Modelling Gesture Control

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- Scale factor of 4mg per LSB, using

$$\Delta A_{OUT}\,[g] \cong 1\,g \times \sin(P)$$

  We can therefore substitute 4mg and obtain P to be 0.23 degrees per LSB.

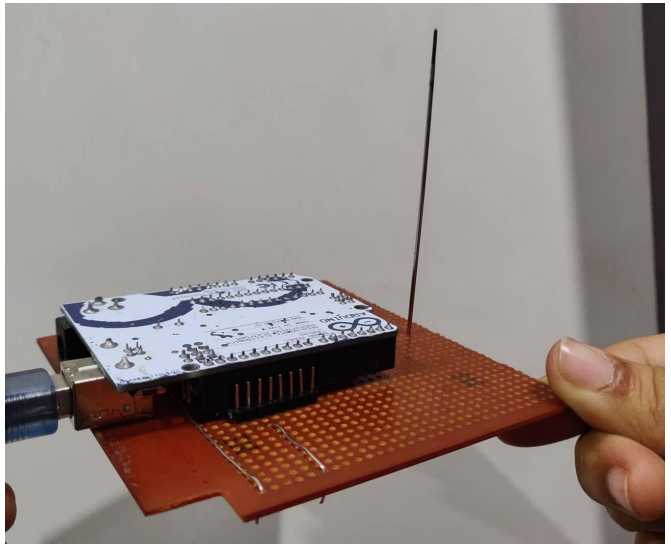
- Gesture control would require operation frequency anywhere between 50Hz to 600Hz and the output rate of ADXL345 is 3200Hz.

