Float Design Document

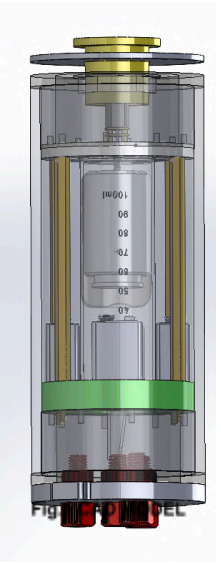
❖ Functions

- ➢ Operate as an independent device which is compact and easily deployed
- ➢ Completes two vertical profiles in pool using a buoyancy engine
- ➢ Transmit depth and current time after each profile

❖ Float design:

Buoyancy engine design:

Consists of 1 100ml syringe connected to a DC Motor with encoder, powered by four 9V alkaline batteries and controlled by a Raspberry Pi Zero. As the motor drives the syringe to take in water the weight is increased to decrease buoyancy causing the float to sink. Conversely, as water is expelled weight is reduced, increasing buoyancy allowing the float to rise.



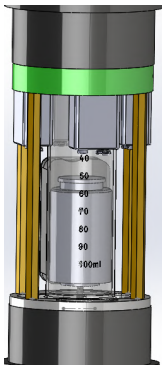


Fig.2 Internal

Internal design:

3D printed components paired with brass standoffs, make up the internal structure securing the electronics and pneumatic in place.

External Design:

The components of the buoyancy engine are housed within a 90mm diameter, 200mm length acrylic cylinder with two aluminium flanges secured with O-rings . This cylinder is sealed with two custom-machined end caps featuring penetrators.These penetrators allow the antenna to extend outside of the tube for data transmission and enable the syringe to expel and intake water, facilitating its buoyancy control .

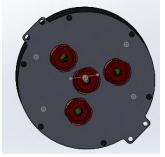


Fig.3 End CAP

Safety:

To ensure our pressure tube is safe we added a 26mm pressure relief plug that is on the top of the float. The Plug will release if there is excessive build up of pressure within the tube. A fuse is also installed near the battery to shut the float down in the event of an electrical fault.

❖ Design Process

Design philosophy:

Our design process involved thorough research and idea generation to create a functional float suited for the task. Once the basis was established we created a CAD model to visualise the inspired design. Creating this model helps us refine the concept before actually making the float.

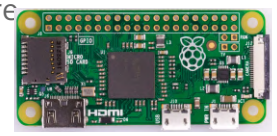


Fig.4 Raspberry PI Zero 2W

On-Board Control:

We selected the Raspberry Pi Zero as our onboard controller as it offers versatility and efficiency. The compact size and low power consumption make it ideal for space constrained environments. With the builtin GPIO pins, it seamlessly interfaces with motors and sensors. Additionally, Its WiFi capability enable real time data transmission, enhancing system functionality and accessibility.