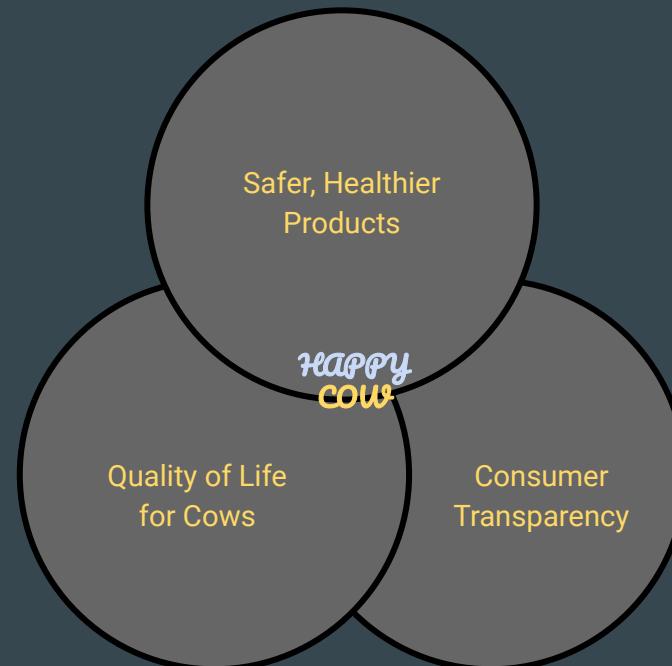




Xiao He
Yousef Akbar
Shengjia Wu
Wei Bao

OVERVIEW - A PROBLEM TO SOLVE

A superior, affordable solution to better quality products for farmers and consumers.



OVERVIEW - LAYOUT: HOW DOES IT WORK?

Sensors

Accelerometer
Sunlight
Temperature

PSoC 6

Bluetooth
Enabled
I2C



Power

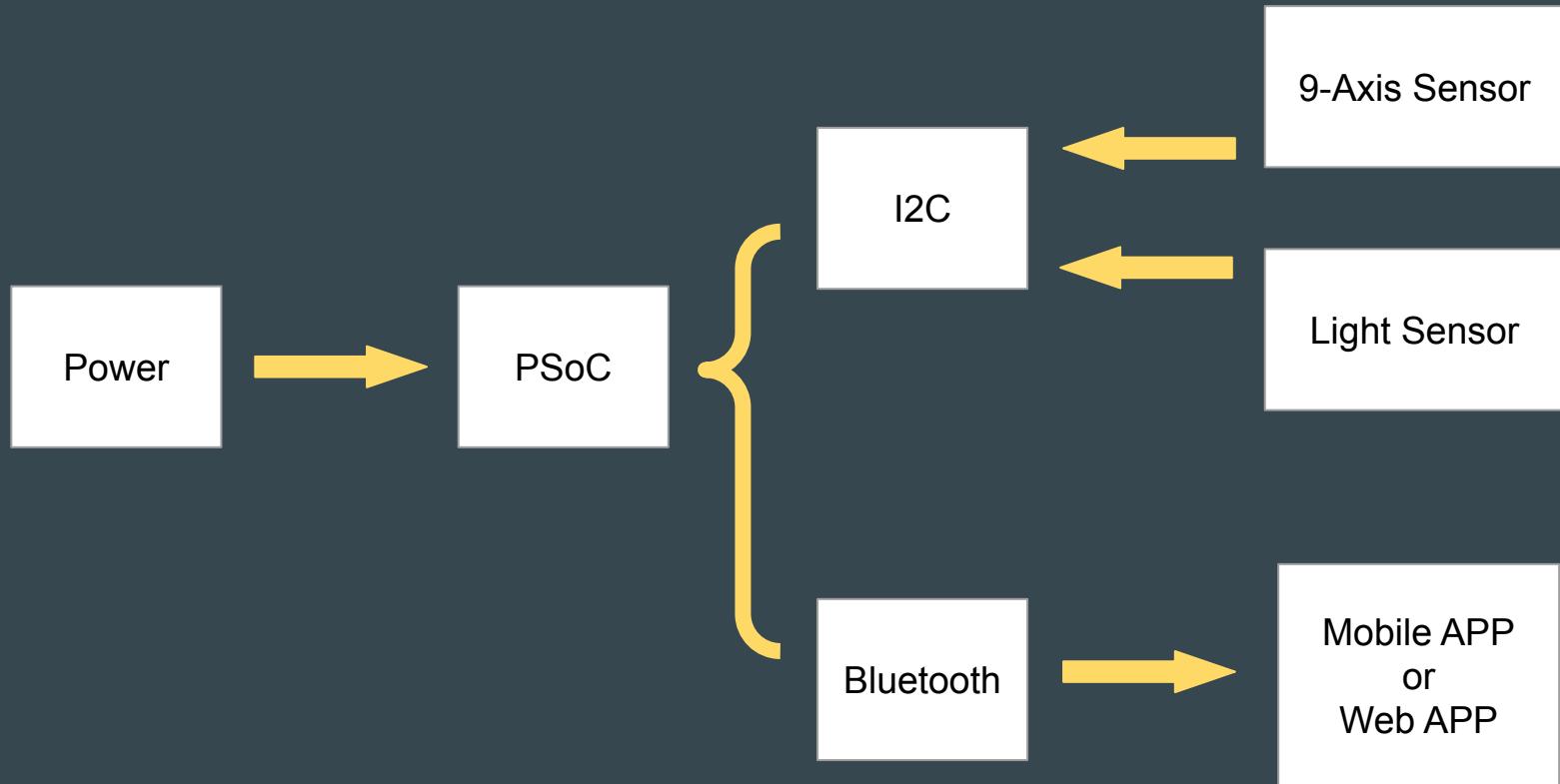
LiPo Plug
Battery Pack
USB-C Charging

Looks

On Point.

Safe and
Secure

OVERVIEW - SYSTEM BLOCK DIAGRAM



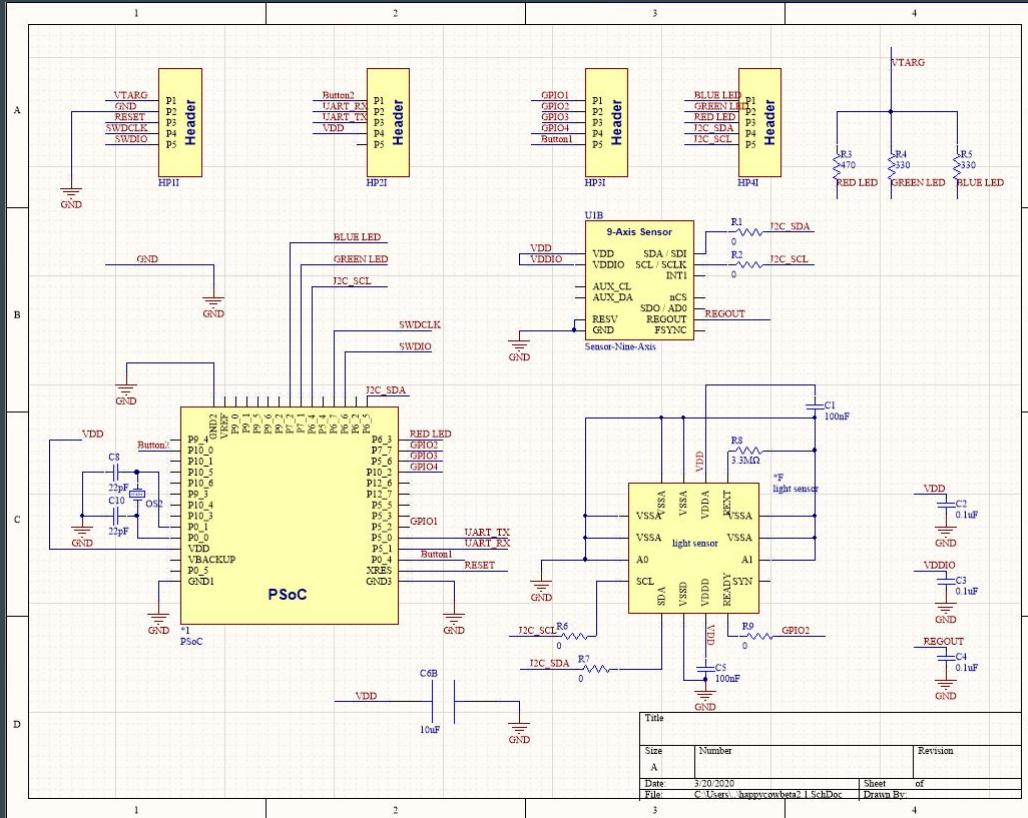
OVERVIEW - FUNCTIONALITY

- Motion Sensor
 - Eating
 - Drinking
 - Sleeping
 - Walking
 - Rumination (*“Rumination or cud-chewing is the process by which the cow regurgitates previously consumed feed and chews it further.”*)
- Light Sensor
 - Time Exposure to Sunlight
 - Temperature

