Clemson University
ECE 4310: Computer Vision
Lab 7: Motion Tracking
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Due: November 10, 2020

Purpose:

The purpose of this lab was to calculate the distance a phone traveled based on data from the acceleration in the x, y, and z directions and data from gyroscopes measuring pitch, roll, and yaw sampled every 0.05 seconds. The was to use this information given (in the .txt file) to create a C program which automatically segment the data into periods of motion and periods of rests and calculate the motion along and about each axis during the periods of motion.
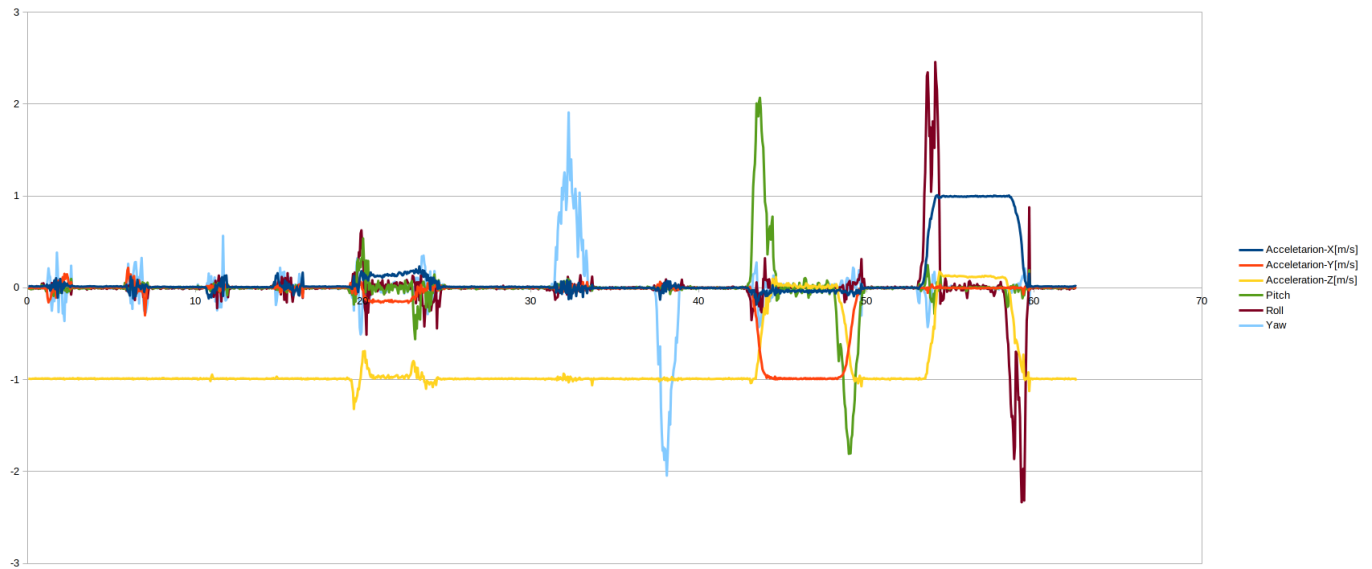
Output and Results:
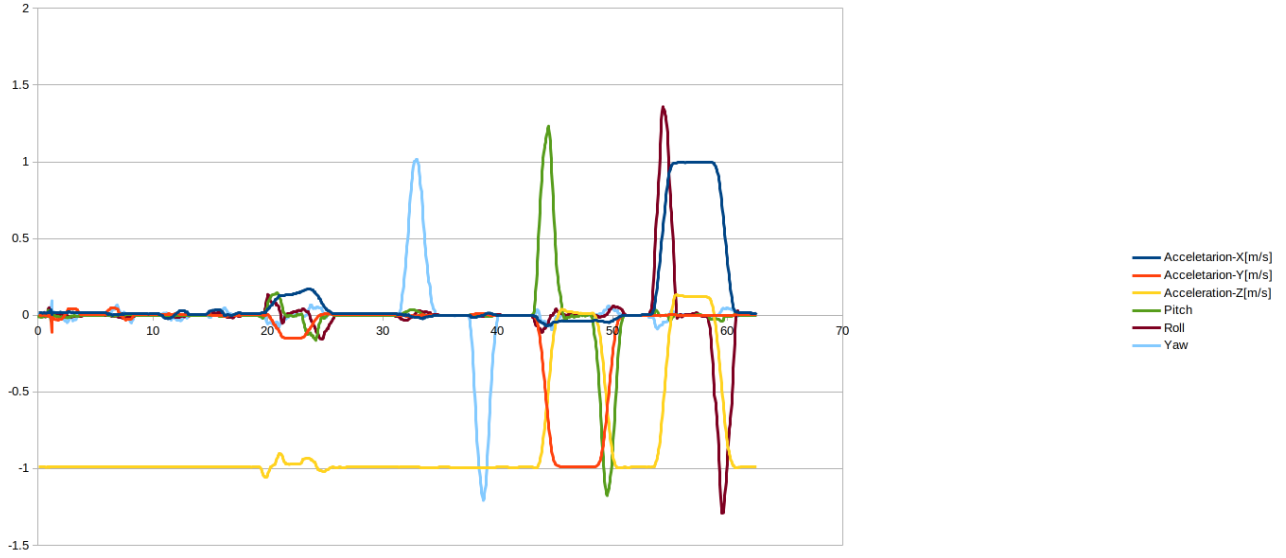

