Omni-Sense

Sense the dangers of everyday life before it's too late.

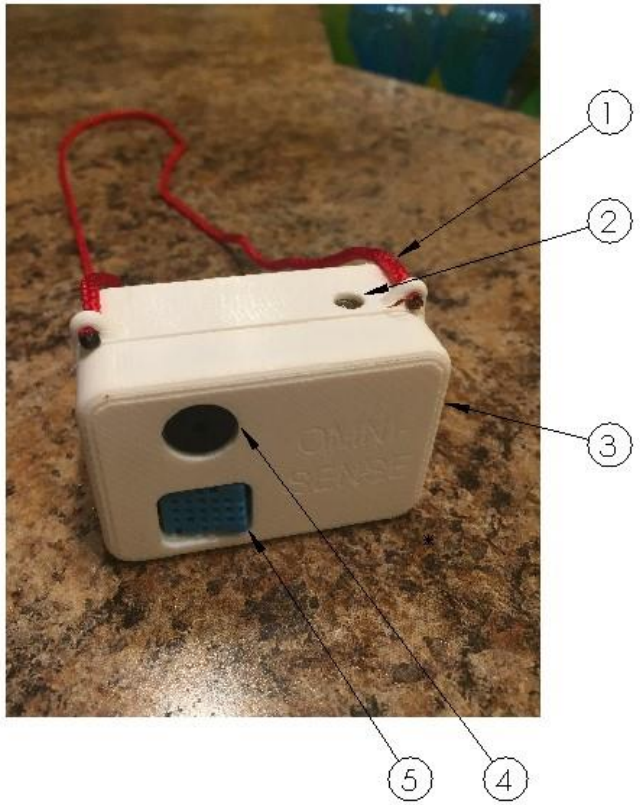
Team Member Introductions

- Shawn Roemer – Team Leader, Drafter/Designer (Hardware), Cost Analyzer, Material Procurement
- Christopher Cabrera – Designer (Electronics, Software), Programmer, Sensor Expert, R&D.
- Michael McClendon – Quality Engineer, Marketing Manager

