GROUP 2

MOVEMENT CORRECTION SYSTEM

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Project Goal

Movement Correction System for a common mistake in boxing

- Hardware used: M600 Smartwatch, Verity Sense Sensor, Android phone
- real-time identification
- Instant feedback on watch/phone
- Visualization of Progress: percentage of correct punches in each training session

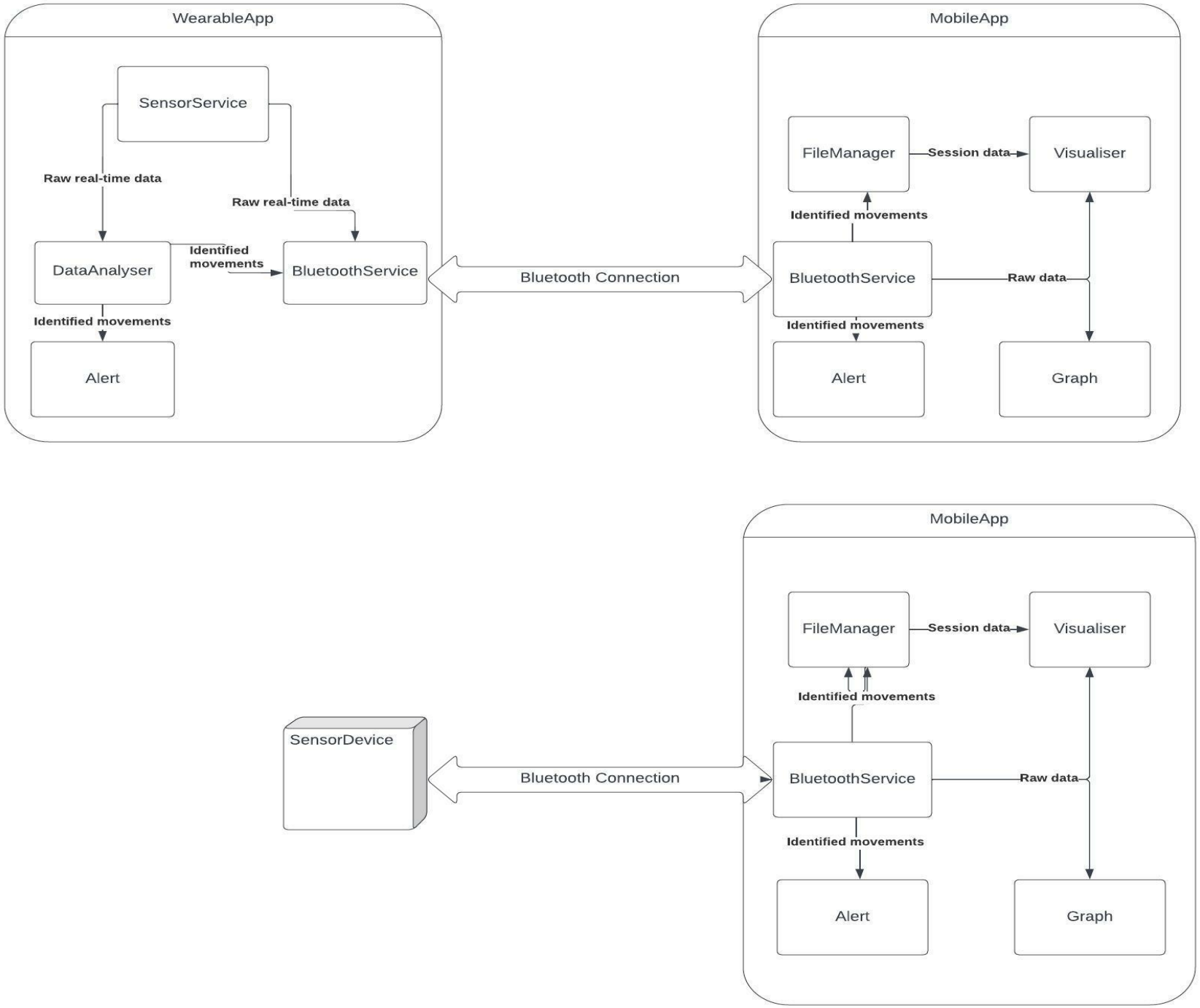
The mistake explained:

Especially beginner athletes face this problem when punching a straight/cross. After the extension of the arm, they tend to drop their hand towards the ground. With correct technique, the hand is pulled back straight to the jaw.

