**Project Deliverable D: Conceptual Design**

***GNG1103 [D03] – Professor David Knox***

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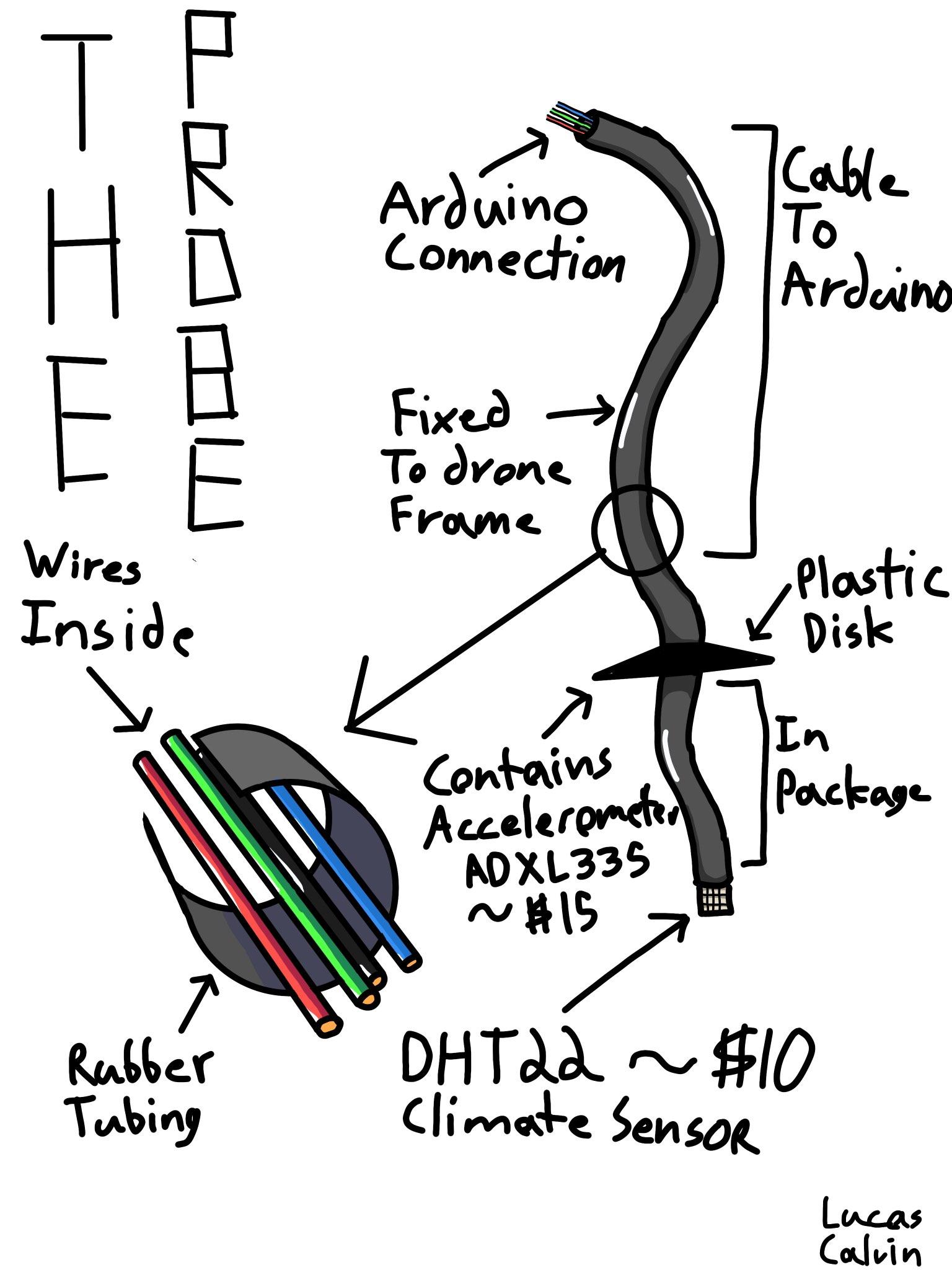
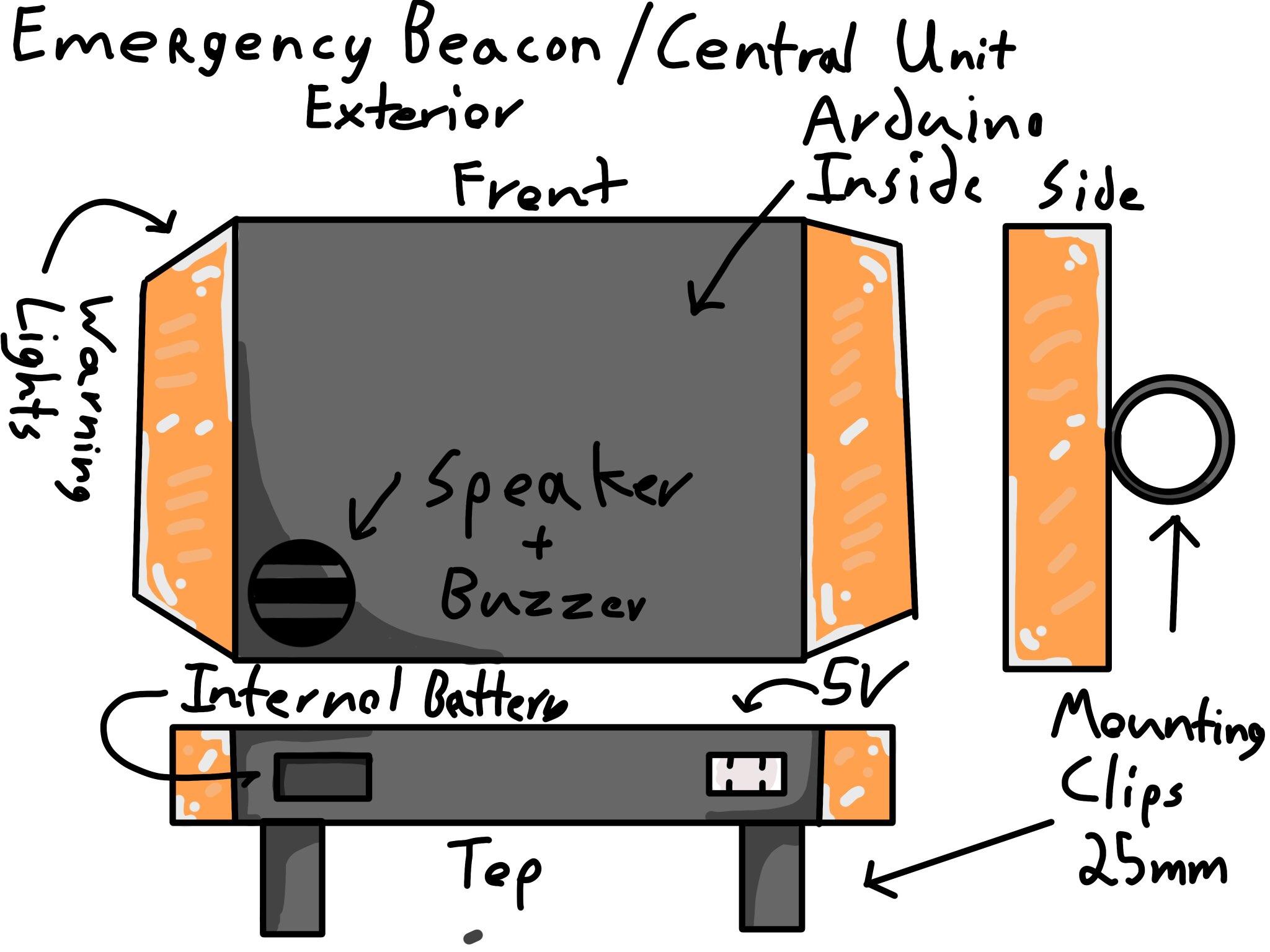
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# **Introduction**

