Cabrillo College Robotics opted to use a buoyancy engine as a profiling float. Variable buoyancy was created by compressing and expanding a 100 ml syringe. The syringe plunger was actuated back and forth using a custom linear drive system consisting of an MGN 12C linear rail (1) and a T8 lead screw. This was driven by a continuous 20kg/cm servo. The assembly was encased in a 4 inch diameter acrylic tube with a PVC end cap on one end. The other end has a 3 cm diameter pressure release plug that satisfied the minimum diameter requirement. No fasteners are used to hold the device together assuring that pressure will be released if it is greater inside than outside. The plug is machined from aluminum and has two O-ring seals. When the pressure inside exceeds that outside of the housing, the plug will release. The syringe penetrates the housing via vinyl tubing connected to a quarter inch barb fitting.

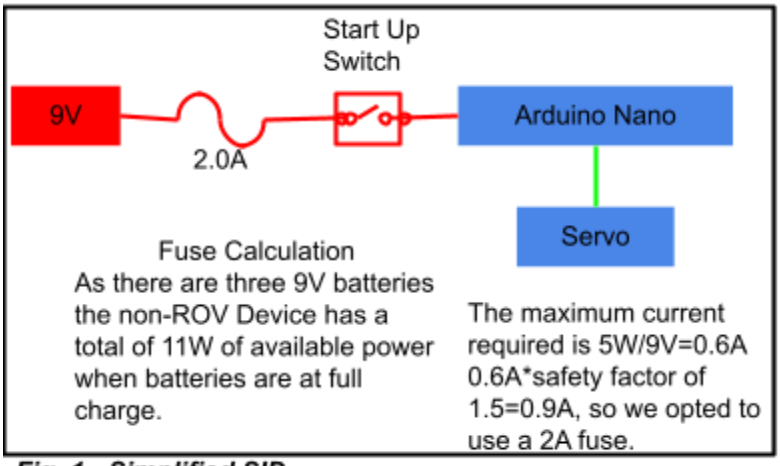

Fig. 1 - Simplified SID

The vertical profiling float is powered by three onboard 9V alkaline, disposable primary batteries that are securely affixed within the container with 3D printed brackets (2). They are wired in parallel and have an inline 2A fuse within 5 cm of the battery positive terminal. They power a servo motor which controls float buoyancy. The engine is a completely separate system from the main ROV and will not conduct any ROV tasks. It is controlled by an onboard arduino nano and the profiling process starts by power cycling a toggle switch. Once powered on, there is a 30 second delay giving the ROV enough time to deploy the profiling engine. The non-ROV device does not utilize cameras or thrusters.

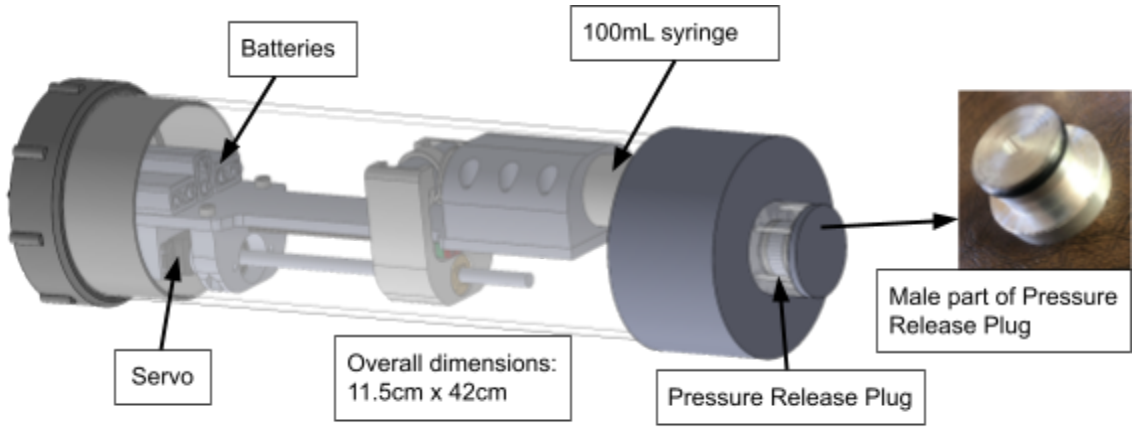

Fig. 2 - Simplified Schematic

References:

1) https://us.misumi-ec.com/vona2/detail/221005387514/?HissuCode=LWL7R60BPS2&gclid=Cj0KCQjw1ZeUBhDyARIsAOzAqQJtIPLer0oCEtKSuU6Wlfd9HCvU6ZPiVGL4pCl1arQr5rJiG4g5QykaAvWKEALw_wcB

2) https://www.amazon.com/Energizer-Alkaline-General-Purpose-Battery/dp/B00003IE4E