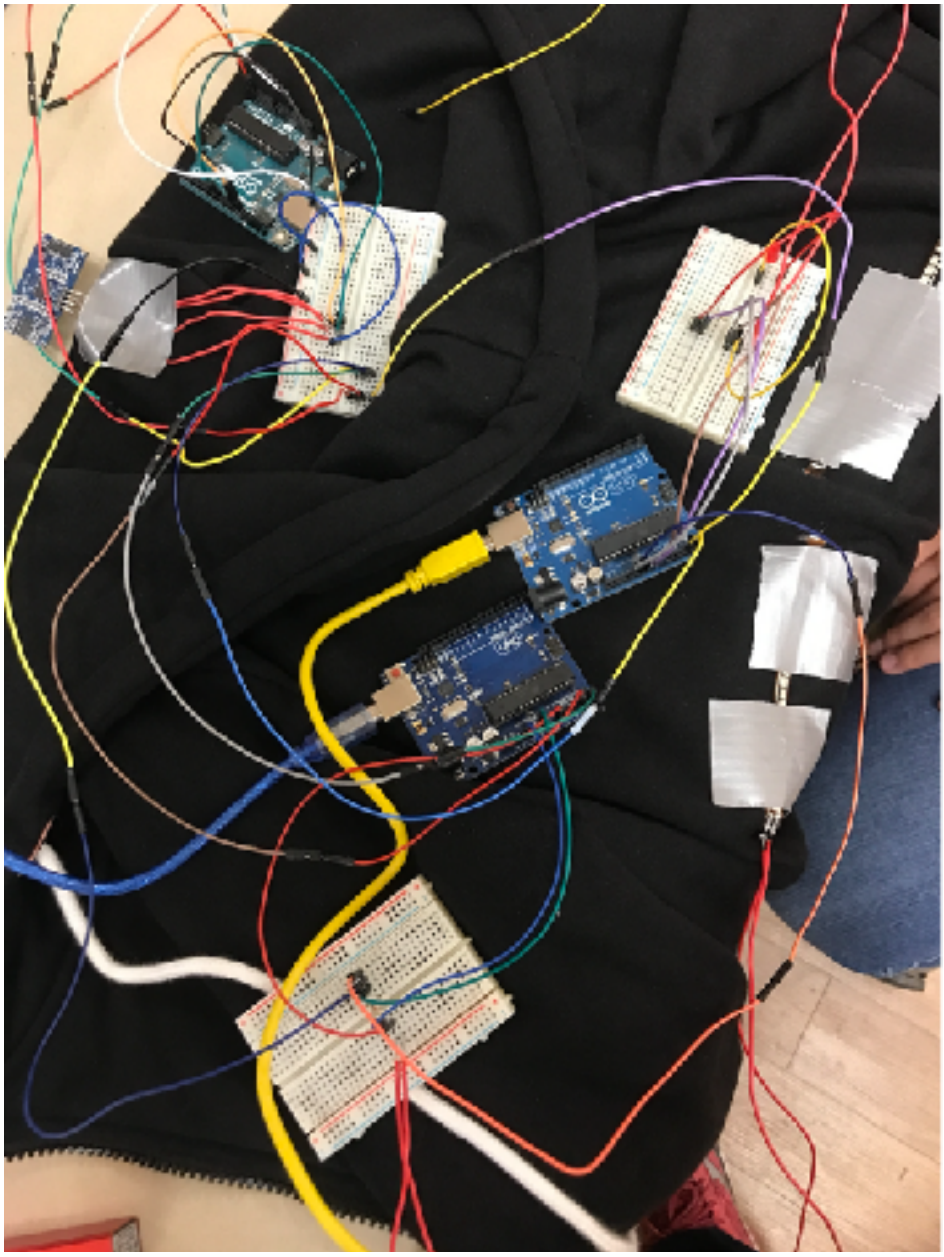
Posture Monitoring jacket



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Introduction

- Title and Objectives:

Title

Why did you select this project

What goals are your project trying to accomplish?

What technical functionality are you planning on achieving?

What are the unique features of your project>

What benefits does your project provide?

Design

- Block Diagram

- **Full drawn out block diagram**

- **Modularity - each block should be able to operate on its own with given**

  inputs and expected outputs

- Block Descriptions:

- **Clear interfacing between blocks (including explanation and legend for separate lines**

- **Function of each block is cleary explained**

- **Clarity oon how each block contributes to the overall design**

- Technical Overview:

- **Is this project too much/too little work for this semester?**

- **Shows understanding of actual design and technical functionality of the project**

- **Alernatives are well shown, explained, and project is justified on uniqueness/ advantage**

Introduction:

As wearable technology grows popular the emphasis on building health related application has increased. Our motivation came from a startup called Athos. Athos has designed wearable technology for exercising. Also, according to the American Chiropractic Association, 31 million Americans experiment low-back pain at any given time. Back pain is one of the most common reasons for missed work and is the second most common reason for visit to the doctor. Furthermore, Americans spend at least $50 billion each year on back pain. And the major cause of back pain is weak abdominal and back muscles or poor posture or many who work a desk job can relate to poor posture.

