Mak453 Design Project 3

Changes

Chose a display that has 5 buttons and also needed a new dev board because DFRobot Beetle BLE was out of stock

GitHub Link: https://github.com/mak453/ece1895_design_project3

Below This is the Initial Proposal

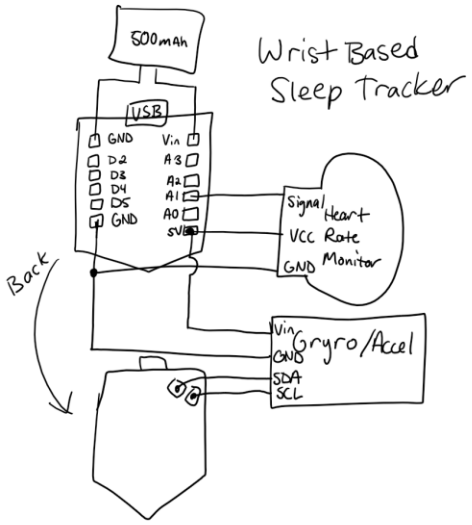
Project Overview

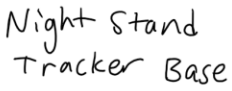
Two Piece Sleep Tracking Set up

A wrist mounted heart rate monitor and gyroscope and accelerometer to track heart rate and movement through the night. Connected to a mini-Arduino that uses Bluetooth to communicate to a base. The wrist tracker will be battery powered via a small rechargeable lithium battery. The base has a noise sensor to detect the ambient room noise. This has a screen and three buttons: green, yellow, and red. After sleeping the user selects how well they slept based on great (green), okay (yellow), or terrible (red). There will be an SD card reader to log all the data collected each night, it will be powered via USB connected to the wall or plugged into a laptop when the user wants to retrieve the data logs.

If time allows, a digital encoder to allow the user to view past nights' data maybe up to a week's work of data. This data would either be numerical or graphical if time permits for me to code that up.

Quick Pin Layouts





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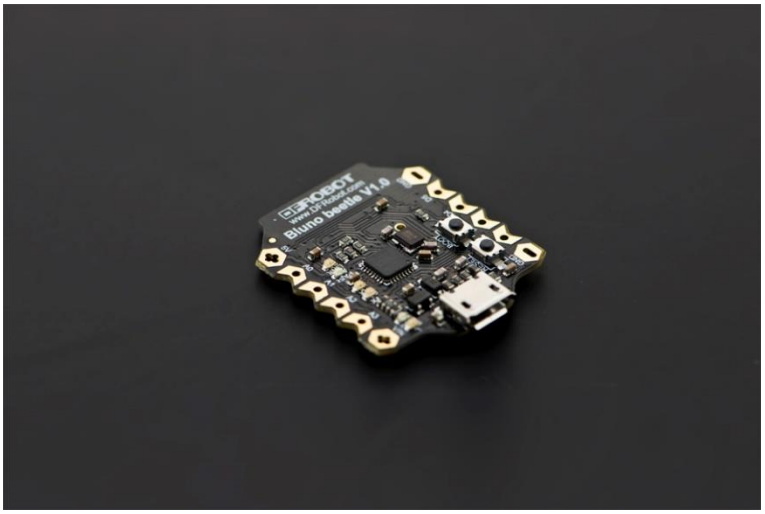
Required Resources

DFRobot Beetle BLE – Wrist Tracker $15



- Heart Rate Monitor $16
- Gyroscope/Accelerometer $10
- 500mAh rechargeable Lithium battery $8

Haven’t picked board for Base, need to figure out all of I/O but definitely one with Bluetooth and enough pins to run a display. Could be either a full Arduino Uno or smaller $20

- Sound sensor $5
- 3 digital push buttons $6
- Rotary digital encoder $2
- Adafruit 2.9" Red/Black/White eInk Display Breakout - THINK INK $35

Total Cost: $117

Other Equipment: Maker space 3D printer and laser cutter. Some of the software libraries such as the encoder, I can take from my Bop-It. All other sensors were complete breakout boards with tutorials and working code that I can modify. I will need to research more about display libraries, because the screen I chose is a graphical screen rather than a character and numerical screen.

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Project Justification

I really want to make a project that is useful and I can keep for a while. I'm interested in learning how to do wireless communication to talk between different devices and send information back to the computer. I specifically wanted to do something involving sleep tracking, because I really struggle with falling asleep and having data and tracking what factors equate to good restful sleep would be very beneficial to me.

I think this project will definitely be a challenge to complete in 6 weeks, but I tried to stick to my strong suits and interests. I know I don't like designing PCBs and schematics so I stuck to only breakout board components so I only need to connect to the dev boards. I enjoy the coding and interfacing so I plan to get as much as I can done in terms of connecting hardware to dev board so that all of Thanksgiving break I can spend coding. I've honestly enjoyed doing the Bop-It project and working with electronics, because I've never gotten the chance to explore this area. Most of my hands on experience is in woodworking and machining, so electronics were scary to me. Bop-It has shown me it's not that bad or all that difficult once I sit down and really focus, which is why I want to challenge myself with this project.

Schedule

Week 1 – Receive components, begin hardware testing both Wrist Tracker and Base, start coding for Wrist Tracker

Week 2 – Complete hardware testing for both, complete Wrist Tracker code

Week 3 – Start hardware code for Base, design enclosures

Week 4 – Finish hardware code for Base, start building enclosures

Week 5 – Complete data log code for Base, finish enclosure

Week 6 – Test and complete project

Potential Roadblocks

I'm doing a lot of front-end research now and before I did the proposal and order items to verify that my idea is plausible. Since I haven't done any Bluetooth/wireless communication, I expect that to be the most challenging; however, I'm very optimistic because I say a lot of sample code for everything that I think I need.