

The ETSU Buccaneers have designed and created a vertical profiling float, named Luna, capable of completing multiple vertical profiles and transmitting data wirelessly to the control station on the surface. The frame of Luna consists of a 70cm OD Syringe with a Blue Robotics Bar02 sensor, and a Blue Robotics Underwater Switch embedded in the bottom. Inside of Luna, a 5-volt servo is mounted to a smaller syringe. When the servo spins a lead screw, it either raises or lowers the plunger. When the plunger is retracted, the buoyancy changes as the water enters the float. This lowers the float to the target depth of 2.5 meters. After staying at the desired depth for 45 seconds, the float then extends the syringe, changing the buoyancy causing the float to rise to the surface. After it surfaces and transmits the data, it completes another vertical profile in the same manner. Luna has two Nickel-Metal Hydride 9-volt batteries wired in parallel to provide sufficient power to the servo and Raspberry Pi Pico. Both components receive power only after it is passed through a 3-amp fuse, switch, and DC-DC buck converter. This regulates power to a stable 5 volts, which is usable by all of the components. Once the switch is turned on, the Pico uses the HC-05 Bluetooth Module to get the start signal from a control station on the surface. After starting, the Pico actuates the syringe and catalogs the pressure and depth from the Bar02 sensor along with the current time and company number. Once the depth of 2.5 meters is reached, the syringe actuates once again to the middle to attain neutral buoyancy. After holding for 45 seconds at the target depth, the syringe actuates again to bring Luna to the surface. At the surface, the logged data is transmitted via the Bluetooth module to the control station, where it can be viewed as a graph or table. The battery pack was designed with 20 gauge wires, as it can safely handle the full load current of 1.6 amps. These wires can safely handle high voltages as well, so the 9 volts utilized by our circuit are well within specifications.



Figure 1. Luna Frame



Figure 2. Batteries shown are for testing purposes only. Actual batteries are Nickel-Metal Hydride.

Products	Amps Used
Servo	1300 mA
Raspberry Pi Pico	100 mA
Bluetooth Module	100 mA
Bar02 Sensor	100 mA
Full Load Amps (FLA): 1.6 Amps	Fuse used: 3 amps