WOLVERINE

ALEXANDRIA, EGYPT 2025
TECHNICAL REPORT

Arab Academy
For Science, Technology and Maritime Transport
Regional Informatics Center

TRITON

UNDER THE SUPERVISION OF
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1-Mechanical System

To enhance precise depth control, our float was designed with a reduced total length of 59.3054 cm. This compact design posed a challenge in component organization, which we addressed by merging the power and control areas into a single "Component Zone," resulting in only two zones: the Component Zone and the Suction Zone .
The Component Zone consists of a top and bottom section. The top section features a cross-shaped structure secured with screws inside the Component Cap, which is attached to the float's top flange using penetrators. O-rings within the flange ensure a watertight seal. The bottom section includes a connector, motor holding base, and two battery bases. The connector is fixed to the motor base with screws, and the motor driver is placed on top. The motor,a 12V DC motor with 52 RPM speed and 21 kg·cm torque—is held in place by friction using two supporting parts. It connects to the Suction Zone via a coupler. In the Suction Zone, the suction system consists of a threaded syringe attached to the float's bottom flange, a power screw, a plunger, and a screw nut. When the motor rotates the power screw, the nut (attached to the plunger) moves vertically to draw in water, causing the float to sink. To fine-tune buoyancy, we used 50g, 60g, and 80g fishing weights positioned at the bottom of the float, aligned with the center of gravity. To prevent the weights from sliding into the syringe, we added a custom syringe cap.

2- Communication & Electrical System

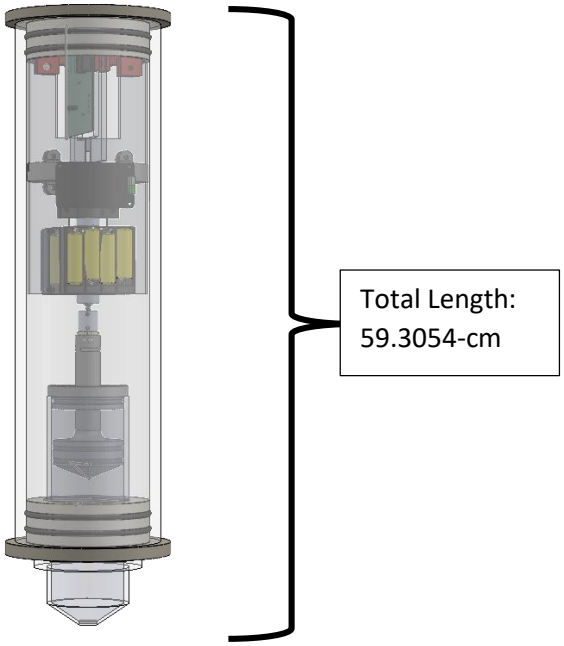
Communication:

The float communicates with the station over WiFi using an HTTP-based server-client model. The ESP32 acts as a WiFi access point, it allows the station to connect and request data via HTTP. After successfully receiving the data, the station sends an acknowledgment.

Electrical

The float control system consists of two microcontrollers to enhance functionality and expand future improvement options. The primary microcontroller is the ESP32, which handles communication with the ground station, reads pressure data from the pressure sensor, and sends depth-holding commands to the Arduino Nano. Additionally, the ESP32 is connected to a real-time clock (RTC) for timekeeping and synchronization. The secondary microcontroller, the Arduino Nano, receives commands from the ESP32 and controls a DC motor responsible for operating a syringe mechanism. The entire system is powered by a 12V AA alkaline battery pack, with a 1.5A fuse integrated for safety and circuit protection.

Figure (3) Battery Pack



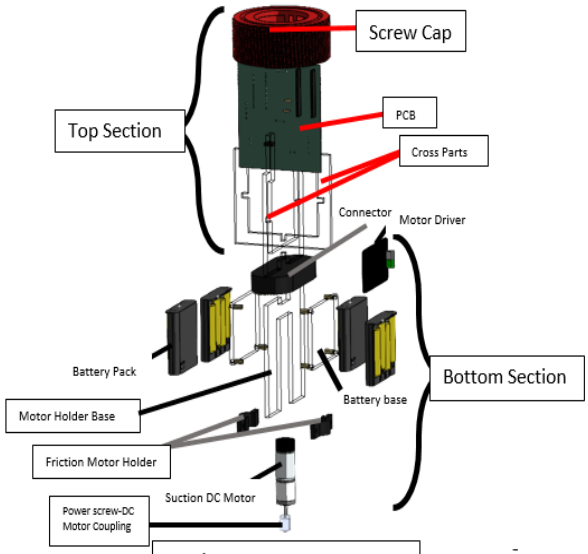


Fig.3: Component Zone explosion view

Arduino Nano	5V	30mA	**150mW**
ESP32	3.3V	500mA	**1650mW**
DC Motor	12V	1250mA	**15000mW**
RTC	5V	10mA	**50mW**
Pressure Sensor	3.3V	1.25mA	**4.125mW**
LED	5V	30mA	**150mW**

