The Emergency Beacon

The 9ers

By : Karen Hakko, Elsa Lange, Tri Thai, Jacob Troop and Sandeep Sinha

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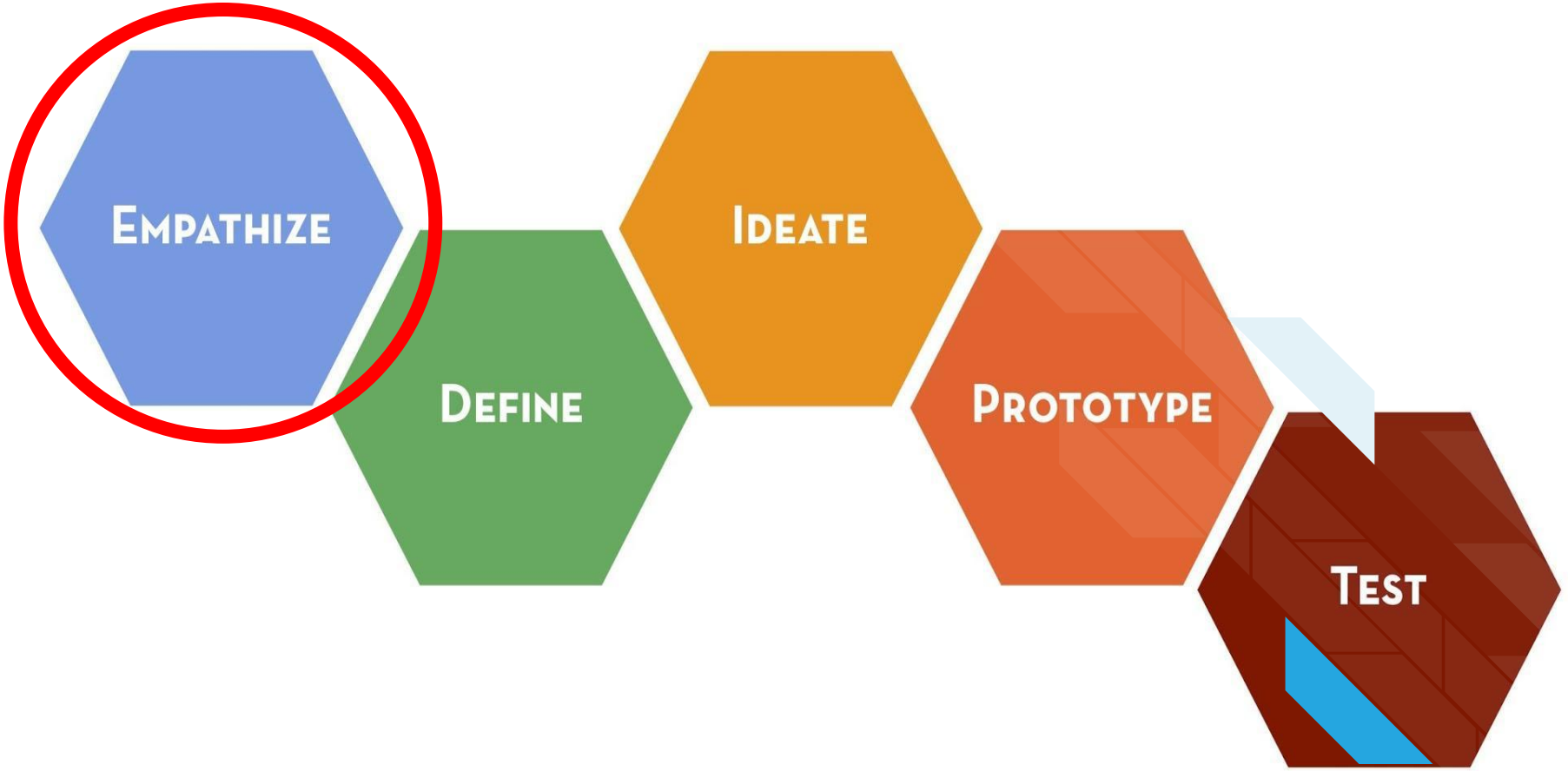

EMPATHIZE
DEFINE
IDEATE
PROTOTYPE
TEST

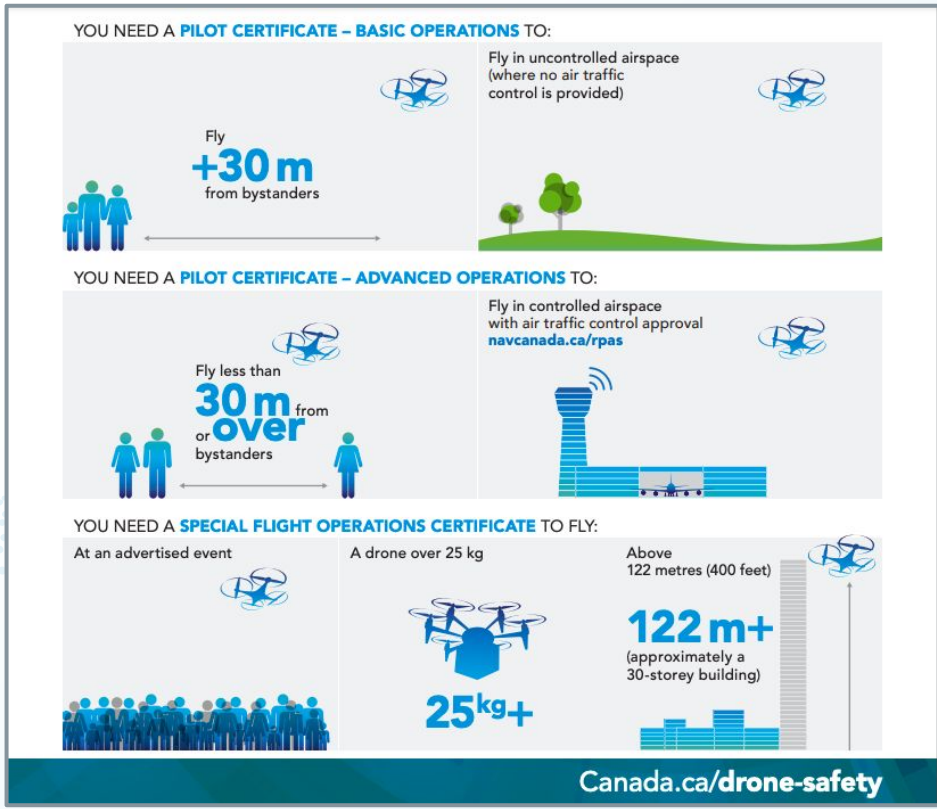
Needs Identification

- JAMZ team requirements
- Emergency beacon

Specific Need	Importance
Safety and Security	1
Accuracy of Data	2
Reliability of Data	3
Communication with Pedestrians	4
Size/Weight	5
Aesthetics	6

