Phoenix Robotics

Non-ROV Device Document “Slippery Snake ED”

Figure 1: Non-ROV Device

The purpose of the non-ROV device, also known as a vertical profiler, is to complete Task 3: Mate Floats. The inspiration for this task was from the National Science Foundation-funded GO-BGC projects. This year's profiler is composed of three different modules: one at the bottom, one in the middle, and lastly, one at the top. The profiler's main body is made up of a 6-in clear PVC tube and has a height of 80.5 cm.

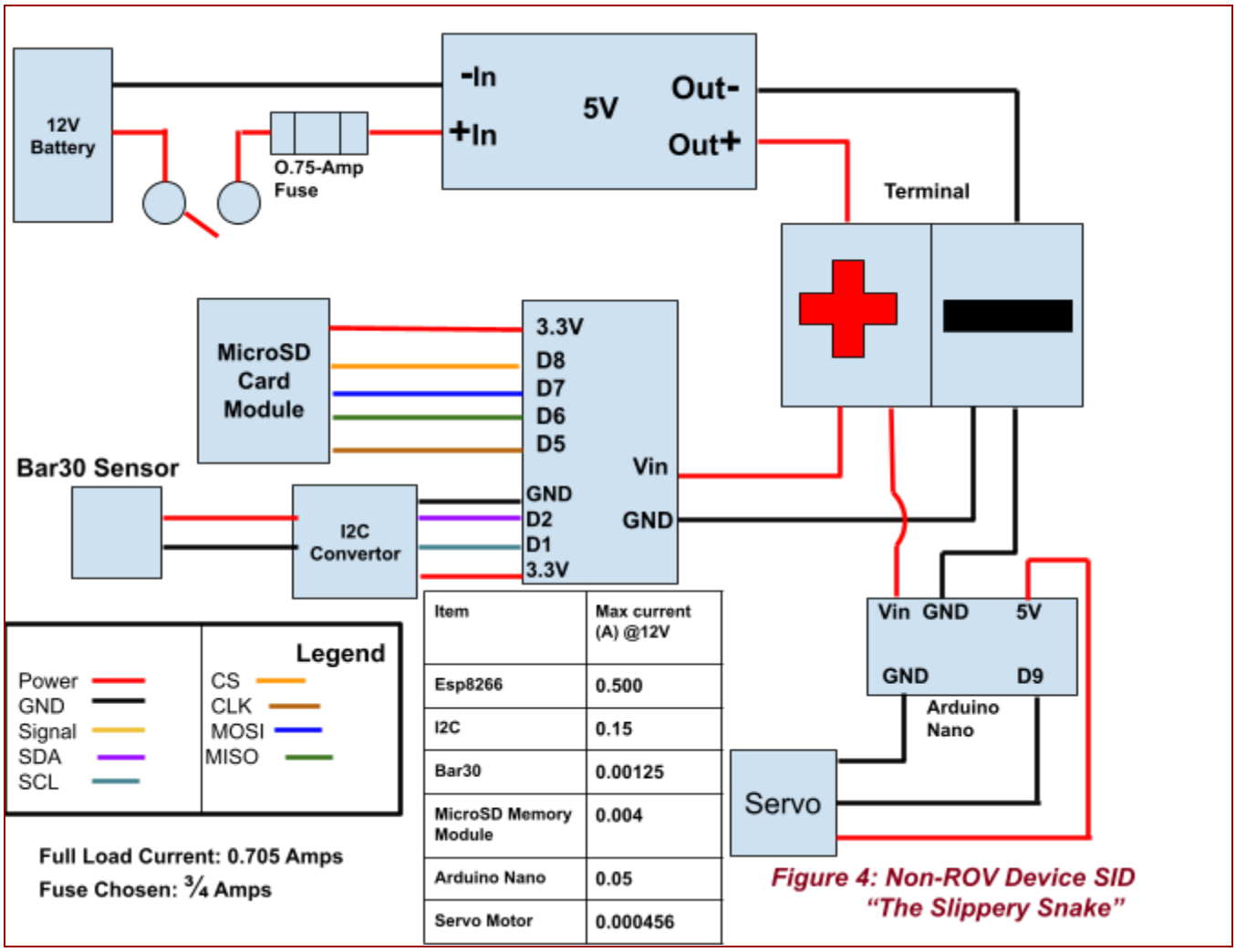
Starting at the bottom of the vertical profiler, there is a rubber pressure relief stopper that acts as a safety feature in case the pressure inside the device exceeds its limits. This helps protect the components inside the device from damage. The profiler's ballast weights are also located at the very bottom. These include lead-filled PVC pipe weights and various dive weights, totaling around 18 kilograms.

Figure 2: 12V Battery Pack

Continuing to the center of the profiler, this is where the button for turning the device on and off will be found. The two-way button allows power to run to every electronic device on the float. For example, the electronics tray holds an 8-AA battery pack that outputs a total of 12 volts. The battery pack allows the float to run longer and prevents batteries from being replaced regularly. It also allows every device to have sufficient amp flow as needed. The 12-volt output is then regulated down by a voltage regulator to 5 volts and passed through a 0.75-amp fuse. These regulations allow for safe use of the data collection and transmission system along with the Arduino Nano, which directs a 5-volt 360° servo that operates this year's buoyancy engine. This year's buoyancy engine is a water-based system, which allows it to move up or down a water column two times in a row within the designated float area while also reaching the required depth of 2.5 meters for the profile to be deemed successful. The buoyancy engine consists of a 60-milliliter syringe and Lego system bricks. The engine's function is that of a syringe being moved by a lead screw system, in which a screw moves the plunger, making the syringe go either up or down.

Figure 3: ¾ Amp Fuse

Lastly, at the top of the profiler reside the data and communication electronics. To be more specific, at the very top is a Bar30 Blue Robotics pressure sensor. The sensor connects down to an I²C level converter, which is read by an ESP8266. This ESP device acts as a Wi-Fi module to send the data wirelessly to a device on land while the profiler is in the water. However, for the device to successfully send the data, the ESP must save all the data the pressure sensor collects to a MicroSD card via a memory adapter. Once the float reaches the surface, the ESP will pull all the data it saved underwater and post it to a WebSerial, allowing those on the surface side to graph the data.



Item	Max current (A) @12V
Esp8266	0.500
I2C	0.15
Bar30	0.00125
MicroSD Memory Module	0.004
Arduino Nano	0.05
Servo Motor	0.000456

Figure 4: Non-ROV Device SID "The Slippery Snake"