Methodology

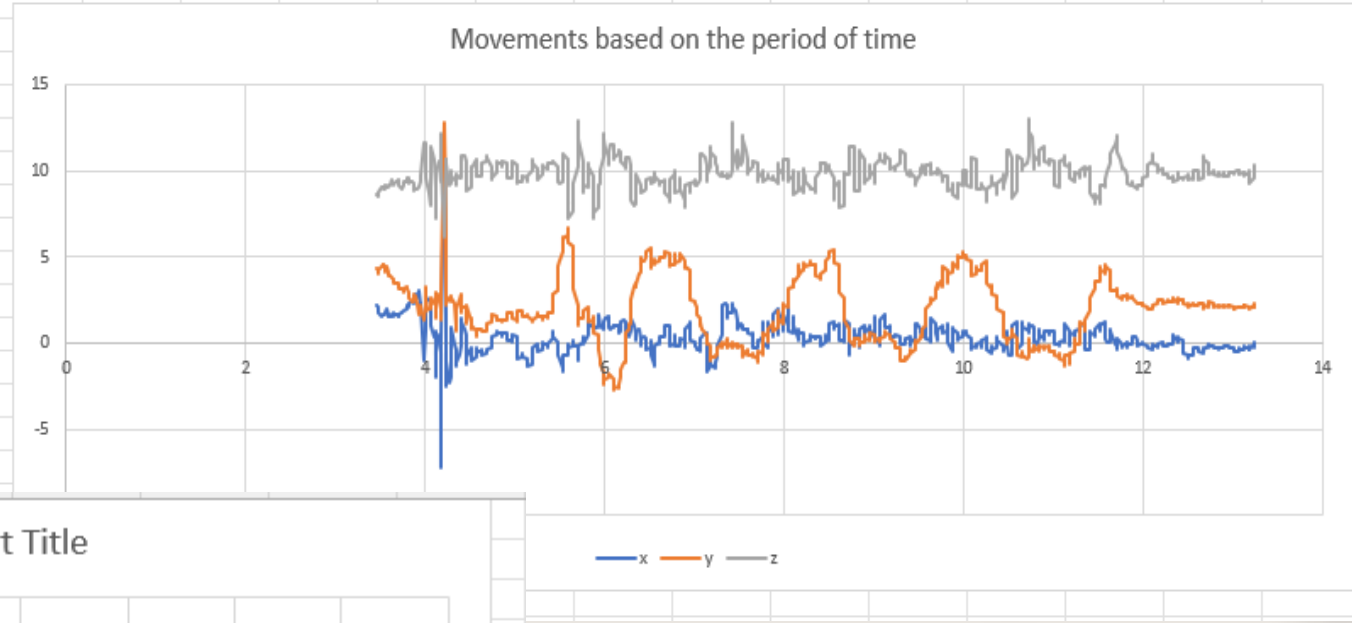
- Collection of sample data
  - Test person with boxing experience for correct and incorrect samples
  - Test person without any experience, instructed
  - Test persons without any experience and no instructions
- Sample analysis
  - Identification of patterns
  - Direction and duration of acceleration
- Algorithm design
  - Search for an algorithm to identify correct/incorrect movements, based on sample analysis
- Algorithm testing
  - Testing of algorithms with the same test persons

