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Athlete Motion Tracking

Precision Performance Cycling
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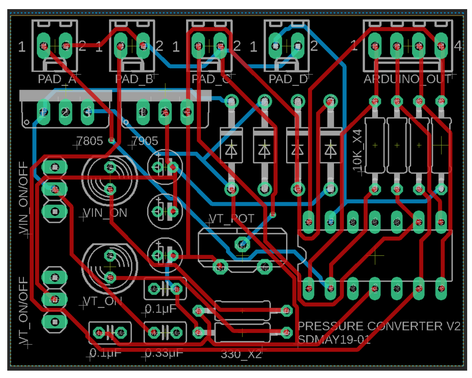
Functional Requirements:

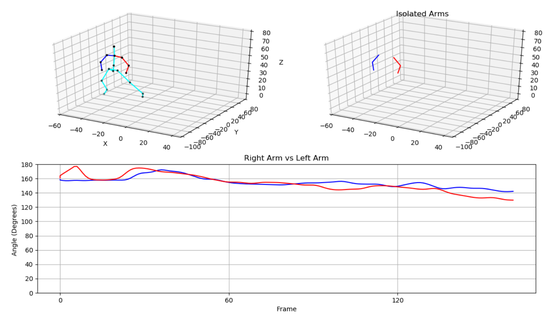
-Camera
-Image Processing System
-Image Processing Collection
-Sensors
-Sensor Transmission
-Sensor Data Collection

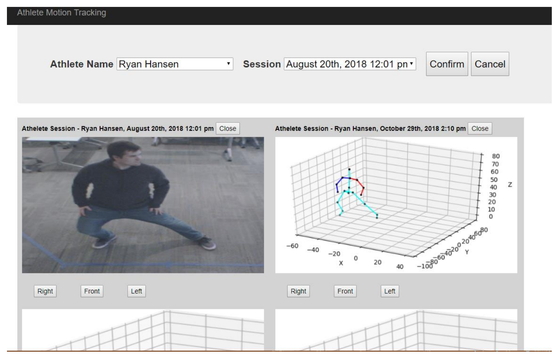
Non-Functional Requirements:

-Camera User Interface
-Sensor User Interface
-Efficient Data Processing

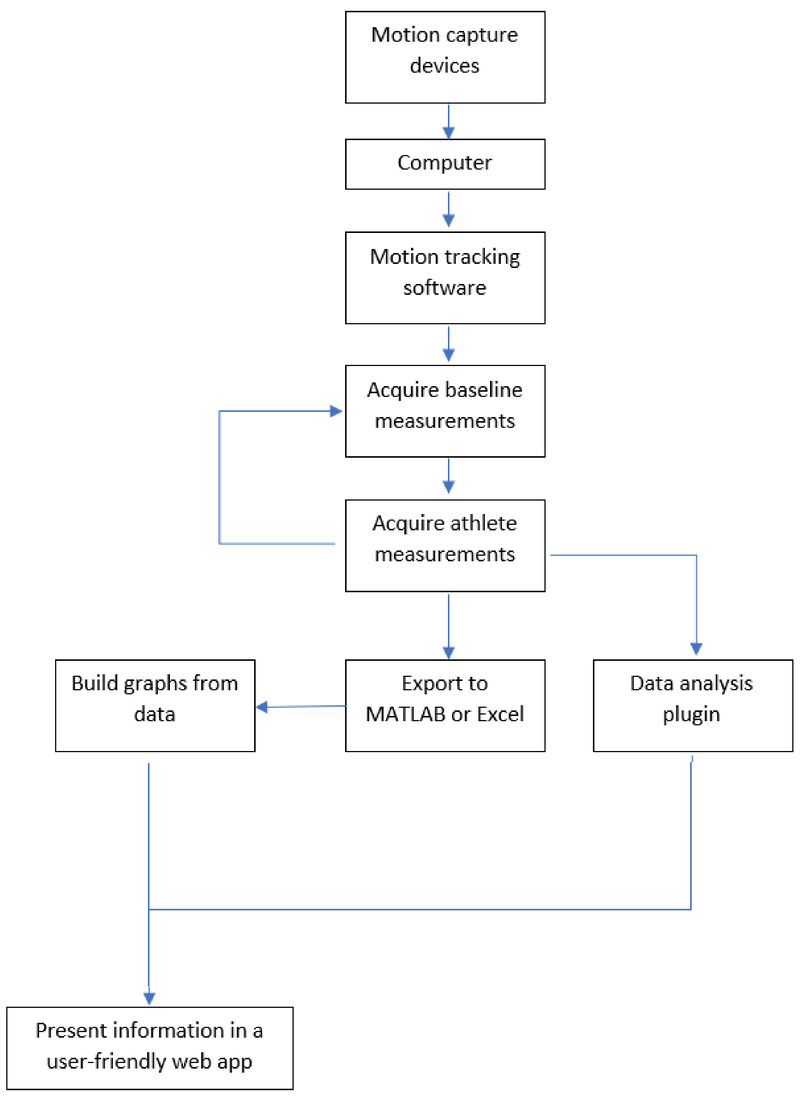
Athlete Motion Tracking involved the full integration of two systems that track an athlete's motion while training from fully stationary to completely portable to incorporate data analytics. The scope of this project includes combining software image capturing system that processes live video to determine the position of important points on the body. The second system uses pressure sensors and other body sensors to track the motion of the athlete outside of the lab. Together, the two tracking systems are integrated together on a cohesive web application that both coaches and athletes can utilize to improve and make training more effective.







Data Capture | **Data Processing** | **Web Application**



System Diagram and Breakdown

- Motion Capture Devices
  - Four Cameras that could obtain 60 fps at 480p – PlayStation Eye Camera
- Computer
  - Computer with four USB ports that had separate COM Channels with enough RAM
- Motion Tracking Software
  - Software that tracked the athlete's body using minimal invasive techniques
- Baseline Measurements
  - Determine the preferred angles for tracking
- Athlete Measurements
  - Acquire components based on common athletes' needs and specifications
- Data Analysis
  - Turn the sensor and camera information into useable information for angle and pressure assessment
- Data Exportation
  - Export the data to Excel for the client to view
- Graphic User Interface
  - Turn angle information into visual information for both client and athlete to see review and see progress over time

Requirements and Constraints

-Athlete Comfort/Non-Intrusive
-Portable Sensor System
-Multisport Uses
-Minimal Interaction
-Minimal Upkeep

Capabilities:

-Video Capture of Athlete Motion
-Recording of Pressures from Athlete
-Data Analytics from Gathered Data
-Session Side By Side Comparison
-Multiple Athlete Capability

System and Integration Testing

Hardware
-Circuit Testing
-System Testing
Software
-Unit Testing
-User Requirement Testing