Analyzing and Redesigning Housing for Pressure and Temperature Sensors

Students:

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Project Objectives

- Design a new/improved housing for the BRPTS that will function when deployed at or in the ocean.
- Determine what went wrong with the original housings

Background

In the Innovative Scholars Program in the Ocean Engineering Cohort, we have been working to collect data on weather events, erosion happening on the coast. We have been particularly targeting research into how wash over can affect coastal beaches and the ecosystems and communities there.

For this research early in the semester we deployed Blue Robotics Pressure and Temperature Sensors at Odiorne Point, a coastal beach in NH. Our goal was to collect data regarding the waves and sand. Unfortunately, all but one of the BRPTS deployed malfunctioned. From there we started to work on finding out the original issue that caused the malfunctions. We narrowed it down to either the housing leaking, or the circuitry not working, and sometimes both. From here students in the cohort were broken up into different groups to work on various problems. Our group was dedicated to solving the BRPTS housing leaking issue.

Methods & Materials

- 3D Printing:
  - We printed multiple test models
- Who we collaborated with/got guidance from:
  - Dr. Fredrikkson gave us guidance on how to take apart and reassemble the housings properly. For example, the caps needed o-ring grease for the o-rings in it, so he showed us how much to add and how clean to keep it.
- Testing:
  - First we reassembled the old housing units according to Dr. Fredrikkson's instructions, added weights to them, and dunked them in a water tank. From this we found that loose screws let water leak in, but this seemed to be the only problem (we had redone the o-ring grease correctly).

Results:

- Trial and Error:
- We needed to take a lot of measurements of the different pieces of the housings so that we could 3D print a model that would fit the battery, circuit, etc.
- The first printing went wrong since the file has incorrect dimensions, then we fixed this and tried again. From this we got a more suitable housing unit, but the printing filament shrunk as when it printed so the batteries didn't fit.
- What went wrong with the original housings:
- Too much o-ring grease was used
- The screws holding the lid to the main body were loose, this resulted in water leakage and sand getting in the o-ring grooves.

In Progress:

- Currently we are working on designing a case for the circuitry so it is not free floating inside the housing.
- We are also going to print another version of the housing that will be wider to accommodate for the shrinking that is caused when the filament is printed.

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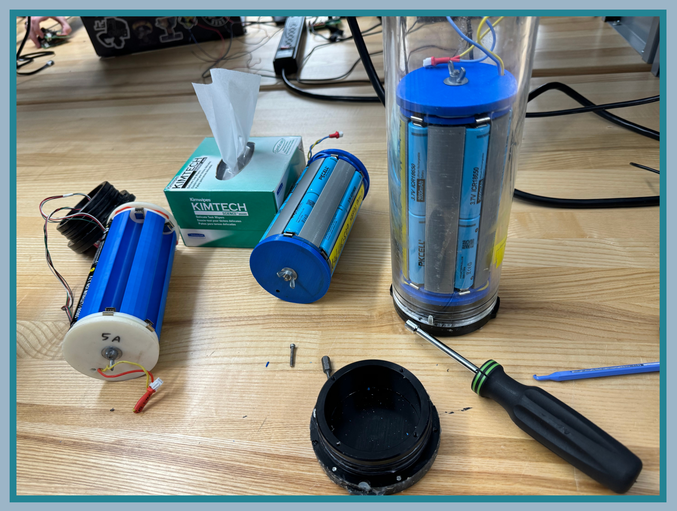
Introduction:

- This project was to create a durable housing that would not leak when deployed on the coast

Challenges:

- Figuring out the cause of the leakage when originally deployed
- Finding good ways to measure the model's dimensions
- Switching the model from one design program to another



Goal: Create a housing for pressure and temperature sensors that can withstand a large coastal storm.

Materials:

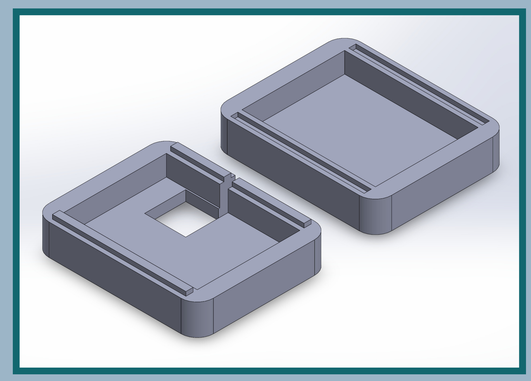
- SolidWorks and a 3D Printer were used to make multiple housing models

Methods:

- Testing of the original model in the Chase tank
- It was found that the housing did leak due to loose screws and too much o-ring grease

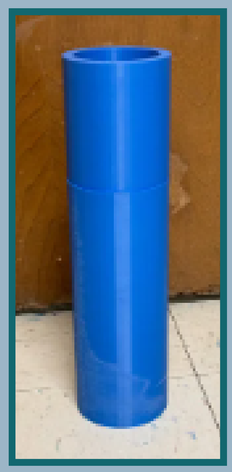
Results:

- Designed a new housing model, close to the original, that splits the chamber into two separate spaces



Future Work:

- Design a casing for the circuitry to keep it safe from impacts to the housing.



References:

- Dr. Fredriksson, an Ocean Engineering Professor at UNH, was able to share the original 3D model designs