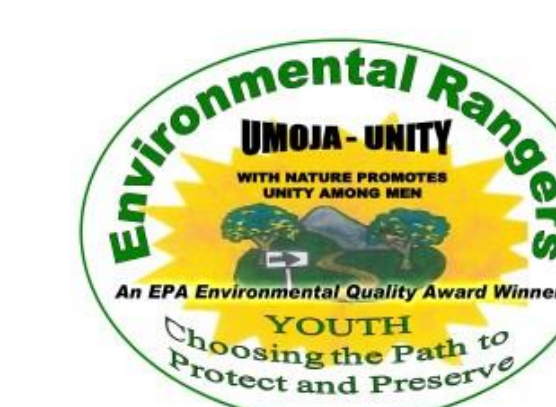


Submersible Remotely Operated Vehicle (SROV) Construction & Adaptation for Varying Marine Eco-Systems



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ABSTRACT

This project details the successes and challenges of a small group of USVI public Junior and Senior High School students to build and maintain an SROV to support underwater research activities in the Mandahl Bay, St. Thomas wetlands.

INTRODUCTION

- SROV "Umoja Explorer" construction and use led to observational discoveries about the eco-system as well as mechanical challenges. Test exploration missions created intellectual questions that students are now applying to their area research projects.
- The study eco-system is a mangrove lagoon whose various and radical habitats have proven challenging to study. Obstacles include venomous creatures; zero-visibility zones; fresh, brackish and salt water regions; and human activities such as boating and fishing. Potential future areas of exploration include surveying benthic communities, seafloor habitats, littering, oil spills, and evidence of hurricane damage effects.
- This project also explores basic functioning and construction of SROV's, designed "on-the-fly" to meet specific mission needs.

Piloting an OpenROV through the mobile app Cockpit allows a research team to guide observations and record images and video, such as this one of a sea turtle.

