IoT BASED OIL SKIMMER BOAT

Neha Dhabadghaw[1], Ovais Sayyed[2], Moinnuddin Qureshi[3] , Muskan Shaikh[4]

[1]Guide name: Er. Rihana Jamadar
[2]Guide name: Er. Nayana Chaskar
Electronics & Telecommunication, M.H Saboo Siddik College Of Engineering

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Abstract - An oil skimmer is utilized to extract oil from an aqua-oil blend. It establish a highly acidic, alkaloid, and salty setting that imperils aquatic life and contaminates coastal zones. Each year, 706 million gallons of expended oil enter rivers, causing pollution. Oil spills have sullied sea water, affecting aquatic beings negatively. Hence, our recommendation is to invent a minuscule ship that acts as an oil skimmer to draw out oil from water. A bunch of such petite ships collaborating might tidy up oil spills while reclaiming the oil leaked. The ship is steered by a dc motor powered system with two steering gears, and the handler guides it with a remote. The ship features an on-board oil skimmer system that screens oil from water and accumulates it in a distinct container. This allows for the retrieval of oil from the water as well as its purification.

***Key Words*:** Skimmer, Alkaline, Rudders, Contaminated, Gallo

1. INTRODUCTION

Oil skimmers help remove oil from the water and diminish bad smells. As oil builds up on the water, there's a hindrance to oxygen's flow, promoting anaerobic bacteria growth and causing bad smells. Plus, if oil piles up, a fire risk could arise. Hence, using an oil skimmer combats these issues by clearing the oil from the water.

2. OBJECTIVE

The objective of this project is to develop an autonomous oil spill clean-up system that efficiently removes oil from water bodies, protects the environment and aquatic ecosystems, and incorporates IoT technology for remote monitoring, data collection, route optimization, resource allocation, and enhanced safety measures to minimize human exposure to hazardous conditions during oil spill response operations.

3. PROBLEM STATEMENT

The challenge being designing a belt that skims for oil on water surfaces, scrapes it clean, and efficiently collects in a tank or sump.

4. METHODOLOGY

First an top most, the choosing of an Arduino Nano serves as a central nervous system of the means. It's crucial to interact the Arduino Nano with two L298N motor driver units: one devoted to ship examine and the other for motor pump. This arrangement enables precise ship movement and effective oil combing. To boost the functionality of the ship, necessary sensors, like GPS, are linked to the Arduino Nano for real-time tracing of the boat's situation. The core of the system lingers in the oil combing mechanism, which is achieved through the second L298N motor driver accountable for managing the motor pump. This pump is fashioned to efficiently draw out oil from the liquid's exterior. The system's IoT potentials are enabled through fusion with the Blynk server. This connection permits distant surveillance and control via the Blynk mobile application. A user-easy interface is crafted on the application, showcasing oversight for ship movement, oil combing initiation, and real-time surveillance of significant parameters. To make sure trustworthy and secure data transmission, the accomplishment of a sturdy communication protocol is crucial. This protocol promotes seamless interplay between the Arduino Nano and the Blynk server, making sure that operators can manage and supervise the ship with certainty. Oil amassed during combing needs a depot solution, typically an on board tank. This tank includes a level sensor to oversee the oil deposit capacity, preventing floods and perfecting efficiency. Additionally, a reliable power system is a requirement for the ship. This arrangement should be able of assisting the Arduino Nano, motor drivers, sensors, and the pump. Prior to implementation in locales prone to oil discharges, the system goes through broad examination and calibration. This guarantees that all elements work optimally, from ship control to oil combing and application-oriented monitoring. Once implemented, a maintenance plan is crucial for periodic checks and part replacements to uphold long-term functioning. The system should also be planned to allow for firmware enhancements to fit in improvements and advancements in technology.