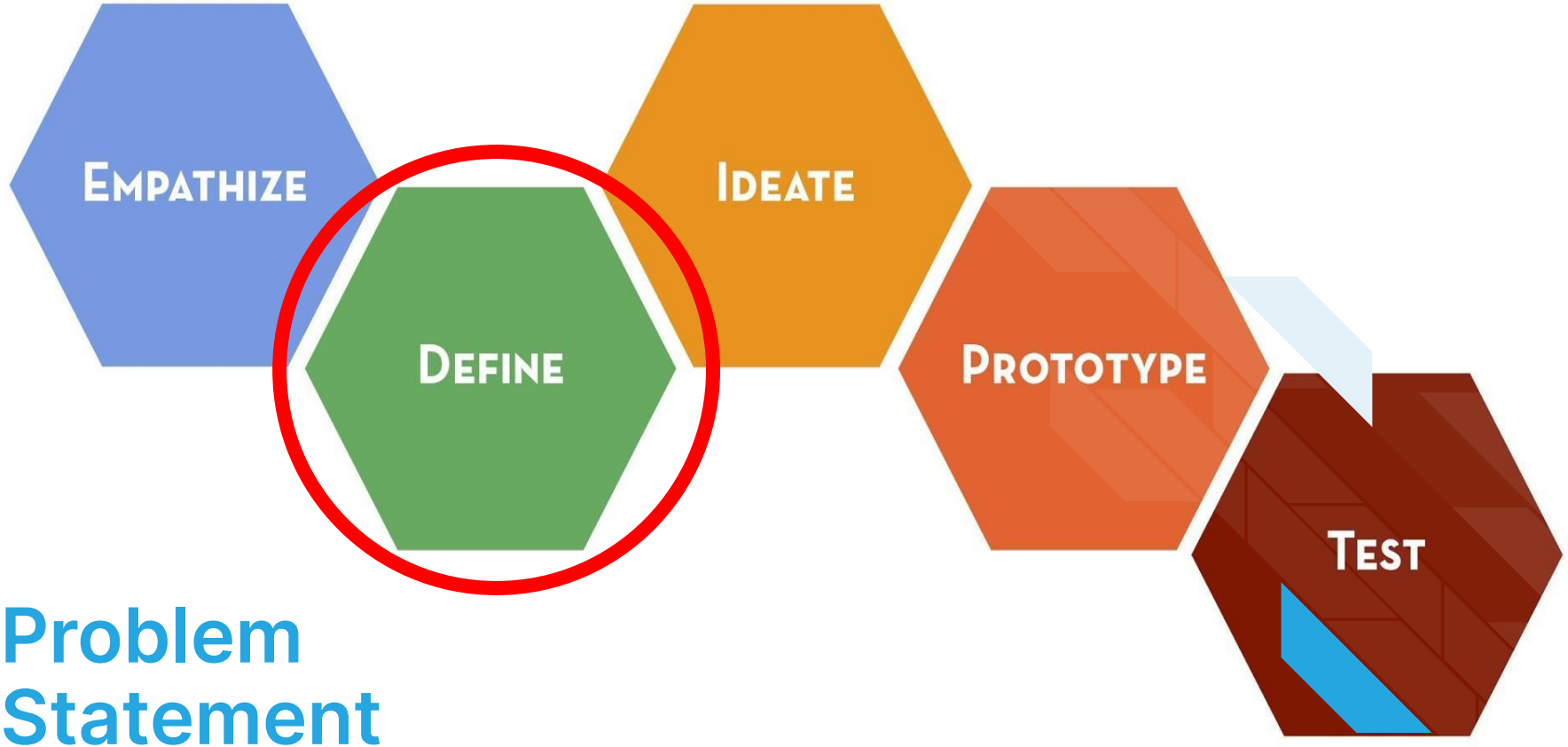
Transport Canada

- Drone requirements
- Effect on our beacon
- Importance of accuracy



Benchmarking

- Similar products
- What we learned
- Application plan



Problem Statement

Design Criteria

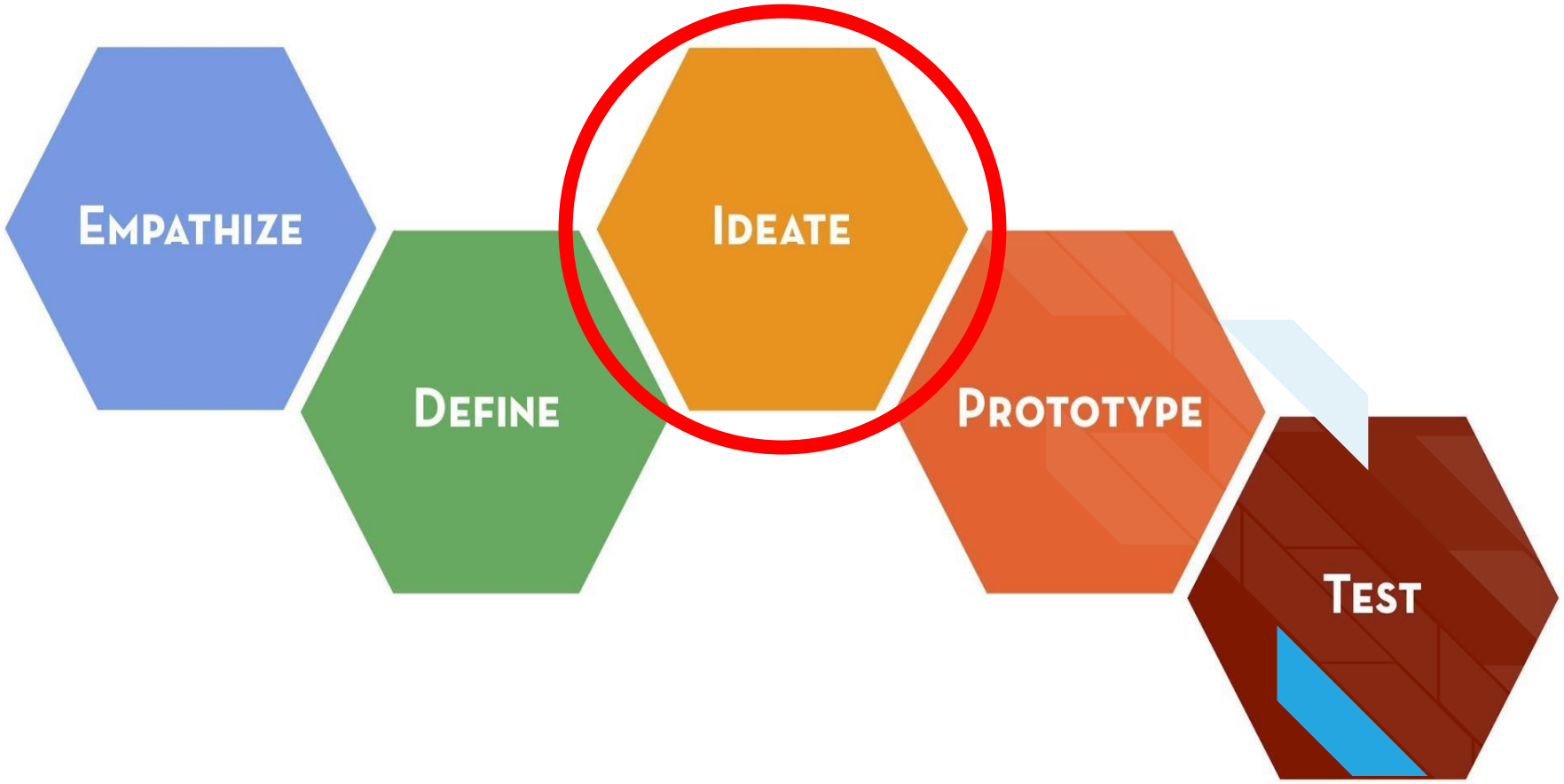
Table 1 - Emergency Beacon Design Criteria Based on the Identified Needs

Need	Design Criteria
Emergency beacon must relay accurate information about the location of the drone to the operator.	**Data transmission**
The emergency beacon should **alert the operator** if the drone goes **off-course**.	**GPS** and transmission.
The emergency beacon should **relay the information as quickly as possible.**	Data transmission.
The beacon must be able to **interpret information** with the impact and/or altitude sensors to trigger the beacon.	Data transmission.

Table 5- Ranks of Technical Benchmarking Based on Importance

Product and company	Importance (weight)	Eureka Products: Marco Polo - Ultralight Single Drone Recovery System	Loc8tor	sMRT AU10-HT	Flytrex
Transmitter/ GPS	4	4	3	2	1
Battery and power usage	2	4	3	2	1
Size	1	3	4	1	2
Speed	3	4	3	2	1
Cost	2	3	4	1	2
Range	3	3	2	4	1
Total		21	19	12	8
Weighted Total		54	45	33	18

