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CSE 599Y HW 2

1. Bias:

   Accel x: -0.0150904427247324 *g* m/s^2 (note normalized to *g* = 1)
   Accel y: 0.00583385400267632 *g* m/s^2
   Accel z: -0.00097660093524 *g* m/s^2

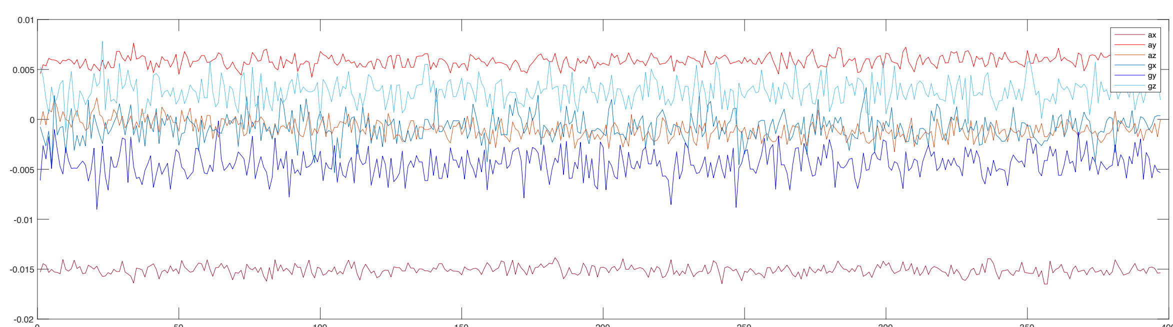
   Gyro x: -0.000789482359402338 rad/s
   Gyro y: -0.00445569855483133 rad/s
   Gyro z: 0.00280029105730132 rad/s

   RMS Noise:

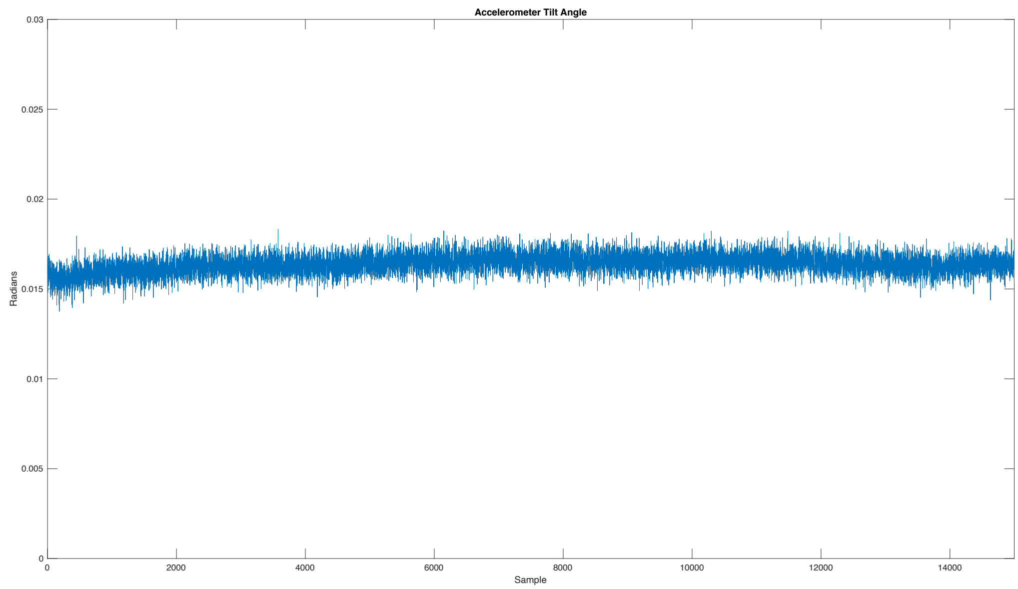
   Accel x: 0.0150978473120693 *g* m/s^2
   Accel y: 0.00586048931572918 *g* m/s^2
   Accel z: 0.00133859825185881 *g* m/s^2

