ECE M202A Project

QVAR HOOPS

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MOTIVATION & OBJECTIVES

- Athletes across the board are always trying to improve on one thing: consistency
  - Ex. Basketball players shooting hoops
- This project aims to use both Neuromuscular (QVAR) and Accelerometer (IMU) data to measure the consistency of a player's shot, both physically and physiologically
- The goal is to create a data-driven tool that athletes can use to help improve their shot consistency

TECHNICAL APPROACH & NOVELTY

- Current most advanced Basketball training technology - Homecourt AI
  - Machine vision-based smart shot tracking and training
  - Tracks certain visual statistics, but nothing else
- By adding sensors to the body of the player (QVAR and IMU), we are able to gather new data that can enhance the training process and provide a new level of insight into a player's shot
  - We can see if the muscle is firing the exact same way for every shot, how it behaves when fatigued, etc.

METHODS

Data Collection

- Done using STMicroelectronics sensor chips attached to the sensortile.Box Pro
- Controlled using android device, and collected onto an SD Card
- Data is then transferred onto a laptop for post processing

Data Processing

- Initially planned to do some preprocessing using embedded capabilities of the chip
  - complicated infrastructure
- Data post processing done using python (jupyter notebook)
- Mostly using Pandas ML Library and other signal processing ML Algorithms

EVALUATION & METRICS

Collected Data Quality

Is the data clear, consistent, and indicative of the player's movement?

Accurate Processing

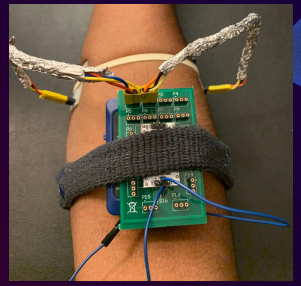
Are the characteristics of the data being extracted properly and accurately?

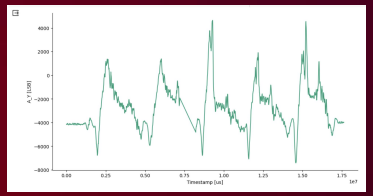
Meaningful Output

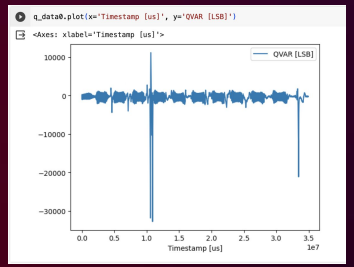
Is the final output from the algorithm something that can empirically be used to benefit a player's training routine? For example some sort of concrete consistency metric.

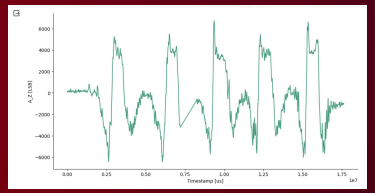
CURRENT STATUS

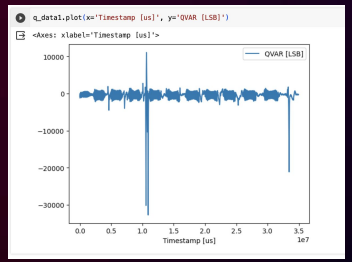
- Initial Data collection from both sensors (right)
- Initial Data representation and processing (below)











NEXT STEPS

- Optimize data collection (fix QVAR outlier issues and ensure consistent data collection)
- Finish data processing and interpretation into a meaningful final output