Software Design

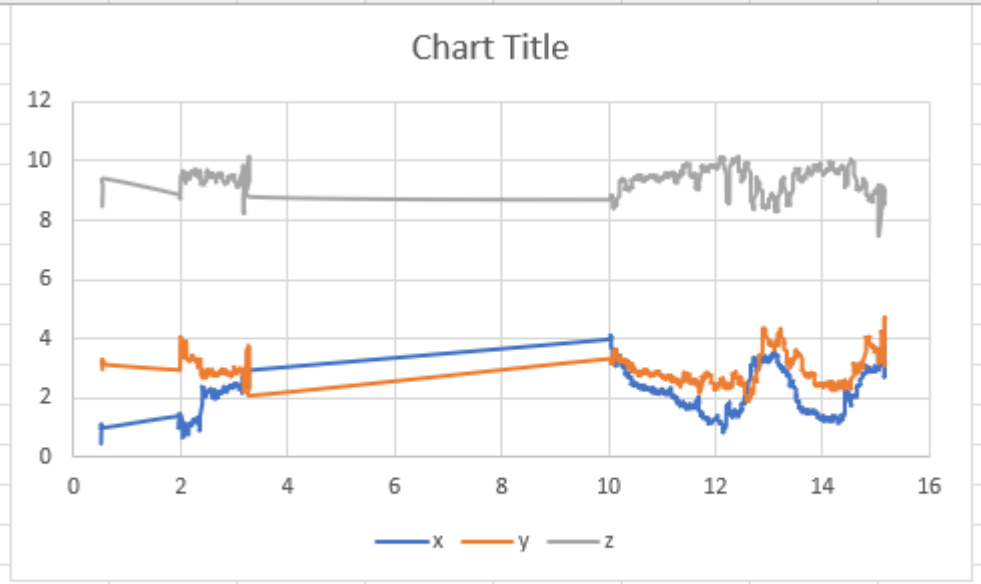


Data analysis

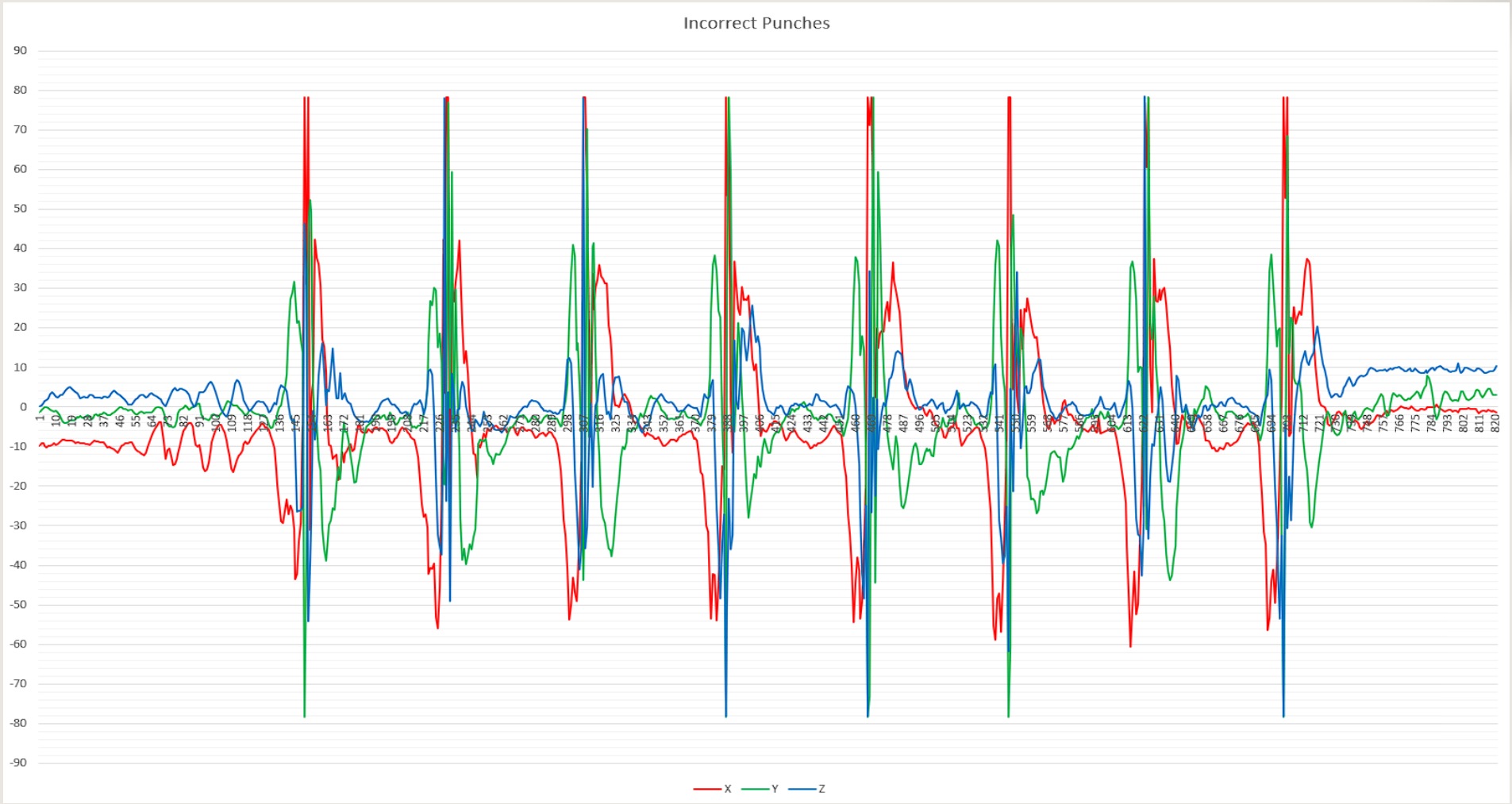
time/s	time/ms	x	y	z
3.458	3458	2.19661	4.33819	8.64048
3.466	3466	2.10329	4.24726	8.47777
3.469	3469	2.00519	4.09651	8.48256
3.472	3472	1.87358	4.07019	8.56152
3.475	3475	1.81855	4.11805	8.7003
3.477	3477	1.73958	4.22333	8.78644
3.517	3517	1.53141	4.49133	9.02573
3.523	3523	1.67737	4.56072	9.07358
3.528	3528	1.65344	4.49372	9.0353
3.538	3538	1.62233	4.51526	8.94437
3.541	3541	1.7013	4.4004	8.91087
3.545	3545	1.79701	4.15873	9.2028
3.573	3573	1.93819	4.42911	9.0353
3.581	3581	1.63908	4.17308	9.04487
3.586	3586	1.57926	4.05823	9.07358