Team 13, began this deliverable with the intent of creating multiple design concepts for each subsystem and then reducing them to the best possible solution through the process of elimination. This path let us obtain a plethora of possible solutions which could then be reduced by combining the most similar concepts and listing other alternatives. Once team 13 successfully created a design bank we ranked each concept by following guidelines that showed which design concepts were unique, cost-effective, and most viable. This ranking system helped us determine which designs we should pursue, for each subsystem ultimately leading group 13 to finalize a concept.

# **Individual Design Concepts**

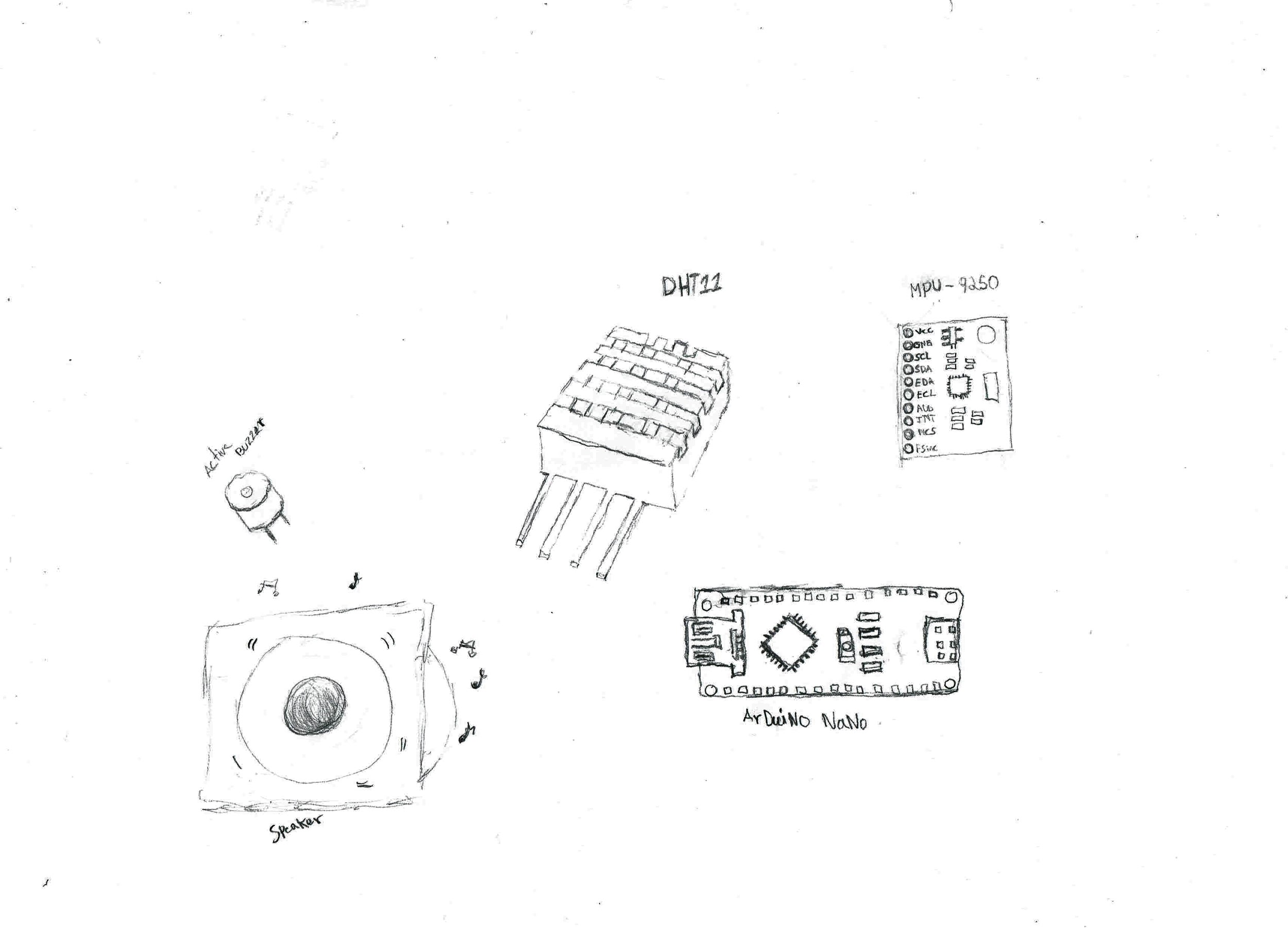
Below are Team 13’s individual design concepts. Each member of the team was tasked with designing a solution for each subsystem the team is attempting to build.

* 1. **Lucas Calvin Design Concepts**

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## **Rafael Aragon Design Concepts**