Legend	Green	Yellow	Orange	Red
Grade	4	3	2	1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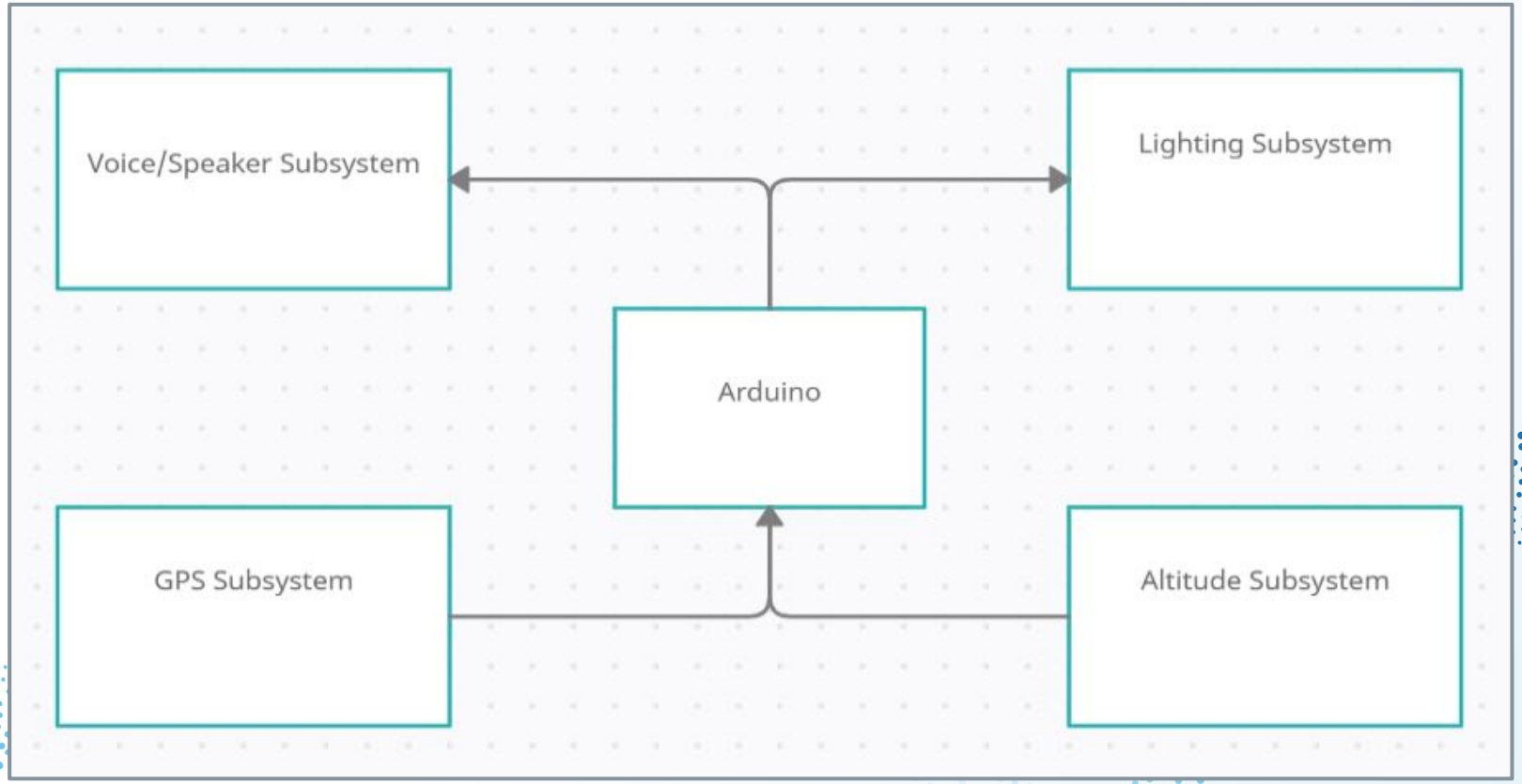
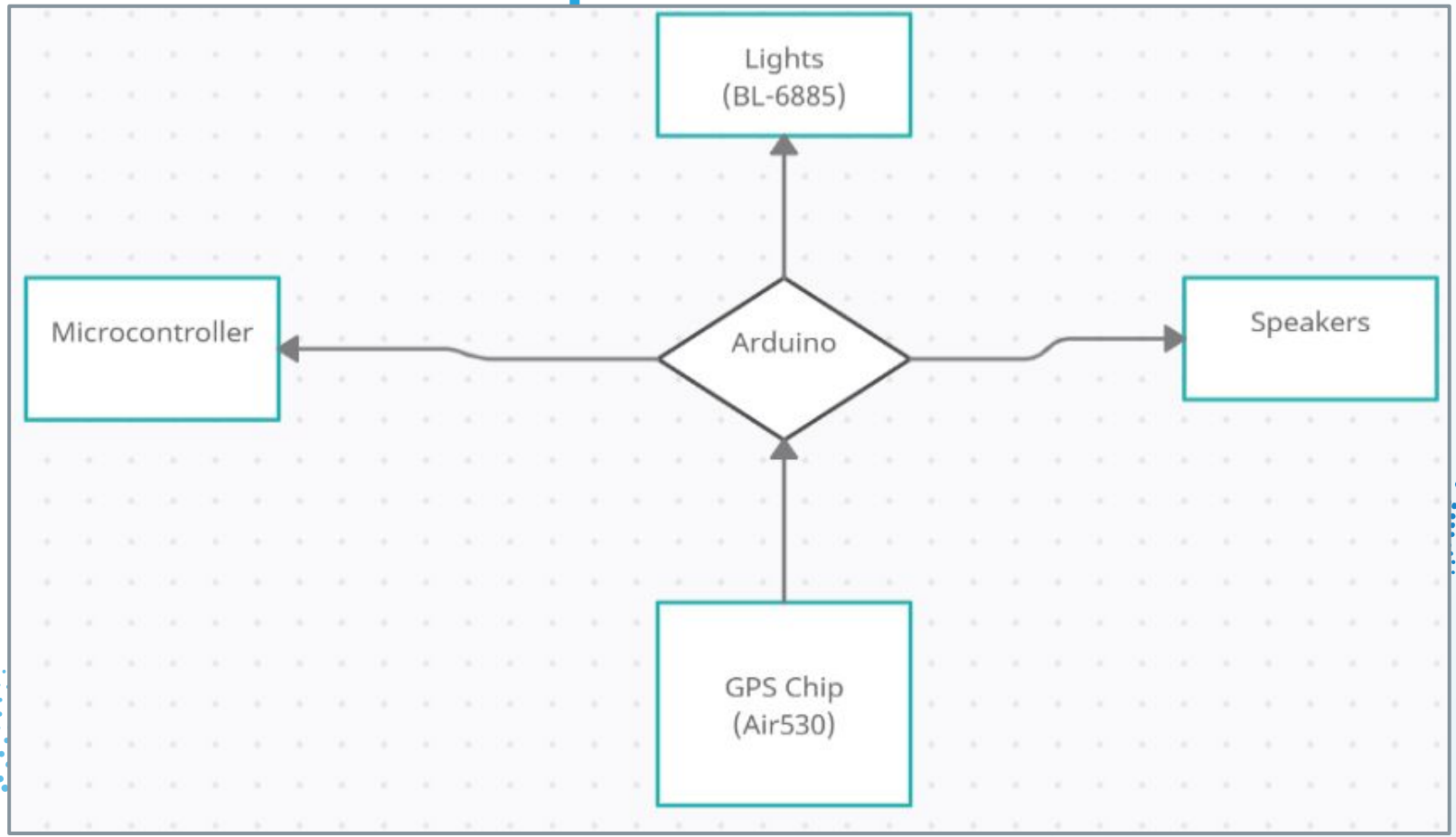
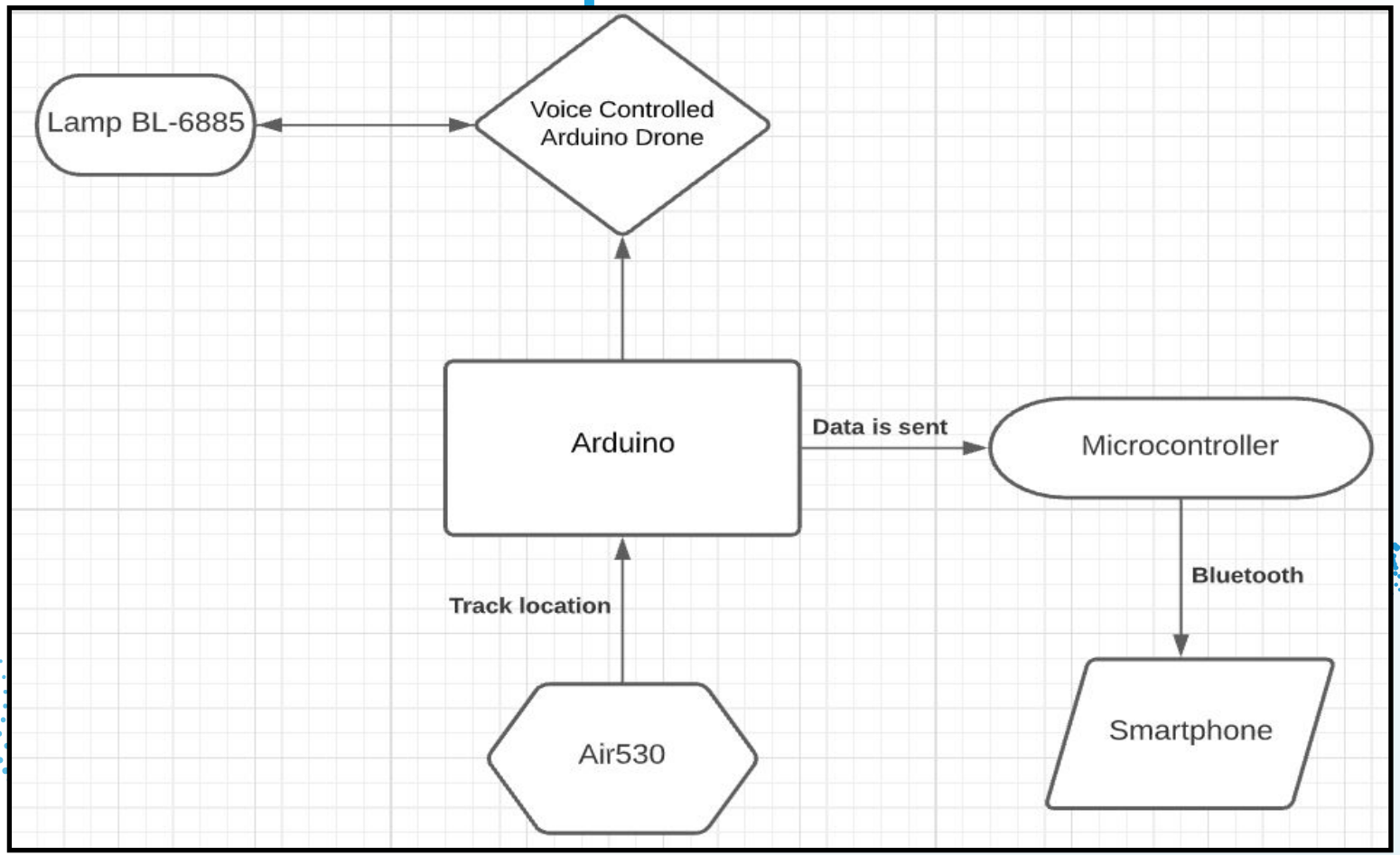
Subsystems