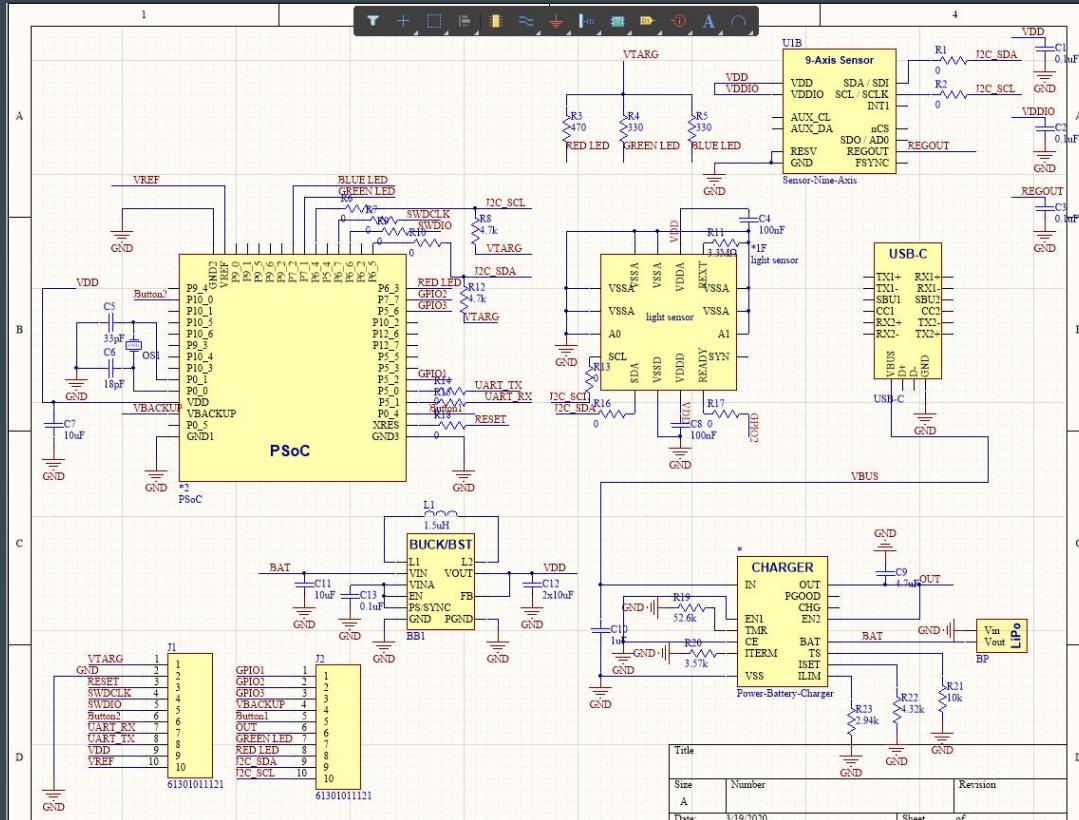


Happy Score on Mobile APP or Web APP

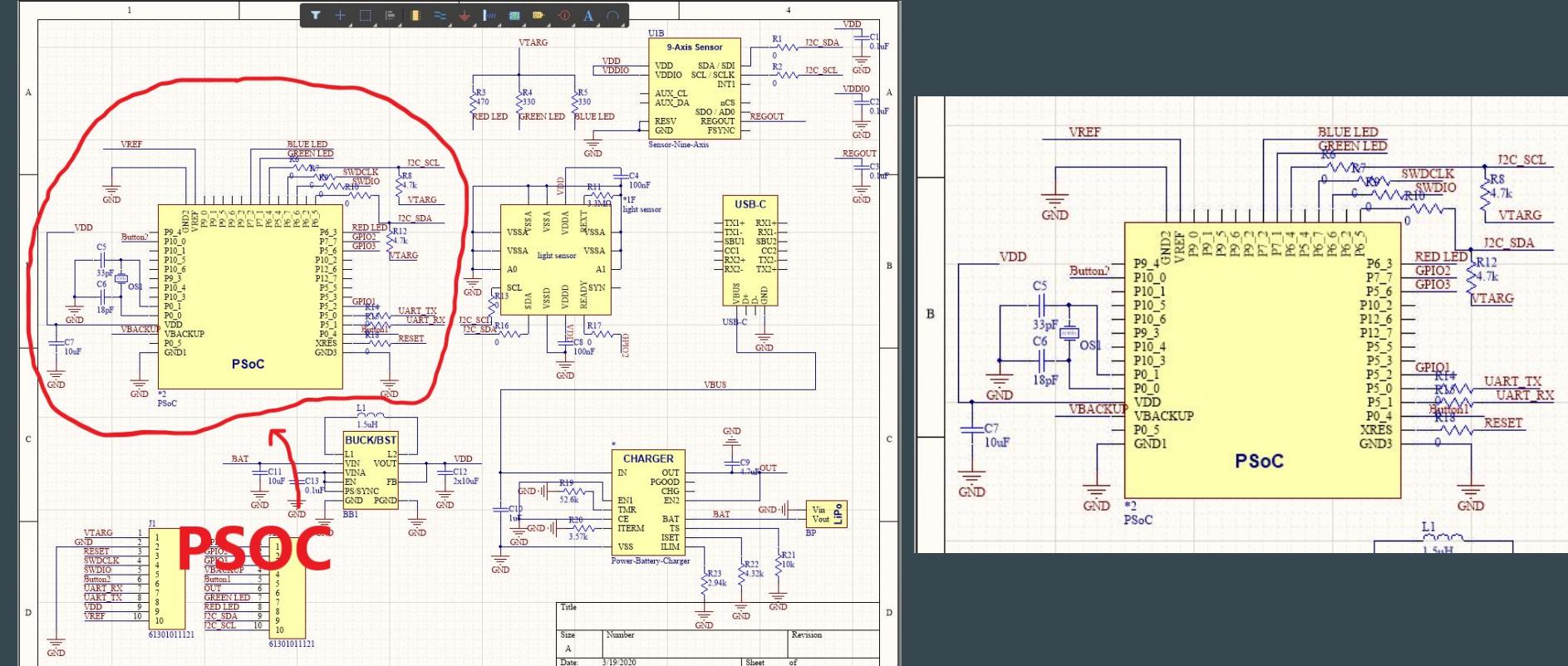
HARDWARE - PCB DESIGN: BETA BOARD SCHEMATIC



