

In the Roundhouse Internship, the main project that I had the opportunity to work on was designing and building an eDNA sampler. eDNA stands for environmental DNA, which is DNA that is shed by organisms into the surrounding water. Scientists can collect the DNA shed into the environment and analyze relative population sizes of a specific species and/or what species are present in the region that the eDNA sample was collected from. eDNA is becoming a very valuable tool for a variety of research projects and there is a need for cheaper and more easily accessible eDNA samplers than what is currently on the market. Eventually, this eDNA sampler will be open source, meaning that anyone can have access to the build instructions and list of materials needed to build it.

Another project that I worked on in the Innovation lab was recycling plastic into filament to be used in 3D printers. We use 3D printers on a frequent basis as a great way to prototype a project or to quickly make something that can be used in the lab. There tends to be a lot of plastic waste as not all of the prototypes end up being used or the printers missprint. I was able to take the discarded plastic and turn it back into 3D filament and successfully 3D print new projects with it!

This was my first experience with hands-on engineering and it was a great introduction into this field. Participating in this internship solidified my desires to continue down the path of engineering. While I did run into many challenges designing and building the eDNA sampler, I was able to successfully come up with solutions with the support of the iLab manager, Drummond Wengrove.

The iLab is an environment where you learn something new whenever you are there. I was able to gain many new hard skills, such as using and fixing 3D printers, and using the lathe and the milling machine. In addition, I was able to advance and develop many of my soft skills, such as my communication skills, teamwork and collaboration skills, and problem solving skills. All of these skills will be transferable to other internships or jobs that I will have in the future and will hopefully set me apart from other candidates during the application process.

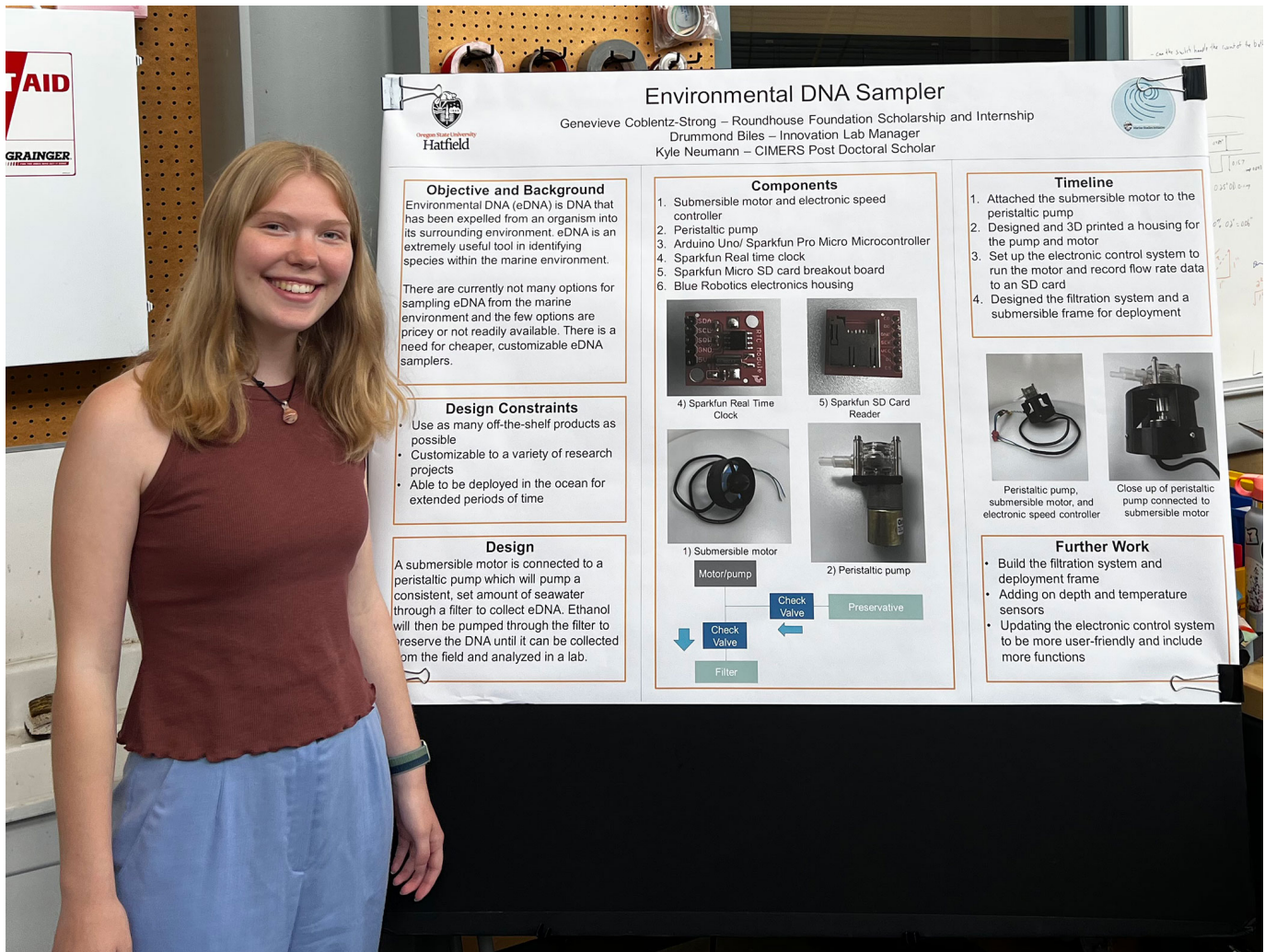
The culture in the iLab was so supportive and collaborative. It made it exciting to go into work every day and I feel lucky to have met and become friends with some amazing people through the course of this year-long internship.

