Bouyancy Engine

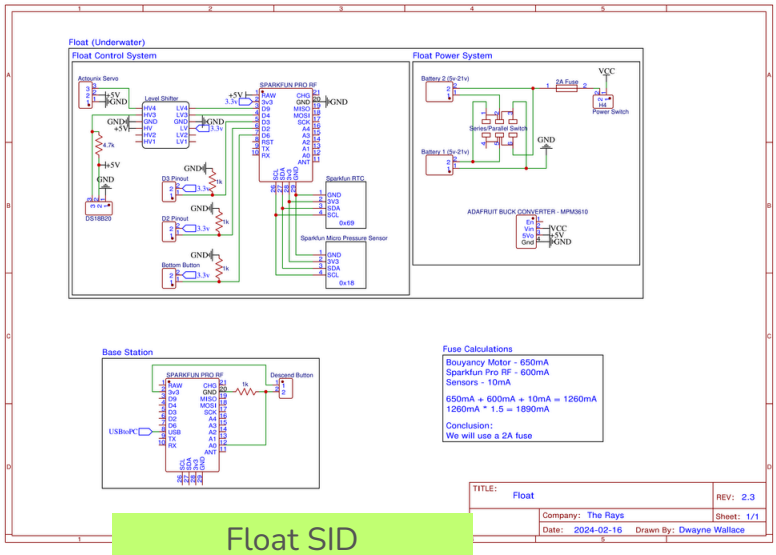
The Rays float is an independent device capable of completing two vertical profiles. It is housed in a recycled 3” Blue Robotics tube that is 11" long. The canister is sealed with two O-rings as a watertight enclosure. The float features penetrators on the bottom with one being used as a pressure release valve. It has an onboard power system that uses two non-rechargeable 9V alkaline batteries. Our float has custom designed 3D printed legs to protect the penetrators from damage and includes an integrated handle to safely deploy it with our ROV.

The float has an Actuonix linear actuator for the buoyancy engine controlled by a SAMD 21 Pro RF-LoRa which is also used for radio communication with the base station. The float utilizes a RTC and Micro Pressure Sensor for collecting data, all on a custom designed PCB along with the SAMD 21 Pro RF-LoRa and other components.

The custom designed software program employs a state machine with three states: idle, descending, and ascending. It starts inside the idle state until it receives a signal from the base station. After a signal is received, the float enters the descending state in which it begins to suck in water such that it sinks. The float has a magnetic reed switch to determine when it has reached the bottom of the pool. After doing so, it moves into the ascending state. In the ascending state, our float expels water to rise. When the current pressure is close to the target pressure recorded at the beginning of the idle state, our float transmits the data collected and starts the process all over again.

The float has a 2 amp fuse installed within 5 cm of the positive terminal of the battery to prevent an electrical overload occurring.

Float & Base Station
Photo Credit: Dwayne Wallace



Float SID