Voice/Speaker Subsystem
Lighting Subsystem
Arduino
GPS Subsystem
Altitude Subsystem

Global Concept A



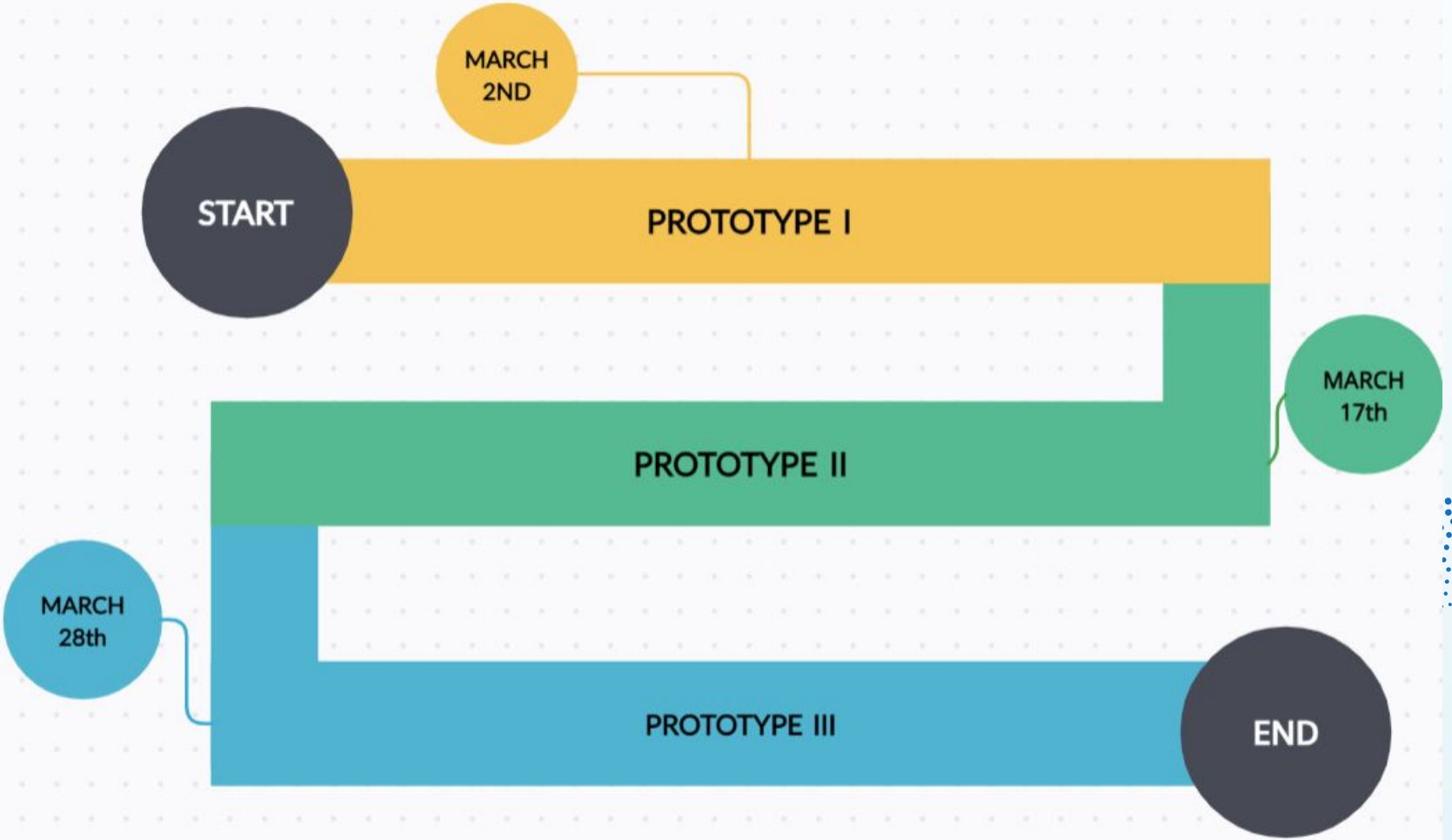
Global Concept B

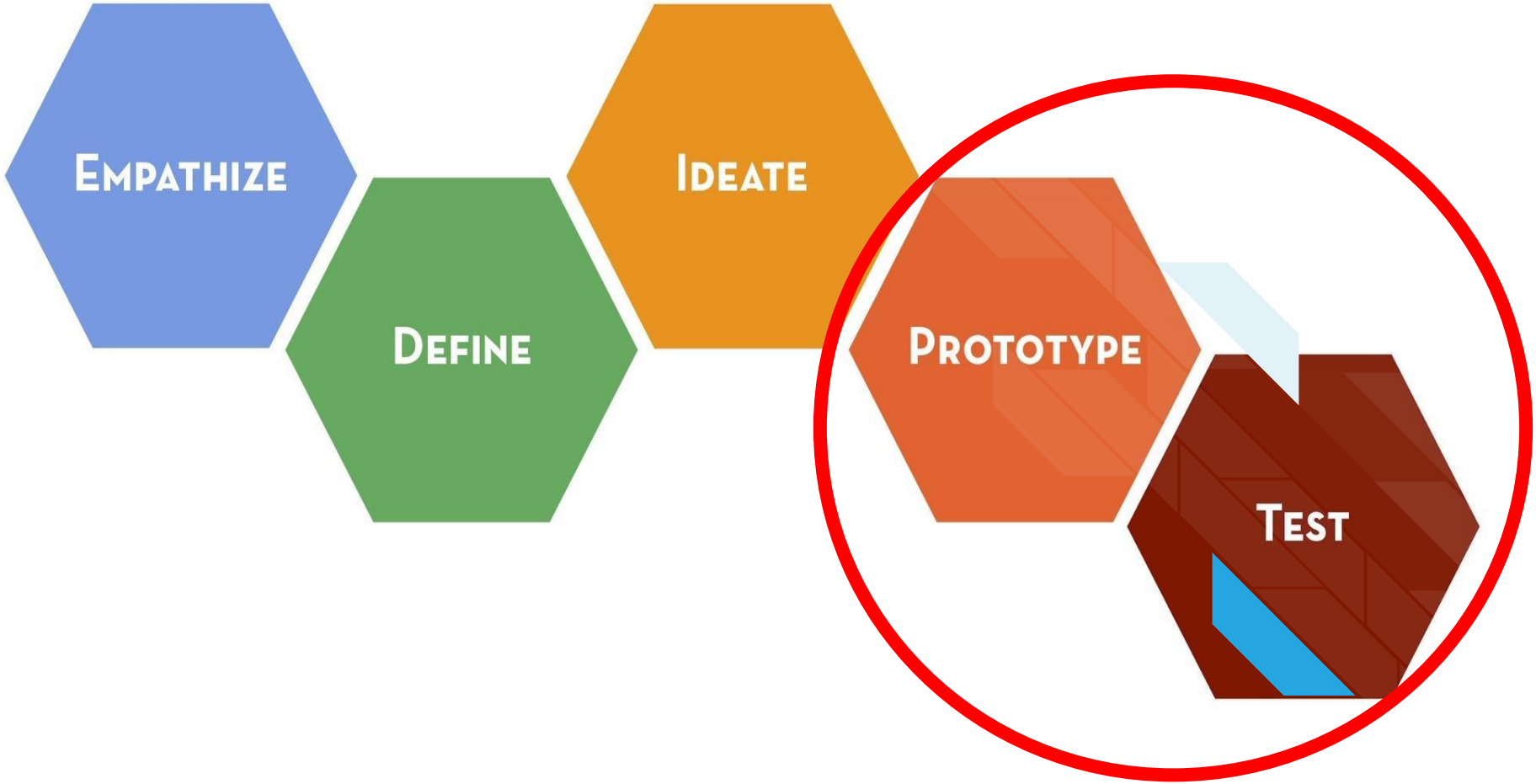


Project Plan

Bill of Materials (BOM)

Arduino Uno ($19.21)
Breadboard ($11.30)
Barometric Pressure Sensor ($7.89)
GPS Module ($29.98)
Speakers ($14.55)
LED lights ($1.20)
Acrylic Case ($13.00)