About

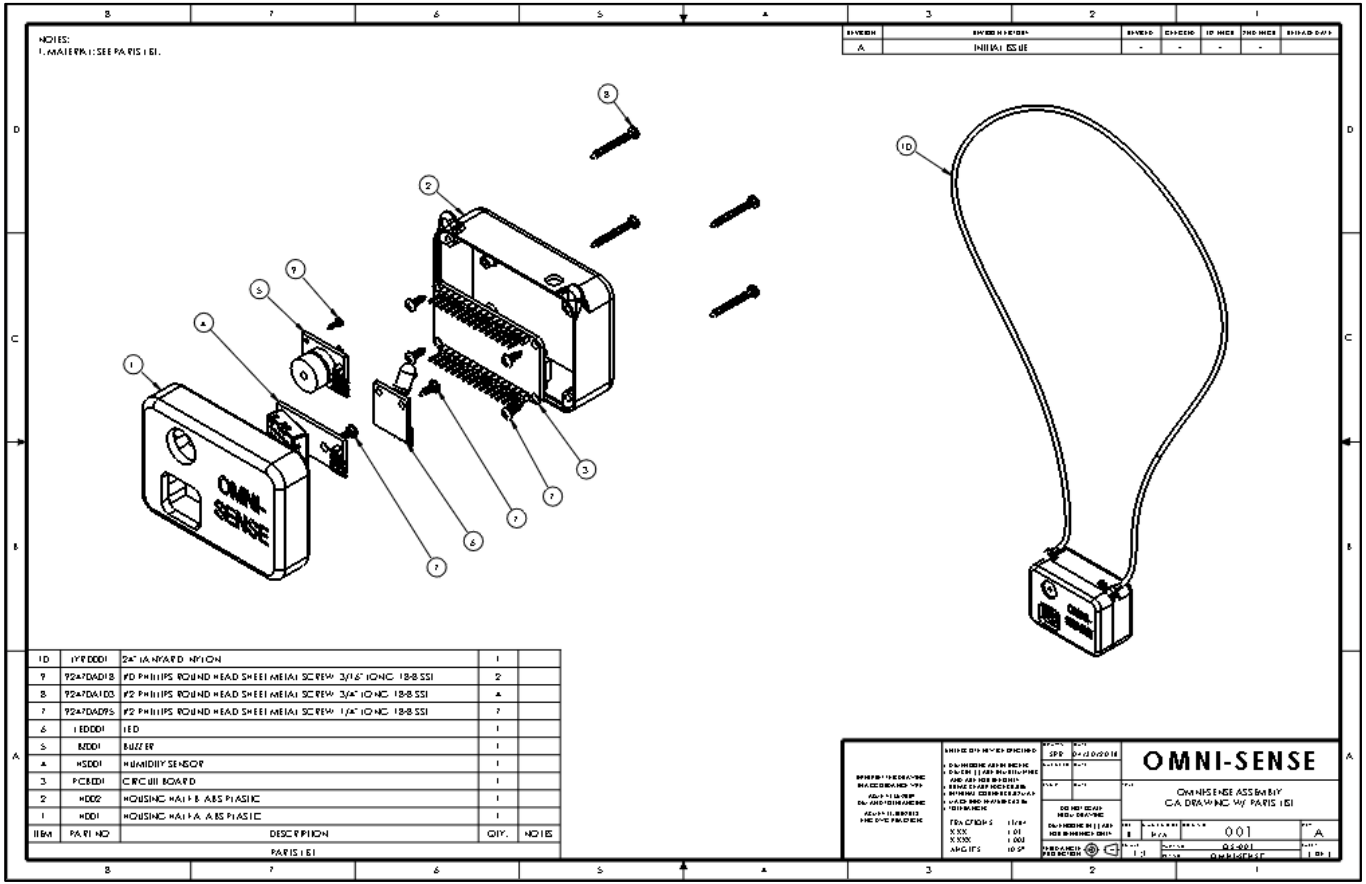
- ***Omni-Sense*** is a fashionable and durable piece of jewelry that is engineered to save lives. Its fashionable design is coupled with its functionality as a sensor for conditions that can prove harmful to the body.
- ***Omni-Sense*** will be used to detect potentially dangerous levels of either smoke, carbon monoxide, temperature and/or humidity, all while doubling as decorative jewelry. This device will be able to adapt to an individual's lifestyle, utilizing applications that range from detecting hazards for the elderly (in their environment) to professionals such as firefighters (in their persistently dangerous environment).