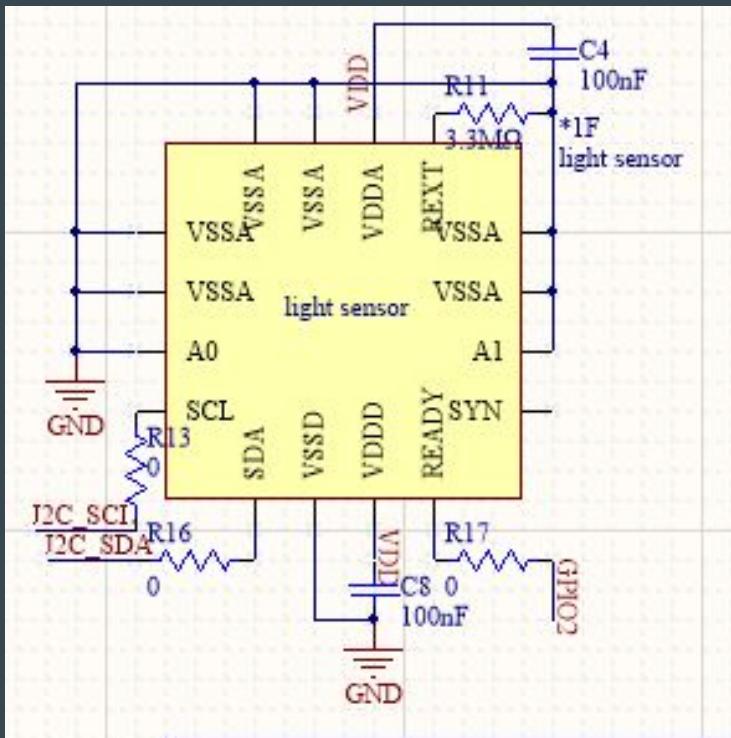
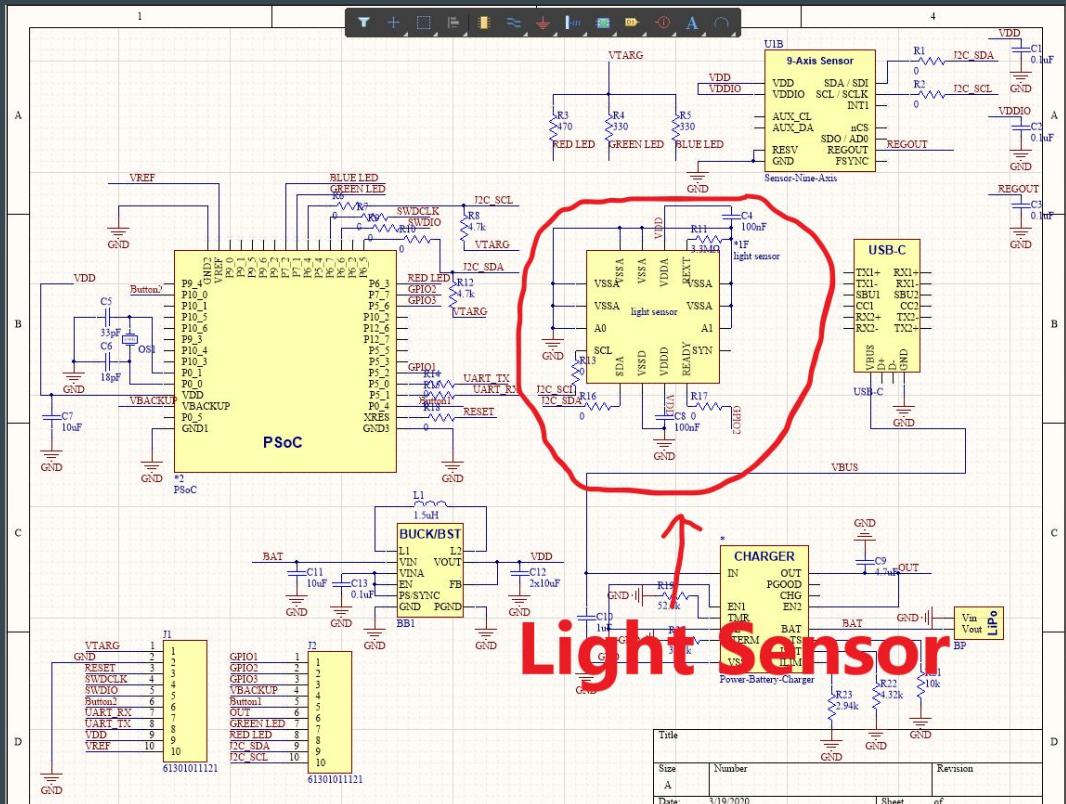
HARDWARE - PCB DESIGN: FINAL BOARD SCHEMATIC



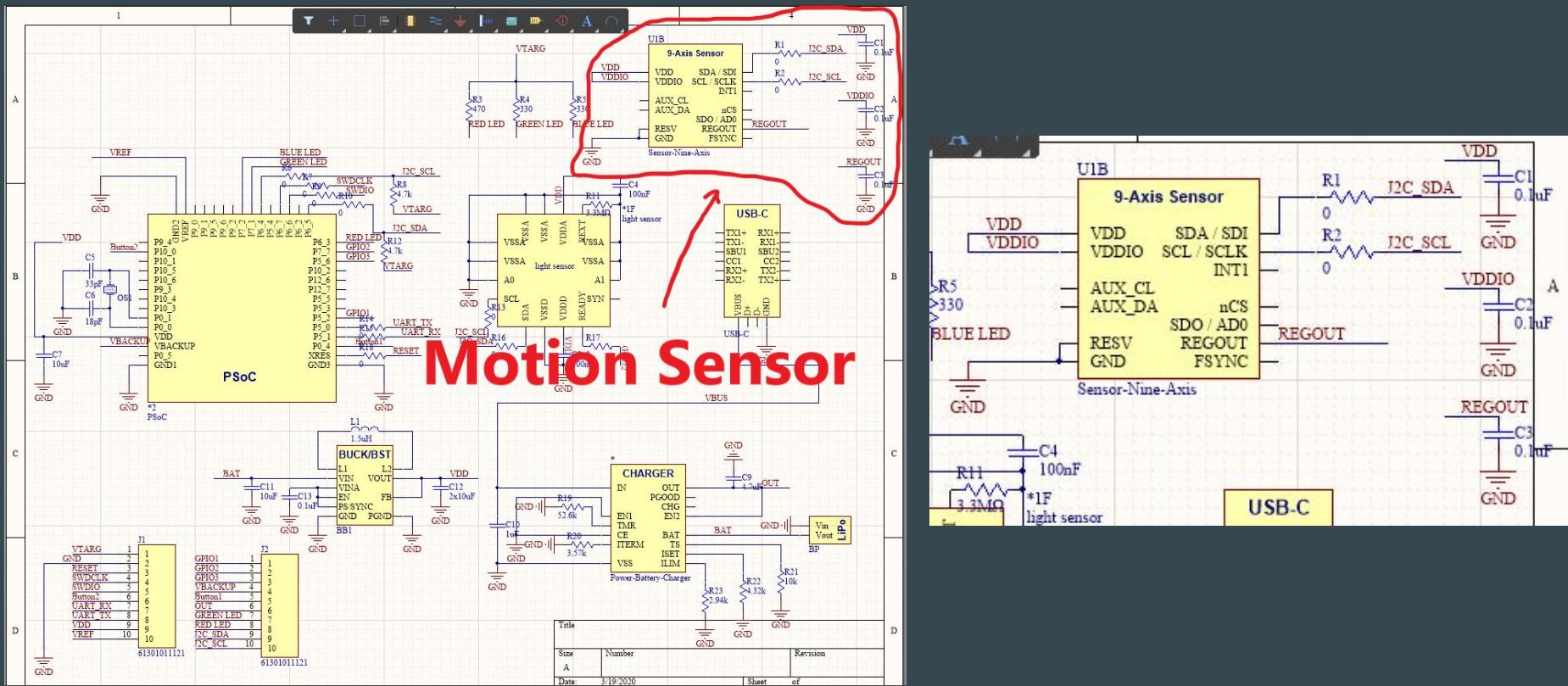
HARDWARE - PCB DESIGN: FINAL BOARD SCHEMATIC



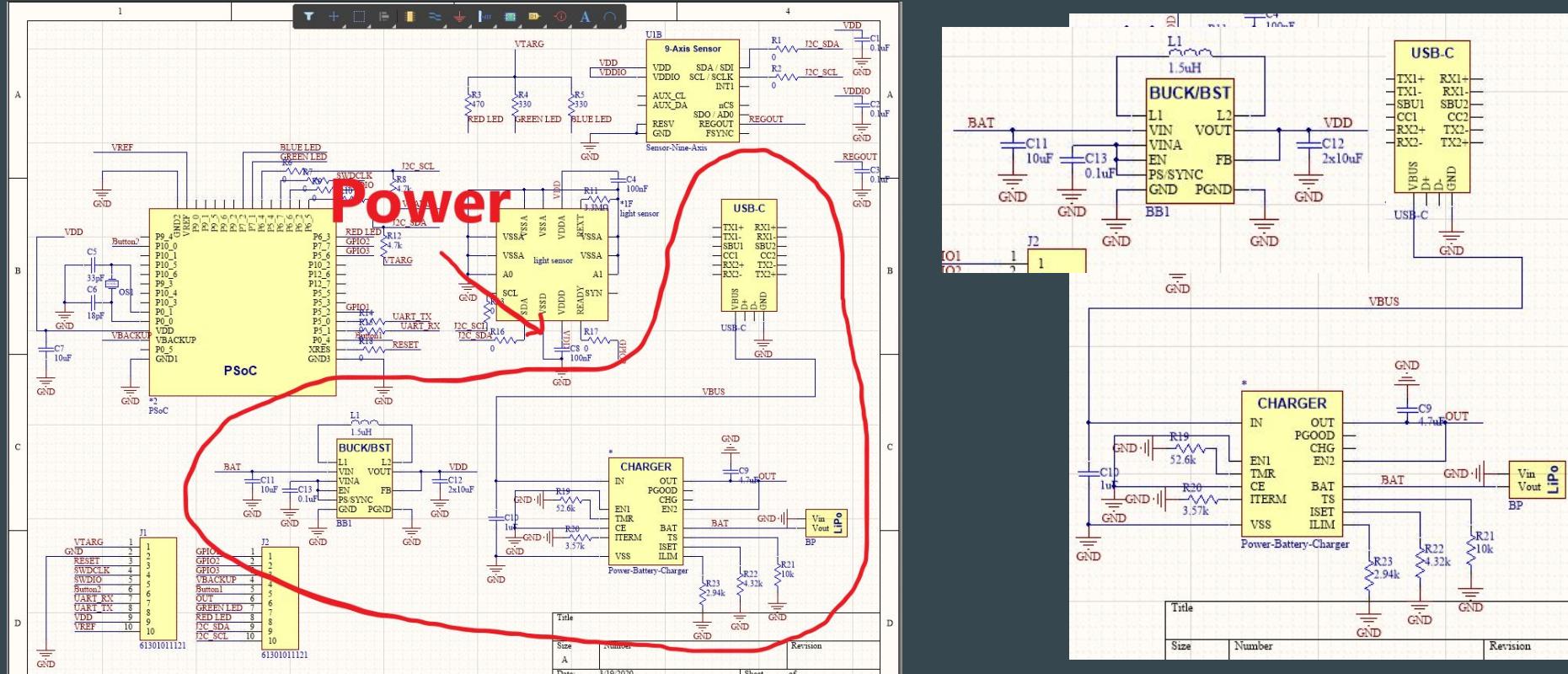
HARDWARE - PCB DESIGN: FINAL BOARD SCHEMATIC