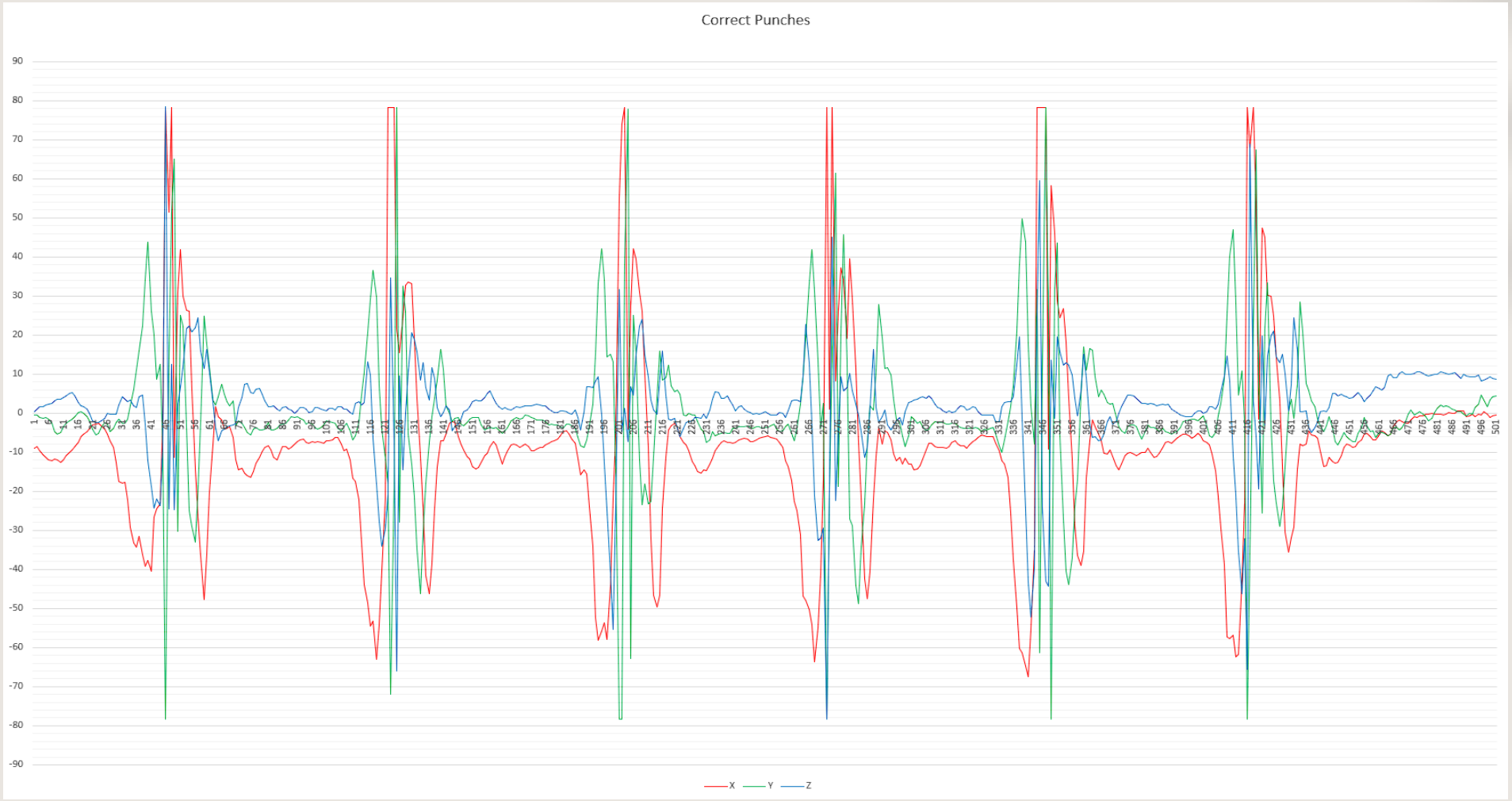
time/s	time/ms	x	y	z
0.517	517	0.445065	2.962314	8.487342
0.52	520	0.789631	3.227918	8.633304
0.523	523	0.863809	3.306881	8.829515
0.525	525	1.050449	3.146562	8.992228
0.527	527	1.103091	3.213561	9.209974
0.53	530	0.976272	3.134598	9.420543
1.962	1962	1.368695	2.945565	8.872586
1.971	1971	1.150948	3.031706	8.748159
1.974	1974	1.0002	3.352345	8.800801
1.977	1977	0.9667	3.79741	8.913264
1.983	1983	1.258625	4.053442	9.15494
1.987	1987	1.462015	4.082155	9.480363
2.028	2028	1.306481	3.881158	9.626326
2.034	2034	1.119841	3.708875	9.674182
2.039	2039	0.952343	3.534199	9.609575
2.042	2042	0.746561	3.409772	9.54497