Figure 1: Raw Data

Figure 2: Smoothed Data (Window size = 25)

Table 1: Results in movement and rotation (Window Size = 10)

Start Index	Stop Index	Start Time	End Time	X [m]	Y [m]	Z [m]	Pitch [radians]	Roll [radians]	Yaw [radians]
15	49	0.7	2.4	0.242882	-0.313148	-14.010061	-0.017793	0.0014	-0.046751
110	142	5.45	7.05	0.057237	0.53329	-12.414348	0.001226	-0.015332	0.041271
206	238	10.25	11.85	-0.217162	0.081988	-12.399938	-0.001187	-0.00968	-0.021367
287	313	14.3	15.6	0.306143	-0.000505	-8.185588	-0.00397	0.018928	0.038564
314	329	15.65	16.4	-0.06246	-0.003031	-2.725714	-0.00156	-0.01674	0.002479
379	408	18.9	20.35	0.359972	-0.054766	-10.64872	0.160133	0.101771	-0.066214
449	488	22.4	24.35	3.056256	-1.637123	-17.66159	-0.17722	-0.113945	0.050609
623	663	31.1	33.1	-0.104642	-0.106179	-19.392608	0.046047	-0.000761	1.506481
742	775	37.05	38.7	-0.13283	0.117453	-13.269423	-0.001093	-0.00997	-1.505605
855	889	42.7	44.4	-0.659122	-4.135501	-11.766035	1.575511	-0.096717	-0.080646
957	991	47.8	49.5	-0.551448	-12.606755	-2.955155	-1.517109	0.008954	0.050742
1060	1088	52.95	54.35	2.599399	-0.017509	-8.314717	-0.005016	1.702578	-0.073202
1159	1195	57.9	59.7	14.105117	-0.017829	-2.897318	-0.038691	-1.605712	0.045554
Total Distance:				18.999341	-18.159615	-136.64122			
Total Angular Rotation:							0.019278	-0.035226	-0.058083

Thresholds: Accelerator = 0.0009 and Gyroscope = 0.03

Table 2: Results in movement and rotation (Window Size = 20)

Start Index	Stop Index	Start Time	End Time	X [m]	Y [m]	Z [m]	Pitch [radians]	Roll [radians]	Yaw [radians]
6	48	0.25	2.35	0.352533	-0.309568	-21.381299	-0.017175	0.000298	-0.044526
100	142	4.95	7.05	0.191492	0.578579	-21.376094	0.001452	-0.01667	0.040136
197	237	9.8	11.8	-0.150589	0.105197	-19.386427	-0.000551	-0.012135	-0.013817
277	329	13.8	16.4	0.68473	0.018411	-32.78159	-0.005372	0.001318	0.041893
369	407	18.4	20.3	0.434299	-0.003757	-17.976666	0.16069	0.105549	-0.059015
440	485	21.95	24.2	3.981427	-2.823389	-23.638944	-0.192021	-0.093844	0.049514
613	661	30.6	33	-0.00152	-0.075387	-27.943726	0.047987	-0.0047	1.4599
733	774	36.6	38.65	-0.139125	0.087022	-20.451682	-0.001611	-0.010253	-1.4764
845	889	42.2	44.4	-0.641987	-4.129016	-21.225546	1.575496	-0.097429	-0.080252
947	991	47.3	49.5	-0.909985	-22.070812	-2.855779	-1.513114	0.00934	0.051571
1050	1088	52.45	54.35	2.612688	-0.019962	-16.336424	-0.005032	1.702818	-0.073442
1150	1195	57.45	59.7	23.021133	-0.03924	-1.887527	-0.040427	-1.616448	0.043937
Total Distance:				29.435096	-28.681921	-227.2417			
Total Angular Rotation:							0.010323	-0.032157	-0.060501

Thresholds: Accelerator = 0.0009 and Gyroscope = 0.03

Conclusion:

The purpose of this lab was to calculate the distance a phone traveled based on data from the acceleration in the x, y, and z directions and data from gyroscopes measuring pitch, roll, and yaw sampled every 0.05 seconds. As seen in Table 1 and 2 above, as the window size gets bigger more data is lost when trying to calculate how far the phone has traveled. I choose 10 and 20 window sizes because I felt like they were far enough apart to get a sense of how the data changes with window size but not too big that data is lost. Some of the axis are easier to calculate due to less variance in them and vice versa.