Design

Fish Logic's vertical profiling float is called the SeaLift. Within its acrylic watertight housing, an array of electronics drives the buoyancy engine which gives SeaLift the ability to complete the 2 vertical profiles it was designed for. These electronics are divided into the buoyancy engine, and the detection system. The buoyancy engine consists of a 12-volt DC motor, a power screw, two carbon fiber rods, switches, and a piston top. The piston is waterproofed with 2 O-rings which spans across the diameter of the canister, effectively turning it into a syringe. The detection system consists of 2 hall effect sensors. A magnet suspended in water by floats will activate a hall effect sensor when the float reaches the water surface. Similarly, a magnet will be pushed towards another hall-effect sensor, activating it when the float reaches the bottom of the pool. The overall dimension of SeaLift is 125mm diameter x 406.45 mm height.

Figure 1 Picture of Float

Power

The SeaLift uses 8 AA alkaline batteries as its power source as it is able to be contained in the tight space the canister provides. The batteries are connected in series to provide a total voltage of 12V. The batteries are secured into battery mounts attached to the internal frame. A 3A fuse is installed under the frame and behind the flange.

Safety Measures

O-rings are used to install flanges and to waterproof the piston inside the canister, no screws are used to keep the flange connected to the canister. In scenarios where the internal pressure of the canister exceeds the pressure outside, the flanges will pop out of the canister. Pressure relief plugs or pressure release valves are not used in the SeaLift. Outside the canister, a cage is placed over the bladder to protect it from sharp foreign objects that could puncture the material. A larger shroud is installed to the bottom of SeaLift to act as the bottom of the float and protect the plugs that extrude out of the bottom acrylic cap.

Figure 2 Battery Configuration

External Connections

A waterproof socket incorporated into the acrylic cap is connected to a Beetle CJMCU microcontroller. The SeaLift program can be updated by connecting the waterproof plug to a laptop with the Arduino IDE. This connector is closed with a waterproof cap when not in use.
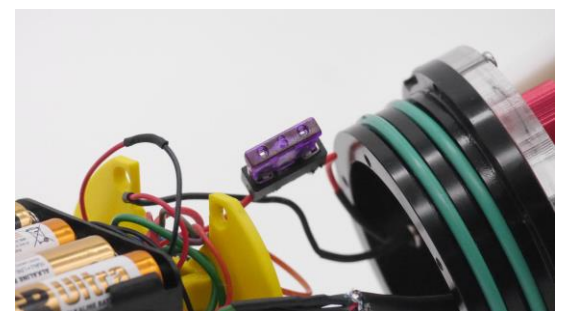

Figure 3 Location of 3A fuse in Float