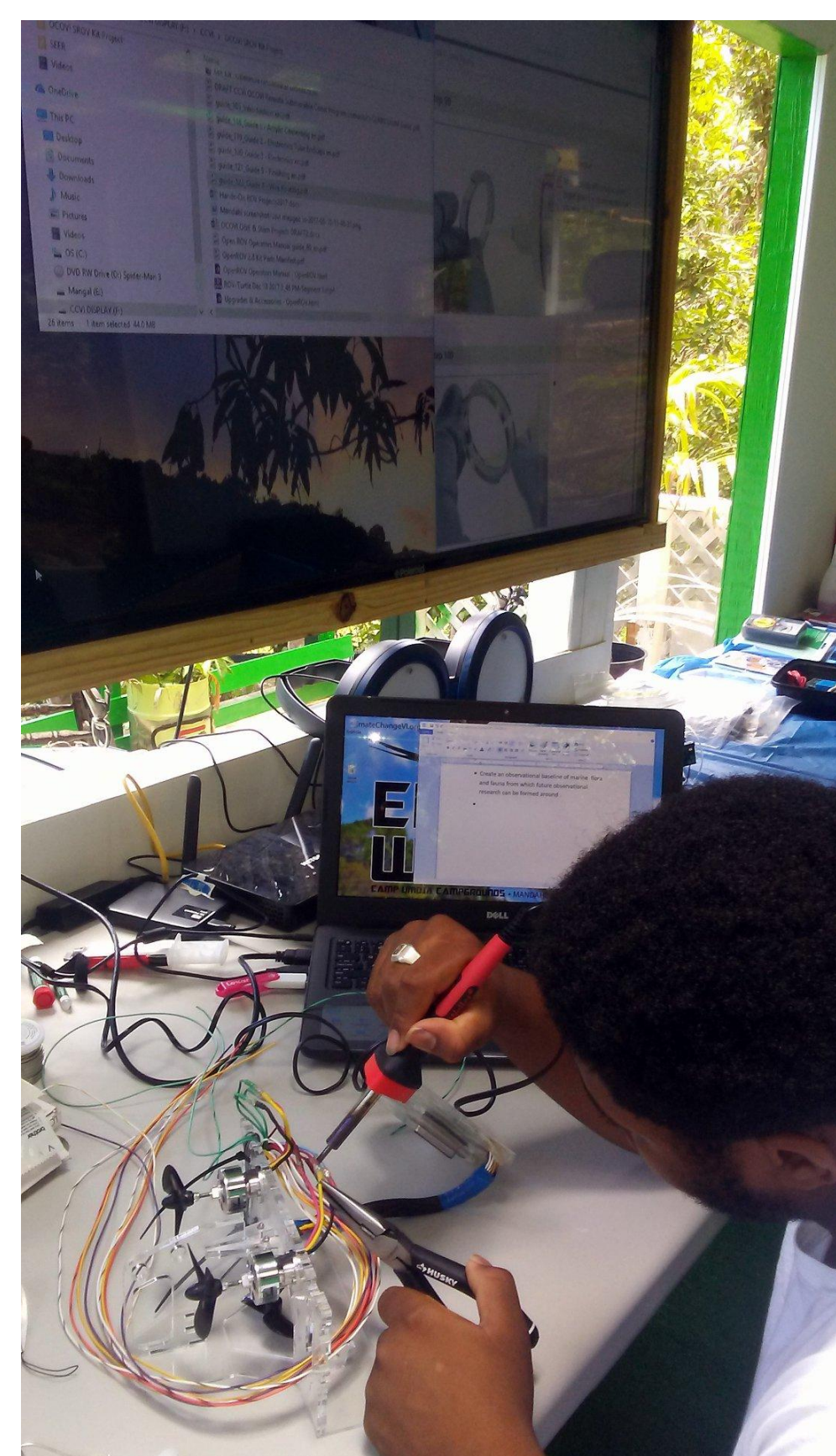


What is an SROV?

- Submersible Remotely Operated Vehicle
- Sometimes referred to as an underwater drone or submarine.

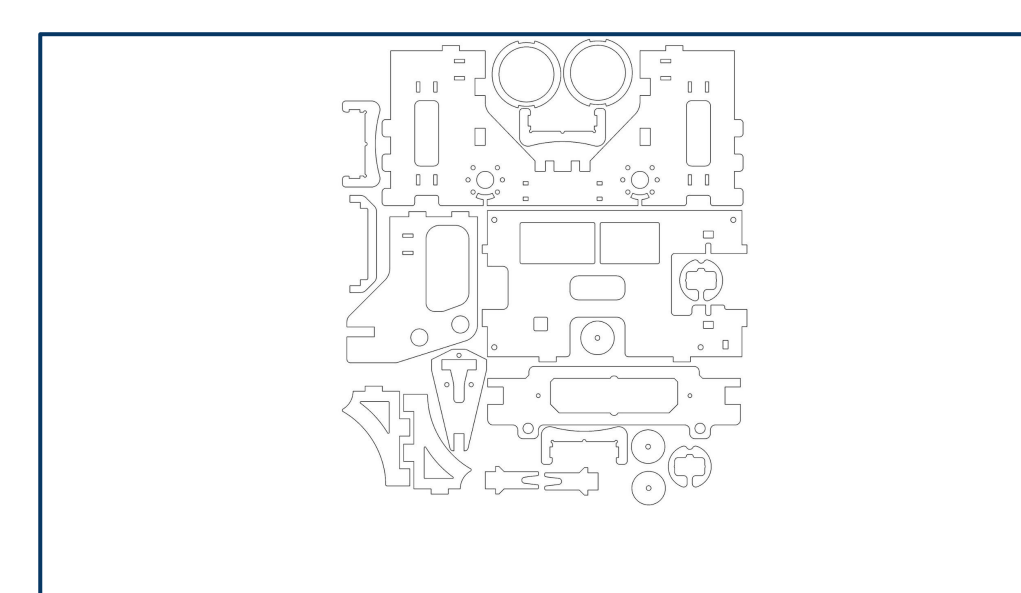
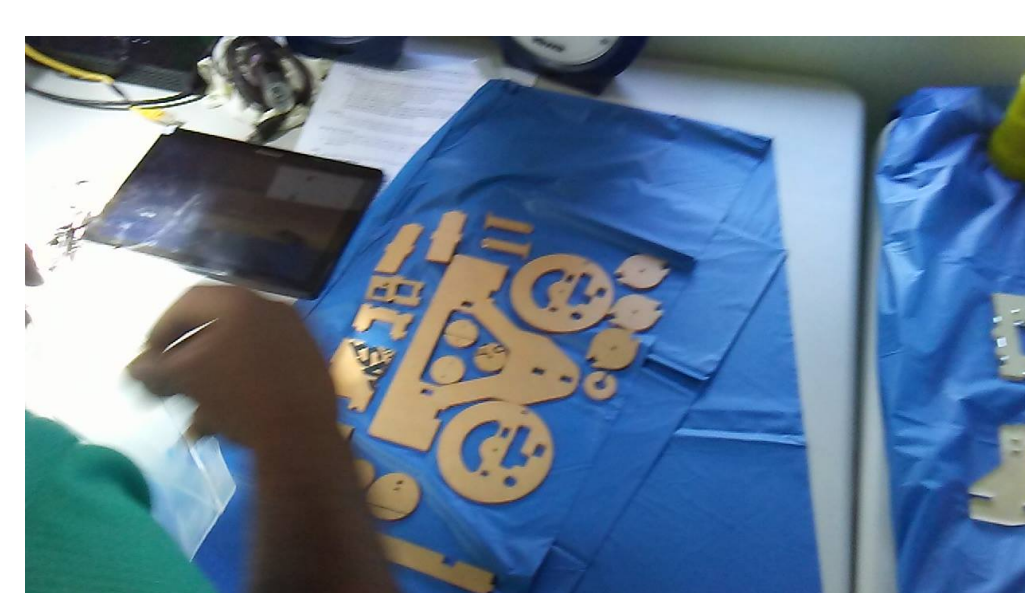
TOOLS