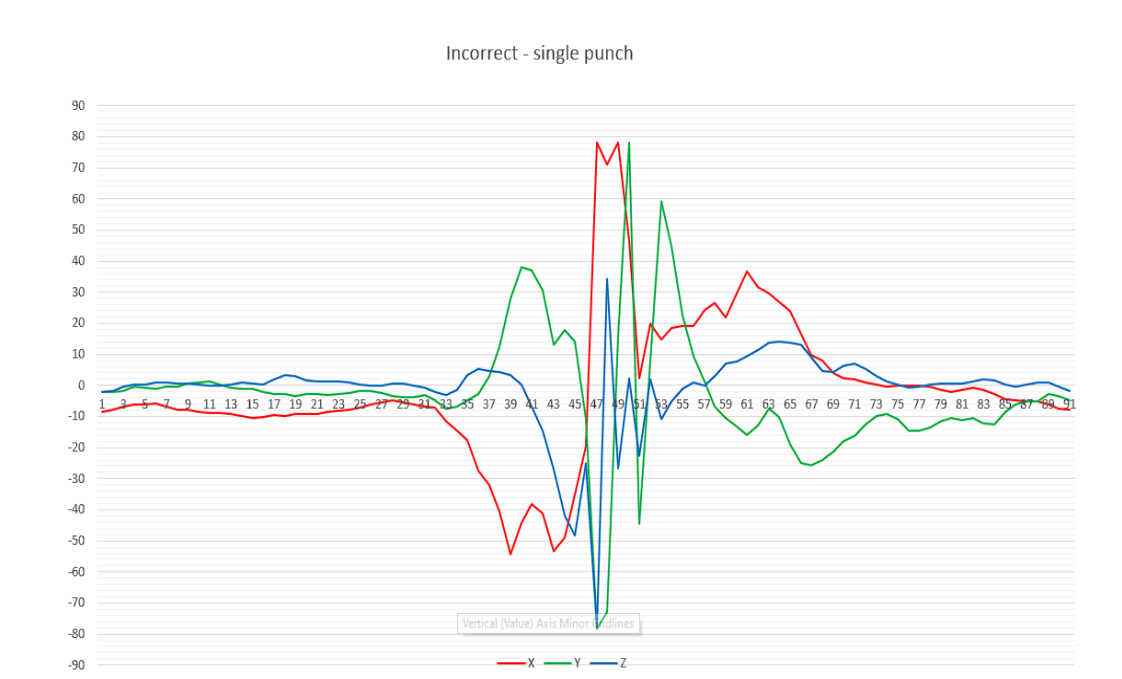
Data Analysis – Incorrect Punches

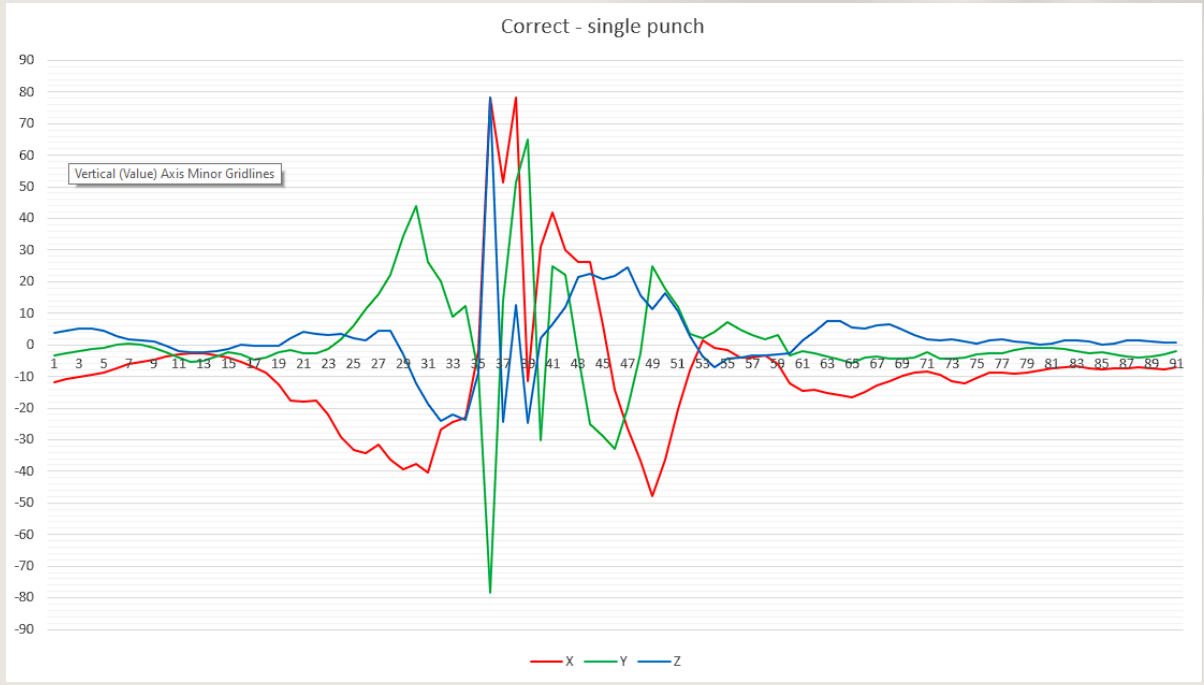


Data Analysis - Correct Punches