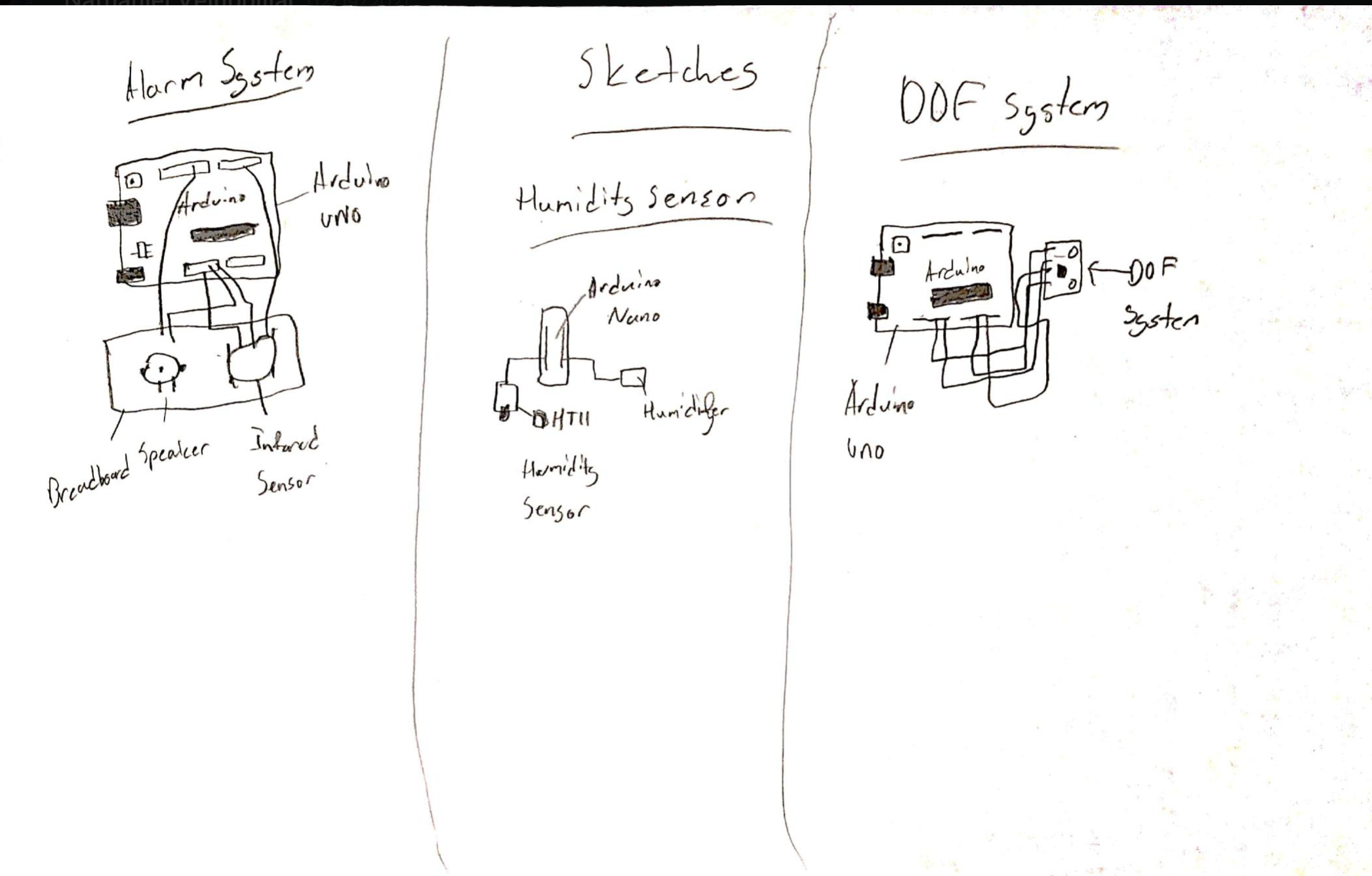


## **Alessandro Furlano Design Concepts**

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## **Sukhshant Litt Design Concepts**

## **Nathaniel Veluppillai Design Concepts**



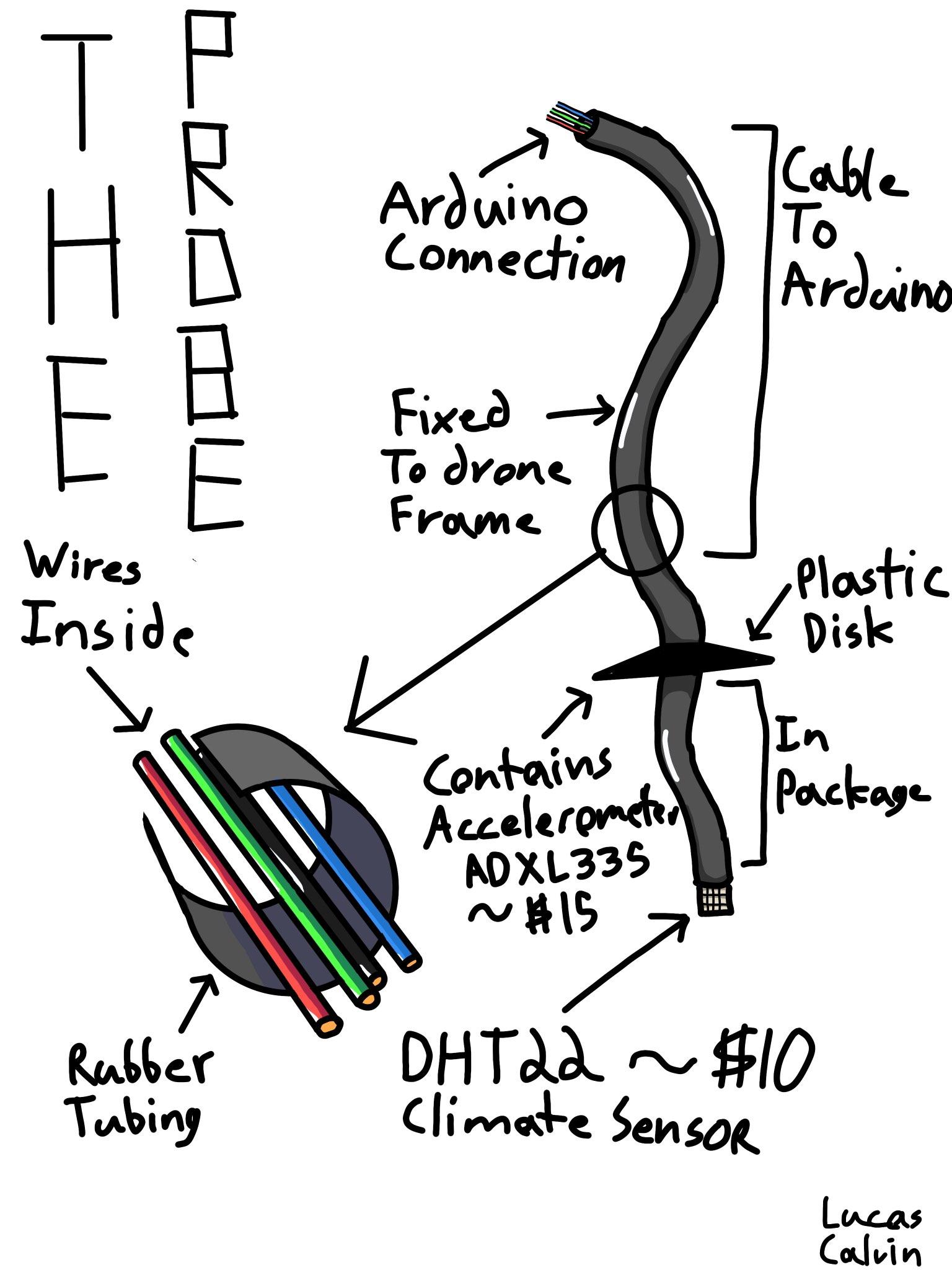
Team 13 started with a total of 16 design concepts 5 for Subsystems 1 (Degrees of Freedom Sensor), 5 for subsystem 2 (Climate Sensor), and 6 for subsystem 3 (Emergency Beacon). This was narrowed down to 6; this was done through discussing the merits of each idea and deciding which devices were better suited to the client’s demands and combining designs that could be. For example, several members of the team had very similar concepts for subsystem 3 which led to us combining them into one idea.