Product Description

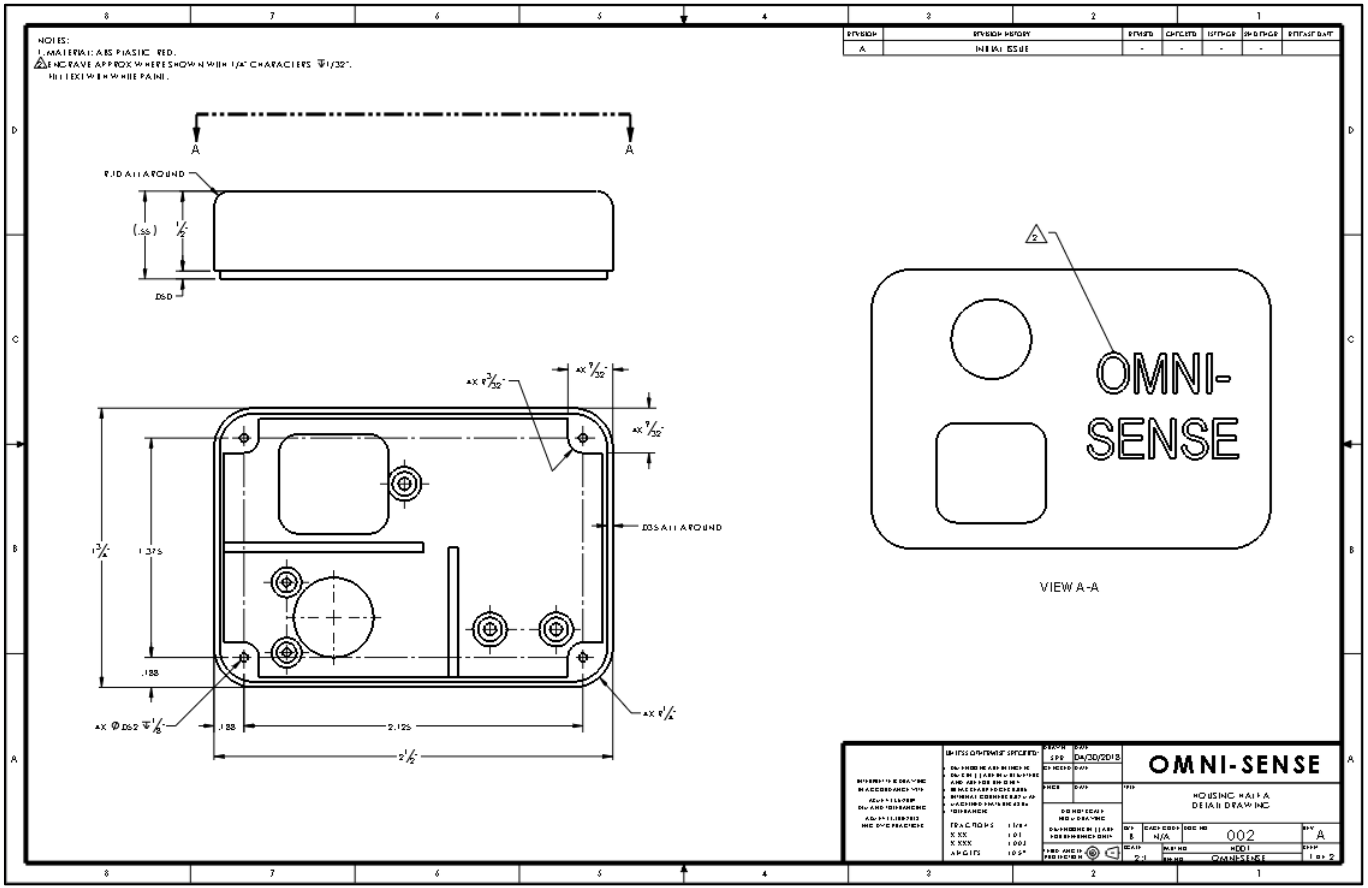


1. Lanyard
2. LED
3. Housing
4. Buzzer
5. Sensor

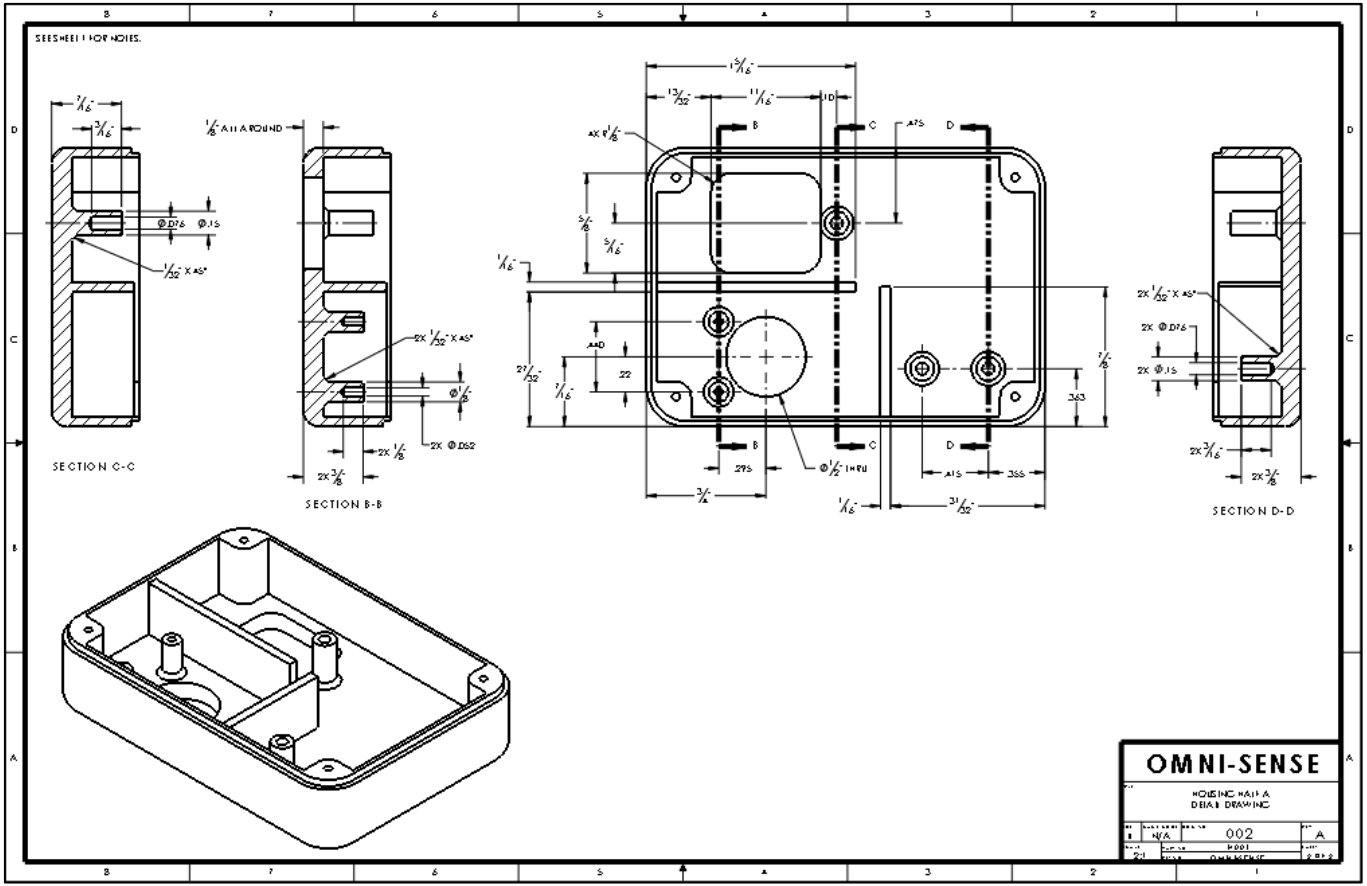
Design Drawings



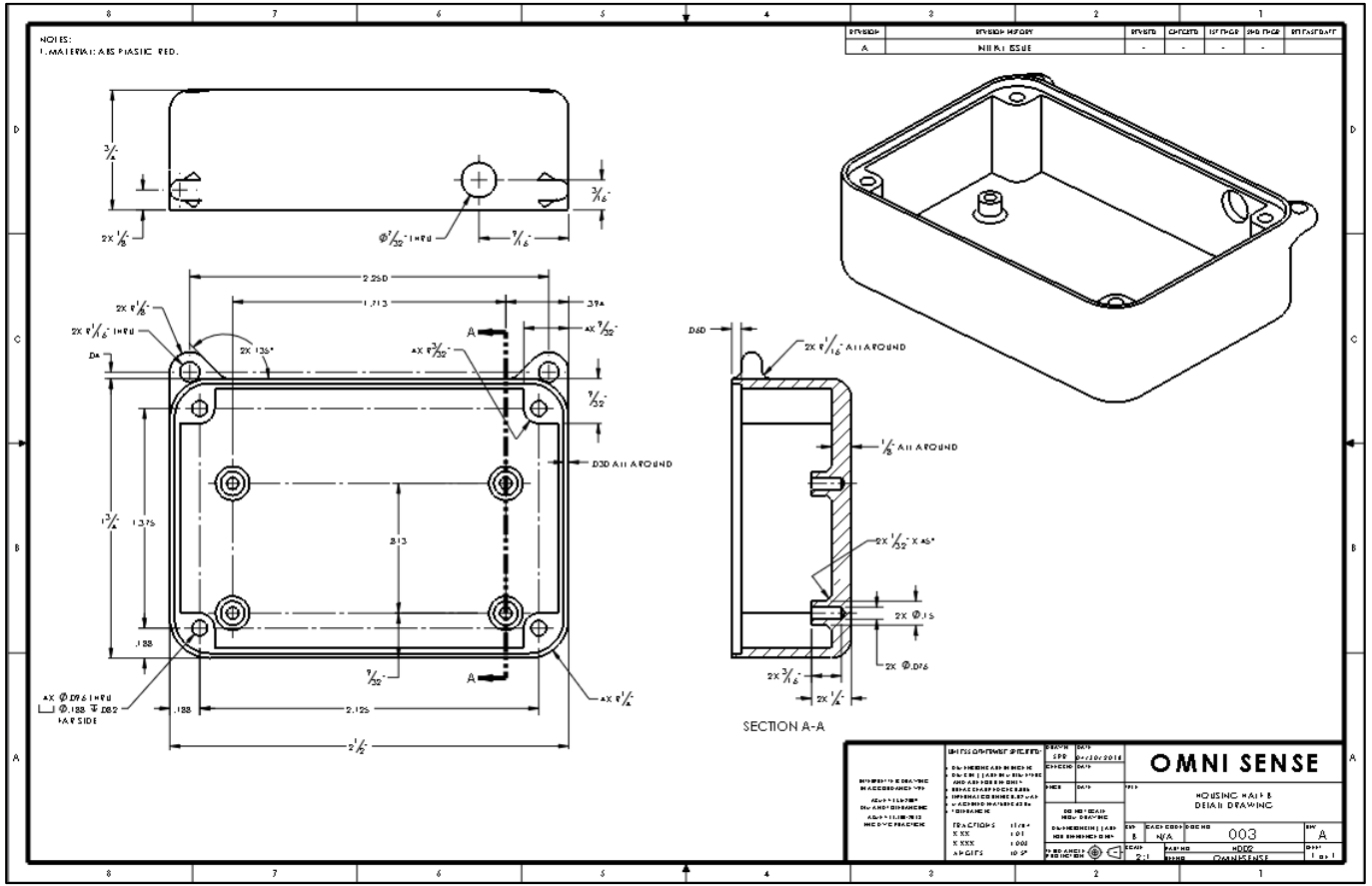
Design Drawings (Cont.)



Design Drawings (Cont.)



Design Drawings (Cont.)



Key Innovations & Advantages

Omni-Sense offers key innovations over existing/competitive products:

Stylish Design

- Different types of enclosures to fit the customer's style.
- Multiple enclosure color options, with the ability to special order custom colors.
- Multiple styles and lengths of lanyards.

Durability

- Strong yet light construction
- Shock-proof
- Splash resistant

Adaptability

- Able to be worn around the neck, or modifiable to be worn on the wrist, ankle or belt.
- Lanyard can be custom selected to fit the customer's wants/needs.

Web Accessibility (Wi-Fi)

- Live 24/7 monitoring allowing caregivers or family to receive real-time reports of conditions.

Wifi Innovation

Since our last meeting, at the end of semester of Senior Project and Design, the faculty's input was noted and implemented for a WIFI server capabilities. Omni-Sense now has the capability to monitor temperature and humidity levels via a web server that anyone authorized can use.

