Smartwear

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UTDesign II: Summer 2018

Project Progression

- ***Simplebiomedical's Goal:*** To develop affordable full body motion tracking that can be utilized for a wide variety of applications including physiotherapy, sports, or video game development
- ***Our Goal***: To design a proof of concept and implement a preliminary foundation upon which our sponsor can further develop their product for market
- We started by researching different components needed for motion tracking
- Once components were identified we designed a schematic for the foundation of the hardware
- We then began focusing on programming the firmware for our boards
- We were able to transmit IMU data to our hub via serial port
- We are also able to transmit IMU data via Bluetooth Low Energy
- Project documentation is complete for handoff to sponsors

Method

- Implement IMUs to track motion via magnetometers, accelerometers, gyroscopes
- Data from IMUs are transmitted via BLE 4.1 to an Android phone application
- The Daughter boards connect to a Mother board through micro HDMI cables using the SPI protocol
- The hub originally consisted of a MAX32630 microcontroller, a PAN1326B Bluetooth shield, and a MAX14690 PMIC
- Simplebiomedical will build upon our research and designs for the future iterations of their product

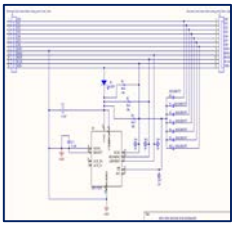
Summer Objectives

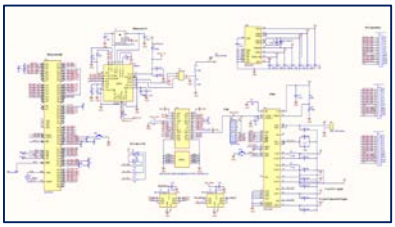
- Begin fabrication process
- Collect and then transmit IMU data via BLE 4.1 to mobile device using the designed firmware
- Document project progression for handoff to Sponsors

PCB Schematics and Footprints

- Schematics designed for Hub and IMUs

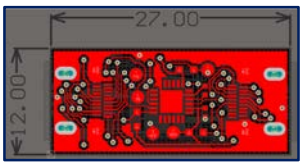
PCB Schematics for Daughter and MotherBoards:

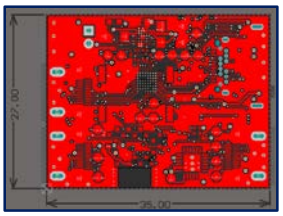




- PCB schematics sent to design engineers to develop into manufacturable footprints
- Designed firmware for collecting data from the IMUs to the microcontroller and for transmitting IMU data via BLE 4.1

1st Iteration Daughter and Motherboard Footprints:





Firmware Design

Programming for Data Collection

- MBED IDE used
- Each IMU is programmed to have a unique ID and a timestamp upon data collection
- Data collection in FIFO register before BLE transmission

Programming the Bluetooth

- BLE 4.1 is used for data transmission
- 1 Packet (max of 20 usable Bytes/packet) is sent as it is collected from each IMU
- Connection via UART service

Ethics statement

Devoted to industry standards and any applicable regulation. All code produced was referenced through open source repository.

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