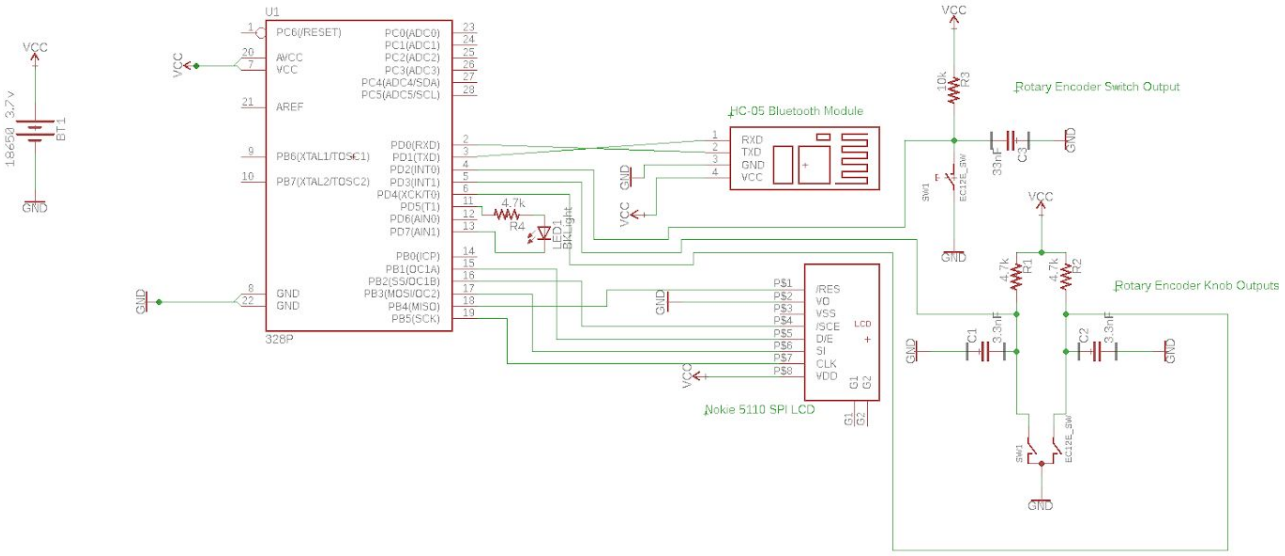
Design Document

(Posture Helper)