# **Group Design Concepts**

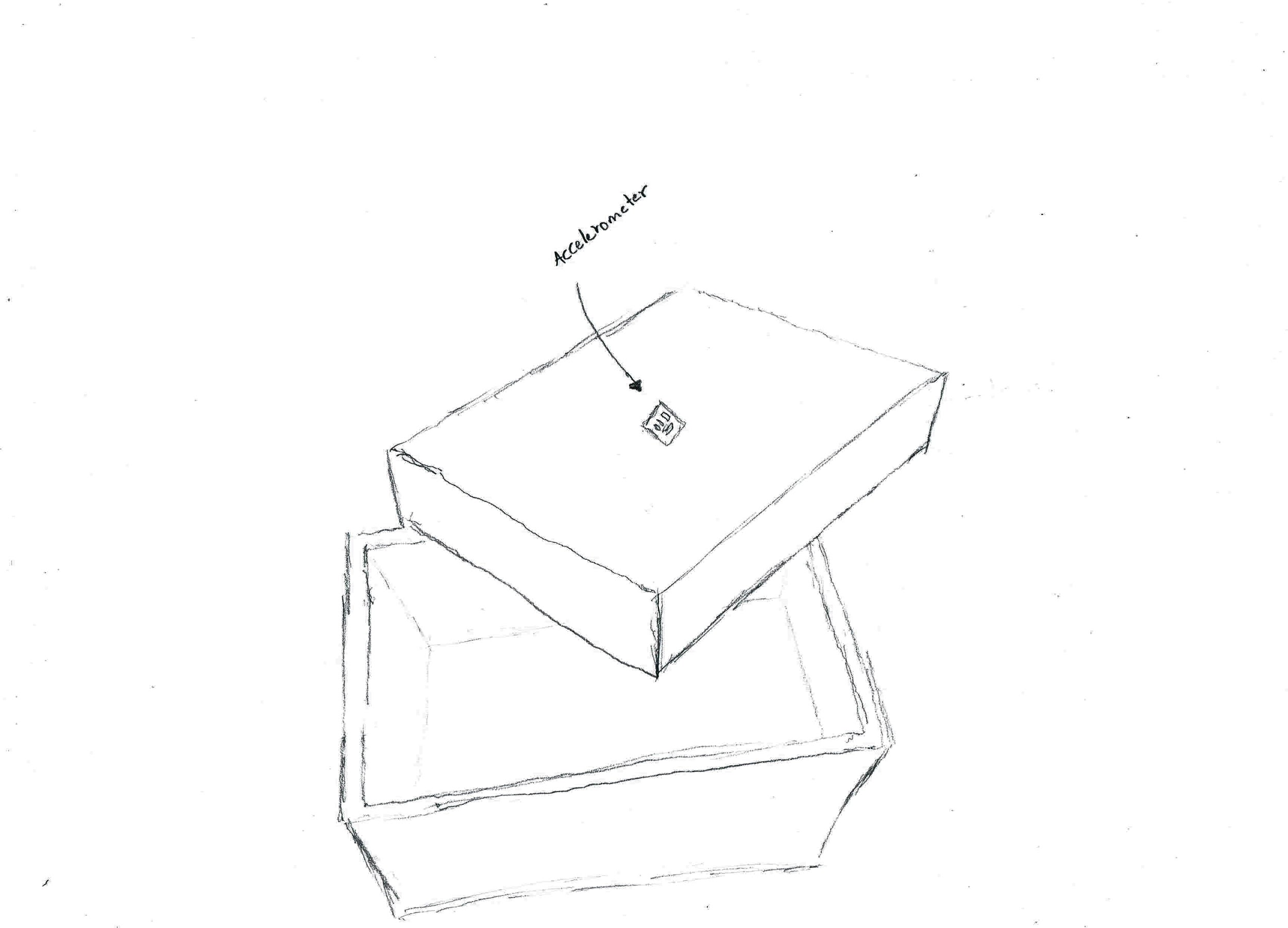
Below are Team 13’s subsystems for their final 2 design concepts. These are broken up into the subsystem they belong to, Concept 1 for each subsystem will be in the Concept 1 final design and Concept 2 for each subsystem will be in the Concept 2 final design.