5. HARDWARE SPECIFICATION

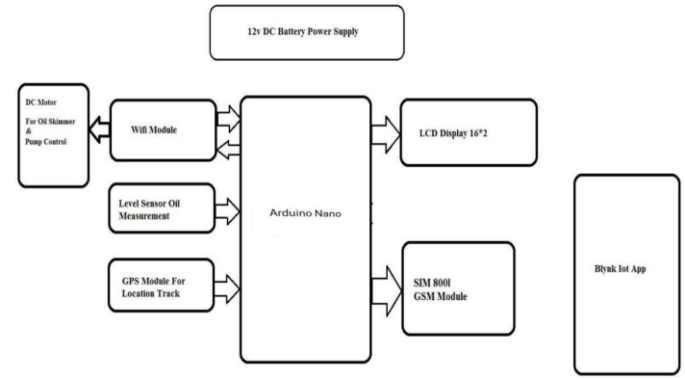
- Arduino Nano
- GPS Neo6m Module
- GSM 800L Module
- ESP8266 D1 Mini Wi-Fi
- LM2596 Voltage Buck Module
- L298N Motor Driver Module
- Oil Skimmer Belt (polyurethane)
- DC MOTOR
- Wings
- DC Pump Motor
- Float Sensor
- Collection Tank
- LCD Display