The scholarship was extremely helpful in removing some of the burden of high tuition costs and the internship provided me with invaluable experience. I loved this internship and working in the

iLab so much that I am continuing to work on the eDNA sampler project in the iLab through the end of Spring term 2023.

Thank you so much to the Roundhouse Foundation for giving me this incredible opportunity!

Genevieve Coblentz-Strong



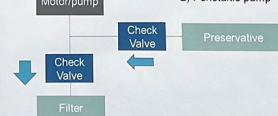
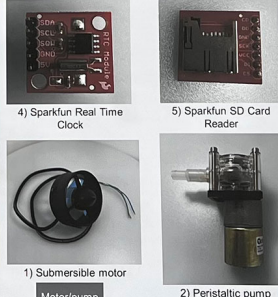
Objective and Background
Environmental DNA (eDNA) is DNA that has been expelled from an organism into its surrounding environment. eDNA is an extremely useful tool in identifying species within the marine environment.
There are currently not many options for sampling eDNA from the marine environment and the few options are pricey or not readily available. There is a need for cheaper, customizable eDNA samplers.

Design Constraints

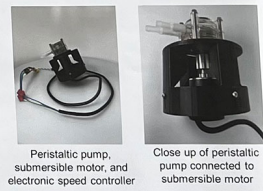
- Use as many off-the-shelf products as possible
- Customizable to a variety of research projects
- Able to be deployed in the ocean for extended periods of time

Design
A submersible motor is connected to a peristaltic pump which will pump a consistent, set amount of seawater through a filter to collect eDNA. Ethanol will then be pumped through the filter to preserve the DNA until it can be collected from the field and analyzed in a lab.

- Components**
1. Submersible motor and electronic speed controller
 2. Peristaltic pump
 3. Arduino Uno/ Sparkfun Pro Micro Microcontroller
 4. Sparkfun Real time clock
 5. Sparkfun Micro SD card breakout board
 6. Blue Robotics electronics housing



- Timeline**
1. Attached the submersible motor to the peristaltic pump
 2. Designed and 3D printed a housing for the pump and motor
 3. Set up the electronic control system to run the motor and record flow rate data to an SD card
 4. Designed the filtration system and a submersible frame for deployment



- Further Work**
- Build the filtration system and deployment frame
 - Adding on depth and temperature sensors
 - Updating the electronic control system to be more user-friendly and include more functions