NON-ROV DEVICE: FLOAT

Kelpie Robotics has designed a vertical profiling float capable of completing two vertical profiles in an underwater environment.

It utilizes a buoyancy engine made a 300mL syringe to displace seawater and control the density of the float, and thus control the vertical height of the float.

Our product uses a microcontroller unit (MCU) development board, with a WiFi module pre-installed. The MCU's antenna connects from the top of the float to the topside station remotely. In addition, Kelpie Robotics has integrated a Real Time Clock (RTC) module for time-keeping, Inertial Measurement Unit (IMU) for movement detection, and a controller-driven stepper motor running a lead screw attached to the pistons of the syringe that acts as the buoyancy engine. When the IMU detects we have either breached the surface or hit the bottom of the aquatic environment through transient acceleration changes, the state machine within the MCU changes state from rising to sinking, or vice versa. As well, when the MCU detects it has breached the surface, it communicates with our ground station in order to relay the relevant information.

The enclosure is made out of 4" and 2" PVC pipe with a threaded cap at the 4" end and a sealed end cap at the 2" end. The two pipe segments are connected with a coupler. The syringe's inlet is connected to the outside of the float through the 2" endcap, which is sealed around the edge to prevent leaks into the float.

Two batteries of eight AA alkaline cells are connected in series for the on-board power, in order to meet the voltage and current needs of our float. Step-down modules are implemented on-board in order to convert the combined 12V output of the batteries into logic and motor power outputs.

Using a 50% safety factor on the current drawn (set to 3A on our motor controller):

3A * 150% = 4.5 Amps, and thus a 5A Blade fuse was determined to be appropriate.

A 2.5 cm pressure release plug rated 10psi is added to prevent built up pressure within the float, and a Schraeder valve is used in order to be able to measure the pressure between runs.

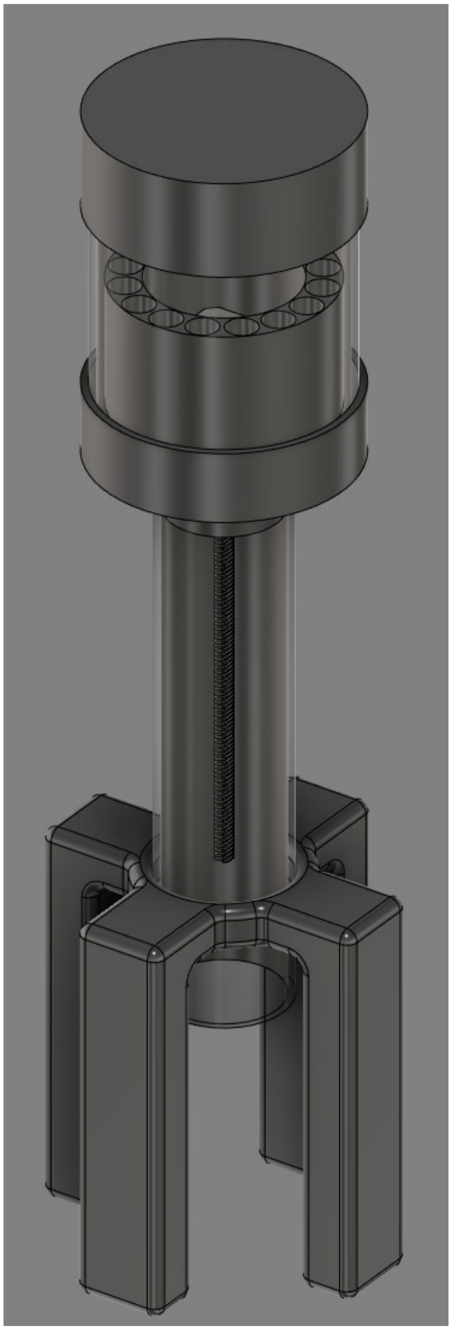

Figure 1 - CAD model of the Non-ROV Device