Phoenix Robotics

Non-ROV Device Document "Sunfish"

The purpose of the non-ROV device, also known as a vertical profiler, is to complete Task 4: Mate Floats. The main inspiration for this task was the National Science Foundation-funded GO-BGC projects.

This year's device uses a water-based buoyancy engine to allow it to complete a full profile in the designated float area. The buoyancy engine consists of a 60-ml syringe and Lego technic pieces. The syringe is moved using a rack and pinion system, in which a pinion or gear moves down a rack, moving the syringe up or down.
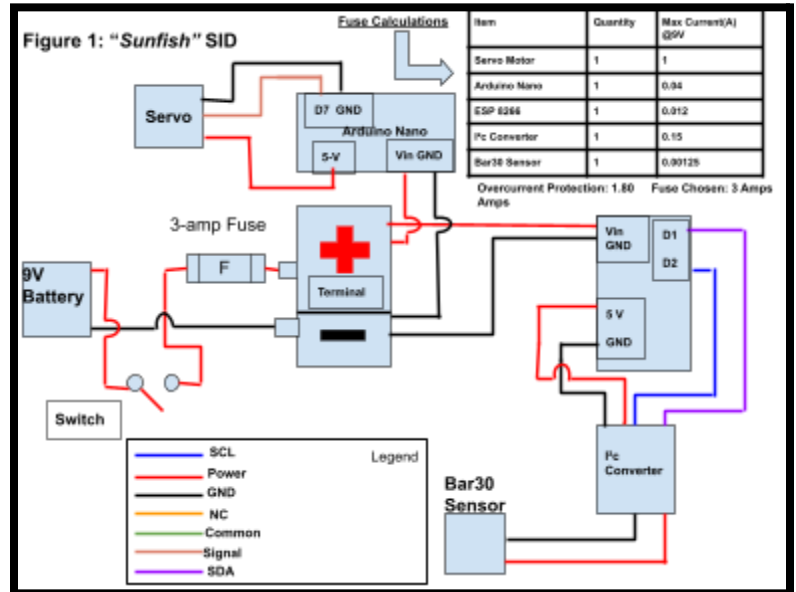

Figure 1: "Sunfish" SID

Figure 2: "Sunfish"

At the bottom of the vertical profiler is a pressure relief hole being plugged by a rubber stop. This is to ensure that the machine won't suffer damage if the pressure becomes too great for it to handle, causing the plug to be ejected from the bottom of the tube. The electrical components of the profiler are housed within a 4-inch acrylic and PVC tube with a rubbing fitting connecting the two and a PVC end cap on top of the acrylic tube. Inside the 4-inch PVC tube is a button that can turn the system off and on. This button is connected to a tray that houses a 9-volt battery and a 3-amp fuse that's 5 cm away. Other than this, the tray holds an Arduino Nano, which connects to a 360° servo motor and is what allows the buoyancy engine to run. Moving to the 4-inch end cap at the top of the profiler is a Blue Robotics Bar30 sensor, which is used to find the depth, pressure, and temperature of the surrounding water. Connected to the sensor is an I²C Level Converter that converts the data gathered into serial for both transmitting and graphing. The last piece of hardware inside the end cap is a NodeMCU 8266 module, which is used to send the information to a website that converts serial to real-time data. The data that is graphed and shown is time in UTC, the company number, the depth of the profiler in the water, and also the temperature surrounding the profiler.

Enlarged SID for viewing convenience:

Figure 1: "*Sunfish*" SID

Item	Quantity	Max Current(A) @9V
Servo Motor	1	1
Arduino Nano	1	0.04
ESP 8266	1	0.012
I²c Converter	1	0.15
Bar30 Sensor	1	0.00125

Overcurrent Protection: 1.80 Amps   Fuse Chosen: 3 Amps

Legend
- SCL
- Power
- GND
- NC
- Common
- Signal
- SDA