ESP8266_DHT11.ino | Arduino 1.8.5 (Windows Store 1.8.10.0)

File Edit Sketch Tools Help

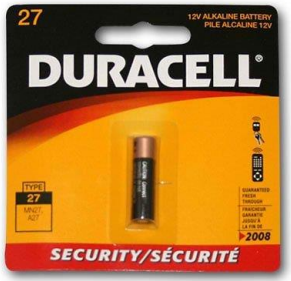
Upload

ESP8266_DHT11.ino §

```
#include <ESP8266WiFi.h>
#include <WiFiClient.h>
#include <ESP8266WebServer.h>
#include <DHT.h>

#define DHTTYPE DHT11
#define DHTPIN  0 // ATTENTION 0 is pin D3 on my ESP8266 ESP12

const char* ssid     = "YOUR_SSID";
const char* password = "YOUR_PASS";

ESP8266WebServer server(1234);
DHT dht(DHTPIN, DHTTYPE,16); // 16 is only correct value for ESP8266 ESP12 DHT11 if this is set wrong you will get reading like 2147483647

float humidity, temp_f;
String webString="";

unsigned long previousMillis = 0;
const long interval = 2000;

void handle_root() {
  server.send(200, "text/plain", "ESP8266 running DHT11 sensor, to read data from sensor GET /temp or GET /humidity");
  delay(100);
}

void setup(void)
{
  Serial.begin(115200);  // to get stdout Tools -> Serial Monitor on 115200 baud
  dht.begin();

  // Connect to WiFi network
  WiFi.begin(ssid, password);
```

Battery Improvements

- We were able to make improvements to the battery by choosing a much smaller battery that still provides the same functionality.
- This battery also provides significant weight savings due to the reduction in size.



Testing Results

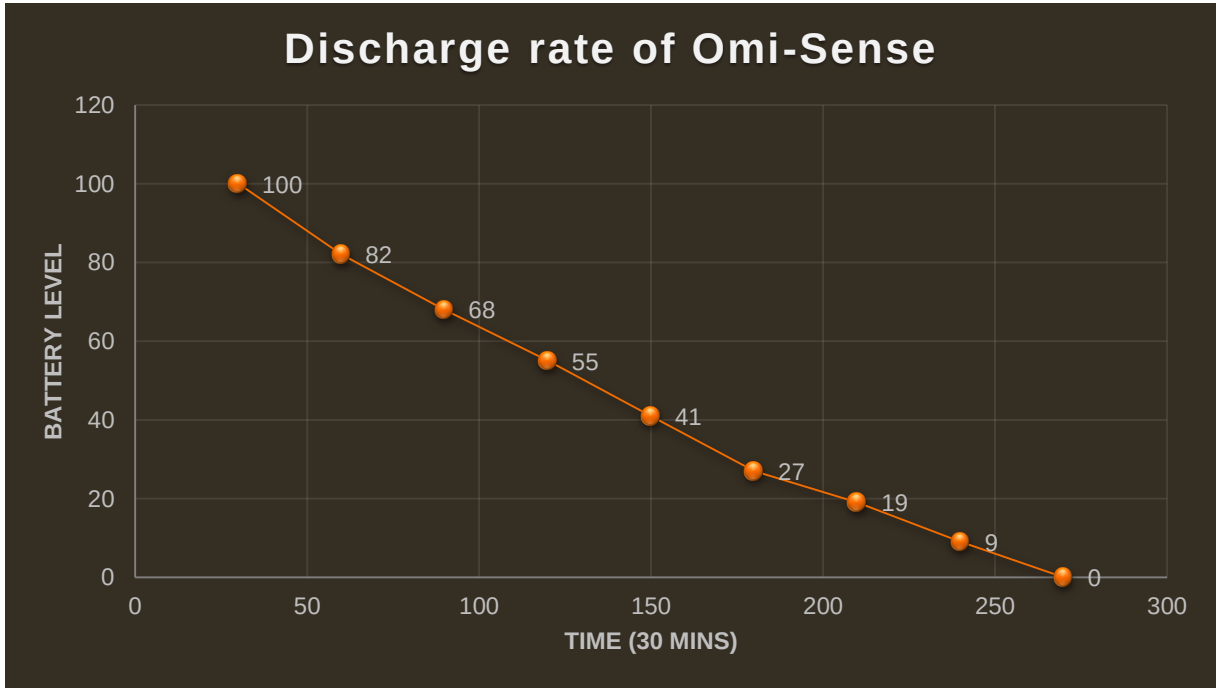
Testing methods performed on Omni-Sense:

- Functionality: Testing was done on every output sensor to test the functionality. For example, the LED light was tested to see if it would light up and if the buzzer would make a sound if given the command to. The temperature humidity was tested to see if they report raw data.
- Durability: The battery on Omni-Sense was tested as well. The voltage of a 12v battery was connected to the microcontroller, and the voltage was tested every 30 mins to check the discharge level. An excel file was created with the data collected.
- Visual Testing: Testing was also done to check the how the device (Omni-Sense) would handle wires and all the sensors onboard. An inspection was also performed on the rope [that goes around the neck] to check for material damage.