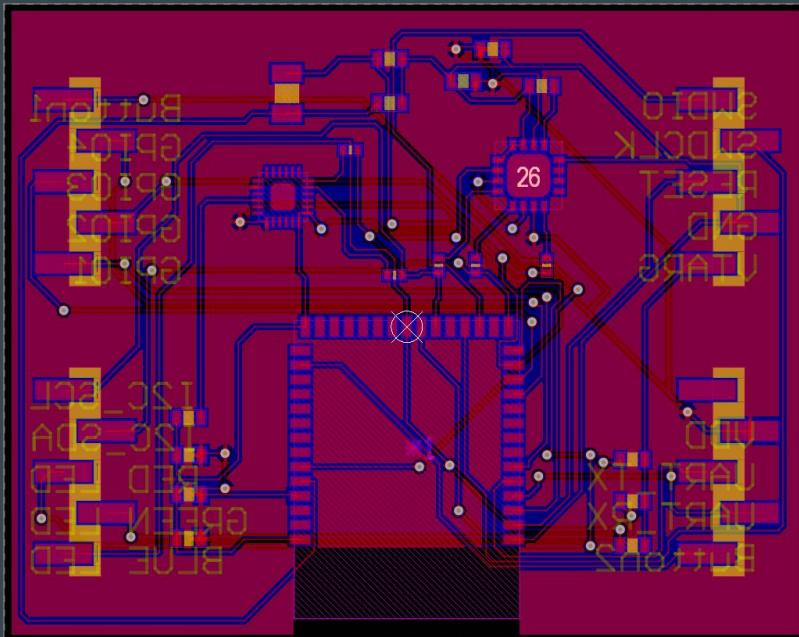
HARDWARE - PCB DESIGN: FINAL BOARD SCHEMATIC



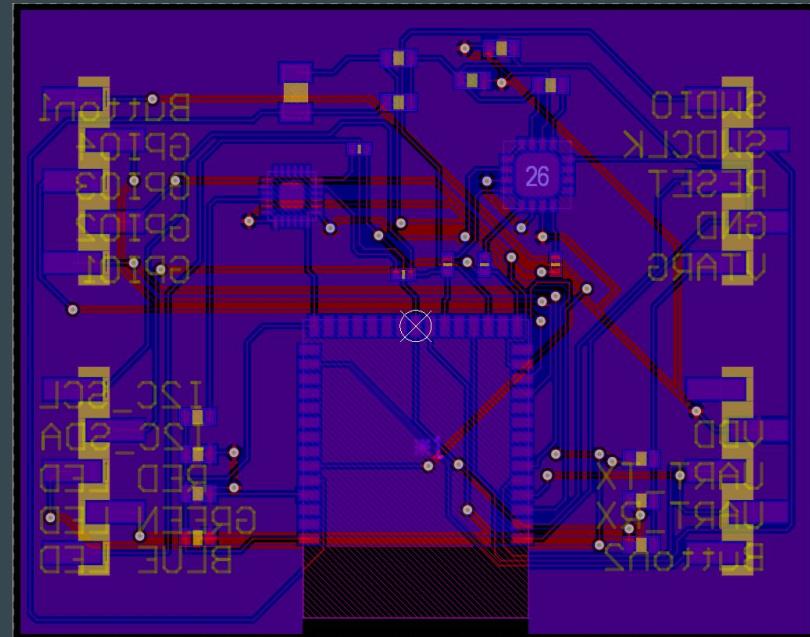
HARDWARE - PCB DESIGN: FINAL BOARD SCHEMATIC