MARCH
2ND
START
PROTOTYPE I
MARCH
17th
PROTOTYPE II
MARCH
28th
PROTOTYPE III
END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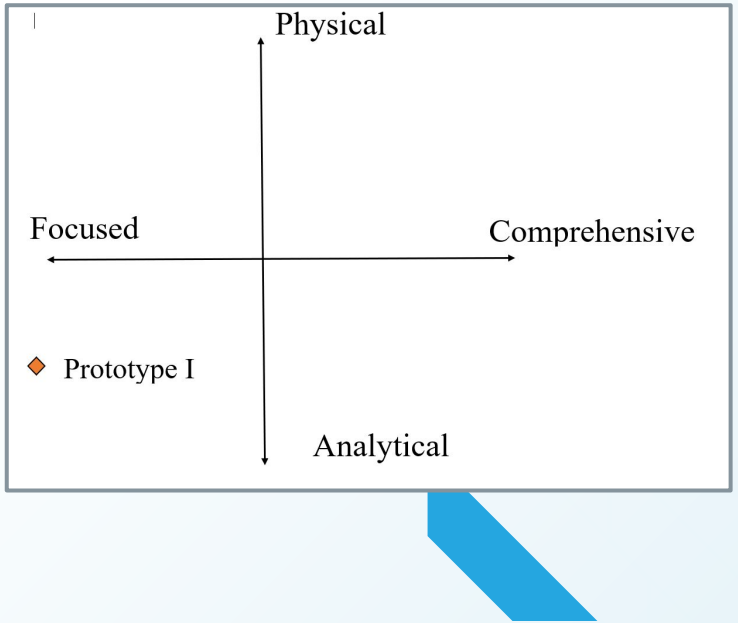
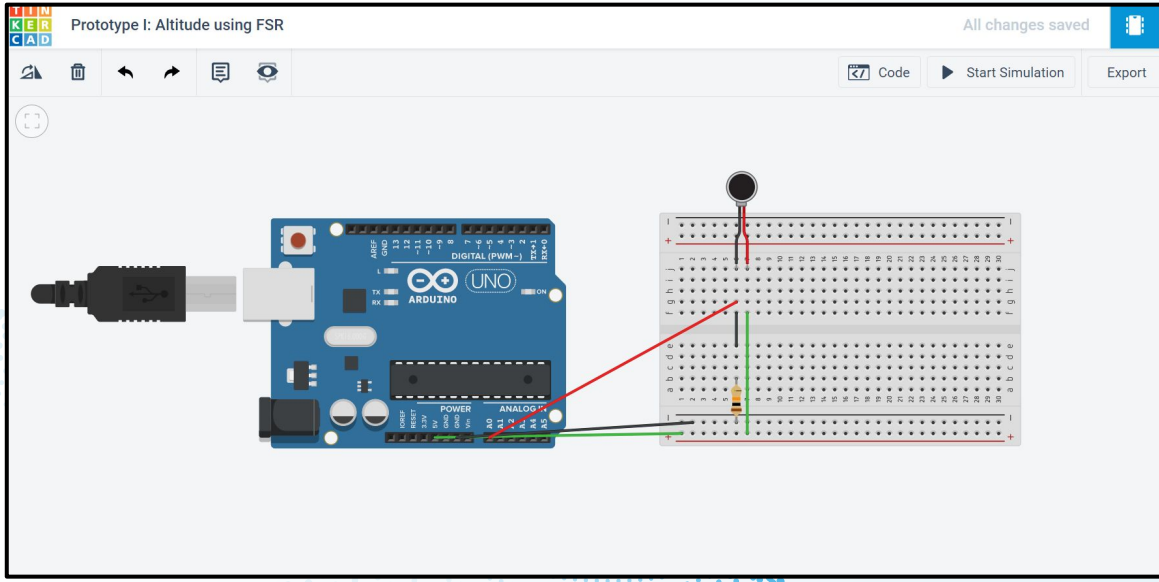
Phase 1: Prototype I

