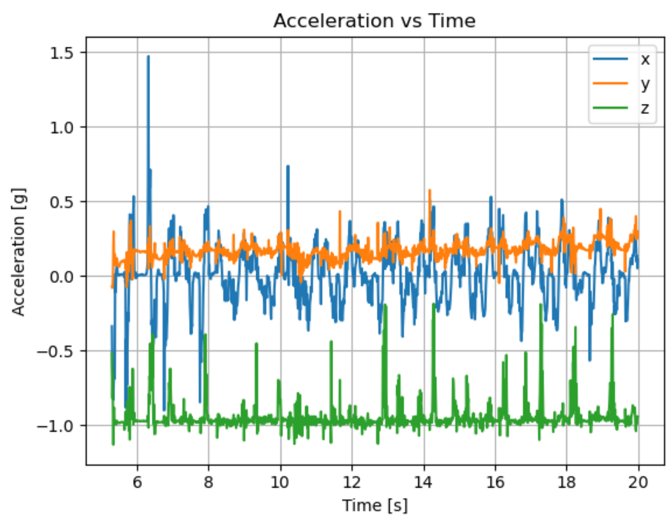
Whereas the graph here shows 450 deg/s, which is 8 rad/s. This is off by half, but is the right order of magnitude, which could be caused by friction and other factors.

4.

A) 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

B)

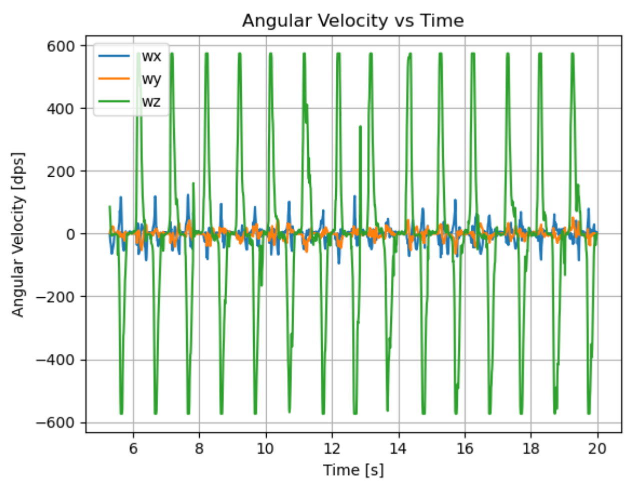


Acceleration in g’s for the x direction appears to peak at approximately 0.4g, making it quite close to the prediction.

C) 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.

D)



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