Vertical Profiling Float Specification

Macau Anglican College · Fish Logic

Design

Haku is Fish Logic's third vertical profiling float. Within an acrylic watertight enclosure, an array of electronics are used to ensure Haku can successfully complete two vertical profiles within fifteen minutes. The overall dimensions of Haku are 90mm diameter * 305mm height. There are no external connections in Haku.

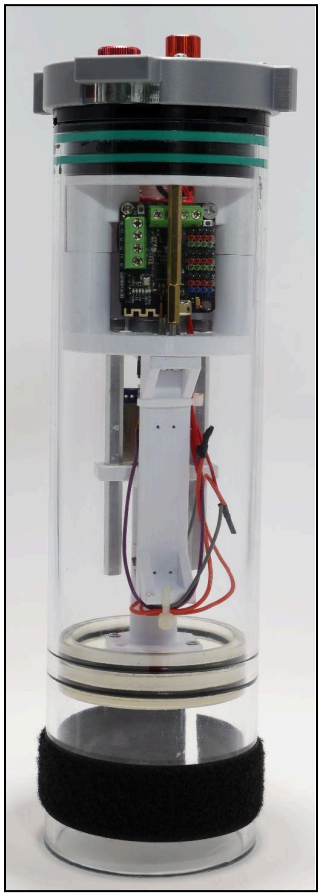

Figure 1: Haku

Mechanism

The mechanism of Haku consists of a buoyancy engine, in which a piston that draws and pushes water to the external pool. 2 O-Rings on the piston which span across the acrylic canister ensure Haku is kept waterproof. The buoyancy engine is actuated by a 12-volt DC Motor.

Electronics

The electronics can be split into three main sections: detection, communication, and data gathering. The detection system consists of two hall effect sensors. A magnet suspended in water by floats will activate a hall effect sensor when the float reaches the water surface. Similarly, a magnet will be pushed towards another hall effect sensor, activating it when the float reaches the bottom of the pool. Communication between Haku and the mission station can be achieved through the use of an antenna within Haku, allowing for transmission of data via radio waves. To gather depth data, Haku uses the Bar30 Depth Sensor from BlueRobotics, and is mounted on the top acrylic cap. These electronics are controlled by a Romeo BLE Mini V2 Arduino.

Power

Haku uses 8 AA alkaline, non-rechargeable batteries as its power source as it is able to be contained in the tight space the canister provides. The batteries are connected in series to provide an output voltage of 12V. The batteries are secured into battery mounts attached to the internal frame. A 5A fuse is installed under the frame and behind the flange.

Safety Measures

To ensure the canister is waterproof, O-rings are used to install the flange and to waterproof the piston. No fasteners are used to connect the flange with the canister. In scenarios where the internal pressure of the canister exceeds the pressure outside, a pressure release valve with a sealing diameter of 25mm will pop out of the canister, releasing the internal pressure within the float.

Figure 2: Watertight Piston

External Connections

The Depth Sensor is integrated into a penetrator, which is mounted on the top of the acrylic cap, and allows for Haku to gather depth data reliably. A cover is put over the sensor when not in use.

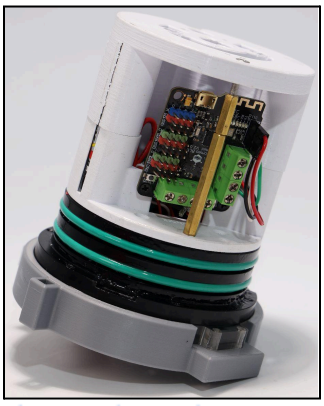

Figure 3: Electronics System

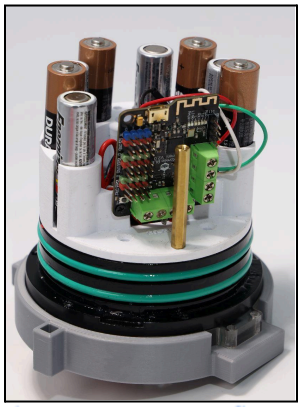

Figure 4: Battery Configuration

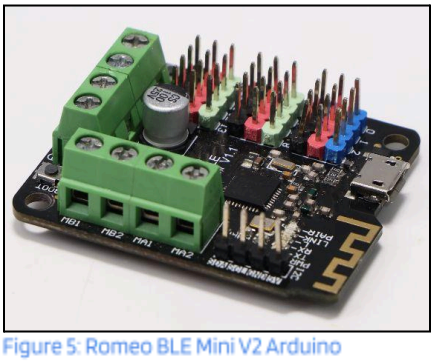

Figure 5: Romeo BLE Mini V2 Arduino