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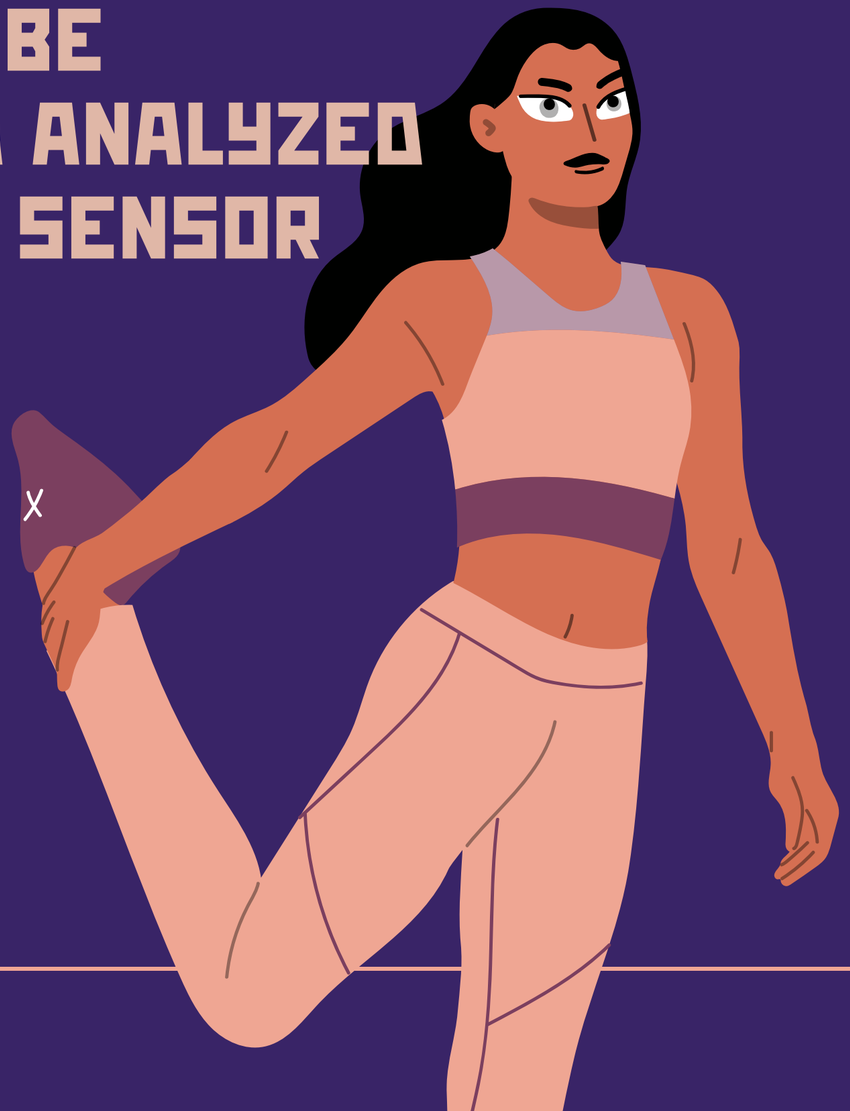
EXERCISE 10: SCIENTIFIC QUESTION

Course: Medical Software Development

SCIENTIFIC QUESTION: HOW CAN PUSHUP PERFORMANCE BE MEASURED AND ANALYZED USING ANDROID SENSOR DATA?

File: pushups.json



USED SENSORS:

icm4x6xx Gyroscope Non-wakeup
icm4x6xx Accelerometer Non-wakeup

ANSWERS

How many Pushups were done?

- 50

How consistent are the movement patterns across the push-ups?

- SD of intervals: 0.343 seconds

What is the average duration of each push-up?

- 0.190 seconds

How much time was spent during lowering and lifting?

- Avg. lowering time: -4.182 seconds
- Avg. lifting time: 4.372 seconds

ANALYTICS:

Data Preprocessing:

- Sort data by timestamps.
- Extract and normalize sensor entries.

Metric Calculation:

- Detect push-up completion and push-up start using resultant acceleration.
- Calculate consistency, average duration, lowering and lifting times of push-ups.

Visualization:

- Resultant acceleration over time to visualize performance.
- Angular velocity from gyroscope to analyze movement.