Test Results - Functionality

FUNCTIONALITY TESTING		
LED Light		
Pass	Fail	
✓		Did the light come on immediately after temp. threshold was met?
✓		Was the brightness of the light satisfactory?
✓		Was the correct indication light engaged?
✓		Did the light remain on until temp. returned to acceptable level?
Audible Buzzer		
Pass	Fail	
✓		Did the buzzer sound immediately after temp. threshold was met?
✓		Was the volume of the buzzer effective?
✓		Did the buzzer emit the correct audible response?
✓		Did the buzzer remain on until temp. returned to acceptable level?
Temperature Recognition		
Pass	Fail	
✓		Was Omni-Sense immediately responsive to undesirable temp.?
✓		Was there any evidence of static feedback (ie. audible or visible)?

Test Results - Durability



Test Results – Visual (NDT)

VISUAL TESTING (VT)		
Casing Body		
Pass	Fail	
✓		Void of physical, structural damage.
✓		Finished surface smooth and burr-free.
✓		All internal components enclosed securely by casing body.
Lanyard		
Pass	Fail	
✓		Void of physical, structural damage.
✓		Both ends of lanyard secured in designated connection site.
✓		Lanyard length adequate, allowing comfortable positioning.
✓		Free of noticable discoloration

Overview of Market Size

The wide range of functionality makes Omni-Sense appealing to a very broad commercial market. The child necklaces are just one example of a piece for young children where the temperature of that environment is being constantly monitored, whereas the adult necklaces would align better with the older generation.

Several entrepreneurial savants suggest that a new startup company should show yearly projections going out 3 years and roll outs to geographic areas should happen over time.

	Year 1	Year 2	Year 3
Total Available Market	326,766,748	1,847,794,156	1,884,975,897
Total Served Market	290,000,000	1,178,120,000	1,210,220,000
Target Market	234,900,000	857,287,518	882,877,518

Overview of Market Size

Distribution & Channels

Since monetary resources are not at our disposal, creativity and innovation are pivotal in reaching the masses; hence we will utilize both *outbound marketing* and *inbound marketing*.

Outbound Marketing - a traditional method of marketing seeking to obstruct potential customers.

Inbound Marketing - a marketing methodology that is designed to draw visitors and potential customers in.

Distribution & Channels

Outbound marketing

- Healthcare Providers
    - Develop network of physicians
    - Key Opinion Leaders (KOL)
- Wellness Demonstrations/Health Fairs
- Trade Shows

Inbound marketing

- Website (marketing channel)
- Search Engine Optimization (SEO)

Sales

With an extensive campaign to make Omni-Sense a household name in the medical device market, our product will be sold through healthcare providers, on Amazon, in big box stores, and through our own online store, enabling consumers to order directly from us without a distributor.

Year 1 Sales Projections:

- Units = $2.4 million
- Web Accessibility = $17.9 million
- Total = $20.3 million

