

# Metabolic Training Gear II

Sponsor: Ron Simms

Samuel Card, Christopher Hoag, Jeffrey De Leon, Ricardo Peña

## Abstract

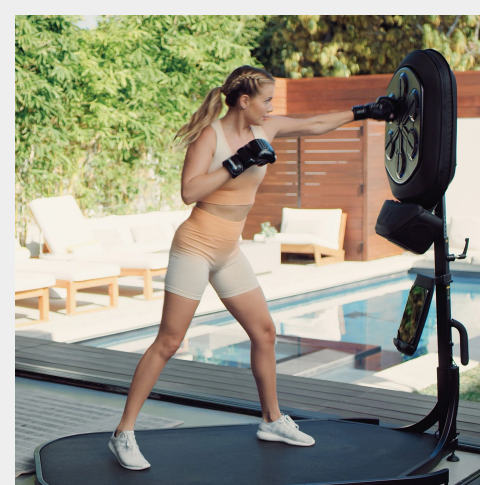
The Metabolic Training Gear II Vest is an interactive device that you wear in the form of a vest to train your hand-eye coordination for boxing with the ability to switch between 4 different training modes. These modes are Flash, All-9, Hand-Eye Coordination, and Pattern Change. The product functions by displaying lights in sequences that turn off after pressure is given to the corresponding light. On top of its main function, the product provides even more features such as heart rate tracking, punch pressure tracking, and the ability to link the device with a mobile device.

## Need for Product

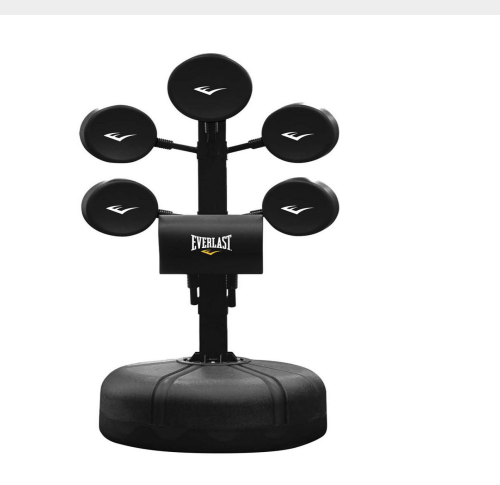
The current state of the problem with eye-hand coordination products lies in their high monetary value, their stationary nature, and disengagement with the users. Thus affecting many athletes that practice martial arts by not allowing for equipment to give the users information that can improve their skills in a significant manner. Most of the gear that is used to teach and practice martial arts is made up of just padding and stuffing, although it is important for safety, it does not generate any impactful outputs that the user can use to their advantage. The MTG II would allow the user to obtain meaningful output from their training, be interactive with other users, and have free mobility. As a result, the users would save time and effort on their training sessions for they are training in a more efficient manner.



Impact Wrap



Liteboxer (~\$1650)



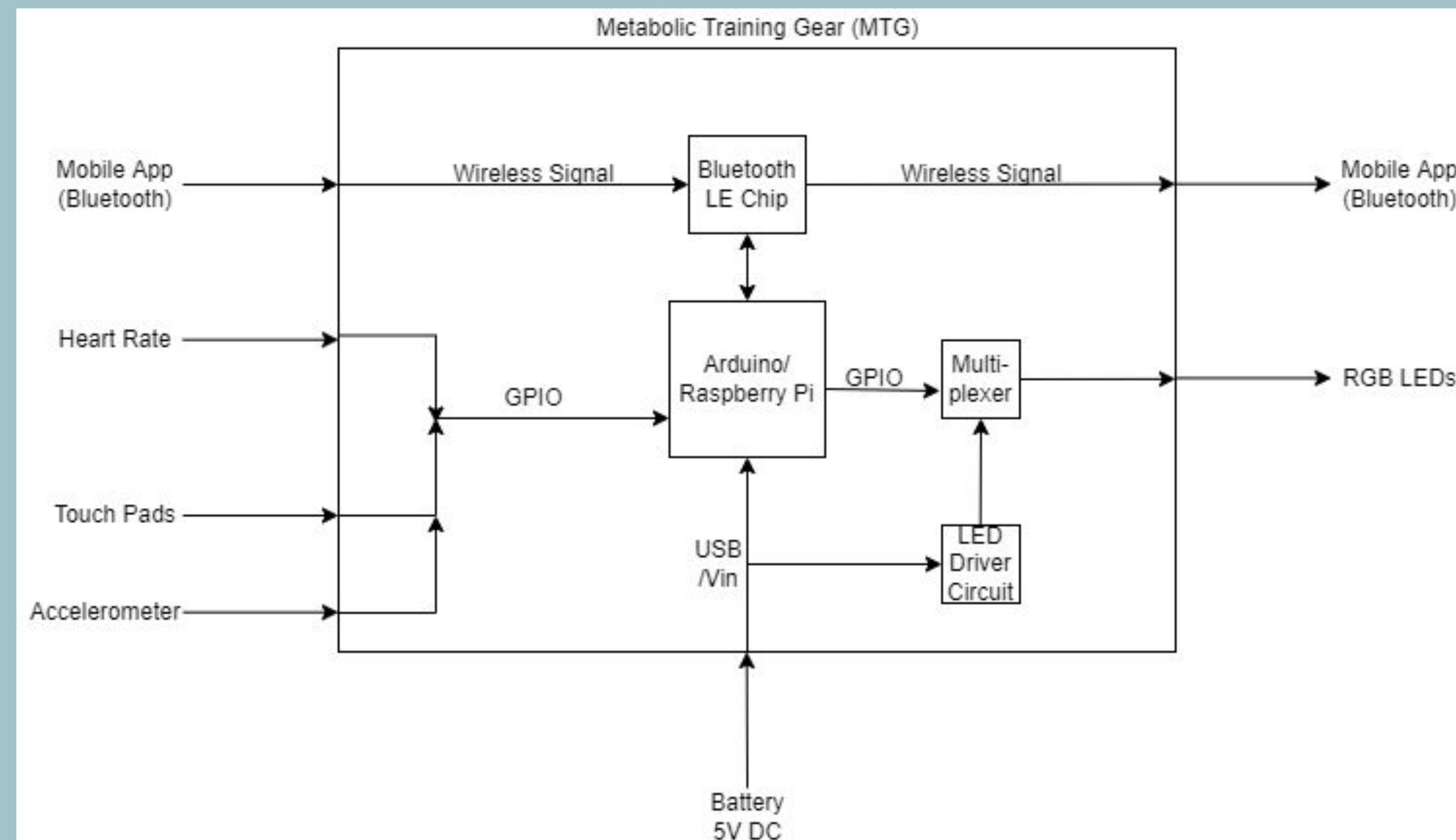
Everlast Heavy Training Box Tree (\$1,100)

