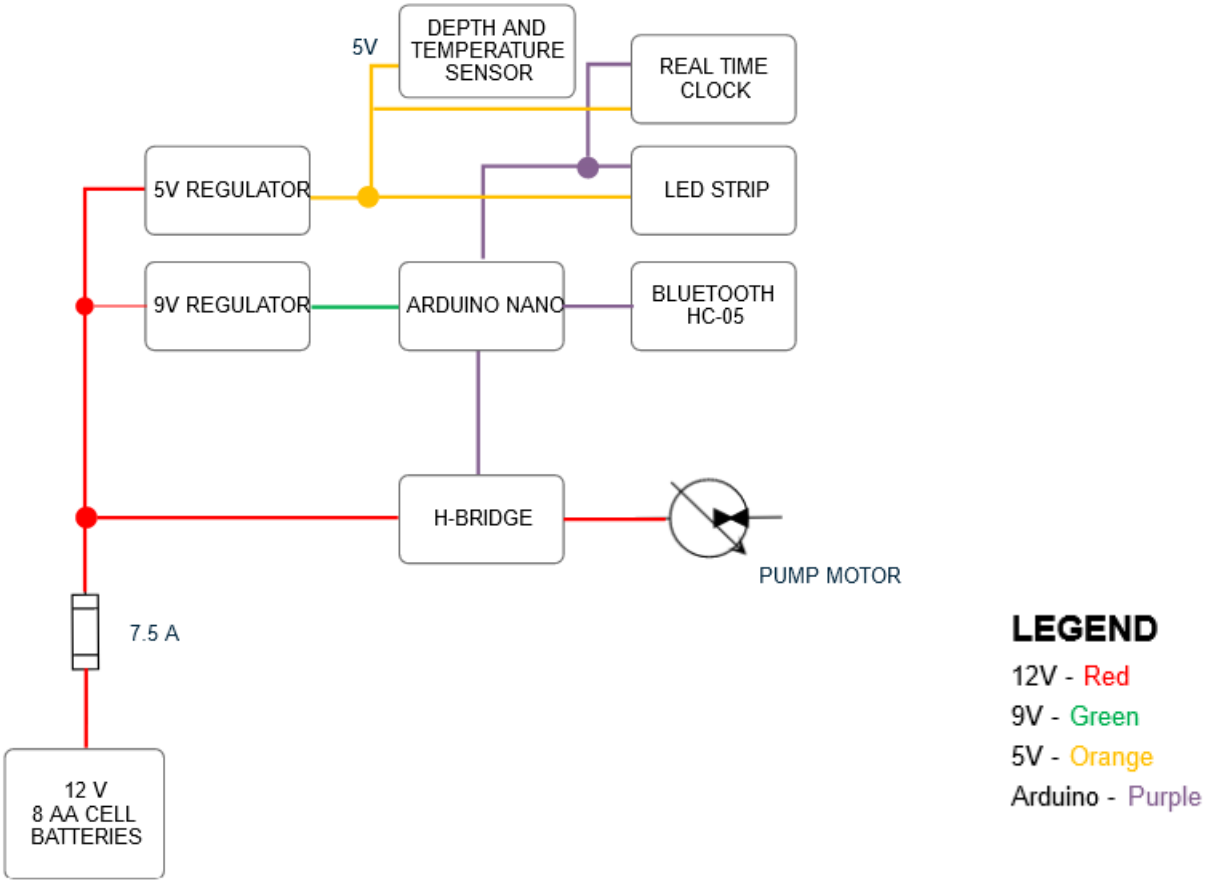
1. NRD (floater) SID



VERTICAL PROFILING FLOAT

AKA "THORPEDO"

OVERVIEW:
Our vertical profiler consists of six stages organized in vertical tiers. This is an autonomous device with its own 12-volt power supply in its enclosure. Our buoyancy engine involves two actuators: a water pump and a normally-closed valve.

ENCLOSURE:
Our enclosure uses 4" acrylic pipes, flanges and a dome from BlueRobotics. The bottom is a custom aluminum end-cap shown below.

POWER STAGE:
Our power source is eight alkaline AA batteries to supply 12-volts. Our custom power distribution board includes an accessible 7.5 amp fuse (right) and a voltmeter (left) easily visible from outside the enclosure along with two H-Bridge controls for the pump and valve. This stage was placed between our two actuators to minimize the EMI from high-current wires.

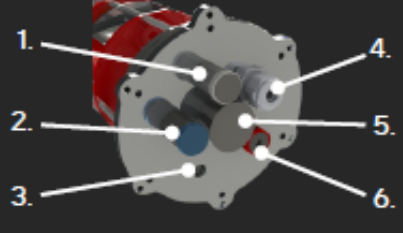
BALLAST STAGE:
See Page 14 for our buoyancy calculation. Most of the ballast is a casted lead plate. We perfected our buoyancy experimentally with lead shot stored in the handle for the ROV to grab for deployment.

CONTROL STAGE:
A custom PCB interfaces an Arduino NANO, memory chip, and bluetooth transceiver. The transceiver is positioned upright to peak above the water line and get signal. The water line never comes higher than the base of the acrylic dome.

BLADDER STAGE:
Our bladder is a flask that stores 500mL, yet we only intake 200mL of water. It's a durable nylon material that is tear-resistant to protect against compromising the enclosure.

PUMP STAGE:
The pump is an OEM replacement part to coffee-makers where it's used to move water from a storage tank to a boiling unit. To profile, the pump intakes for 8 seconds to starts descent, waits a specified length of time, and expels water for 8 seconds to ascend.

VALVES AND SENSORS STAGE:



1. Pressure Testing Vent
2. ON/OFF Switch (BlueRobotics)
3. Water Intake (to valve, pump, bladder)
4. Ethernet Gland (Development Only)
5. Pressure Relief Plug
6. Temperature/Depth Sensor