HARDWARE - PCB DESIGN: BETA BOARD 2D

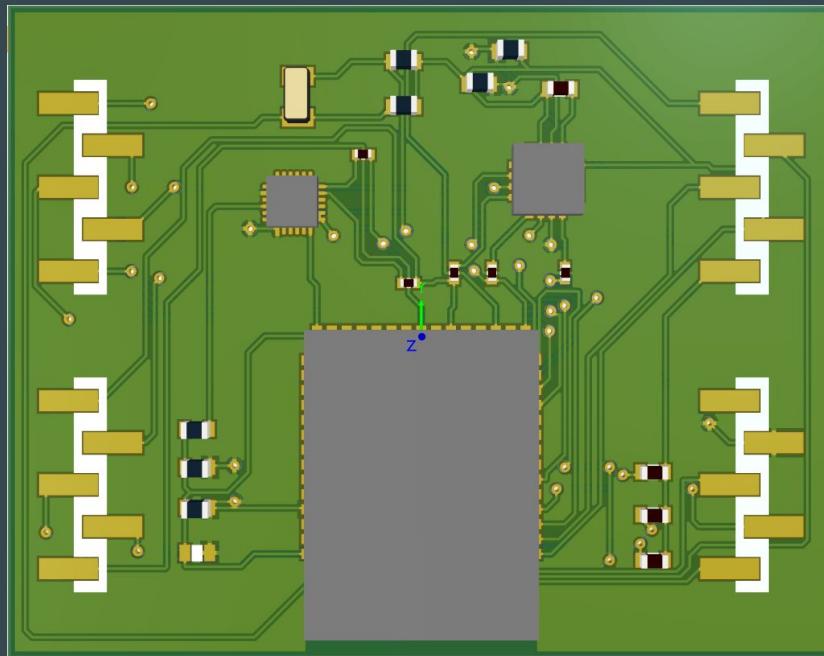


Top

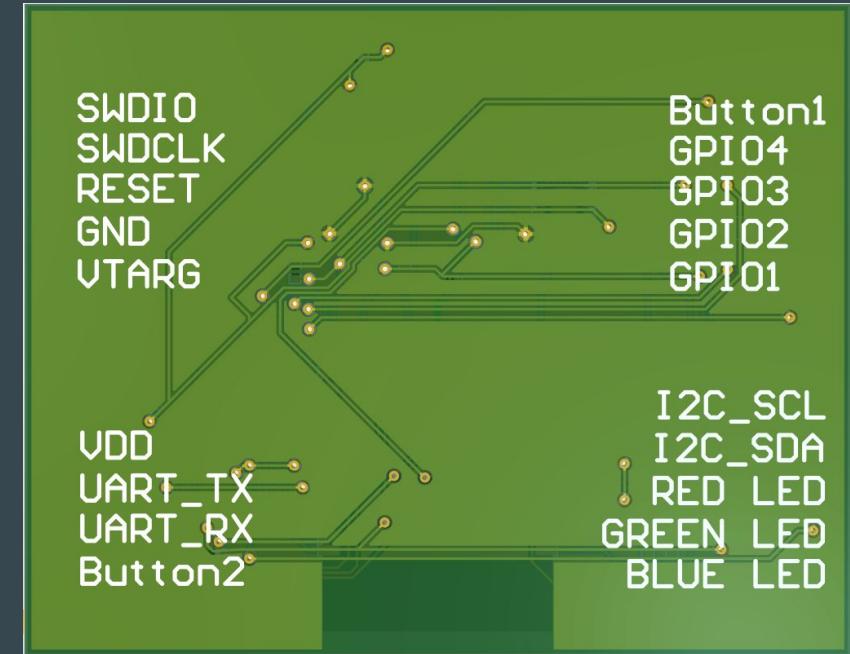


Bottom

HARDWARE - PCB DESIGN: BETA BOARD 3D

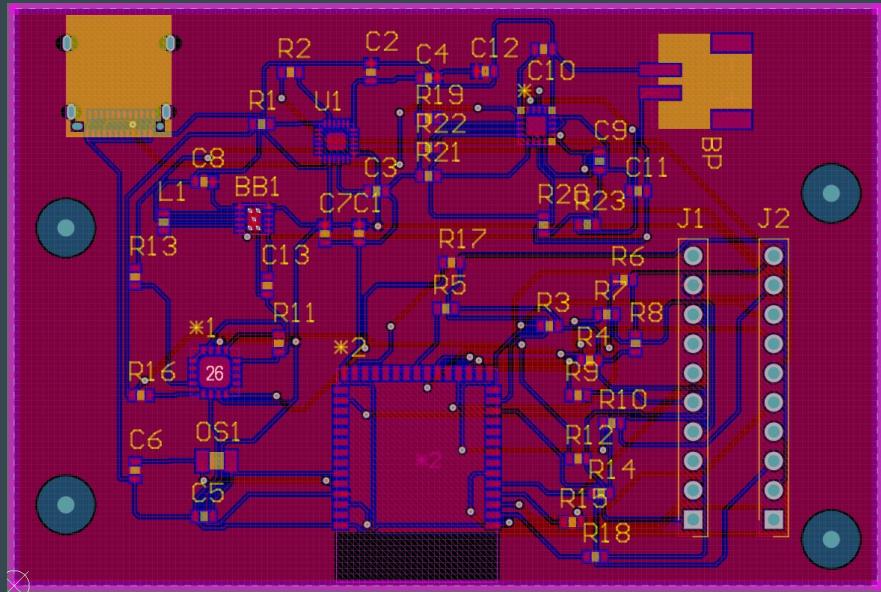


Top

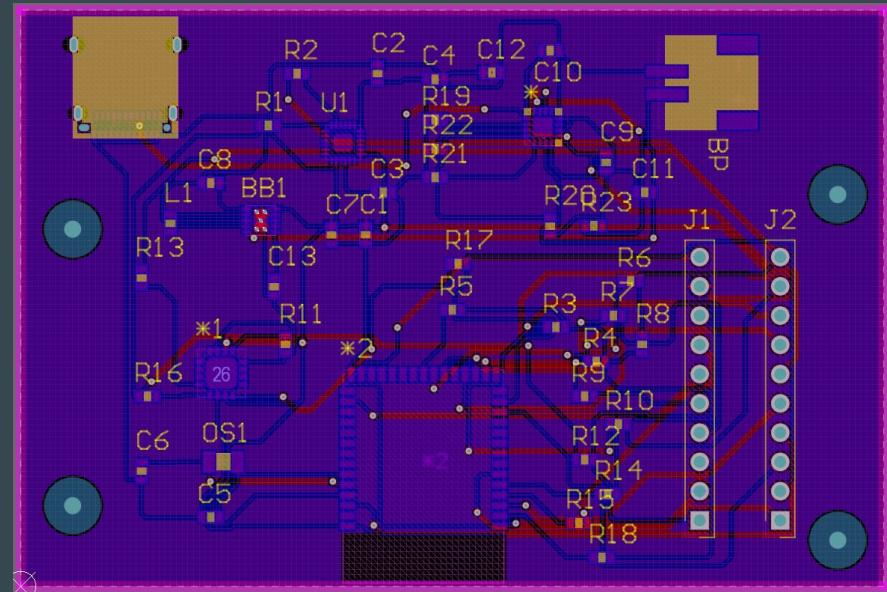


Bottom

HARDWARE - PCB DESIGN: FINAL BOARD 2D

