

Wearable Anxiety Tracking System

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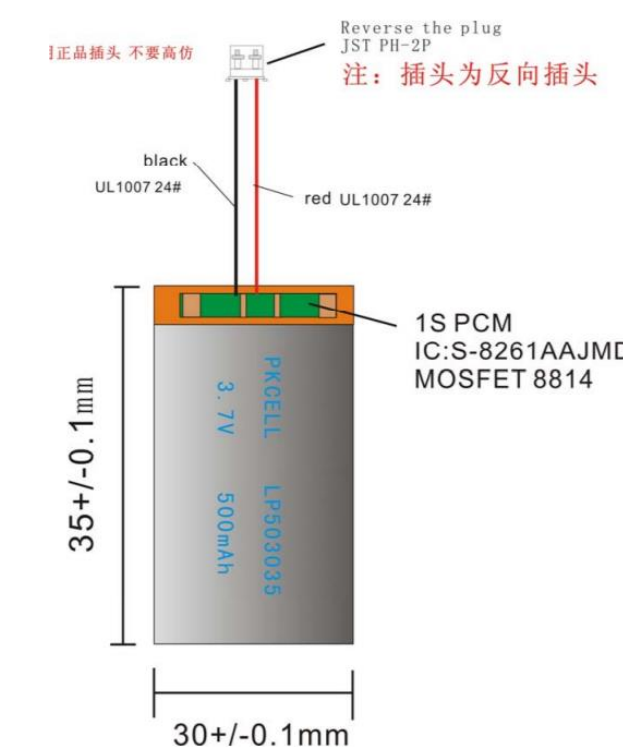
Abstract

This project was designed for the use of an Education teacher, understanding the relationship between anxiety response to STEM subjects and the quality of learning and responsiveness. The device includes a sensor that will detect the BPM of students and will stream this data to a computer that will save the data for later analysis. The device includes a prebuilt sensor, the PulseSensor, and uses the Arduino Nano BLE sensor for the microcontroller.

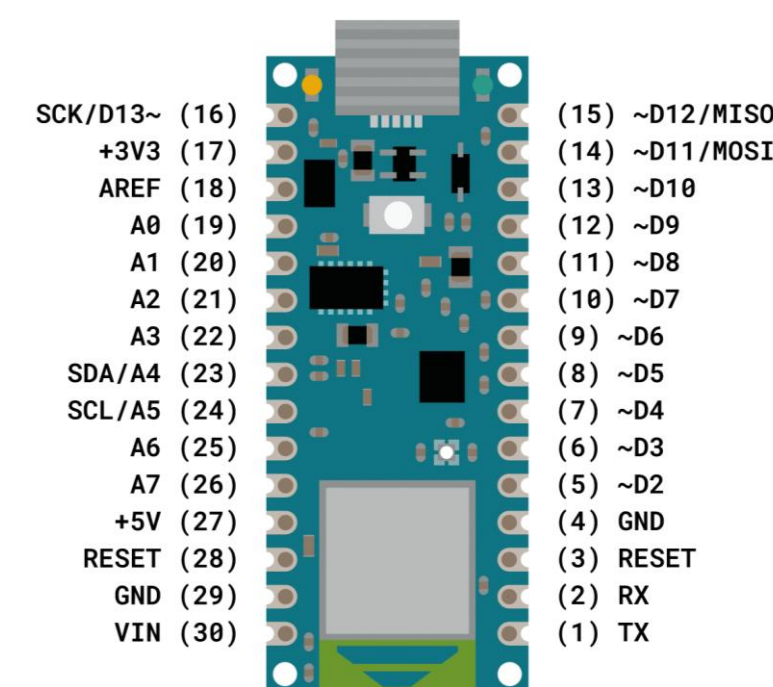
Introduction

There is always a demand for professionals in STEM, so there is much effort in outreach to provide opportunities to people of diverse backgrounds. A major obstacle for many students in STEM subjects is the anxiety students experience while learning and completing projects and assignments. Dr. Pi-Sui Hsu is a professor at Northern Illinois University of College Education who is addressing this issue. Dr. Hsu is conducting research amongst her low-income middle school aged students to track and assess the level of students anxiety in relation to their reactions to the STEM activities.