Data Analysis – Comparison





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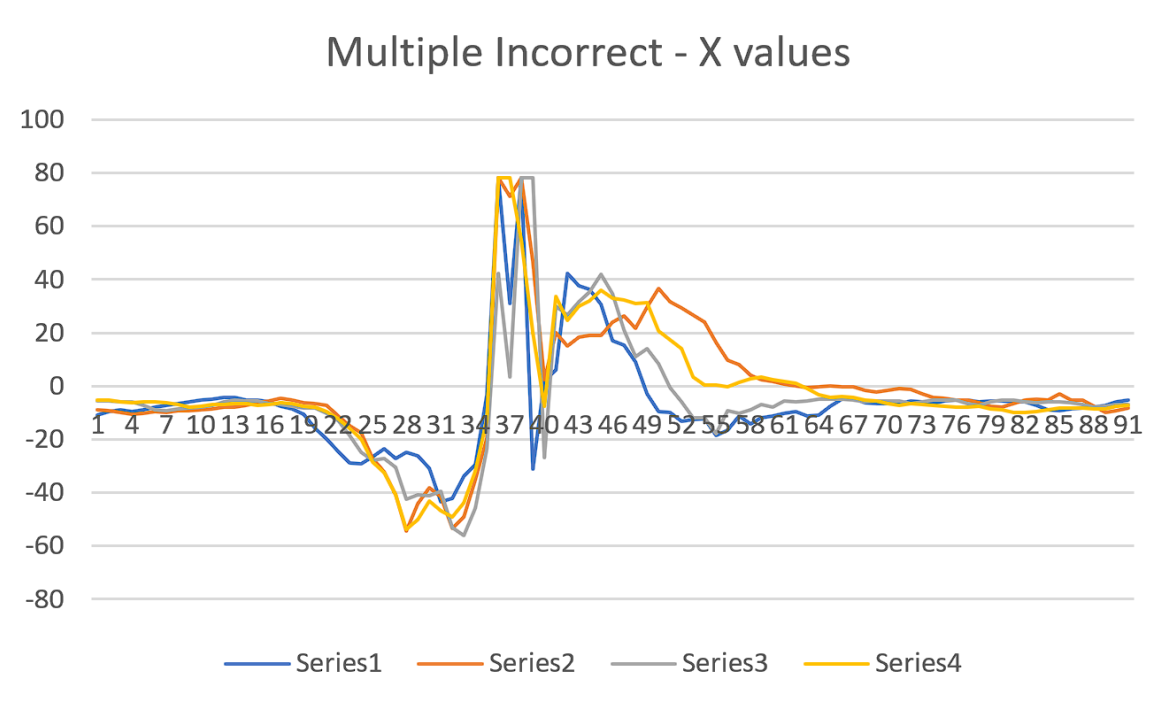
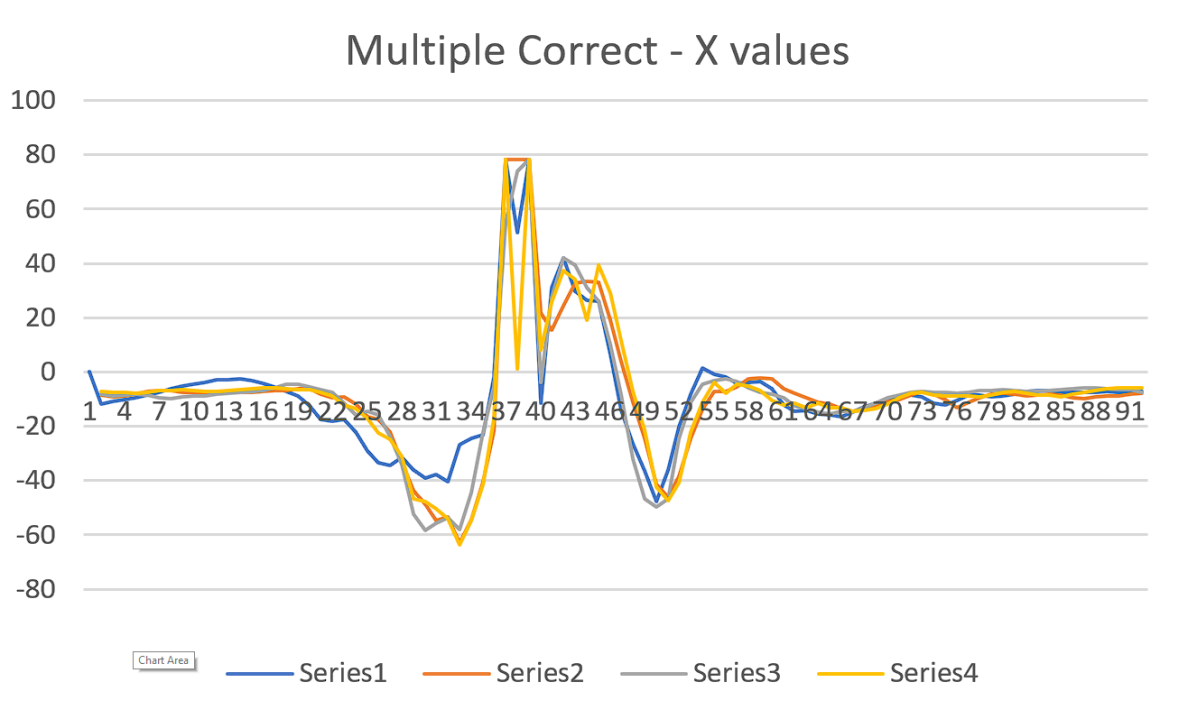