Total power consumption = 170004.125mW ≈ 17W

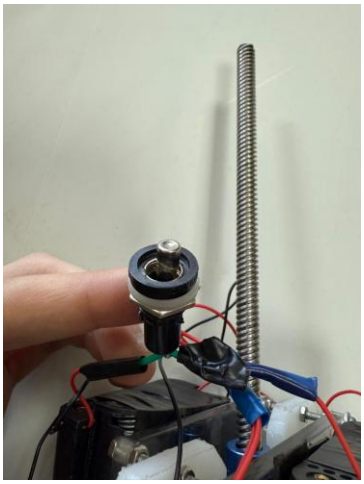
Fuse calculation:

Fuse = 17W / 12V = 1.41A

1.5 A fuse

Table (1) FLA Table

Figure (4) Fuse Used



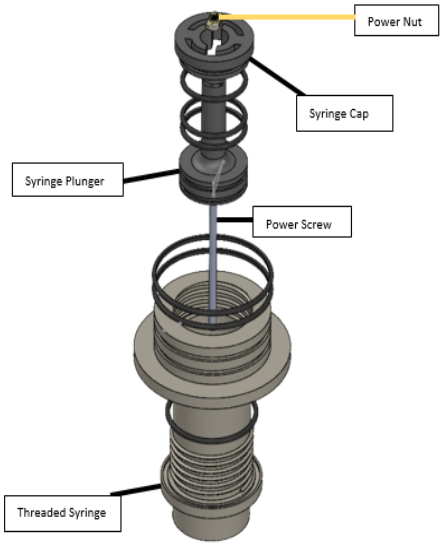
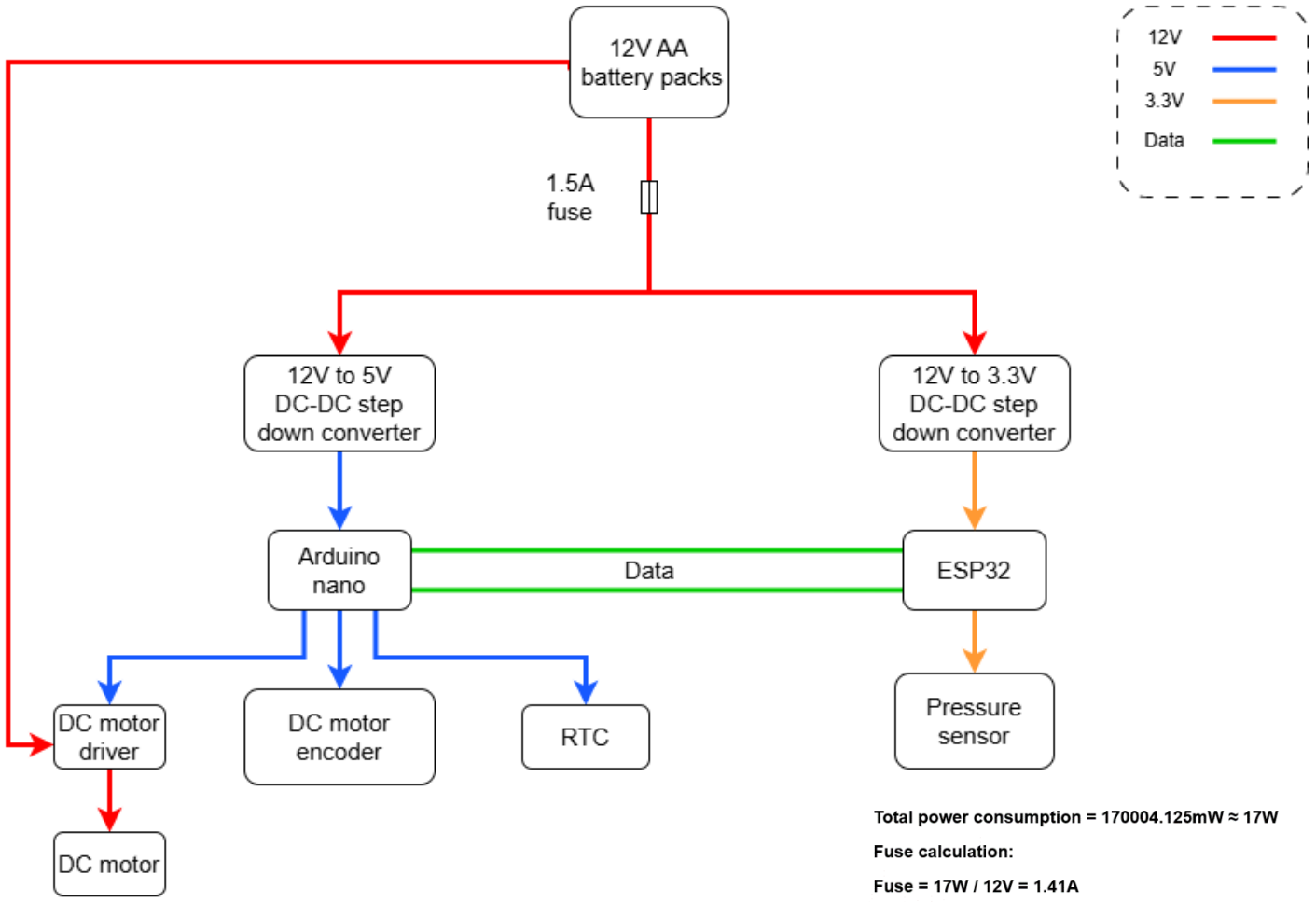


Fig.4: Suction Zone exploded view



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