## Design Concept

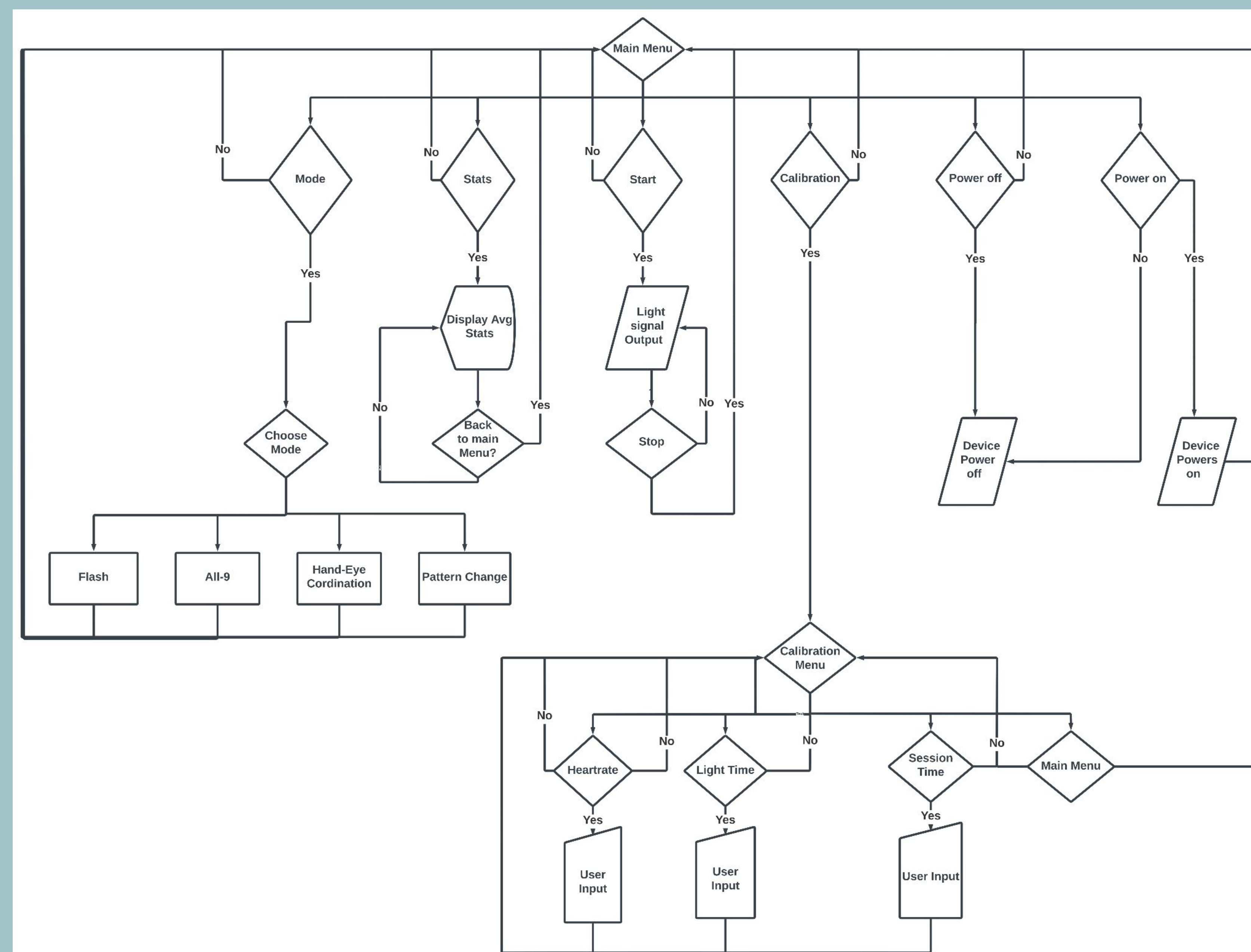
The Metabolic Training Gear II (MTGII) will allow both the trainer and user to be able to have real time sparring with reactive inputs and outputs. Using resistive contact load cells surrounded by low yield LED lights we can quarantine nine hit box sections and program them to what the user wishes to train allowing for versatility and modularity with mobility.