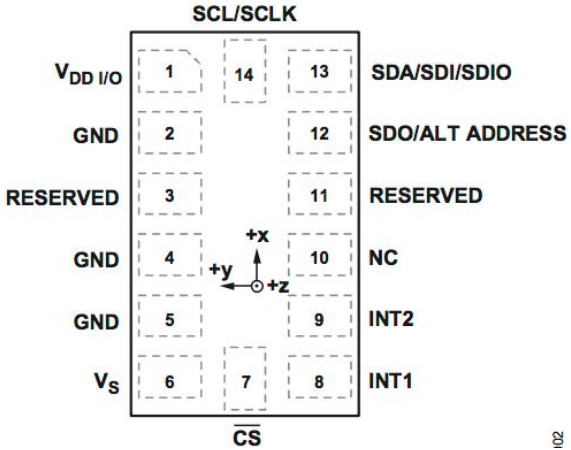
Technical

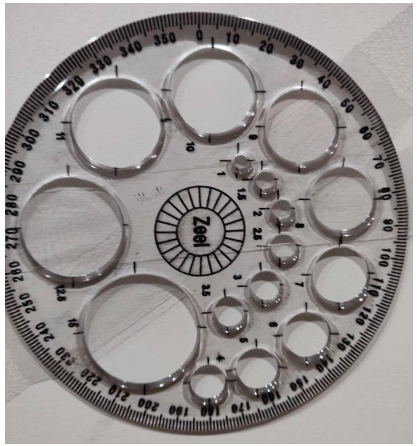
- Arduino UNO
- Processing
- ADXL 345

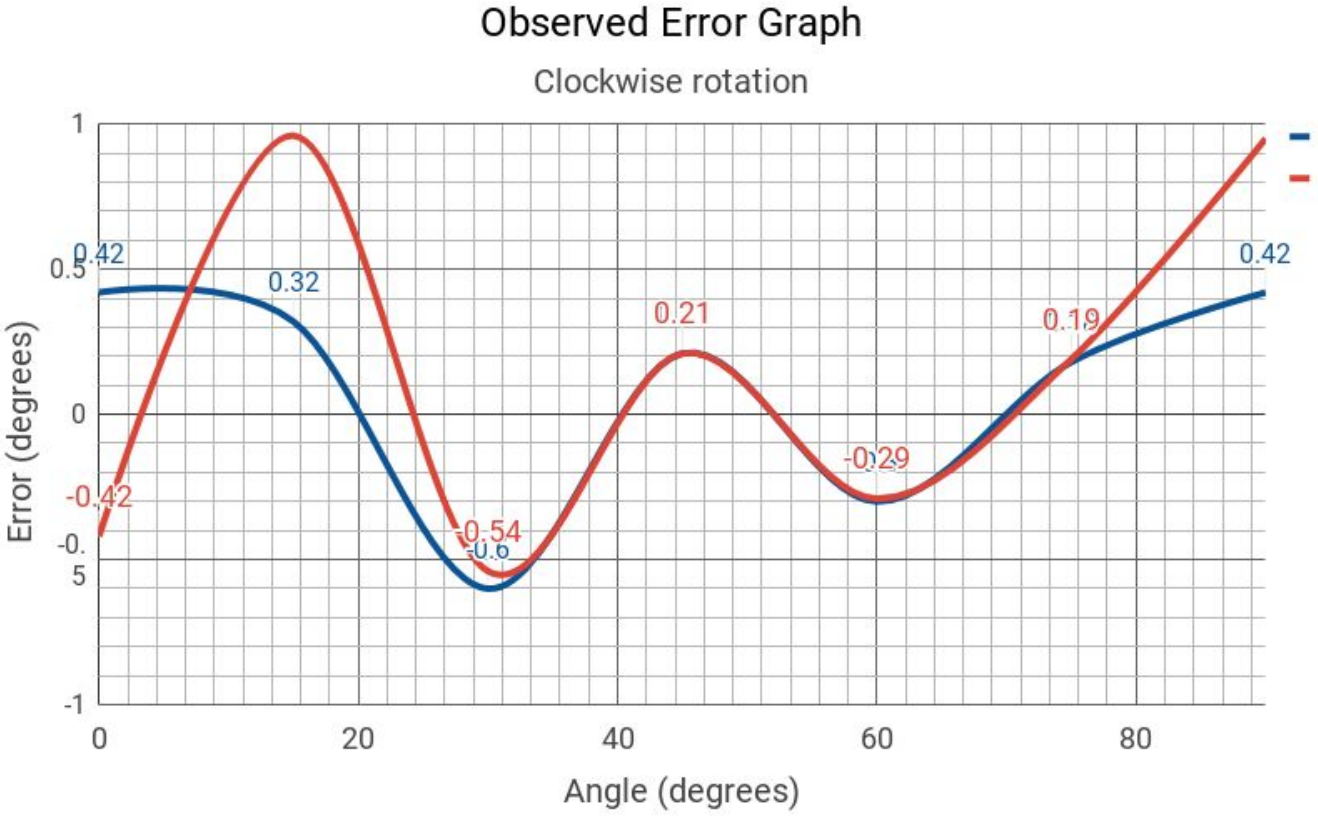
Non Technical

- Importance of planning







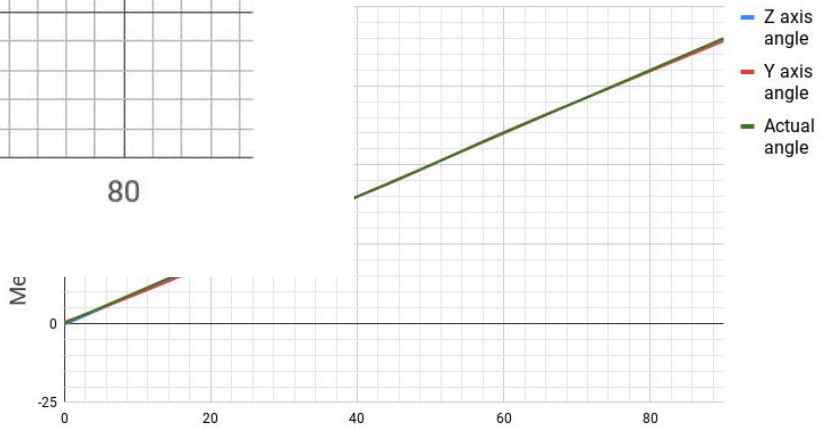