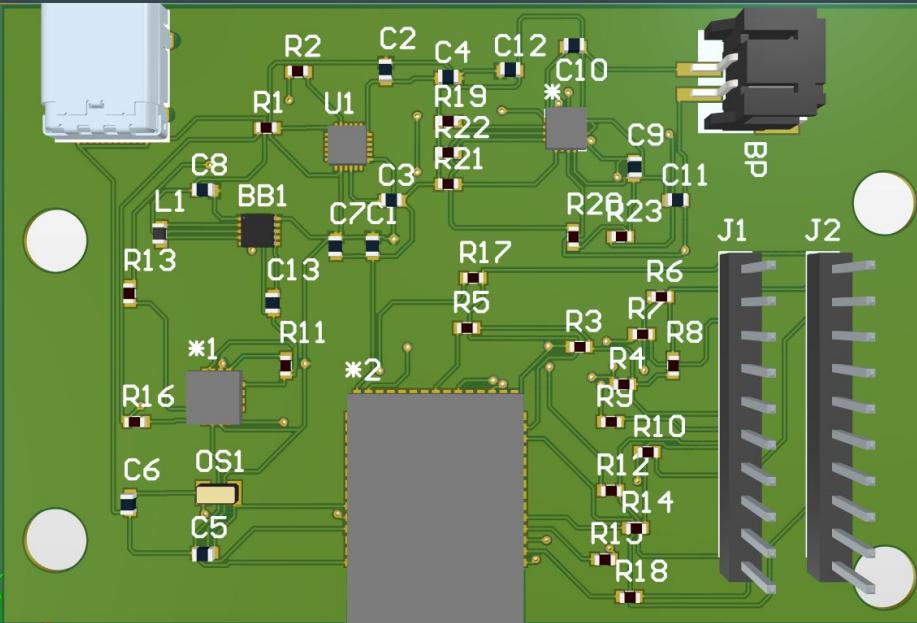


Top

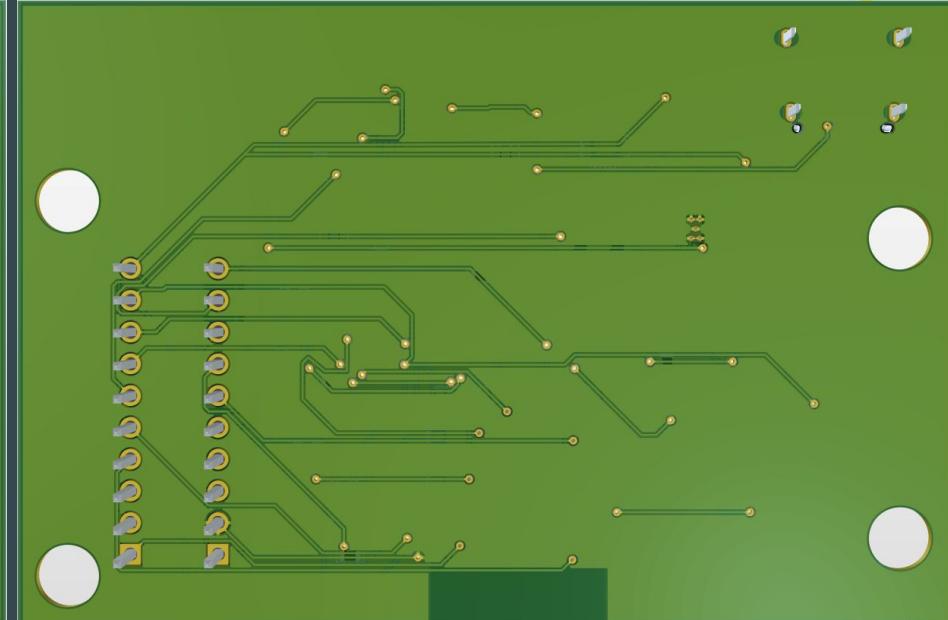


Bottom

HARDWARE - PCB DESIGN: FINAL BOARD 3D

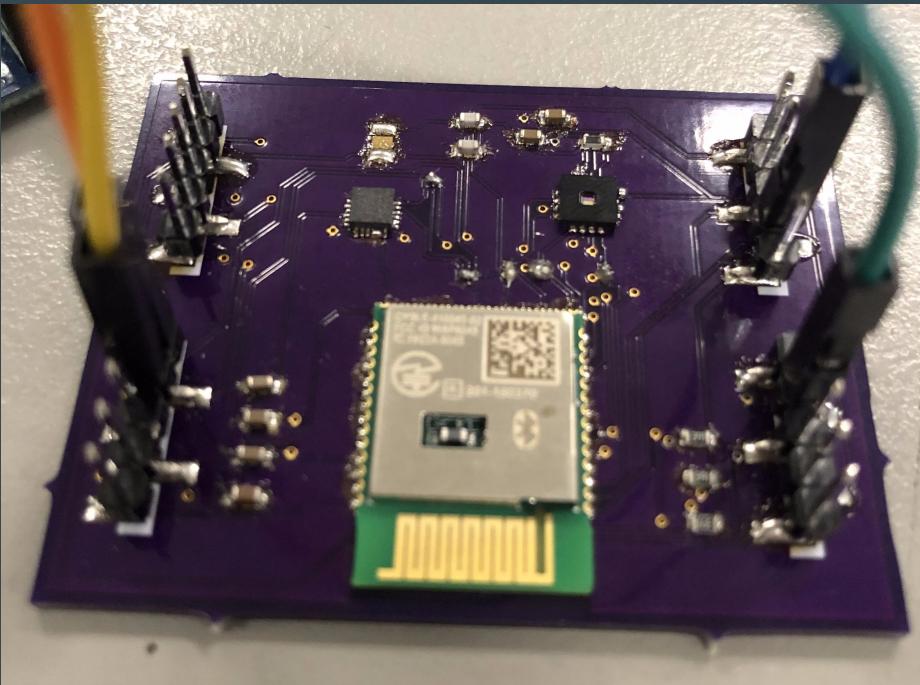


Top

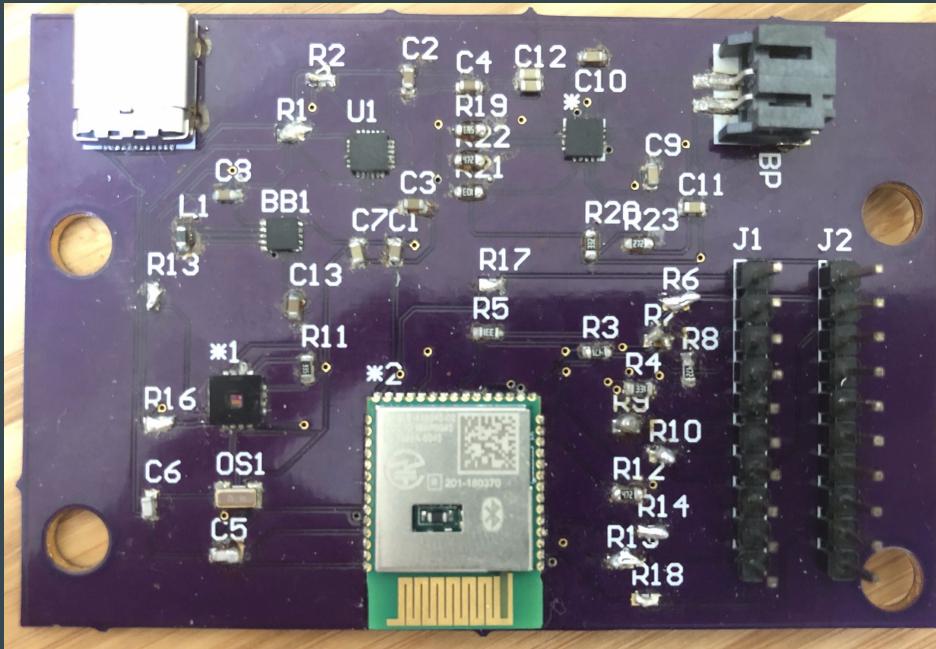


Bottom

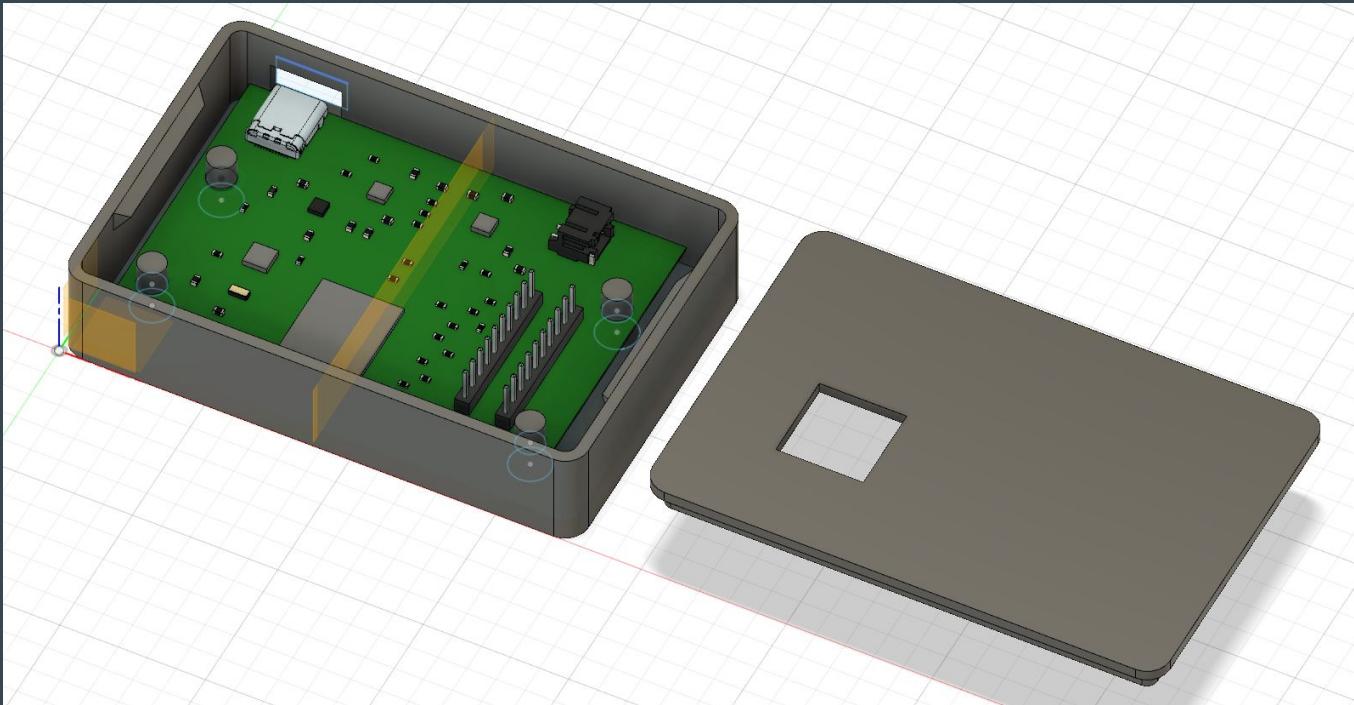
HARDWARE - PCB DESIGN: SOLDERED BETA BOARD