Cost: $0



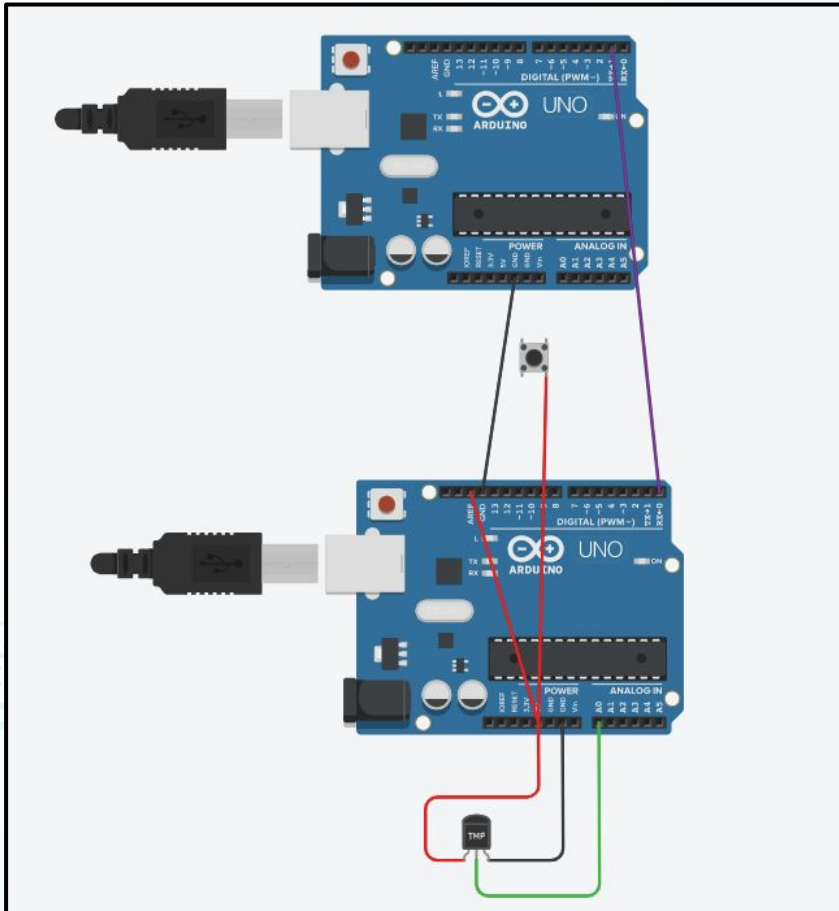
Altitude Subsystem

- Testing done on TinkerCAD
- Low fidelity
- 2 tests



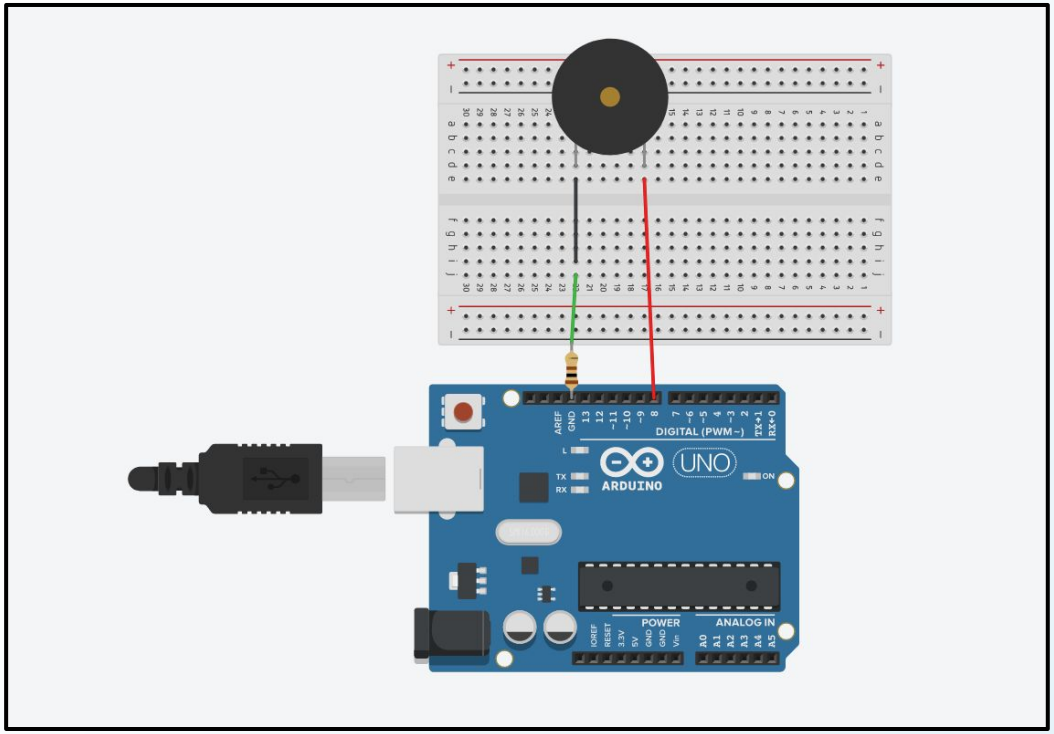
Location Subsystem

- Testing was done on TinkerCAD
- Low fidelity



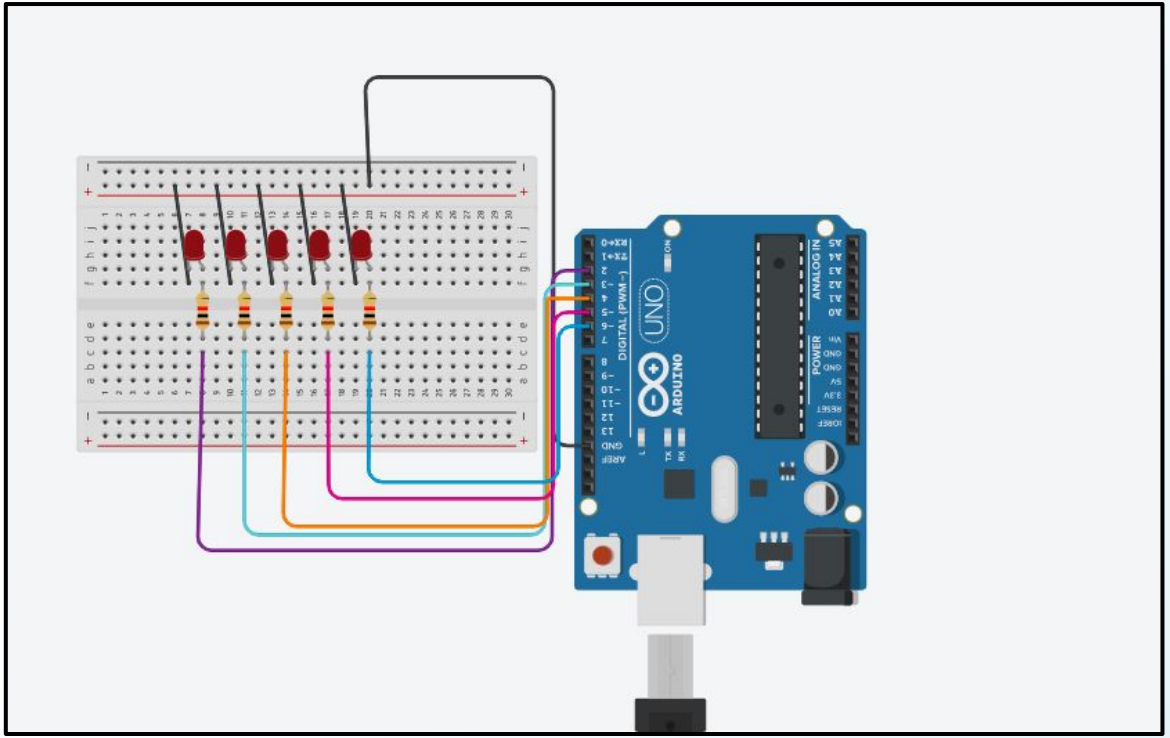
Voice Subsystem

- Testing done on TinkerCAD



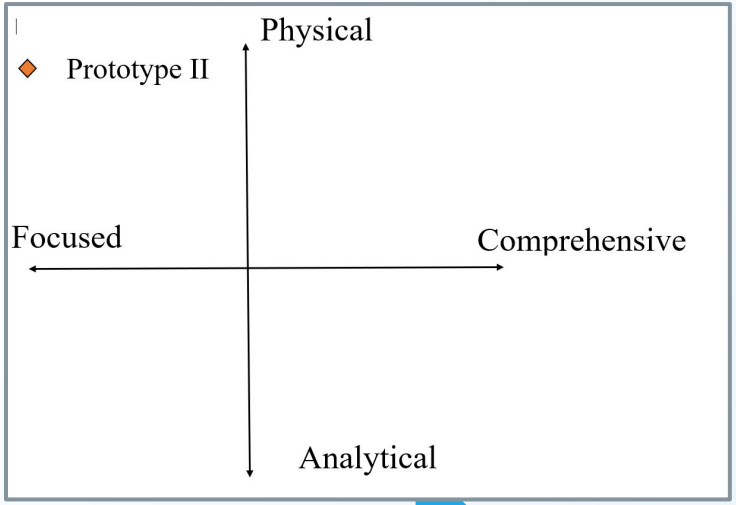
Light Subsystem

- Testing done on TinkerCAD



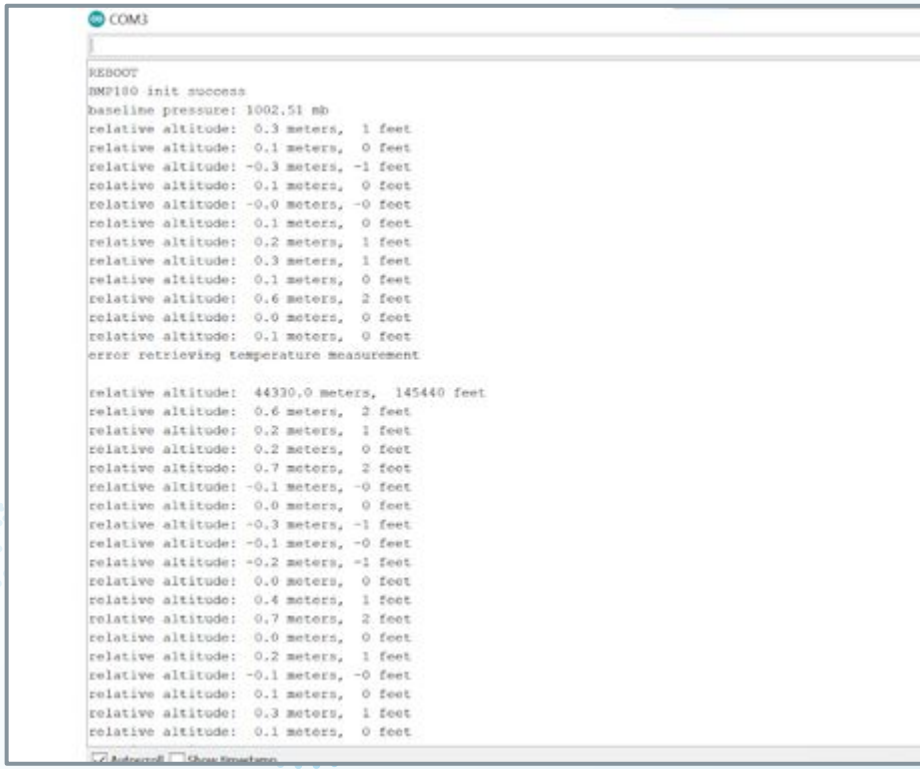
Phase 2: Prototype II

Cost: $50



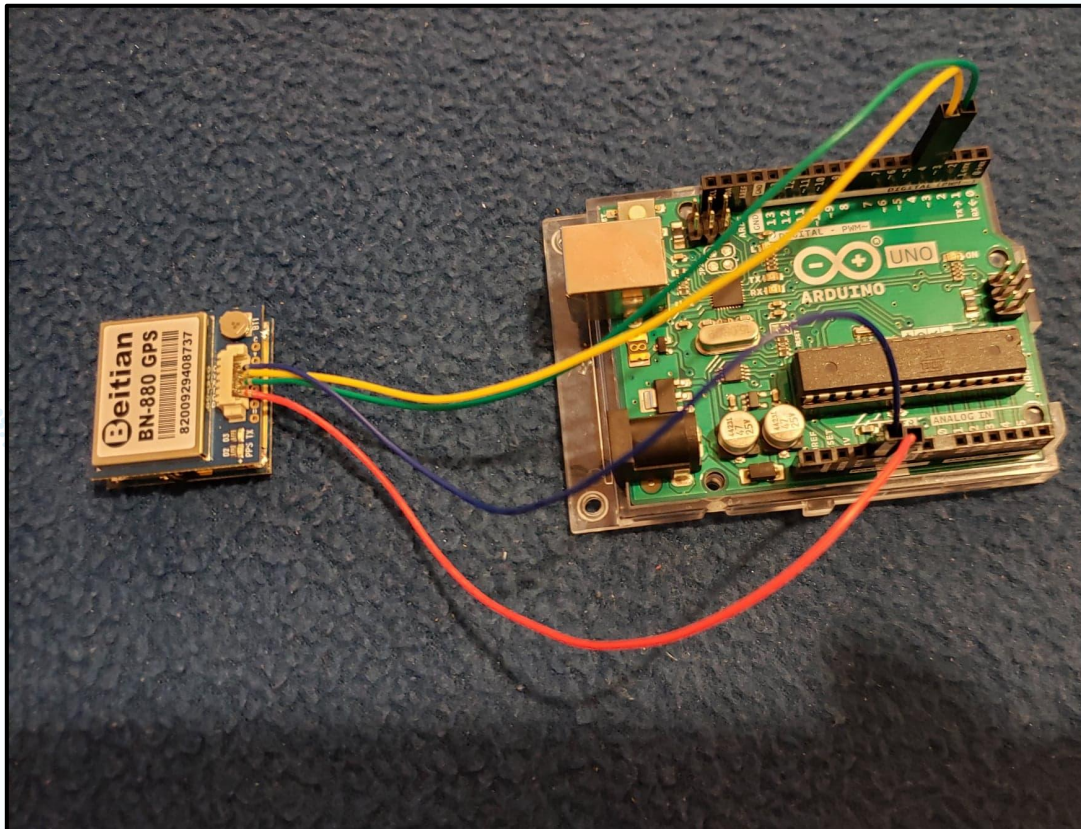