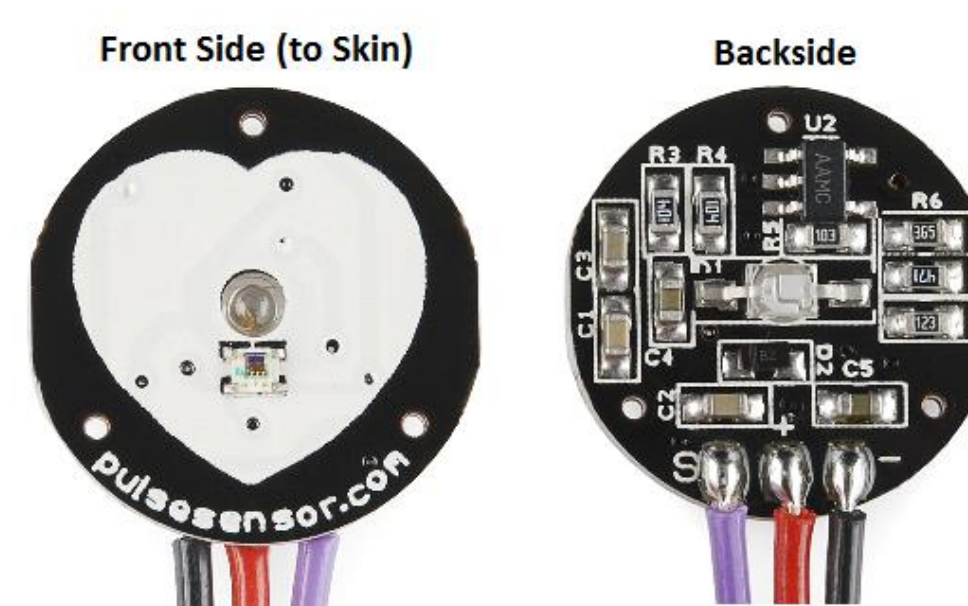
Methods and Materials



A small, compact, and rechargeable battery is needed. The lithium-ion battery has 150mAh charge, which is 7 hours of use. The sessions should not exceed 2 hours, so there is plenty of charge.