HARDWARE - PCB DESIGN: SOLDERED FINAL BOARD

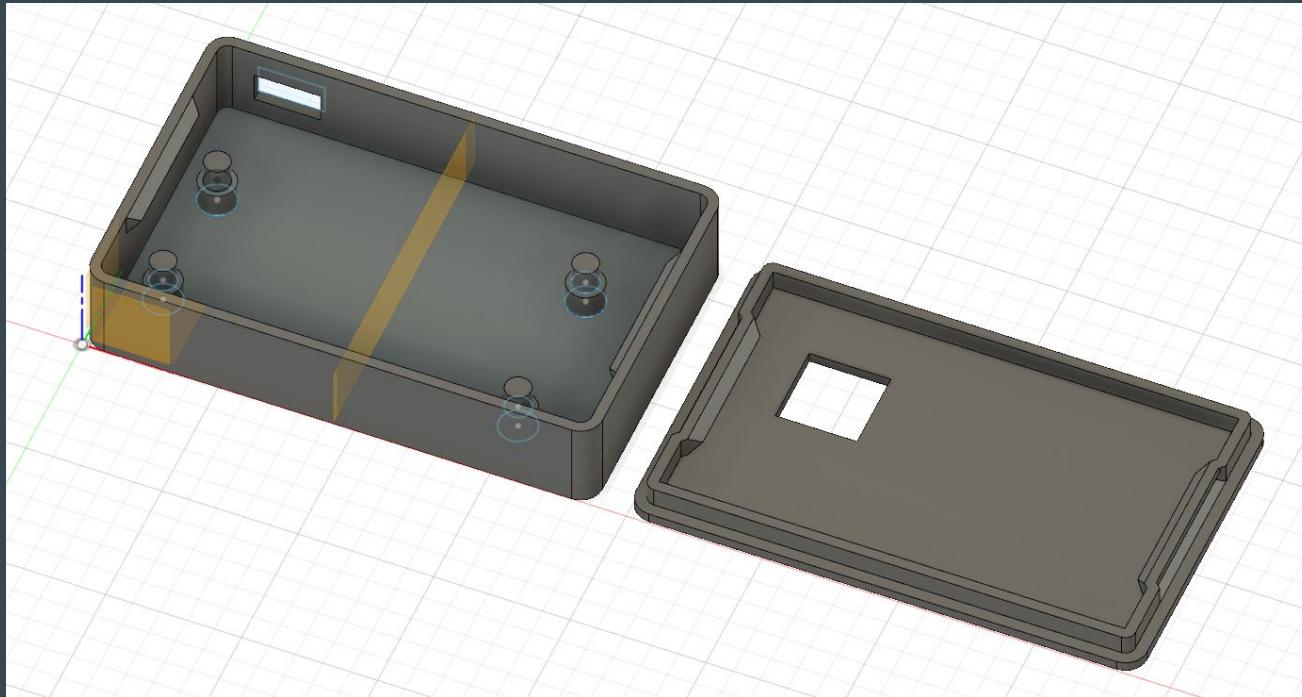


MECHANICAL - ENCLOSURES



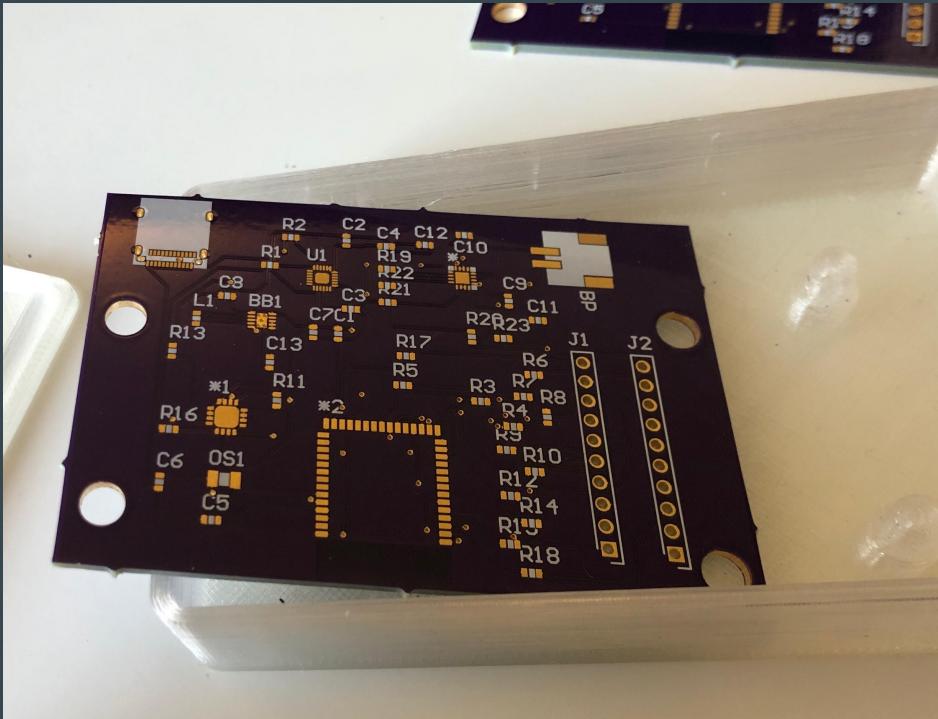
Top View

MECHANICAL - ENCLOSURES



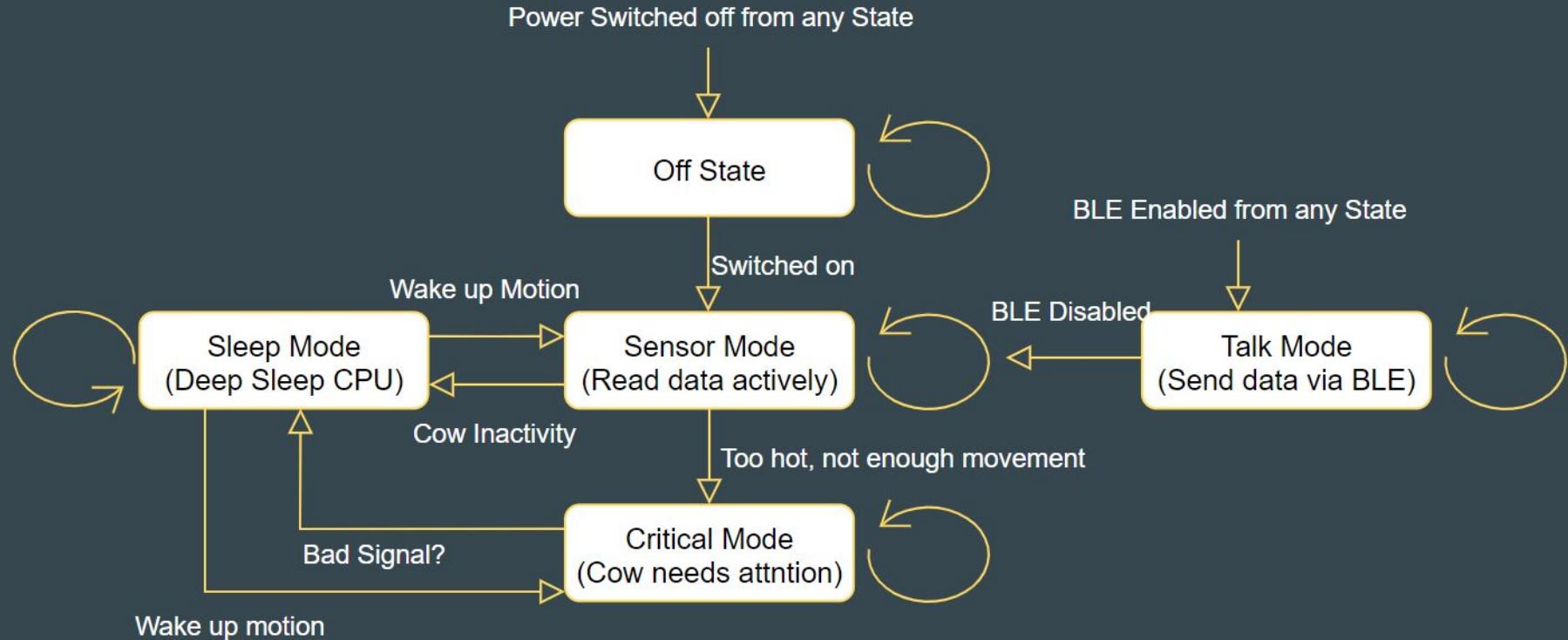
Bottom View

MECHANICAL - ENCLOSURES

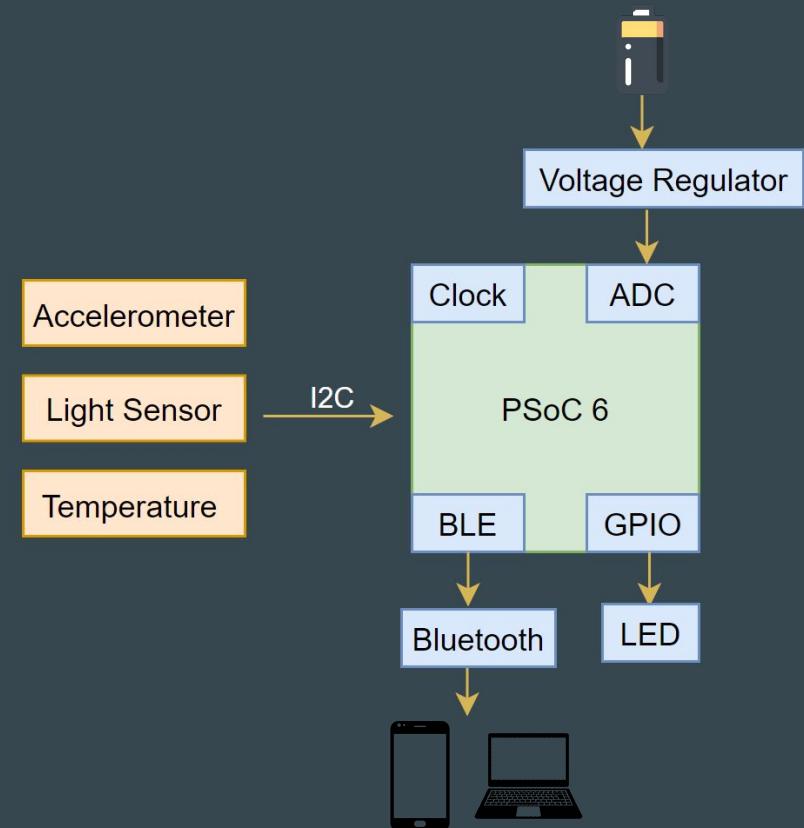
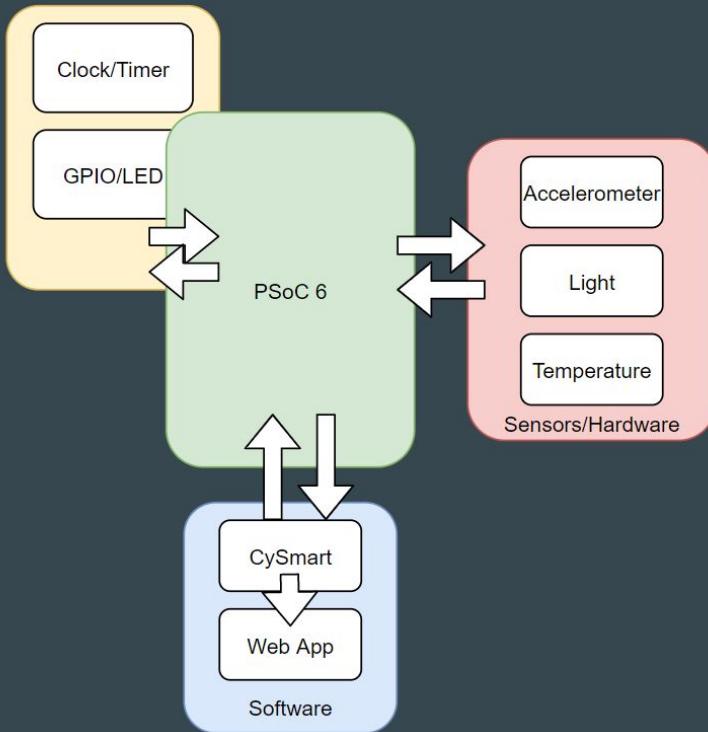


Unsoldered Board with 3D Enclosure

FIRMWARE - STATE DIAGRAM



SOFTWARE - BLOCK DIAGRAMS



CS IMPLEMENTATION

- Web UI
- Two Layers
 - Detailed View for Farmers (With Alarms and Status)
 - Overall View for Consumers (Graphs and Data)
- Infrastructure
 - JS for web design
 - Android Studio app for logging data
 - App uploads to SQL/Web server



POWER ANALYSIS

9-axis-sensor (gyro, acc, mag all on)	5.598 mW
Light sensor (when -40~125°C)	4.95 mW
PSoC 6 (only CM0+ on, 100mHz, With IMO and FLL)	12.54 mW
Total	~ 23.1 mW

- Most of the time, device is set in Deep Sleep power mode, to save power.
- Device wakes up using an adjustable timer interrupt.
- Battery life should be about 25 hours:

The battery capacity of the Lipo battery we used is 175mAh.