## Functional Block Diagram

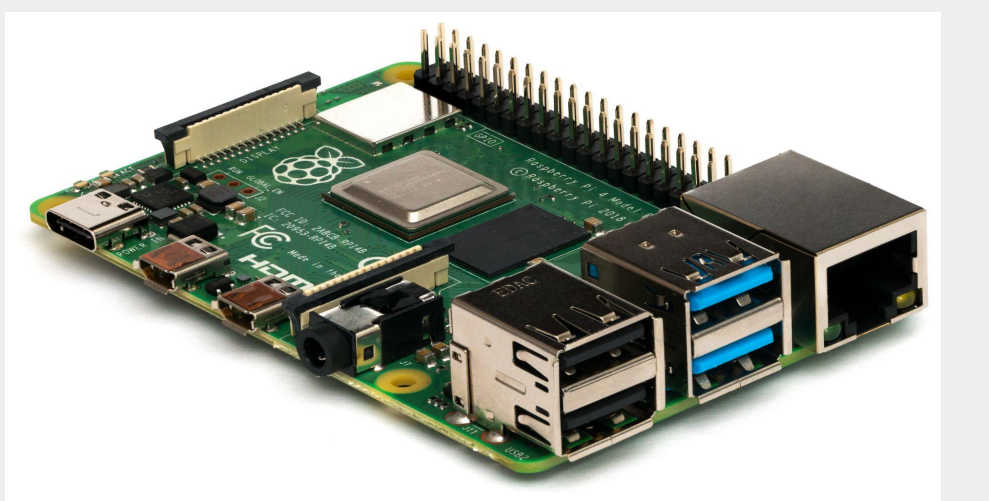
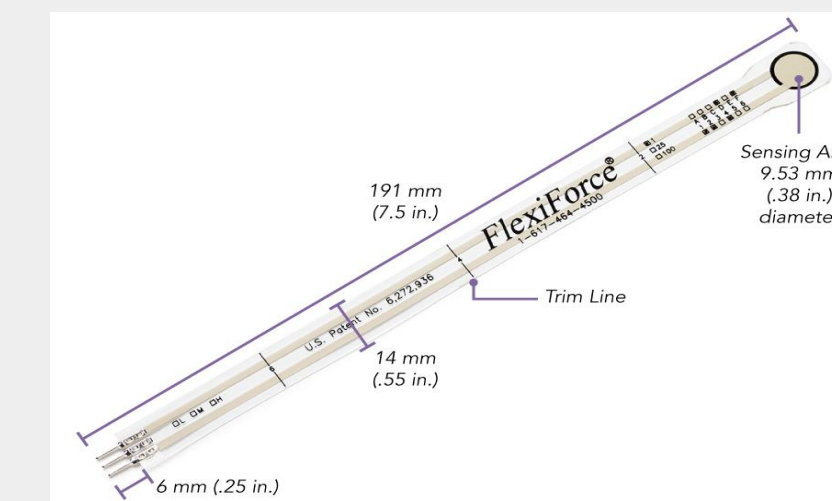


## Software Flowchart



## Components

- Raspberry Pi. Gen 3
- Load Cell Sensor
- Heart Rate Sensor
- Low-yield voltage LEDs



## Future Work

- Next Steps
  - Research (Q2 2022)
    - LED driver options
    - I2C and SPI interface
  - Implement (Q3 2022)
    - Acquire hardware
    - Start designing prototype
    - Programming of microcontroller and app
  - Test and Revise (Q4 2022)
    - Test functionality of app/microcontroller/hardware
    - Make adjustments
    - Finalise

## Glossary

- **MTGII** - Metabolic Training Gear II
- **SPI** - Service Provider Interface
- **I2C** - Inter Integrated Circuit
- **Load Cell** - a force transducer, converts a force into electrical signal

## Acknowledgements

The SCJR team would like to give a special thanks to Ronald Simms and Jonathan Votion for the technical, administrative, and financial support of our project.

We would also like to recognize the UTSA Makerspace, Student Success Center and UTSA ECE department faculty and staff for providing the resources, instruction and support related to this project.