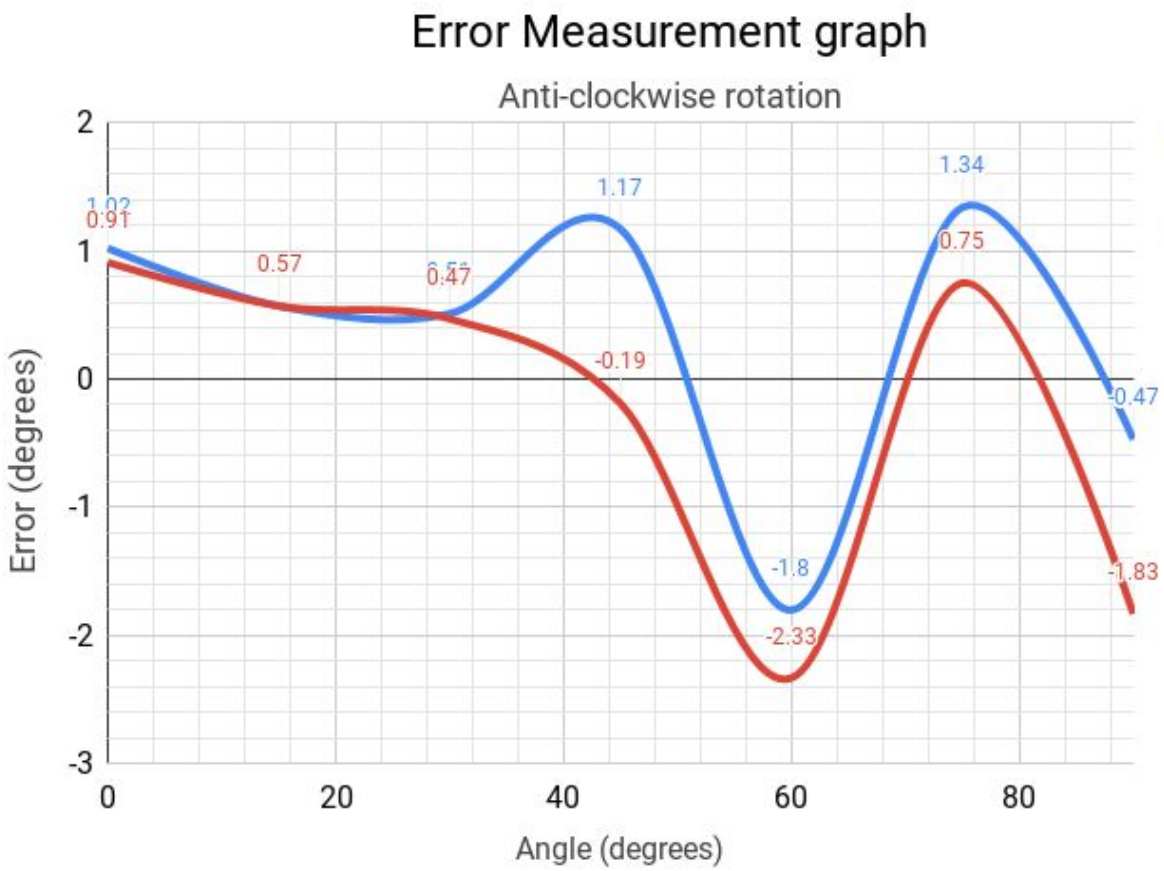
$$_{OFF} + (Gain \times A_{ACTUAL})$$

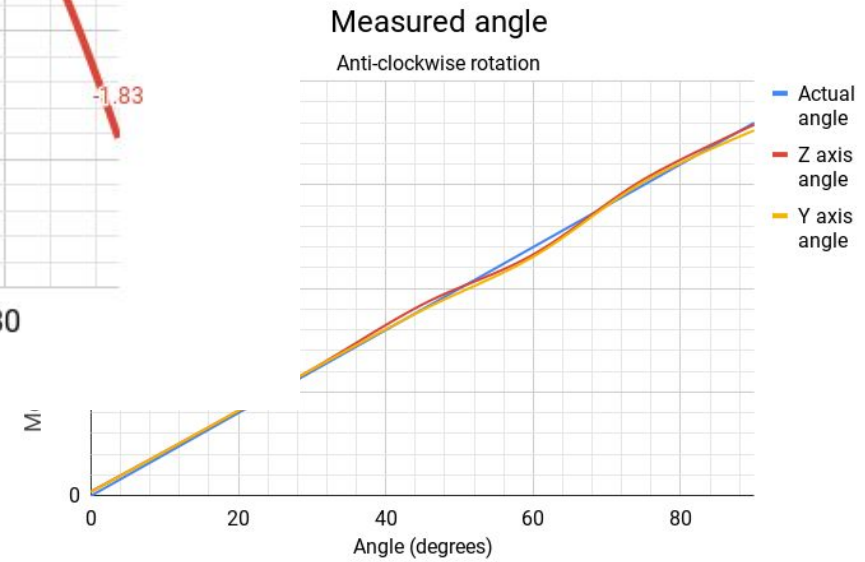
$$= 0.5 \times (A_{+1g} + A_{-1g})$$

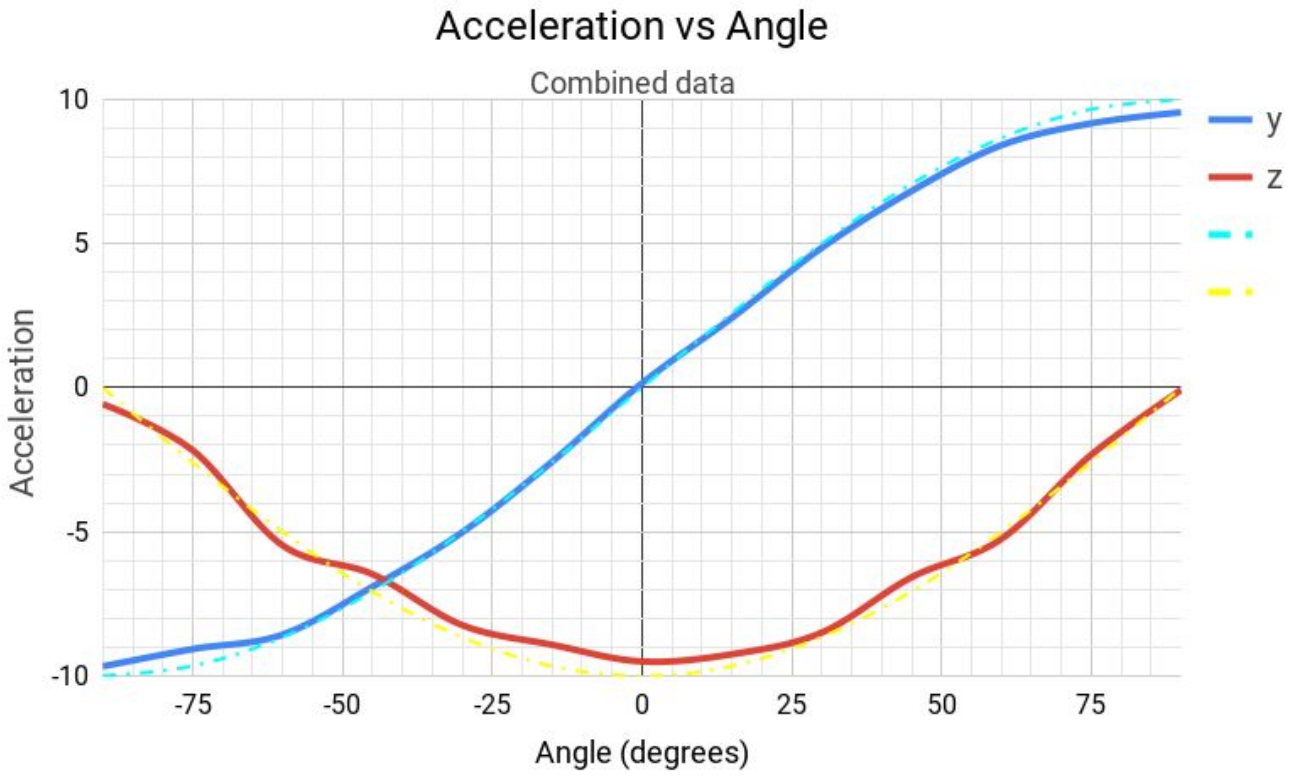
$$).5 \times \left(\frac{A_{+1g} - A_{-1g}}{1\,g} \right)$$

gle and Y axis angle




Error Measurement graph
Anti-clockwise rotation
Z axis error
Y axis error
Error (degrees)
Angle (degrees)
2
1
0
-1
-2
-3
0
20
40
60
80
1.02
0.91
0.57
0.47
1.17
-0.19
-1.8
-2.33
1.34
0.75
-0.47
-1.83


