# *Bluefin*

## Non-ROV Device Documentation – DOC-004

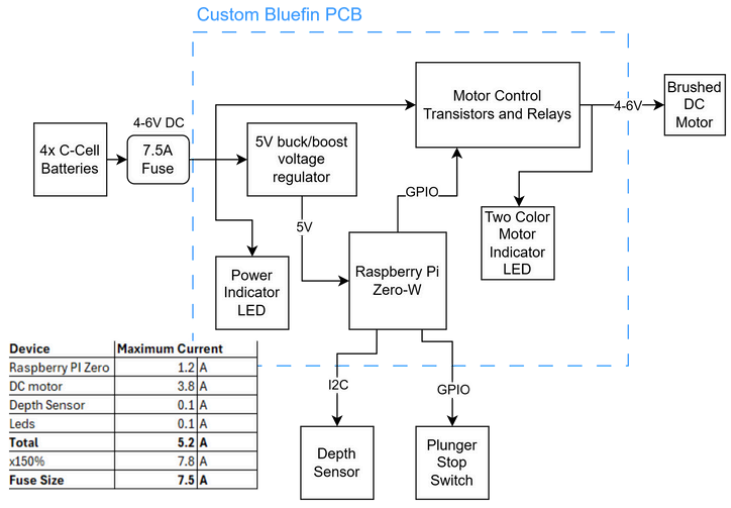
*Bluefin* is constructed from 3-inch clear plastic tube, a 500 mL syringe, and a lead screw that work together to adjust the buoyancy of the syringe by ingesting and expelling water upon operator command.

Employees chose to separate the batteries from the electronics and place the weight near the bottom for serviceability. This separate, watertight enclosure allows batteries to be easily replaced without interfering with the main components. Additionally, a pressure release plug is added in the lower compartment to ensure the safety of the float's surroundings should pressure build up in the battery compartment.

*Bluefin's* use of a custom PCB and Raspberry Pi Zero provides a compact and powerful set of electronics. The PCB's circular shape maximizes space in the round tube. The PCB serves as a Pi HAT, as it features a 2x20 Pi Zero header to integrate the Raspberry Pi. The PCB also includes three LEDs for the following indications: buoyancy engine powered on, motor is operating, and batteries are low. The PCB features two relays, which allow for the operation of a geared motor which drives the lead screw.

*Bluefin* begins the mission at the surface and streams a webpage to a device on deck over a closed WiFi network. The use of a webpage for control and data readout ensures that *Bluefin* can be controlled from a range of devices without any special software. When the 'DIVE' button on the webpage is pressed, Bluefin begins ingesting water to decrease buoyancy and starts recording *pressure*, depth, and time via a Blue Robotics Bar02 pressure sensor. Once the float reaches the bottom of the pool, the Raspberry Pi triggers the motor to move the plunger and expel water from the syringe, increasing the buoyancy and bringing the device to the surface. When the buoyancy engine reaches the surface, the antenna transmits and displays the pressure and depth data at time of surfacing in UTC on the webpage. A depth versus time graph is also shown. This cycle is repeated twice.

Figure 1. *Bluefin* CAD and Tangible Float




| Device | Maximum Current | |
|---|---|---|
| Raspberry PI Zero | 1.2 | A |
| DC motor | 3.8 | A |
| Depth Sensor | 0.1 | A |
| Leds | 0.1 | A |
| **Total** | **5.2** | **A** |
| x150% | 7.8 | A |
| **Fuse Size** | **7.5** | **A** |

Figure 2. *Bluefin Electronics SID*