Environmental DNA Sampler

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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

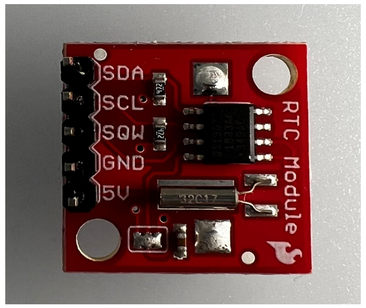
- Use as many off-the-shelf products as possible
- Customizable to a variety of research projects
- Able to be deployed in the ocean for extended periods of time

Design

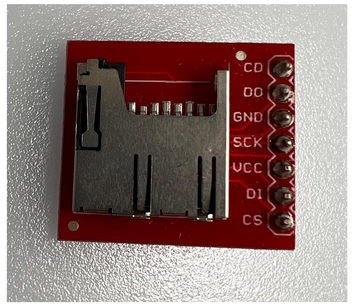
A submersible motor is connected to a peristaltic pump which will pump a consistent, set amount of seawater through a filter to collect eDNA. Ethanol will then be pumped through the filter to preserve the DNA until it can be collected from the field and analyzed in a lab.

Components

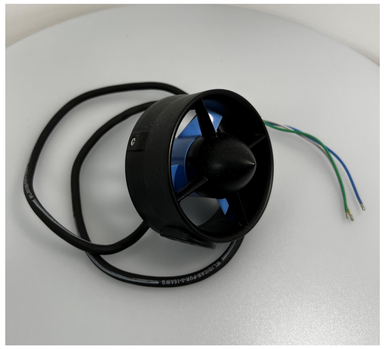
1. Submersible motor and electronic speed controller
2. Peristaltic pump
3. Arduino Uno/ Sparkfun Pro Micro Microcontroller
4. Sparkfun Real time clock
5. Sparkfun Micro SD card breakout board
6. Blue Robotics electronics housing



4) Sparkfun Real Time Clock

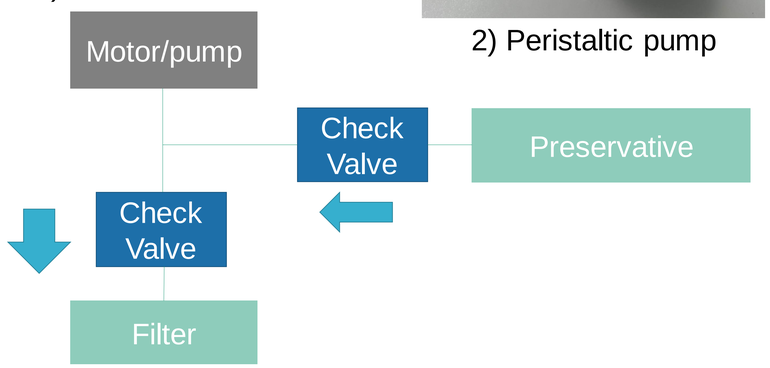


5) Sparkfun SD Card Reader



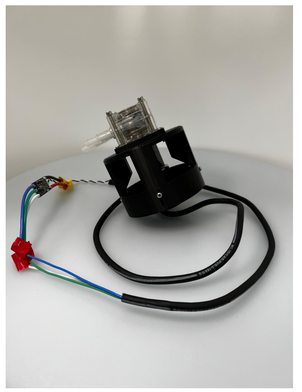
1) Submersible motor

2) Peristaltic pump



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



Peristaltic pump, submersible motor, and electronic speed controller

Close up of peristaltic pump connected to submersible motor

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