- Soldering iron, heat gun, wire strippers, flush cutter
- Hacksaw, small screwdriver set, needle nose pliers, scissors, utility knife, standard pliers
- Acrylic cement, applicator for acrylic cement, Super Glue, 2-Ton epoxy and silicon based lubricant
- Electrical tape, sand paper
- Disposable rubber gloves, safety glasses



PROCEDURE

- OpenRov 2.8 Kit donated to Environmental Rangers program by OCOVI.
- My teammate and I worked with our mentor to build the SROV, using the kit and extra parts provided by our mentor.
- Unlabelled parts to match by the image on the instructions.



- We tried different parts in different places, removed the parts that were not in the correct place and tried again. We had to build and take apart 3 or 4 times because of a piece that was not in correctly.
- Built in steps, first building sections without gluing, testing the sections separately and with other sections before adding glue.
- Learning soldering to solder the tape around the wires.
- St. Thomas schools were on split sessions of school due to the 2017 storms (Irmaria), so we could work some mornings before school. Three days one week and four days another week, plus Saturdays. The vehicle was built in May, launched in June, 2018.



TESTING

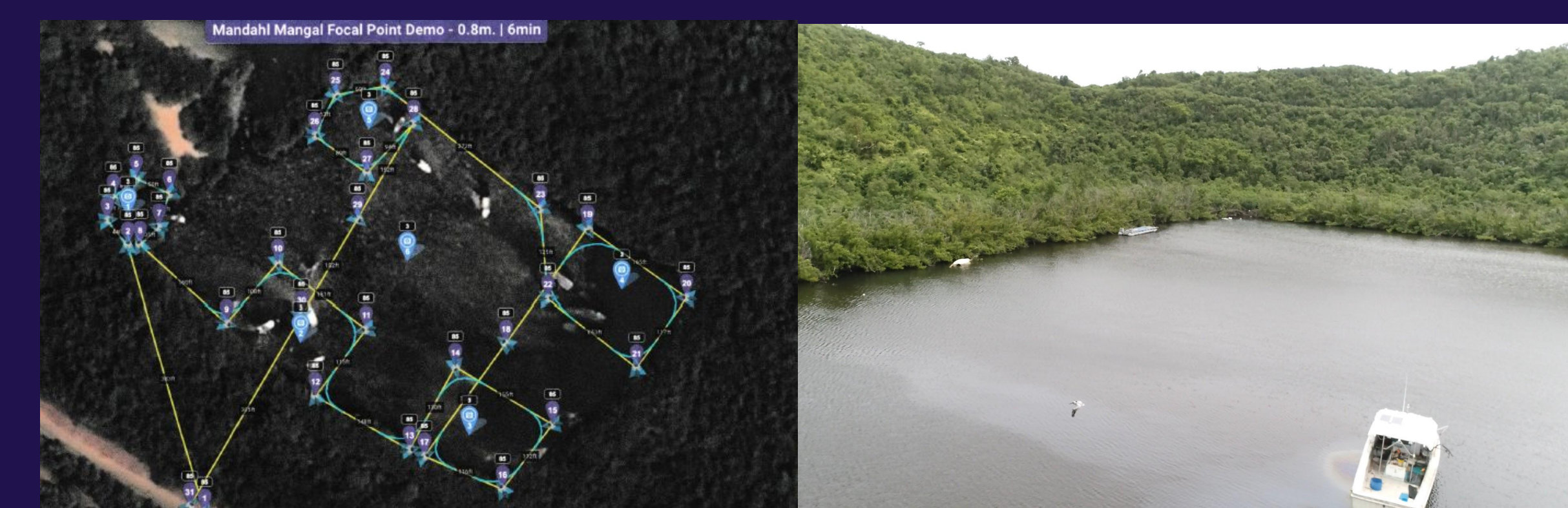
- One person piloting and one person in water at the lagoon.
- On open-water test the SROV sank.
- When we took it out and opened it there was water inside. Just in one section. In every other section it was perfect.

POSSIBLE ADAPTATIONS

- Microphone
- Cotton Swab
- Sonar
- "Disguise" with natural materials to avoid disturbing wildlife.

FUTURE PROJECTS

- Incorporate aerial drone use/fuel spill
- Self-Propelled "Eagle Ray" ROV



Aerial drone use is also incorporated into studying the bay. This facilitates area maps and ROV route planning as well as adding a "third layer" of observation. On October 20, 2018, a boat moored at Mandahl Bay suffered a fuel leak. Using an SROV can allow for sampling and potentially containing fuel spills.

June 3, 2018 Sea Trials



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