## **Degrees of Freedom Sensor**

**Concept 1:**

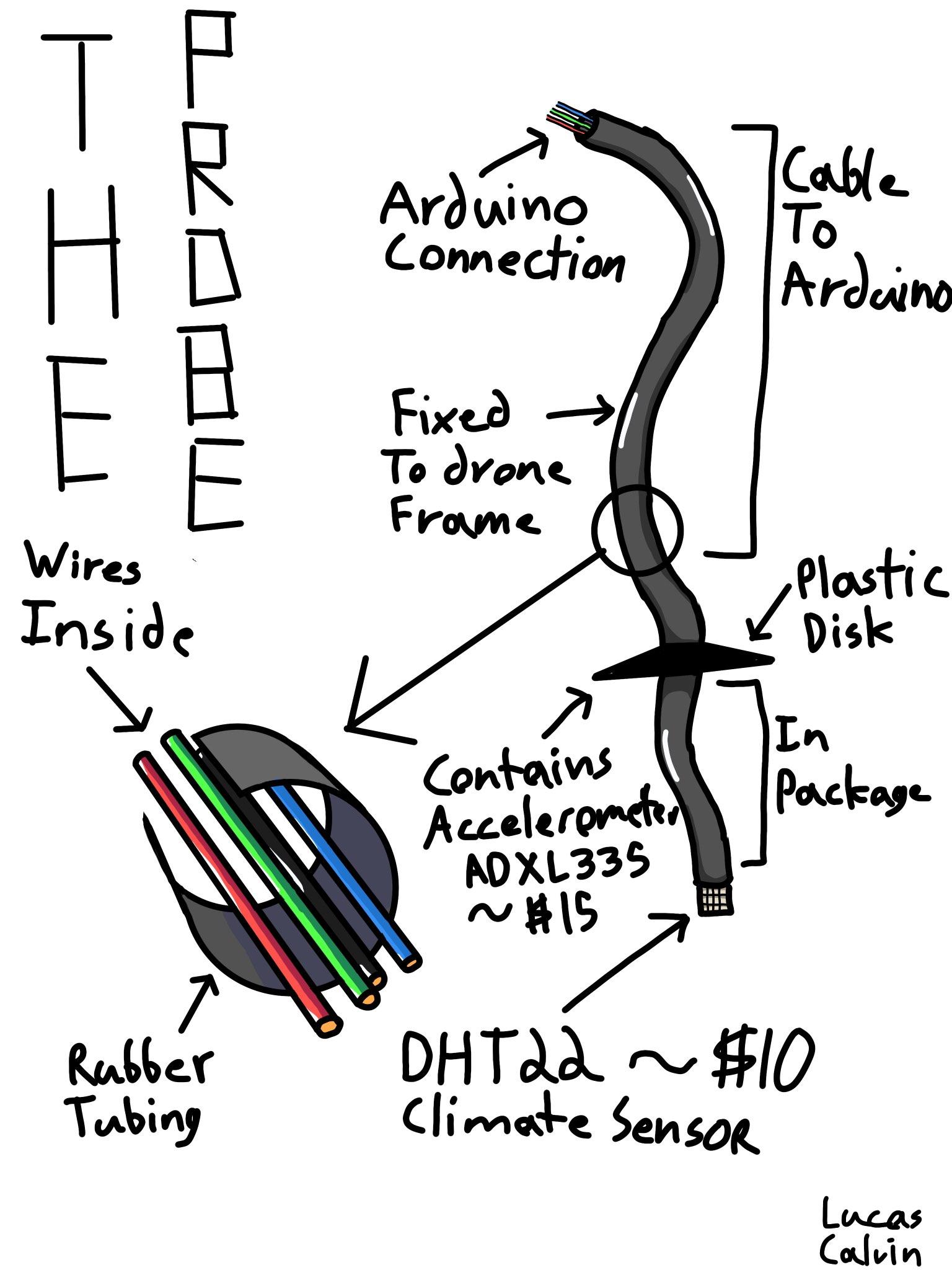


**Concept 2:**



## **Climate Sensor**

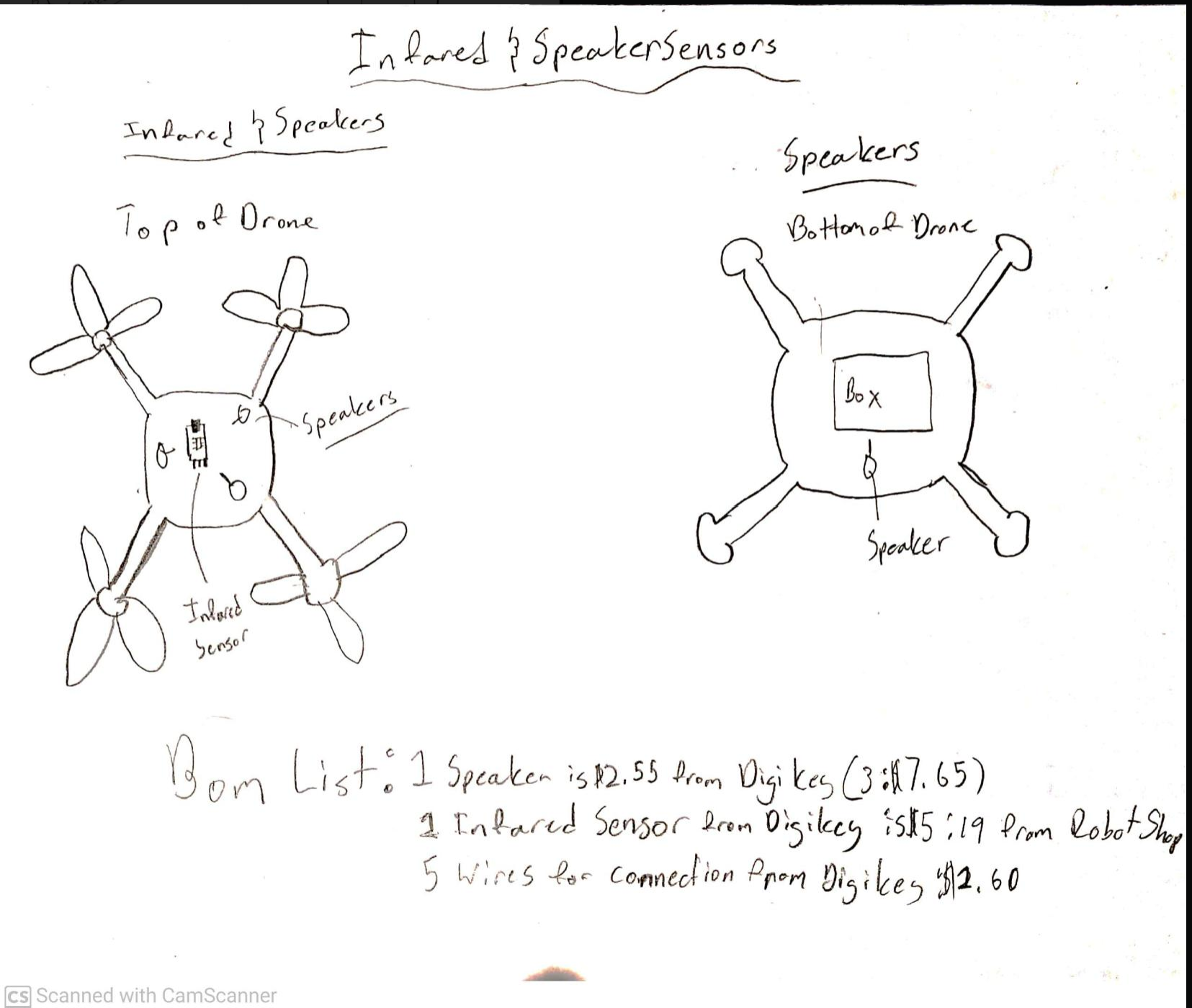
**Concept 1:**



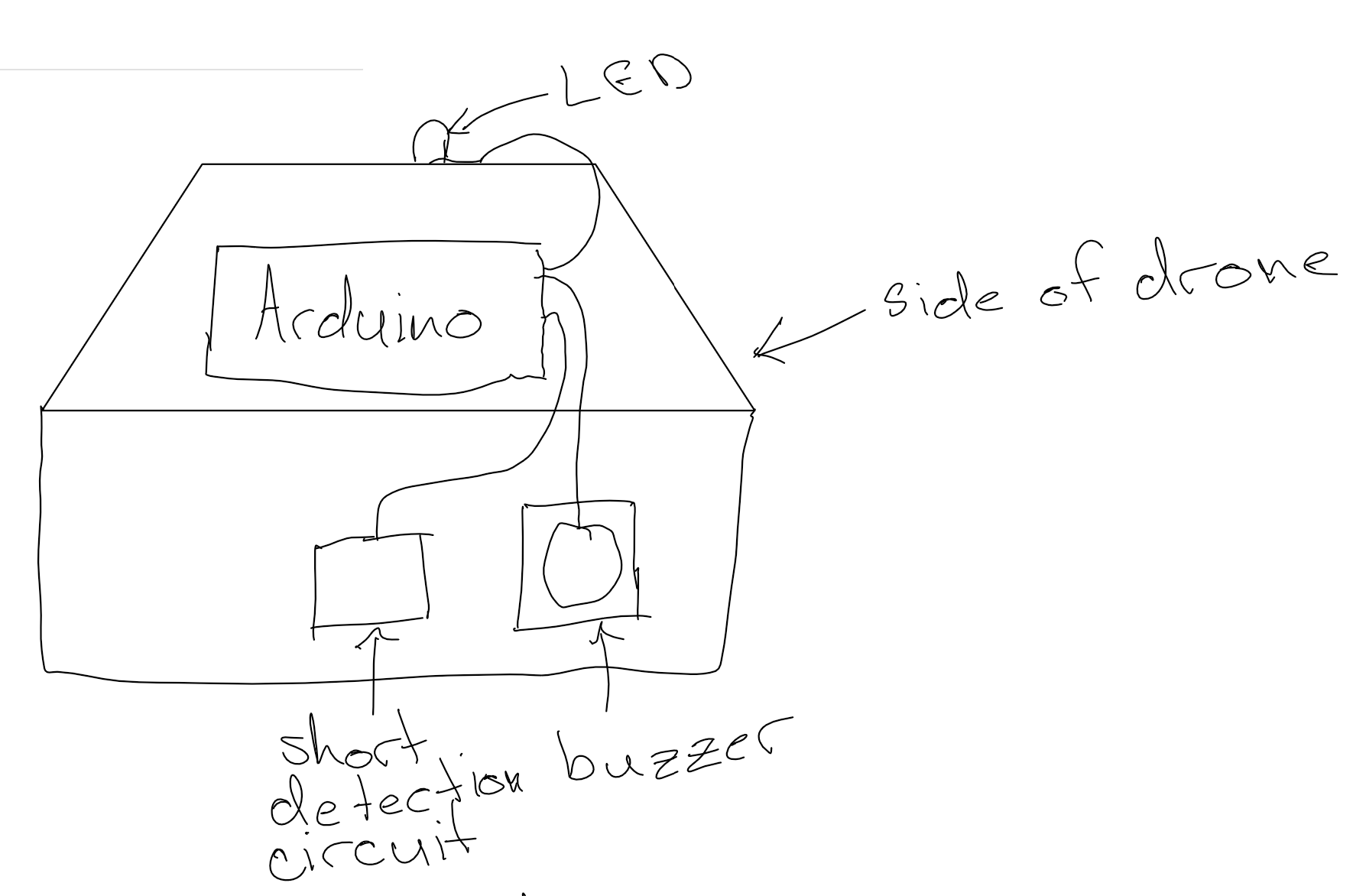
**Concept 2:**

## **Emergency Beacon**

**Concept 1:**

****

**Concept 2:**

****

As seen above are our narrowed 6 designs for the various subsystems of the drone. Together as a team, we deduced which subsystem design will be ideal for the budget. Each design had its beneficial attributes which would be useful for the project, but with the budget, only the best feasible and effective designs could be selected.

*Table 1: Design Comparison*

|  |  |  |
| --- | --- | --- |
| Concept | 1 | 2 |
| Handling food   * Accelerometer | **X** | **X** |
| Climate Sensor | **X** | **X** |
| Emergency Beacon   * Short Circuit Detection * Speaker Warning | **X** |  |
| Cost (under $50)   * Cost of Arduino will be added to these | $29.50 | $42 |

Above is the table we used to compare the designs. The criteria in this table came from the design criteria that were developed in a previous deliverable. The first concept is $40.06 and is the sensor that determines the climate i.e. humidity and temperature. This design is connected to the lid of the case which transports the cargo. This makes it easier to determine the climate within the case and is ideal since the case stays with the drone. The second concept is $46.50 which is cheap and still within budget. This design is good because the wire probe is flexible and can go anywhere including through the lid. These designs are both cost-effective and fruitful for the necessary design criteria.

# **Conclusion**

Team 13 accomplished the goal of this deliverable, independently brainstorming a wide variety of possible subsystem solutions, before effectively narrowing them down to one finalized concept for the device. The process of elimination was efficiently and logically conducted by referencing the target specification and design criteria established during the previous deliverable. The winning concept is now ready for refinement and prototyping in the following stages of the project and will provide the team with a clear direction in its efforts. Team 13 has also continued to update their Wrike project planner.

**Link To Wrike**

<https://www.wrike.com/workspace.htm?#path=folder&id=633987201&vid=19127198>