BUOYANCY ENGINE - *OLIVE RIDLEY*
Non-ROV Device Documentation

Beluga's Buoyancy Engine, Ridley, is an independent device capable of completing two vertical profiles of the pool. It has an onboard power system that utilizes a non-rechargeable 9-volt alkaline battery. This battery is mounted inside the enclosure tube on the opposite end of the pressure release opening. The battery is mounted securely and enclosed in an ABS tube sealed on both ends with end caps. The end cap on the top of the buoyancy engine features a 3 cm plug which is included to relieve pressure if the pressure inside of the tube is greater than the pressure outside of the tube.

Ridley is able to adjust its buoyancy and complete the vertical profiles by ingesting water and expelling water. Ridley is able to do so through a servo-driven syringe. The servo driven syringe is powered by the Raspberry Pi 3B+ and features code that activates the motor, allowing the syringe to intake water thus making the engine negatively buoyant, causing it to sink. The motor is activated and moves upwards when the Buoyancy engine reaches the surface of the pool and a water-level sensor mounted at the top of the buoyancy engine reads dry. This intakes water into the syringe, allowing Ridley to sink. When Ridley sinks to the bottom of the pool, a sonar sensor indicates when contact has been made with the bottom. This triggers the servo to rotate downwards, expelling water from the engine, causing Ridley to become positively buoyant and float to the surface where it can repeat the process until two vertical profiles have been completed.

A python-coded Raspberry Pi 3B+ that controls all of Ridley's sonar sensor, water-level sensor, and servo-powered syringe. Ridley features a 7 amp fuse installed within 5 centimeters of the positive terminal of the battery to prevent an electrical overload from occurring.
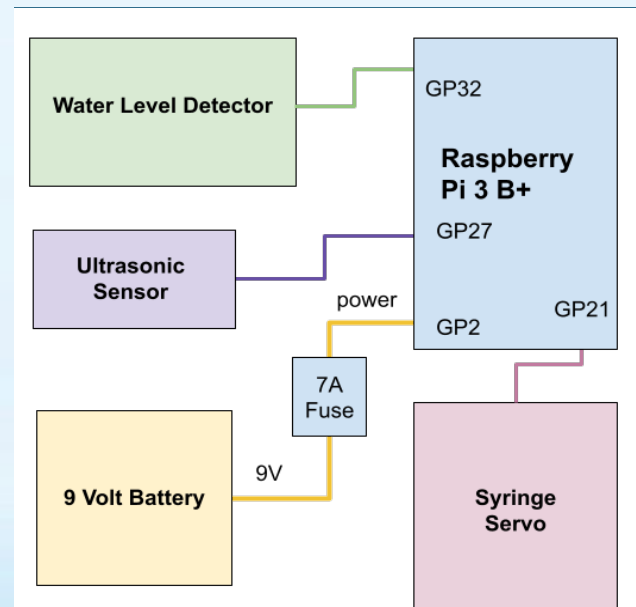

Figure 1. *Olive Ridley*
Photo by Lauren Jones

Figure 2. *Olive Ridley's* SID
Photo by Lauren Jones