Measured angle
Anti-clockwise rotation
Actual angle
Z axis angle
Y axis angle
0
0
20
40
60
80
Angle (degrees)



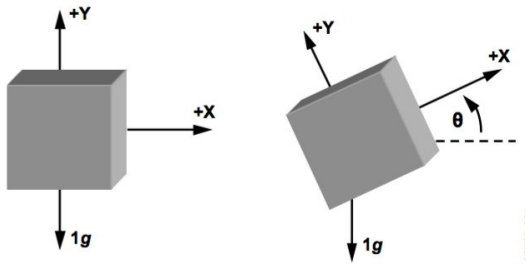
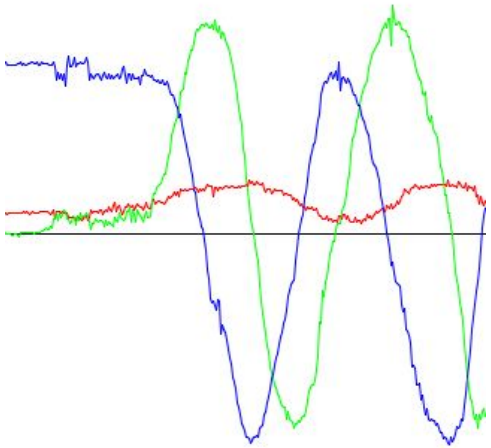


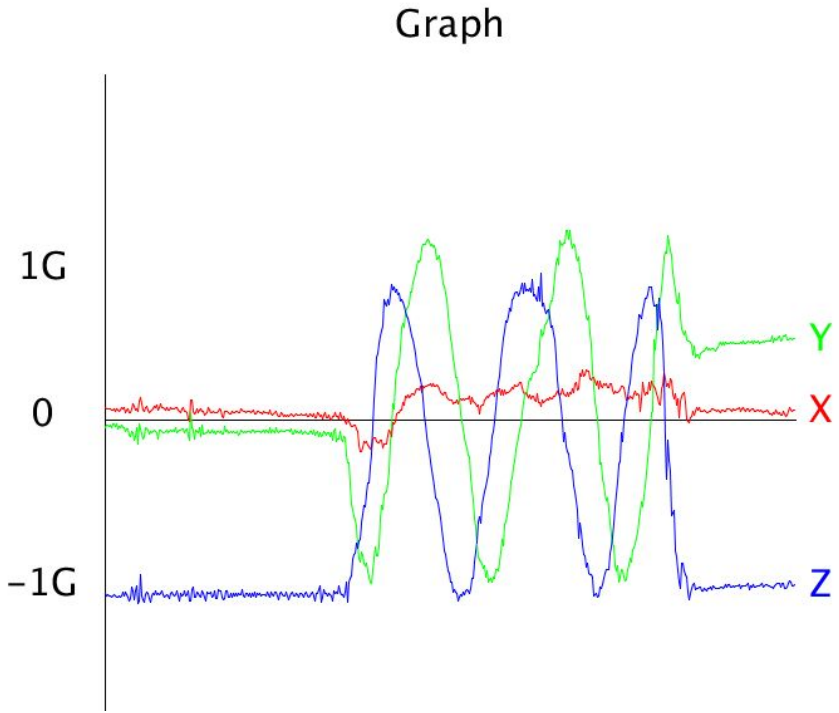
Figure 7. Two Axes Used for Tilt Sensing

$$\frac{A_{X,OUT}}{A_{Y,OUT}} = \frac{1\,g \times \sin(\theta)}{1\,g \times \cos(\theta)} = \tan(\theta)$$

$$\theta = \tan^{-1}\left(\frac{A_{X,OUT}}{A_{Y,OUT}}\right)$$

- Calibration before every run
- Processing for plotting the three angles simultaneously.





Further work?

- A more rigid frame to compare with actual angle? Better measurement techniques?
- Noise reduction?
- Improving graph visualisation.