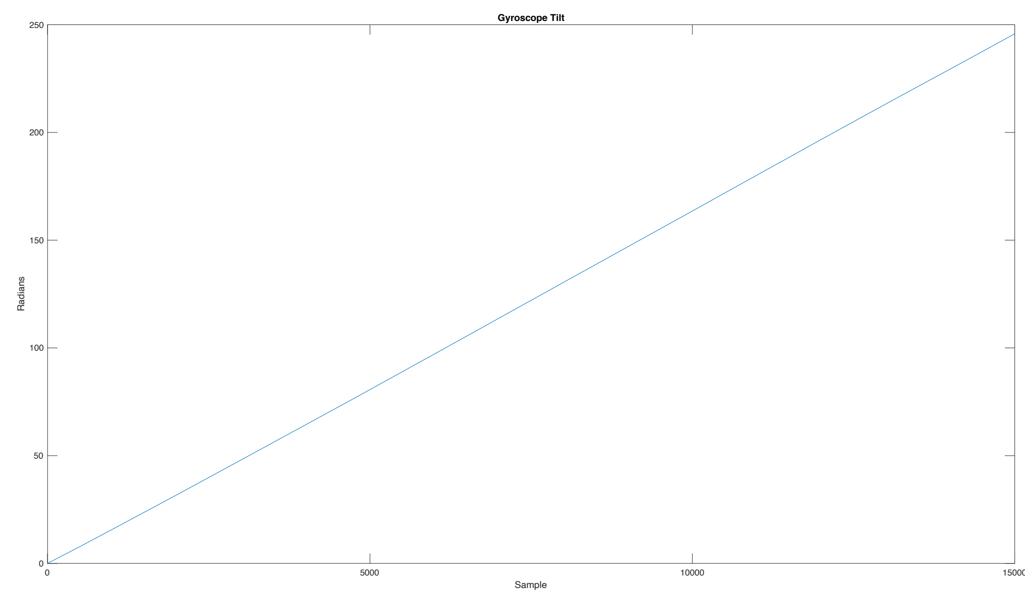
   Gyro x: 0.00153670151754877 rad/s
   Gyro y: 0.00464772327958114 rad/s
   Gyro z: 0.00307224861266790 rad/s

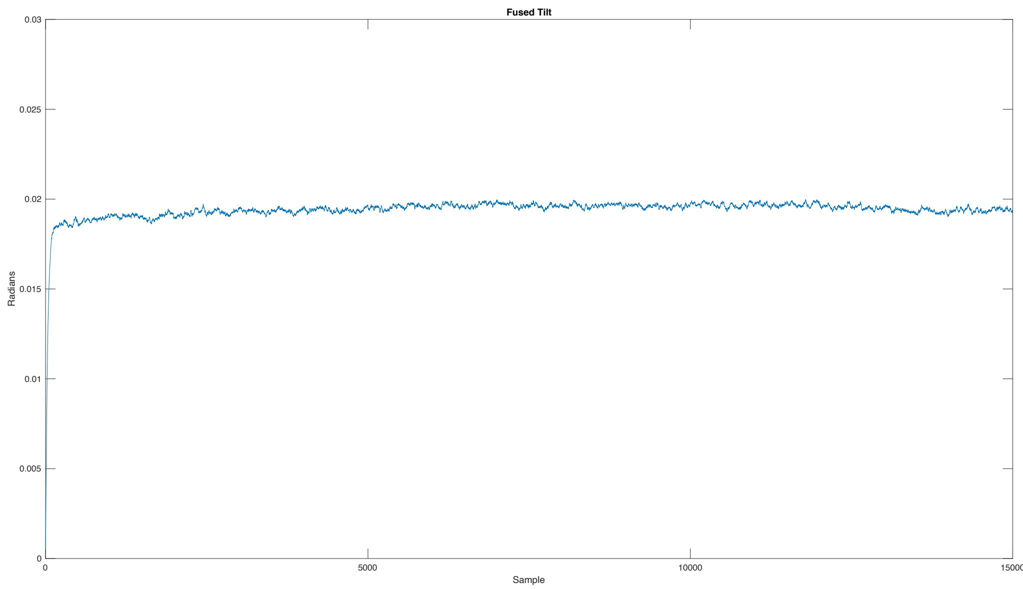
Above calculated from a few seconds of phone perfectly still data:



2. Calculated tilt (angle in radians off of +z axis out of phone) via different methods. Accelerometer had low drift for attitude measurement but had high noise characteristics. Gyroscope had high drift, but provided low noise measurements. The two were fused via complementary filter – the low-pass filtered accelerometer measurements were summed with the high-pass filtered gyroscope measurements to yield a fused measurement with less noise and less drift.


Accelerometer Tilt Angle
Radians
Sample
0.03
0.025
0.02
0.015
0.01
0.005
0
2000
4000
6000
8000
10000
12000
14000


Gyroscope Tilt
Radians
Sample
250
200
150
100
50
0
5000
10000
15000


Fused Tilt
Radians
Sample
0.03
0.025
0.02
0.015
0.01
0.005
0
0
5000
10000
15000