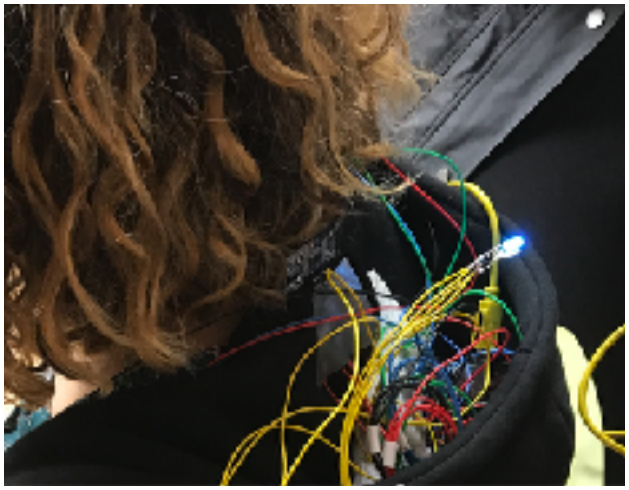
The typical method in correcting posture is remembering to sit up straight. However until muscle memory has been formed, it is difficult to remember to sit up straight and may be uncomfortable at first. This usually leads to many not correcting their posture. Thus we have created a prototype of the Posture Monitoring Jacket. This jacket will tell the user when his or her posture starts to become poor.

Hardware Parts Needed:

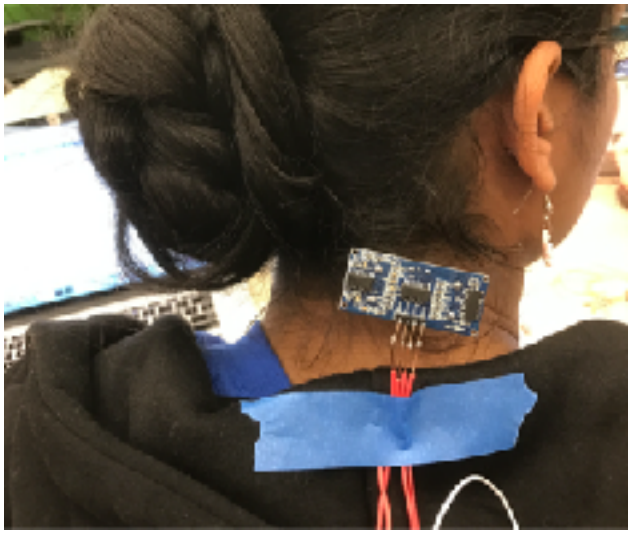
Name of Part	Number Needed
Ardunio	4
Flex Sensor	2
Ultrasonic Sensor	1
Soldering iron	1
RGB LED	3
Ethernet Shield	1
power source (portable battery)	1
Electrical Tape	1

Design

Locations of the external devices



RGB LEDS. Shown to the left is the locations where the LEDS are attached. One is on the hood for the neck, while the other two are on the cuff of the jacket for the mid-back.



Ultrasonic sensor that is attached to the back of the hood. This will be used to measure the posture of the neck.

Both flex sensors will be attached mid-back. Shown to the left is where the left flex sensor is attached.

Calibrating the Jacket

When the user connects jacket (master Arduino) to a power source then whatever position the user is in will be considered good posture. Currently the feature on the jacket the user will have to un-plug and re-plug from the posture every time he or she will like to re-calibrate the jacket.

LEDs

The LEDs are quite crucial to the posture monitoring jacket as the color of the LED indicates good posture. If the LEDs light up blue then the individual is maintaining good posture, otherwise the LEDs will light up red indicating good posture is not being maintained. We soldered the LEDS to the master Arduino.

Master Arduino

The master Arduino is located in the hood of the jacket. This Arduino is constantly fed data via I2C connection from both flex sensors and the ultrasonic sensor. The master will always light the LED blue unless it falls out of the good posture threshold, where then it will change the color of the LED from blue to red.

Slave Arduinos

- **Left Flex Sensor:**

  The left flex sensor is located with in the left pocket of the jacket. This monitors the movement of the left wing of the back. It constantly feeds data to the master Arduino, and if the data sent to the master does not maintain the good posture threshold the LED on the left cuff of the jacket will change from blue to red.

- **Right Flex Sensor:**

  The right flex sensor is located with in the right pocket of the jacket. This monitors the movement of the right wing of the back. It constantly feeds data to the master Arduino, and if the data sent to the master does not maintain the good posture threshold the LED on the right cuff of the jacket will change from blue to red.

- **Ultrasonic Sensor:**

  The ultrasonic sensor is located in the hood as of right now. This monitors the movement of the neck to ensure the neck is also aligned and not doing something funny. It constantly feeds data to the master Arduino, and if the data sent to the master does not maintain the good posture threshold the LED will change from blue to red.

Something

References

- Flex Sensor: https://learn.sparkfun.com/tutorials/flex-sensor-hookup-guide
- Ultrasonic Sensor
  - http://playground.arduino.cc/Main/UltrasonicSensor
  - http://www.instructables.com/id/Simple-Arduino-and-HC-SR04-Example/
- Ethernet
- Something place holder
  - http://playground.arduino.cc/Main/UltrasonicSensor

Links to where we got the parts from:

- HiLetgo New Version NodeMCU LUA WiFi Internet ESP8266 Development
- 16Hertz UNO R3 Ultimate Starter Kit - LED, LCD, Breadboard, Shield, Relay, 9V Adapter, Sensor, Guide for Arduino