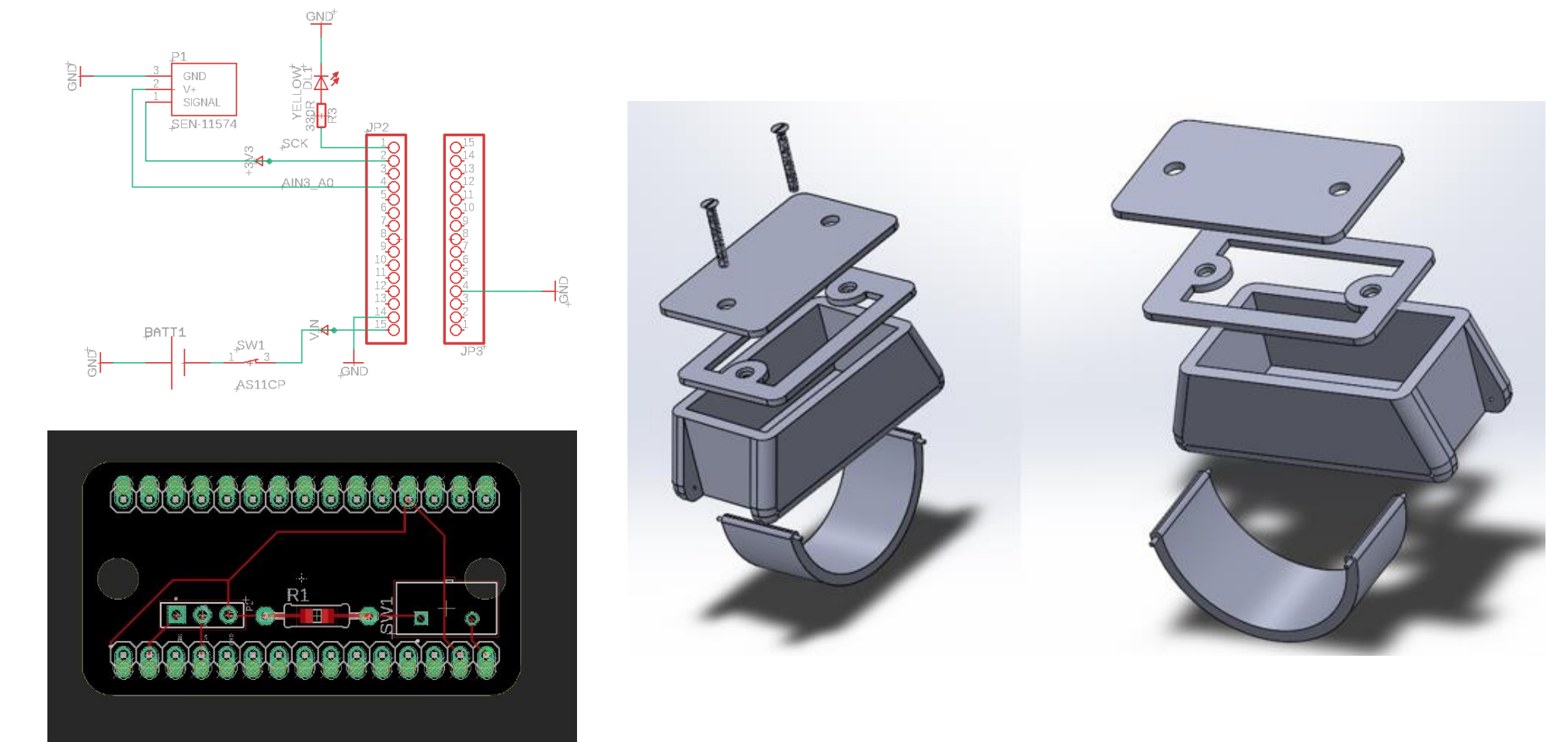


To allow the device to transfer data wirelessly to the user interface, a form of wireless communication is used. The Arduino Nano 33 BLE integrates Bluetooth Low Energy. BLE has low power consumption and communicates intermittent points of data.



The PulseSensor is a prebuilt sensor compatible with the Arduino Nano BLE sense. This sensor is pressed near a vein where a pulse can be detected. The PulseSensor uses an LED with a photoresistor.

#	Date	Time	Timer	Counter	IBI	BPM	IBI Delay (dB*2)	St
1	3/25/2022	10:33:40 AM	4.902344	1	580	103.4483	580	0
2	3/25/2022	10:33:47 AM	5.621094	1	720	83.33333	580	19600
3	3/25/2022	10:33:47 AM	6.320313	2	700	85.71429	720	400
4	3/25/2022	10:33:48 AM	7.101563	3	780	76.92308	700	6400
5	3/25/2022	10:33:52 AM	10.76172	4	680	90.90909	780	14400
6	3/25/2022	10:33:53 AM	11.60156	5	840	71.42857	680	32400
7	3/25/2022	10:33:54 AM	12.46484	6	860	69.76144	840	400
8	3/25/2022	10:33:54 AM	13.32422	7	860	69.76144	860	0
9	3/25/2022	10:33:54 AM	14.10156	8	780	76.92308	860	6800
10	3/25/2022	10:33:56 AM	14.92188	9	820	73.17073	780	1600
11	3/25/2022	10:33:57 AM	15.78125	10	860	69.76144	820	1600
12	3/25/2022	10:33:59 AM	17.46094	11	1680	35.71429	860	672400
13	3/25/2022	10:34:08 AM	25.39398	12	780	76.92308	1680	810000
14	3/25/2022	10:34:07 AM	26.125	13	780	76.92308	780	800
15	3/25/2022	10:34:08 AM	26.86328	14	740	81.08108	780	400
16	3/25/2022	10:34:09 AM	27.64663	15	780	76.92308	740	1600
17	3/25/2022	10:34:10 AM	28.44141	16	800	75	780	400
18	3/25/2022	10:34:10 AM	29.32031	17	860	68.16162	800	6400
19	3/25/2022	10:34:11 AM	30.04297	18	720	83.33333	860	25600
20	3/25/2022	10:34:12 AM	30.74219	19	700	85.71429	720	400
21	3/25/2022	10:34:13 AM	31.40234	20	660	90.90909	700	1600
22	3/25/2022	10:34:13 AM	32.04297	21	640	93.75	660	400



We needed a customized Printed Circuit Board (PCB) for all the electrical components. The housing is designed with comfort and compactness with foremost consideration. The design is made using a 3D Printer using PLA.

Discussion

The most hazardous component of the device is the Lithium-Ion Battery (LIB). The entire device should be stored in a noncorrosive and cool environment. This device is a prototype. The method of manufacturing is made with turnaround and design flexibility with priority. Over time the PCB board may corrode, and the housing will become brittle over time.

Acknowledgements

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