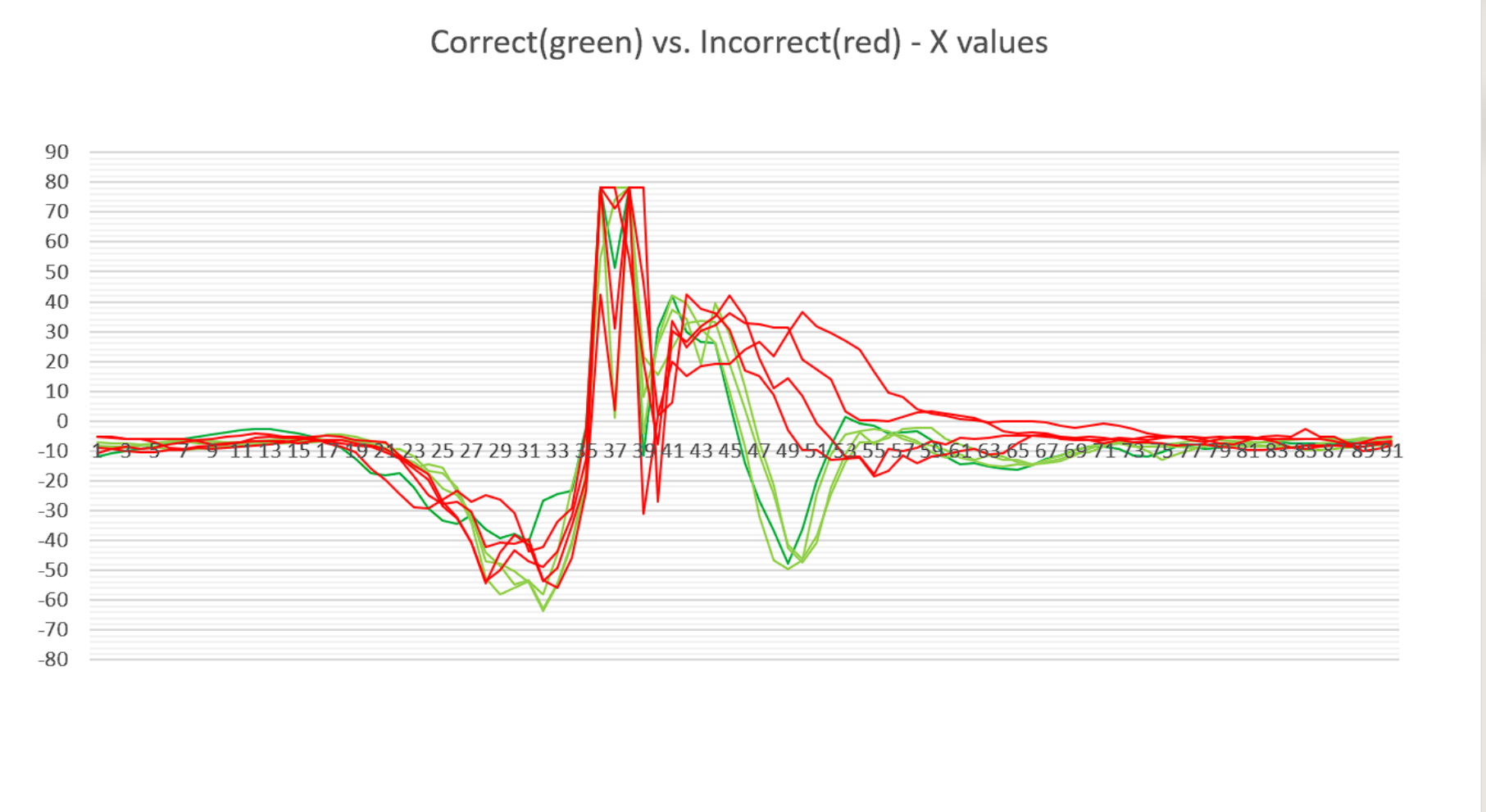




Data Analysis – Comparison of X values



Project Requirements and Milestone

- Basic Requirements:

_Read out / extract data from sensor.