Bill of Materials

11	913T72	Lanyard	Nylon	1	McMaster-Carr www.mcmaster.com
10	92470A018	#0 Phillips Round Head Sheet Metal Screw, 3/16" Long	18-8 Stainless Steel	2	McMaster-Carr www.mcmaster.com
9	92470A103	#2 Phillips Round Head Sheet Metal Screw, 3/4" Long	18-8 Stainless Steel	4	McMaster-Carr www.mcmaster.com
8	92470A095	#2 Phillips Round Head Sheet Metal Screw, 1/4" Long	18-8 Stainless Steel	7	McMaster-Carr www.mcmaster.com
7	FBA_30	Electrical Wire	14 Gauge Copper	2 X 3”	Striveday™ https://striveday.aliexpress.com/store/1963631
6	008968	Battery Clip	Hard Plastic	2	Sun Founder www.sunfounder.com
5	EL-003	Battery	Varies	1	Elegoo Market www.elegoo.com
4	El-2560	Sensor Pack	Varies	1	Elegoo Market www.elegoo.com
3	LUA-12	Circuit Board	PCB	1	Makerfocus https://www.amazon.com/s?ie=UTF8&me=A1N6DLY3NQK2VM&page=1
2	L001	Lid	ABS Plastic	1	Ameritech Die & Mold South www.amdiemoldsouth.com
1	MH001	Main Housing	ABS Plastic	1	Ameritech Die & Mold South www.amdiemoldsouth.com
Item	Part Number	Description	Material	Qty	Supplier
Bill Of Materials					

Total Estimated Cost (per 1,000 Units)

5	Mold Design & Manufacture - Lid	N/A	N/A	$80.00 for 1,000 parts[1]	1,000	$80.00
4	Mold Design & Manufacture – Main Housing	N/A	N/A	$60.00 for 1,000 parts[2]	1,000	$60.00
3	Direct Labor – Packaging & Shipping	$12	0.10	$1.20	1,000	$1,200.00
2	Direct Labor- Assembly Solder & Test	$12	1.00	$12.00	1,000	$12,000.00
1	Direct Material	N/A	N/A	$38.61	1,000	$38,610.00
Item	Description	Labor Rate ($/Hr)	Time(Hours)	Cost (Each)	Qty of Units	Total $51,950.00
Cost Analysis						

1. Based on a manufactured mold that produces 100,000 parts at a cost of $8,000.
2. Based on a manufactured mold that produces 100,000 parts at a cost of $6,000.

Safety Standards

Because of the purpose and functionality of Omni-Sense, it is considered a medical device respectfully. Medical devices can be categorized as Class I, II, or III. More specifically, Omni-Sense is a Class II Medical Device, which means it must be in alliance with the requirements listed below:

- **FDA 21 CFR 820.30 (Design Controls)**
- **FDA 21 CFR 820.20c (Management Responsibility)**
- **ISO 14971 (Risk Management to Medical Devices)**
- **FDA 21 CFR 820.100 (Corrective Action and Preventative Action).**

Project Milestones completed to date

- Form core product design team – Complete
- Brainstorm product ideas – Complete
- Identify product design selection – Complete
- Research existing designs/patents to avoid patent infringement – Complete
- Kickoff meeting to define project scope/discuss project goals – Complete
- Develop project charter - Complete
- Identify project risks - Complete
- Identify team members' roles and responsibilities – Complete
- Develop conceptual design/artistic rendering – Complete
- Develop initial Work Breakdown Structure (WBS) – Complete
- Develop initial Project Network Diagram – Complete
- Identify procurement of purchased parts - Complete
- Perform initial cost estimation – Complete
- Place order for purchased parts – Complete
- 3D print/manufacture components for prototype – Complete
- Initial quality assembly/component fit check – Complete
- Initial PCB programming – Complete
- Battery discharge testing – Complete
- Functionality testing – Complete
- Non-destructive testing (visual inspection) – Complete
- Survey potential customers for product feedback – Complete
- Document comments/feedback from potential customers – Complete
- Determine and document areas for quality improvement – Complete
- Develop change management plan – Complete
- Design improvements based on initial testing – Complete
- Determine potential ethical and environmental issues – Complete
- Perform final testing – Complete
- Final quality check – Complete
- Identify suppliers for procuring resources for materials in bulk – Complete
- Complete cost analysis based on 1,000 units – Complete
- Create an overview of market size – Complete
- Identify safety standards that the product must conform to – Complete
- Develop marketing strategy for shows/expos – Complete
- Develop marketing brochure – Complete
- Fill out patent application – Complete
- Completed project documentation – Complete

Questions?