Altitude Subsystem

- Testing done using BMP180
- Satisfied design criteria



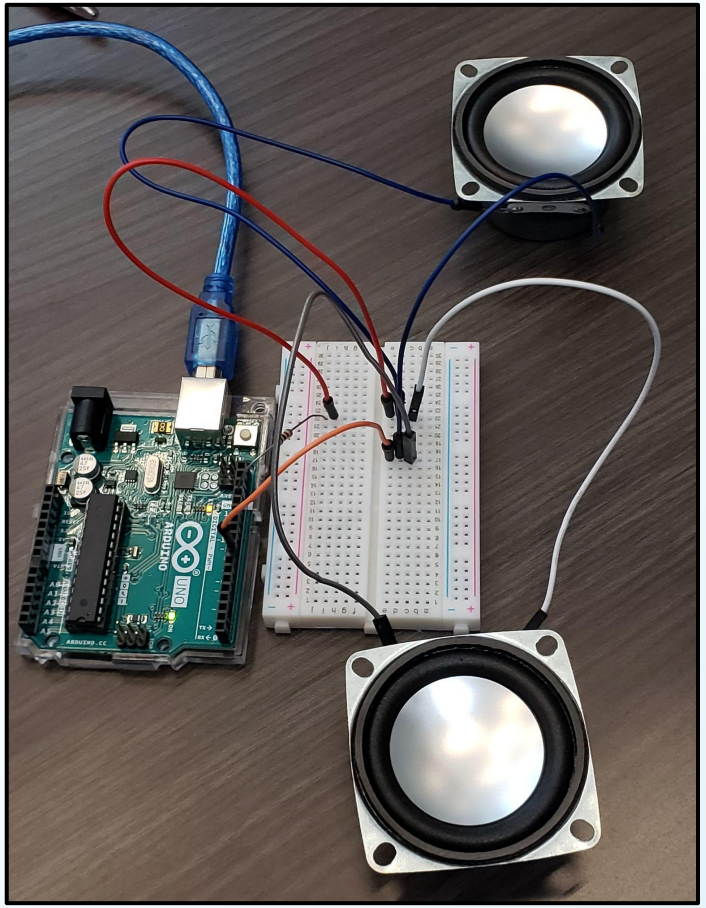
Location Subsystem

- Testing done using the Beitian BN-880
- Test failed



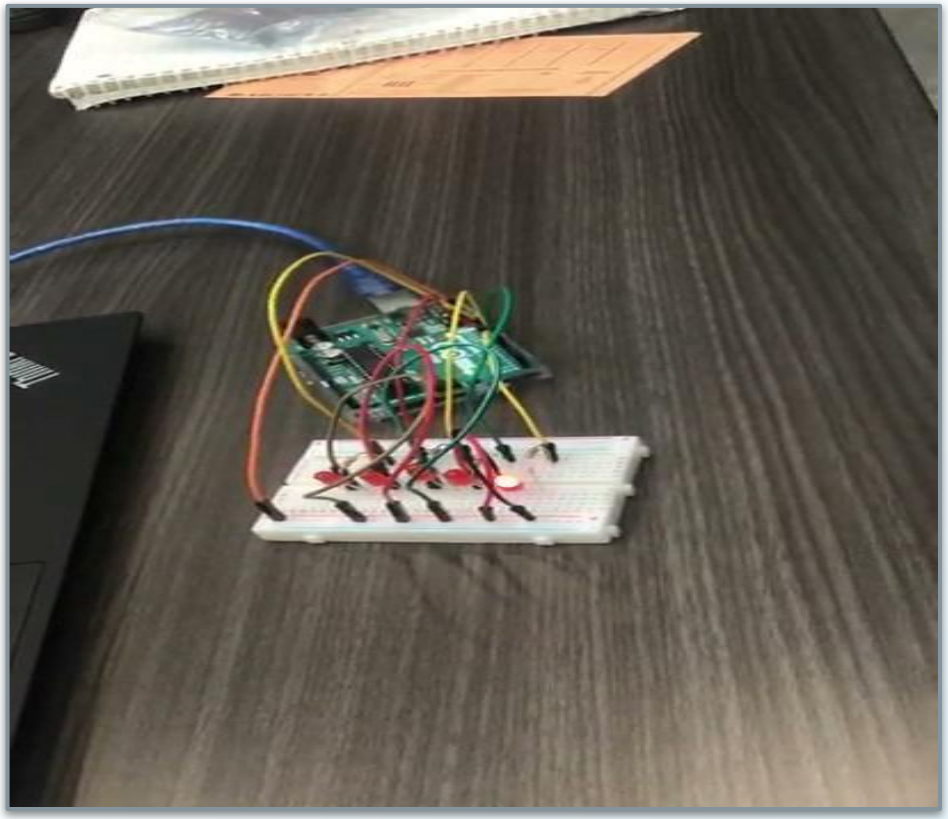
Voice Subsystem

- Testing done using the speakers
- Satisfied design criteria

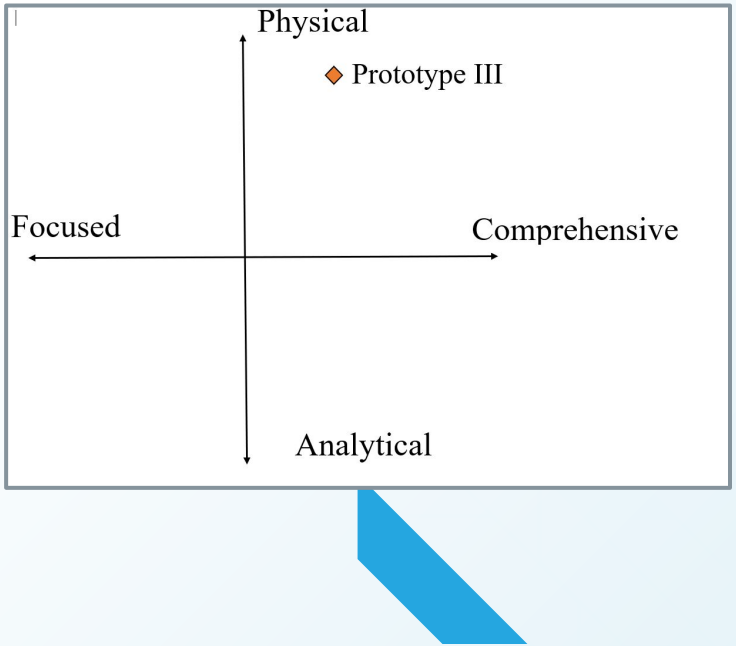


Light Subsystem

- Testing done using the red LED lights
- Satisfied design criteria

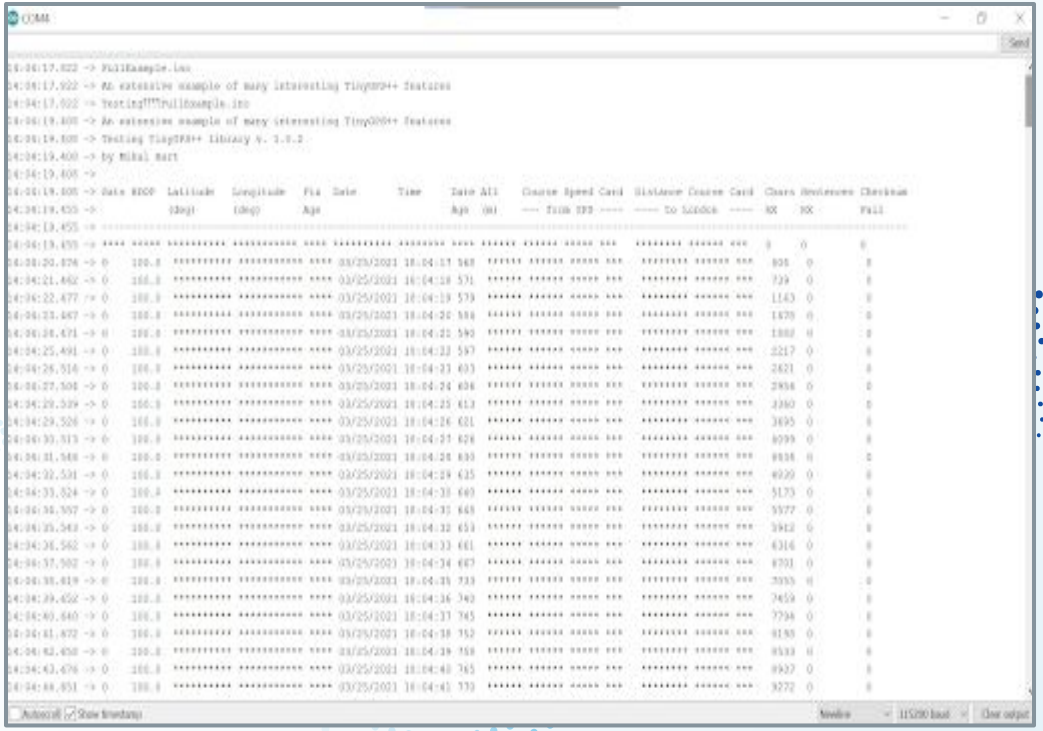


Phase 3: Prototype III