_Read out / extract data from watch.

_Analyze data.

_Visualize data in clear and user-friendly format.

- Current Milestone:

Data visualization on mobile phone and data analysis finished

Current Status

Wearable App:

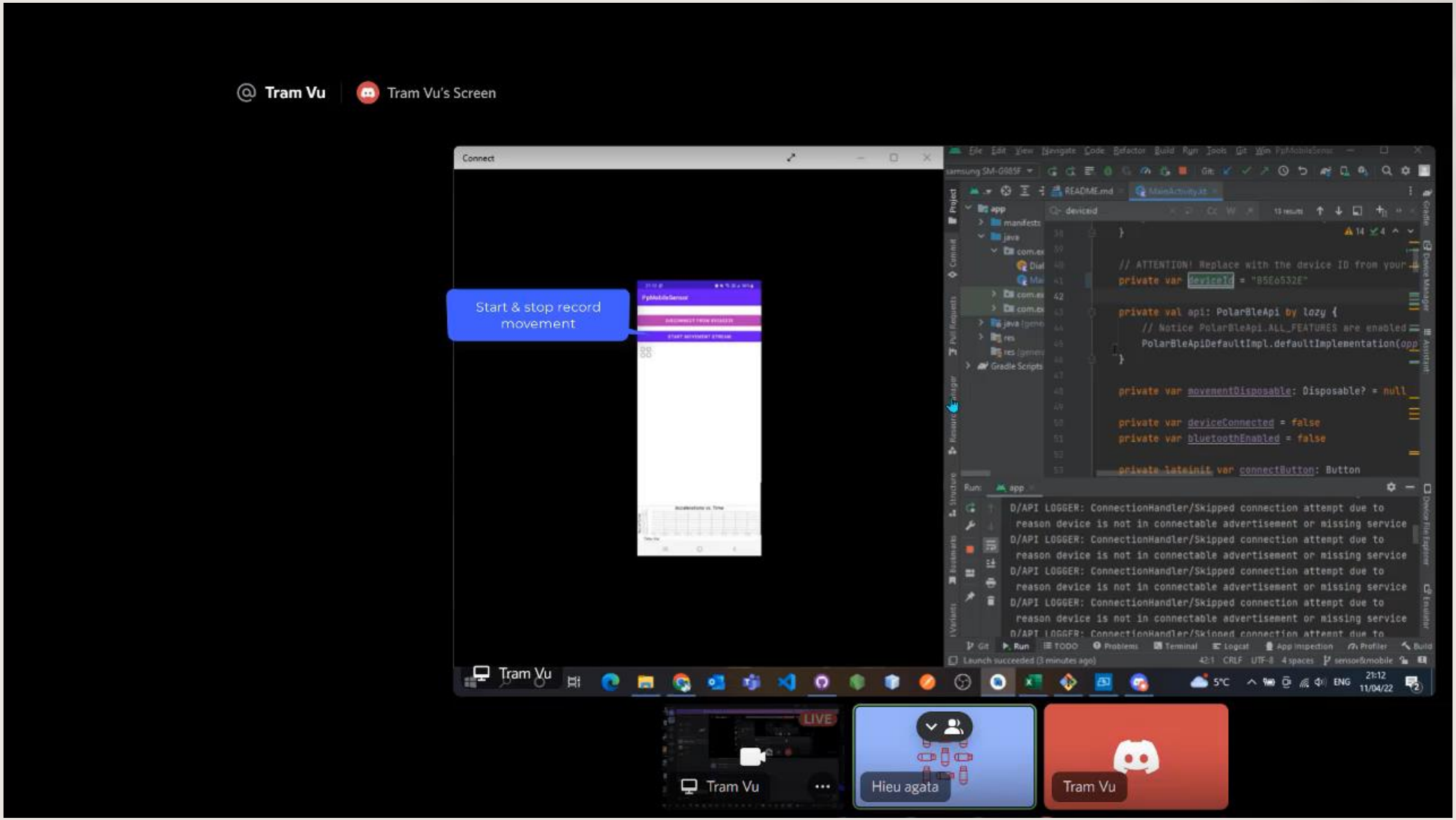
- Retrieve sensor data, storage possible in csv file
- Establish Bluetooth connection with phone
- Data streaming from watch to phone

Mobile App:

- Read and show streaming data from the sensor/watch.
- Draw a graph based on the axis data from sensor.

Data Analysis

A recording showing how the app works



Upcoming tasks:

- Continuing with the Data analysis: collecting more data samples.
- Finalize the Software Design and details, UI.
- Implementation done.