# An Active Prosthetic Device

**To:** Dr. Kyle Winfree

**From:** Ethan Gage ld459, xl225, ay339

**Date:** 25 February, 2019

**Re:** Work Breakdown Structure Documentation

In our project we have divided the work into three main subsystems, the Toe-to-Thumb, the Myosensor, and the Feedback systems. It is my responsibility to get the code for the Toe-to-thumb completed, as well as the circuit design, I am working on this with the ME team. I am also responsible for the circuit design and programming of the Myosensor subsystem, on the sensor side of the system, meaning I am responsible for all parts of code and circuit pertaining to the actual muscle sensor, Aseel is working on the motor side of that subsystem. I am not responsible for the feedback subsystem, though our other members are working closely with the ME team to get that completed.

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| Person Primarily Responsible: Ethan Gage | | | | |
| ID | Activity/Task | Description | Deliverables | Other People |
| 1 | **Toe-to-Thumb Subsystem** |  |  |  |
| 1.1 | Circuit Design | Xbee communication circuit | * Circuit Schematic | ME team |
| 1.2 | Parts Acquisition |  | * Find parts needed * Order parts | Orders placed through GTA |
| 1.3 | **Build and Test** | building and testing circuit |  |  |
| 1.3.1 | Xbee Transmitter  Setup | XTCU setup of the 2 Xbee transmitters | * Xbee communication addresses * Sample rates of sensors | ME team: Allison |
| 1.3.2 | Xbee Transmitter circuits | Wired Xbee transmitter circuits with Arduino  Minis and pressure sensors. | * two breadboard circuits, one for each transmitter * Transmission Test Results | ME team, Lihua for pressure sensor |
| 1.3.3 | Xbee receiver Setup | XTCU setup of XBee receiver module. | * Address of receiver circuit * Reception test Results | ME team: Testing help with Allison  Sensor code:  Lihua |
| 1.3.4 | Xbee receiver Circuit | Construct circuit to control servo motors wired through arduino with XBee receiver | * Breadboard circuit * Arm control test |  |
| 1.3.5 | Perfboard Circuit | Turning 3 breadboard circuits into 3 perfboard circuits, 1 receiver, 2 transmitters | * Soldered perfboard circuits * Verification of working circuit | ME team: Alison, Felicity for building and testing |
| 2 | **Myosensor Subsystem** |  |  |  |
| 2.1 | Circuit design | Design of Muscle sensor subsystem including sensors, arduino, and motors | * Circuit design |  |
| 2.2 | Parts Acquisition |  | * Find parts Needed * Order them |  |
| 2.3 | **Construct and Test Circuit** | Build and Test |  |  |
| 2.3.1 | Hardware components | Interface for muscle sensor electrodes to connect to users arm | * Hardware Interface * Test data | ME team |
| 2.3.2 | Programming Requirements | non-linear mapping of sensor data to servo motors | * Arduino Code * Tests showing functionality | Aseel, motor side code/circuit design |
| 2.3.3 | Perfboard Circuit | Wire the circuit on a perfboard instead of breadboard | * Circuit design maintaining functionality |  |