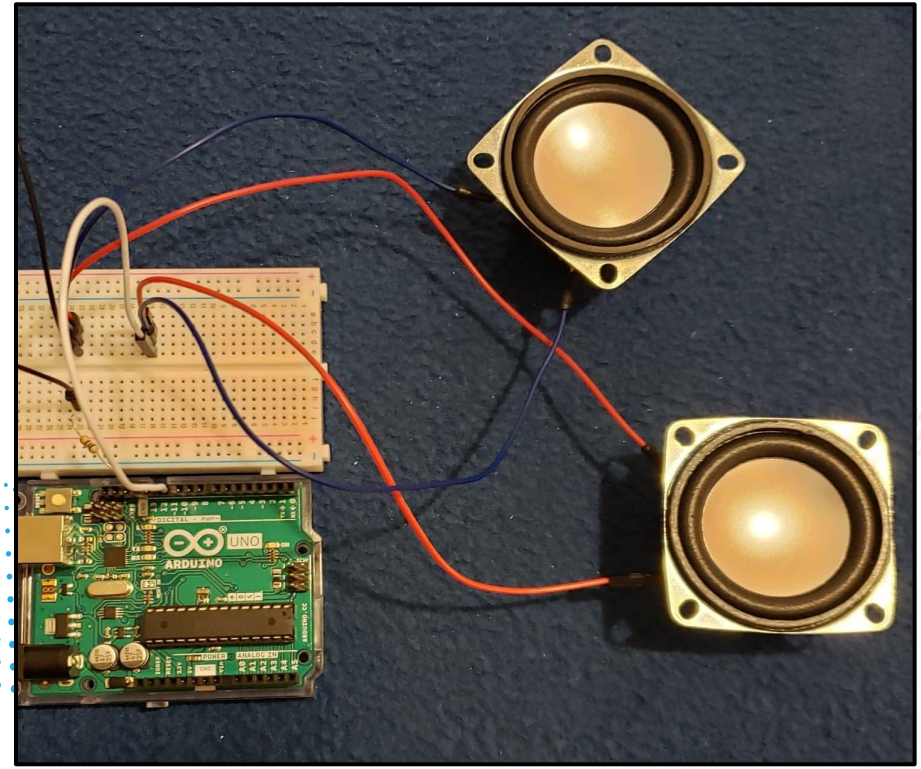


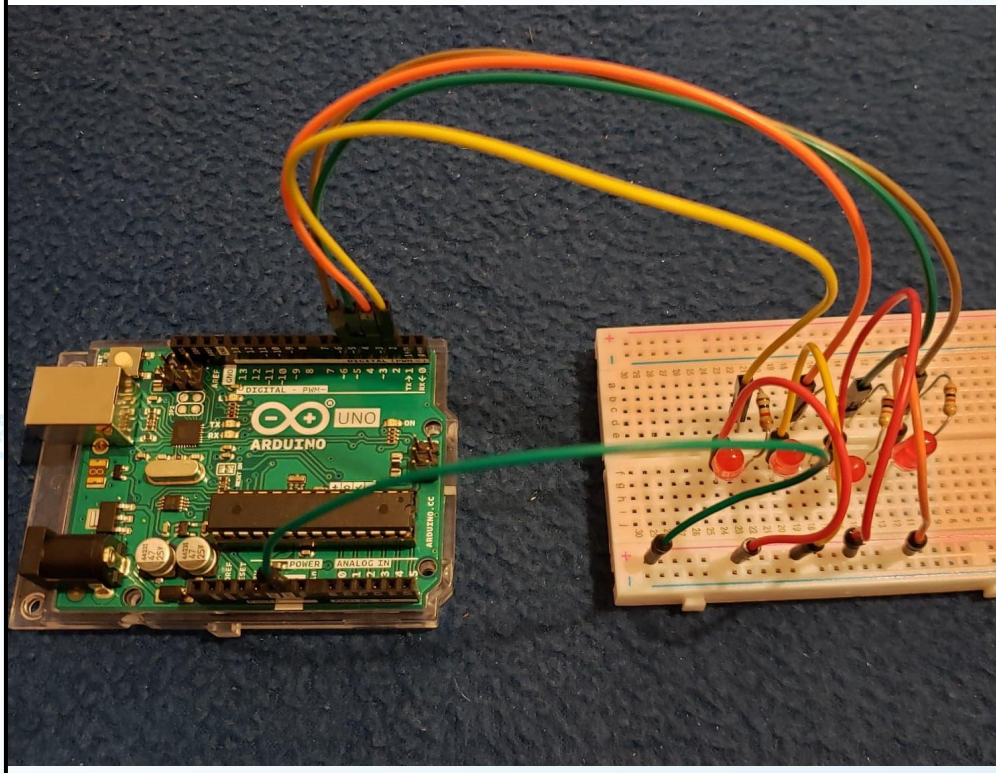
Location Subsystem

- Testing done using Beitian BN-880
- 2 tests
- Satisfied design criteria



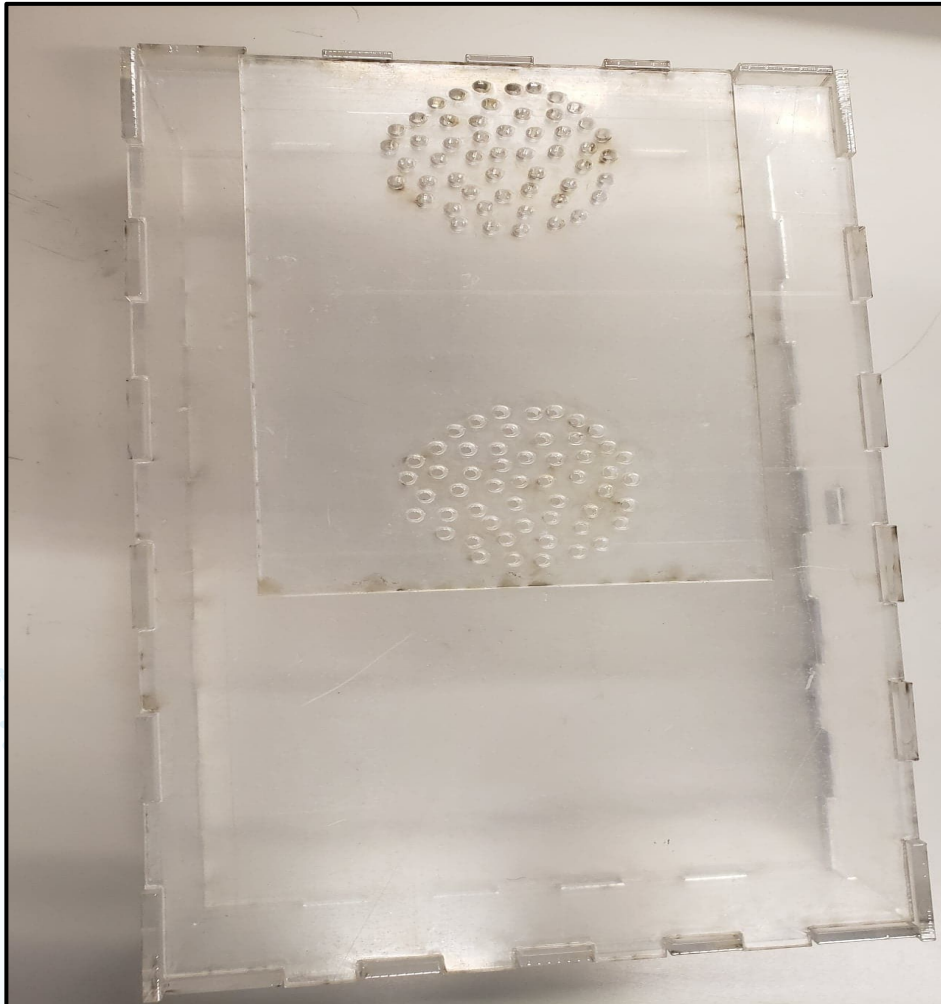
Voice and Light Subsystems





Final Prototype

- Full prototype with acrylic case
- Interpreted status



Product Demonstration

Lessons learned and Future work

- Always more to do than anticipated
- Underestimated task duration
- Applied most lessons learned during labs

- Waterproofing test

Questions