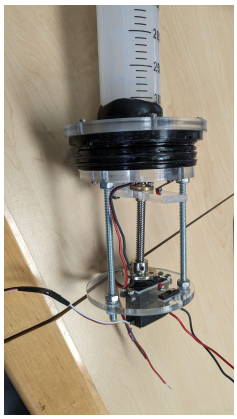
Hephaestus Robotics

VULCAN I FLOAT

The second-generation vertical profiling float, Vulcan II, was developed to perform two vertical profiles using a buoyancy engine. The mechanical design of Vulcan II involved creating computer models and conducting virtual testing to optimize buoyancy calculations and displacement. Design constraints included a maximum float height of 1 meter and a maximum diameter of 18 cm. The team chose a modular syringe design with a linear screw mechanism, which provided simplicity, reliability, and eliminated the need for onboard pneumatics. The blue robotics tube was selected as it offered the best volume change ratios and sufficient space for electronics and future equipment. Modularity and ease of access were prioritized, resulting in a plate system with laser-cut plates connected by threaded rods and screws. This design facilitated easy assembly and disassembly, and in-house manufacturing through 3D printing and laser cutting reduced costs. To ensure float sealing and ocean safety, a 4-inch diameter pressure release valve was incorporated at the top and bottom. In terms of electrical design, Vulcan II housed a Raspberry Pi Model 4B, a GoBilda Motor controller, and sensors within a chamber powered by a suitable power source. A servo hat from sparkfun was added to the Raspberry Pi to control the GoBilda Motor using PWM signals. A GoPro antenna was also attached to the float for passive data transmission. The software design for Vulcan II was implemented in Python, utilizing libraries similar to those used for the Talos III to control the motors. After a one-minute delay, the vertical profiles would begin, initiated by powering the motor to return Vulcan II to its "home position" using a limit switch. Once the home position was reached, a message would be sent over Wi-Fi to the topside, followed by the commencement of a vertical profile. The float would sink by moving the motor down the linear actuator rod, taking in water through the syringe. Upon reaching the bottom, the motor would start to rise until it hit the top limit switch. A connection with the topside would be established, and information would be transmitted. Vulcan II would repeat this process for a total of two vertical profiles. Future improvements for Vulcan II included the integration of additional sensing capabilities such as temperature, salinity, and turbidity sensors. The design also accounted for an antenna with satellite communication abilities, which would enable real-time ocean data collection and processing, facilitating various environmental monitoring projects related to climate change and pollution.



```python
def transmit_Info():
    HOST = "10.1.10.84"  # The server's hostname or IP address
    PORT = 8099  # The port used by the server
    timer = 0
    attempt = 1
    TIMEOUT = 10
    while True:
        try:
            print(f"Attempting connection (attempt {attempt})...")
            with socket.socket(socket.AF_INET, socket.SOCK_STREAM) as s:
                s.settimeout(10)
                s.connect((HOST, PORT))
                print(f"Connection established!")
                while timer < 10:
                    utcTime = datetime.now(timezone.utc)
                    msgFromClient = ("Team Number: TEAM888    UTC Time is :" + utcTime.strftime("%m/%d/%Y, %H:%M:%S"))
                    bytesToSend = msgFromClient.encode('utf-8')
                    s.sendall(bytesToSend)
                    time.sleep(1)
                    print(msgFromClient)
                    timer = timer + 1

        except socket.timeout:
            print(f"Connection attempt {attempt} timed out. Retrying in {TIMEOUT} seconds...")
            attempt += 1
            time.sleep(10)
transmit_Info()
```

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