SeaGuardians Robotics
Vertical Profiling Float

Construction

The F.L.O.A.T. (Future Leader Of Aquatic Technologies) is an innovative automatic floatation device that is housed inside a 72.6 cm long, 3-inch diameter translucent PVC pipe. The propulsion of the float is a 50mm actuator that pushes water in and out of the 3-inch tube using the body of the float as a syringe. The float uses an Arduino Nano ESP32 for transmitting and propulsion. Other devices on the float are a motor driver, a Blue Robotics bar 02-depth pressure sensor, and an Adafruit I2C converter.
The system uses one 12V 2000mAh NiMH battery to reduce heat and over-amperage. SeaGuardians Robotics uses 5-amp blade fuses to help negate these problems.

Operation

Above water, a button is pressed inside the float. This starts a timer to retract that actuator, causing the float to sink. The Blue Robotics bar 02-depth pressure sensor waits until it reads 50 cm above 2.5 m, and stops the actuator. The Arduino Nano ESP32 onboard starts recording data from the depth pressure sensor. As the float passes the required depth, the Arduino stops and retracts the actuator slightly. This stops the float's descent, causing it to rise slowly. The Arduino continues to extend and retract the actuator, keeping the float near or at the required depth for 50 seconds. After the time has been completed, the Arduino fully extends the actuator, causing the float to rise to the surface. After transmitting the data to the mission station, the float repeats the dive.

Transmission

Above the water is a mission station tasked with receiving the data from the float. Using ESP-NOW, a type of Bluetooth communication, it actively waits to receive data. Once the float reaches the surface, it transmits the company number, the time, and the 50 seconds of data it received while within 50 cm of the required depth in five second increments. When this information is received, it will display it on a screen at the mission station.

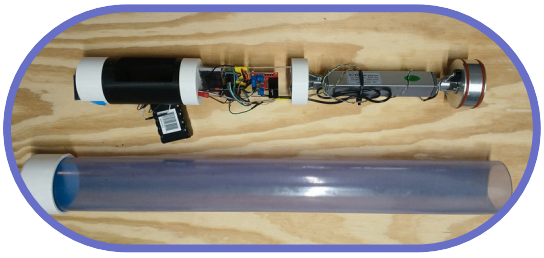

Fig. 1.1 - Float Internals, Nathan Willard

Fig. 1.2 - The Profiling Float, Nathan Willard

Appendix A: Vertical Profiling Float Systems Integration Diagram