Battery Life = Battery Capacity in mAh / Load Current in mA

$$= 175 \text{ mAh} / (23.1 \text{ mW} / 3.3 \text{ V})$$

$$= 175 \text{ mAh} / 7 \text{ mA}$$

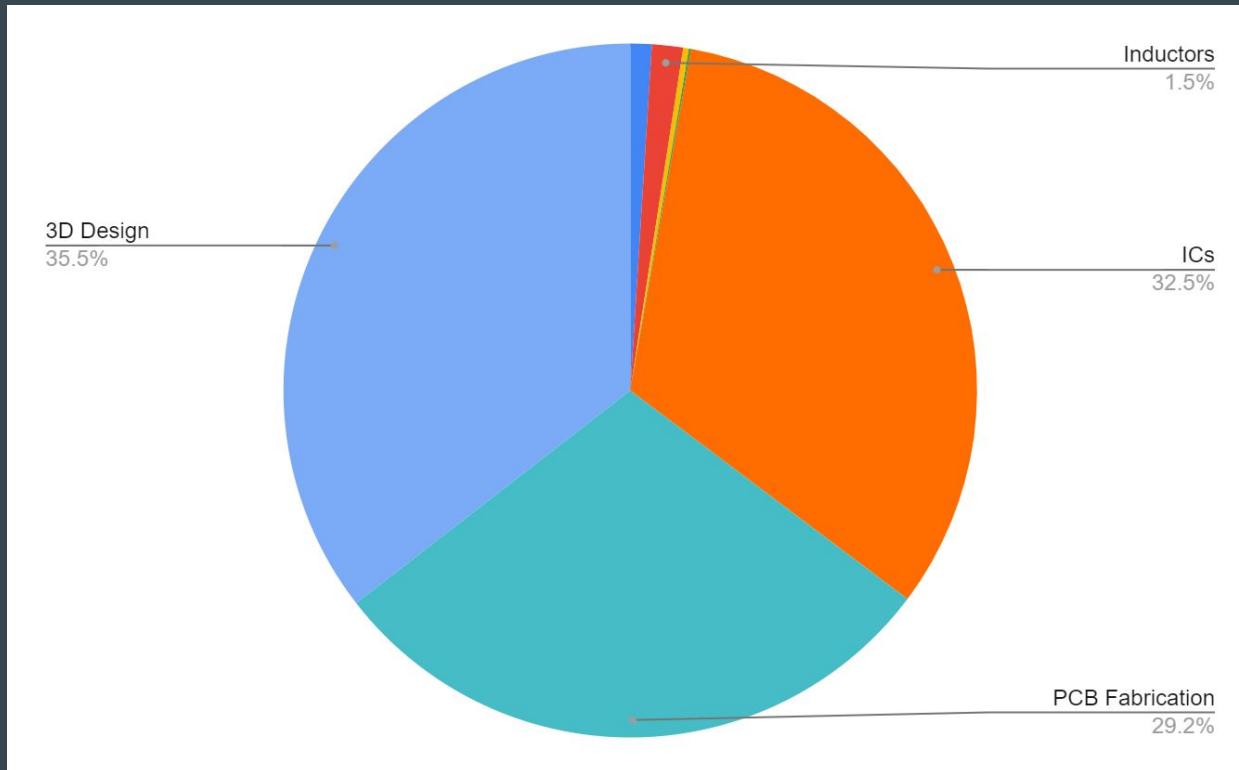
$$= 25 \text{ Hrs}$$

BILL OF MATERIALS

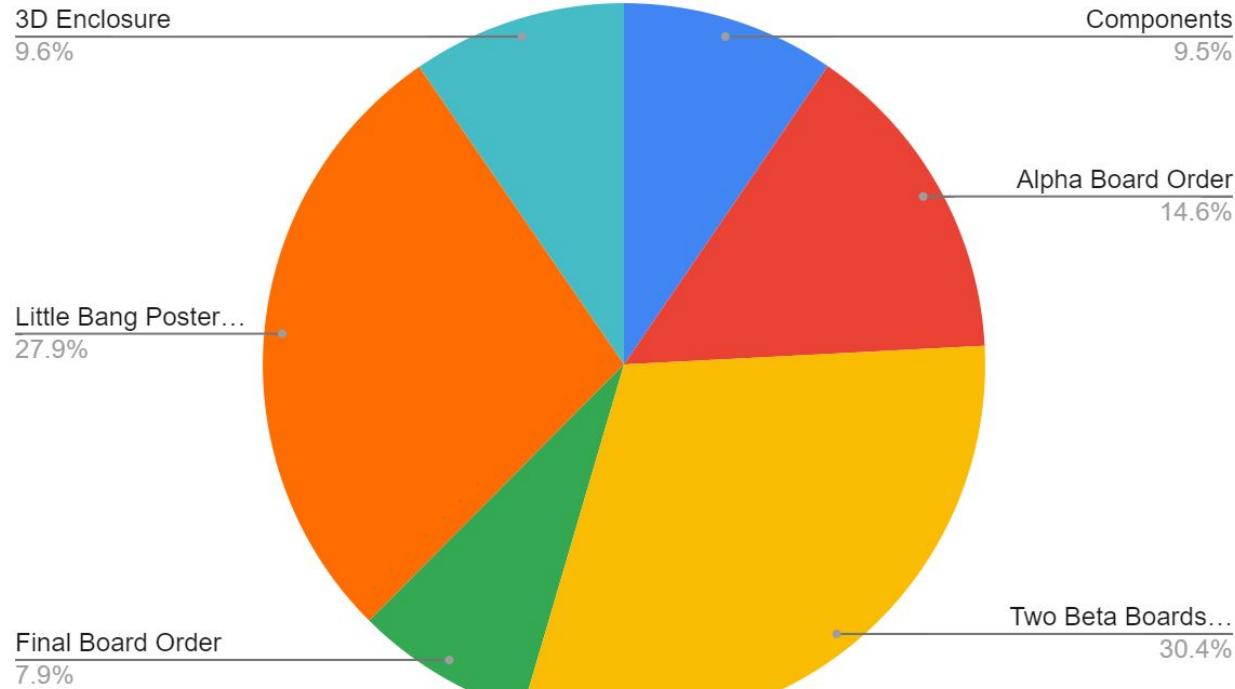
<u>Part/Component</u>	<u>Quantity</u>	<u>Cost per 1 (\$)</u>	<u>Cost per 1000 (\$)</u>
Resistors:			
330 Ohm	2	0.012	12
470 Ohm	1	0.025	25
3.3 MOhm	1	0.003	3
10 kOhm	1	0.109	109
56.2 kOhm	1	0.131	131
3.3 kOhm	1	0.002	2
2.94 kOhm	1	0.137	137
4.32 kOhm	1	0.137	137
4.7 kOhm	2	0.124	124
Inductors			
1.5 uH	1	0.992	992
Crystal			
32.768k Clock	1	0.187	187

Capacitors			
0.1 uF	4	0.008	8
100 nF	2	0.004	4
1 uF	1	0.004	4
4.7 uF	2	0.02	20
10 uF	3	0.026	26
ICs			
Light Sensor	1	16.29	16290
Accelerometer	1	5.91	5910
Designs			
PCB Board	1	20	20000
3D Enclosure	1	24.28	24280
Total		68.401	68401

Budget/Cost Analysis - Product



Budget/Cost Analysis - Overall



Item	Cost
Components	24.121
Alpha Board Order	37
Two Beta Boards Order	76.8
Final Board Order	20
Little Bang Poster Printing	70.63
3D Enclosure	24.28

THANK YOU!!!