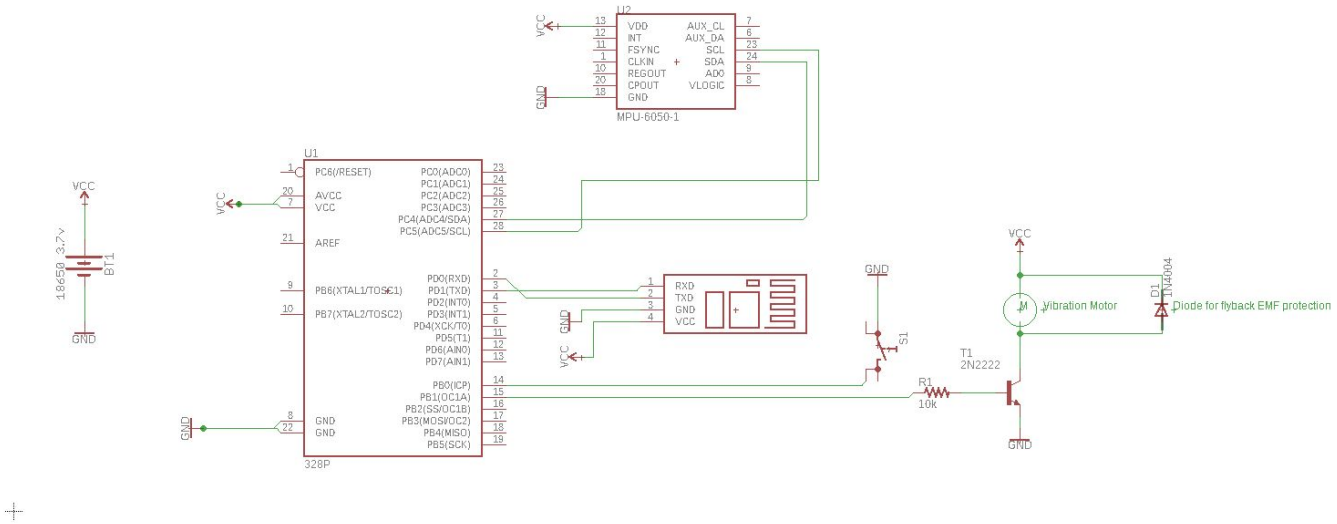
Introduction

Many people suffer from the effects of bad posture. Many find it difficult to correct their posture once they have become accustomed to a bad posture. The Posture Helper is a device intended to actively monitor a user's posture and make them aware of bad habits relating to their posture, while encouraging them to improve their posture. The main device is worn by the user around the neck. It uses a single button to allow the user to calibrate it for their desired posture. The device alerts the user of bad posture through vibration. This device communicates wirelessly with an easy to use wrist-worn interface device. The user can use the control the sensitivity of the sensor, enable or disable vibration notifications, and view basic statistics of movement. The device also features a basic, user programmable clock. The devices are stand-alone and do not require an active connection to each other for basic functionality and use.

Circuit Diagrams

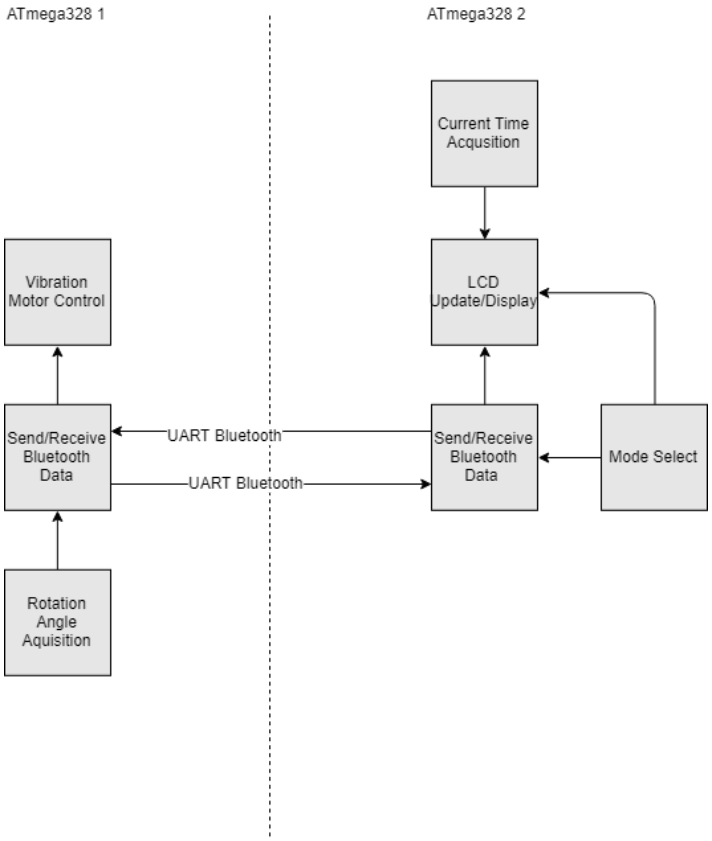


(Circuit diagram for wrist-worn control unit of system)



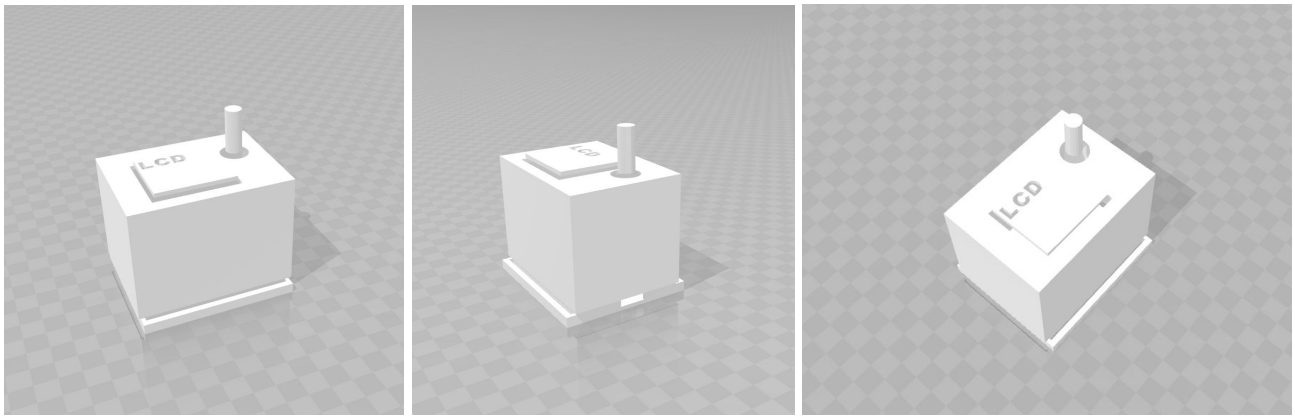
(Circuit diagram for neck-worn unit of system)

