Bits to Bots

We are now into the third and final week of the Marine Science Short Course (MSSC). This past week was spent building six mini Remotely Operated Vehicles (ROV) which will be used as platforms for studying different marine and aquatic ecosystems. I am proud to introduce Pismeri (mermaid), Rasta pis (Octopus after a tok pisin joke), Meri Niuailan (New Ireland girl), Nil Pis (New Irelands iconic fish), Solwara (sea) and Iauro the first set of OpenROV miniROVs to be built outside of the United States of America.

The miniROVs came as unassembled kits with all the necessary tools and accessories to transform bits into fully functional ROVs. The 23 course participants come from either Biology or Environmental Science majors with very little to no knowledge of electronics. Transforming these students into competent electricians was one of the greatest challenges of this program, as most of them had never held anything more than a set of pliers.

As with all great things, we had to start small. The week started with the students learning to use acrylic to weld bits of the main chassis of the ROV, strip and tin wires and cut pieces of wire to required lengths. Teaching the students the correct soldering techniques was also a challenge however they picked it up well. The process of building the ROVs started to flow faster as the confidence levels of the participants picked up. By the end of the third day all the necessary bits had been assembled and we were starting to move into more serious electronics. The next step was to build the E-chassis and prepare the camera to be mounted on.

Students holding the chassis of a miniROV

At this point, we had the skeletons of the MiniROV's ready and the electronics (hereon termed 'brain') coming together. The final step was for the parts to be assembled and for the laptop to start communicating with the brain. A laptop is needed because it becomes the command center, more like the cockpit for controlling the miniROVs. To do this, we needed some programming skills and as with electronics, none of the participants knew much about programming. To make the process a real learning curve for the students, it was decided that the electronics would be programmed manually. This process was done by turning certain switches on counting the beeps and turning the

switches off at the right time so the commands are recorded. This was a painstaking experience for everyone even though it sounded easy.

With the frames completed, the brains wired and programmed, it was now time to test the newly constructed ROVs. The miniROVs were connected to the laptops and turned on and for the first time we could see the world through the eyes of the little machines the students had just constructed. The final step was for the ROVs to complete a wet test to check for any leakages and to make sure they would work in water, which they did. All six could go forward, come backward, ascend and descend in the water column.

Students and lecturers alongside the newly constructed miniROVs

It was a sight watching the faces of the students change from nervous anxiety to surprise and pleasure as they saw the products of their week long project, that started off with pieces of plastic and strips of wire, come to life in front of them. Some were emotional which is totally understandable; who would have thought that a bunch of Biologists and Environmental scientists with very limited practical knowledge would be able to create six new robots in a week.

I am extremely proud of the participants of this year's program and very thankful to the instructors for giving this opportunity to future scientists of PNG.

If would like to read more about the OpenROV team, visit this link
https://openexplorer.com/expedition/rov2png

William Saleu

PNG Environmental Advisor