Red Sea Robotics

Float Documentation

2024

Abstract

There is a real and ever-growing challenge of creating a float that can address real world issues. With this, we aim to create a float that is able to monitor areas in different locations around the world to collect meaningful data for research.

Figure 1: Float top view

Design Rationale

The float is controlled by an Arduino Nano, transmits data with the HC-05 Bluetooth module, and controls the thruster with a BasicESC, all housed within the 4” series aluminum enclosure from Blue Robotics. Actobotics Aluminium frame parts are used to secure the electronics capsule and attach a T200 thruster from Blue Robotics, which is used for propulsion.

Inside the electronics capsule, there are two separate battery packs to power the Arduino and the T200 separately. The pack of 8 AA alkaline batteries connects via 16 gauge wire to the T200, supplying 12V, and a single 9V alkaline battery powers the Arduino, which then supplies power for the HC-05 and the Basic ESC. The HC-05 facilitates a Bluetooth connection to a laptop on the surface, containing the Arduino software to interface communication. The pilot on the surface can send a message to the float wirelessly to perform a vertical profile, and the float can then transmit relevant data which can then be graphed over time on the surface. The electronics layout can be seen in **Figure 2**.

Safety

In terms of safety, strong waterproofing and electrical security is crucial to ensure a functioning and reliable float that will not harm or interfere with marine life. The watertight capsule can be seen in **Figure 1**. Both endcaps of the aluminum capsule are secured with double o-rings, which are coated with silicon grease to ensure a redundant watertight seal. Our team re-potted the T200 WetLink Penetrator connection with epoxy, considering the previous issues we've had with the Blue Robotics factory pots. A 5 amp fuse is connecting the 8 pack of AA to the T200 to prevent overloading and potential overheating or melting of wires.

Payload and Tools

We made the decision to use the T200 thruster for propulsion as that is the thruster we use on our ROV, Tyrone III. The T200 is reliable and watertight, and the price is ideal for our purposes. We, therefore, also used the aluminum electronics enclosure from Blue Robotics, as it features compatible connectors for the T200. We use the Arduino Nano rather than other options because it is well suited for a float, as the onboard computer doesn't require too much power or memory. We designed and 3D printed the electronics board and supporting frames for the internal electronics to suit our design best. The float features the Blue Robotics Pressure Sensor, which can be used to evaluate the effectiveness of the float in profiling and recording data.

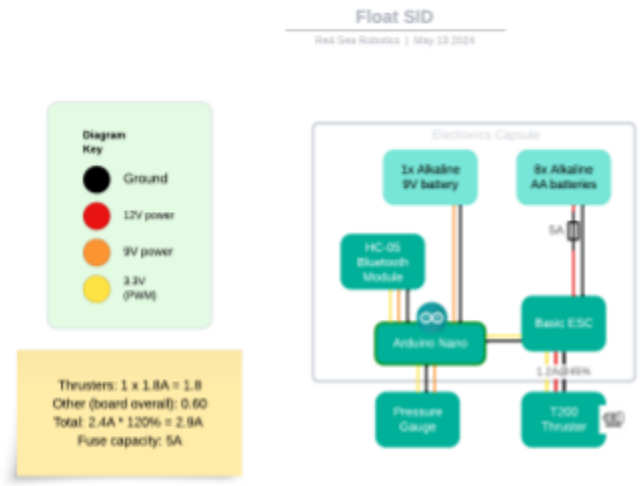

Figure 2: Float SID

MATERIALS

- Blue Robotics 4" Aluminium Electronics Enclosure
- 2x Blue Robotics 4 Inch Endplates
- Arduino Nano
- Blue Robotics T200 Thruster
- 4x Blue Robotics O Rings 4"
- HC-05 Bluetooth transmitter
- Blue Robotics Pressure Sensor
- 6x Actobotics parts