Code Block Diagram

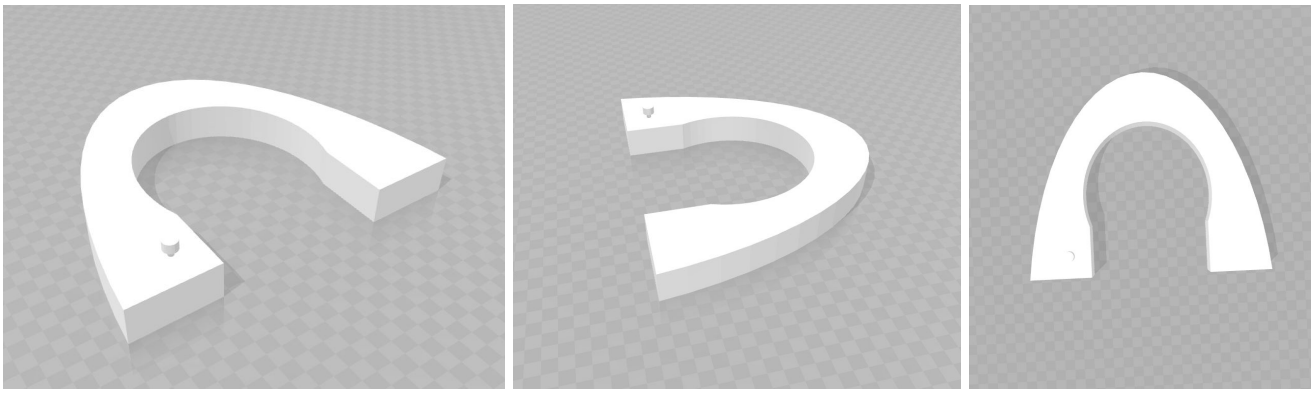


Design Diagrams

Final design layouts for wrist-worn controller device



Final design layouts for neck-worn device



Final assembled wrist-worn device

Final assembled neck-worn device

Time Allocations

Topic	Time Allocation
Documentation	5
Research (Overall)	40
Design (Perfboard design, 3D CAD)	50
Assembly (3D printing, soldering) (Includes redesigns)	30
Testing	5
General Development	20
Integration	10
Total	160 Hours

Milestones

- Portable power sources for both main components (Compact, long lasting, high peak power output)
- System power consumption reduction
- Controlling bluetooth module state from microcontroller
- GY-521(MPU-6050) IMU interfacing
- Nokia 5110 LCD interfacing
- Compact motor driver circuit
- Component wearability
- Rotary encoder input
- CAD design
- PCB/Perfboard layout
- Integration

Roadblocks

- Portable power sources for both main components (Compact, long lasting, high peak power output)
- GY-521 (MPU-6050) IMU interfacing
- Nokia 5110 LCD interfacing
- Compact motor driver circuit
- Component wearability
- Rotary encoder input

Bill of Materials

Part	Quantity
Atmel ATmega328 Microcontroller	2
Nokia 5110 84x48 LCD Display	1
GY-521 (MPU-6050) IMU Module	1
Generic 12x12x7mm DIP Momentary button switch with plastic cap	1
Moli INR-18650A Battery	2
Bourns inc. PEC12R-4125F-S0012 rotary encoder	1
HC-05 Bluetooth Module	2
33nF ceramic capacitor	1
3.3nF ceramic capacitor	2
Pin Headers	45
10k ohm resistor	1
4.7k ohm resistor	2
330 ohm resistor	1
1n914 diode	1
STMicroelectronics 2n2222 NPN BJT transistor	1
Vibrating coin-type motor	1

Github Repo

https://github.com/hjime008/UCR-CS179J-Senior_Design

YouTube Links

https://youtu.be/JBvsA7jTCAs