6. SOFTWARE SPECIFICATION

- Blynk App

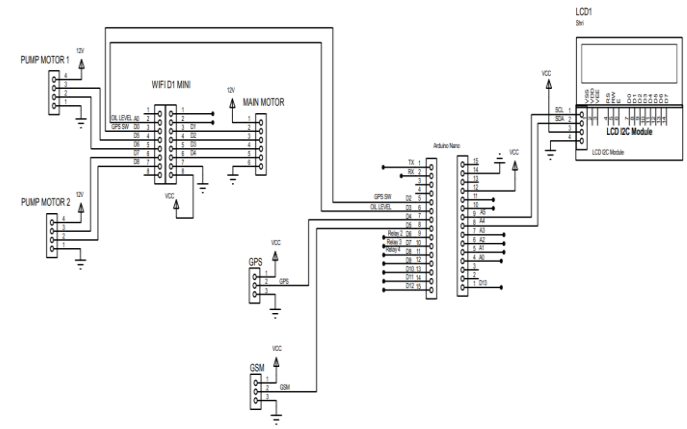
7. SYSTEM DESIGN

- **BLOCK DIAGRAM**



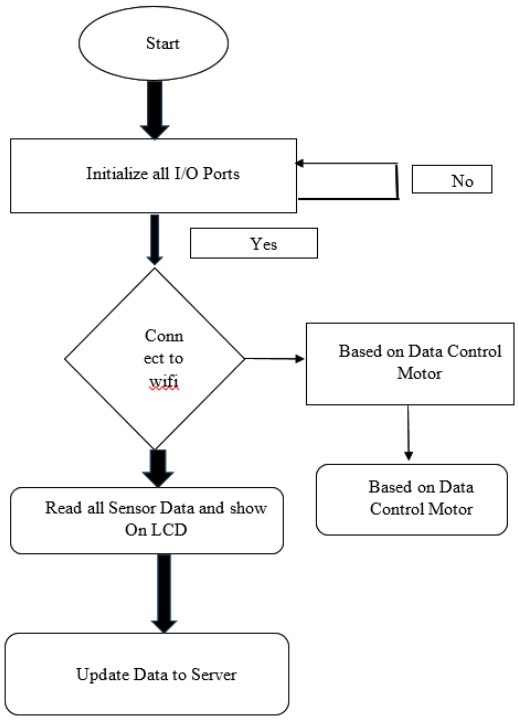
a. Fig 1 – Block Diagram

- **CIRCUIT DIAGRAM**



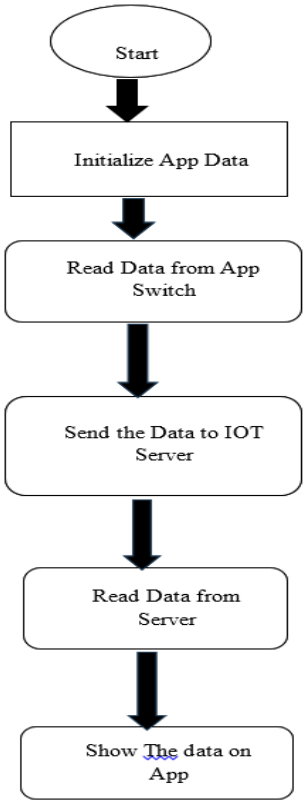
b. Fig 2 – Circuit diagram

- **HARDWARE PART FLOWCHART**



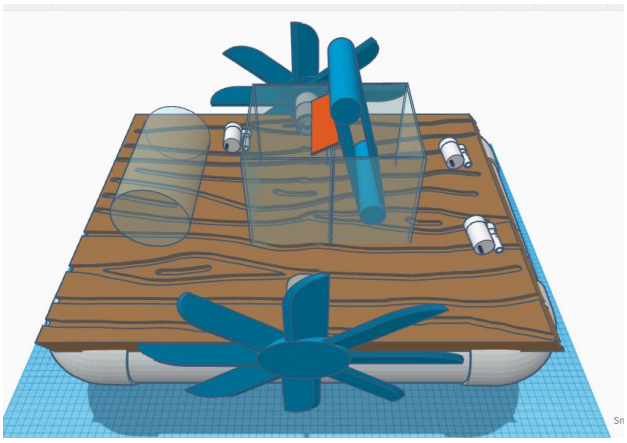
c. Fig 3 –Hardware Part Flowchart

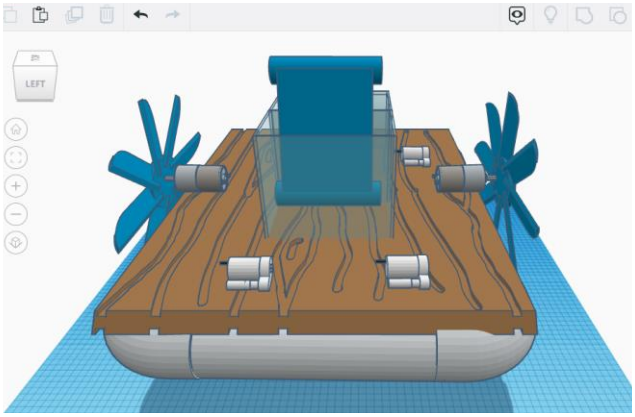
- **SOFTWARE PART FLOWCHART**

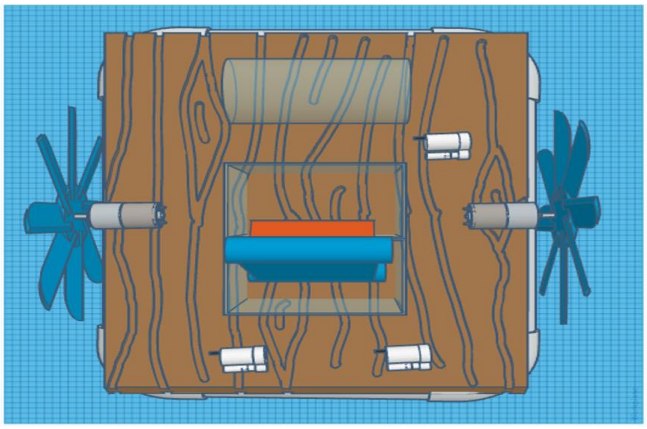


d. Fig 4 – Software Part Flowchart

8. 3D- MODEL







9. RESULT & DISCUSSION

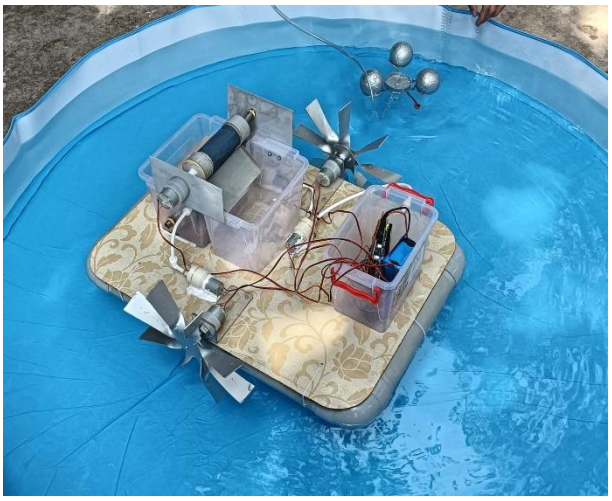
Using a DC motor, we gonna collect oil and water on the water with process step one! Pump gonna collect the mixture from the water and transfer to the container for more steps. DC motor is a tool to contain and gather the oil and water mixture from.

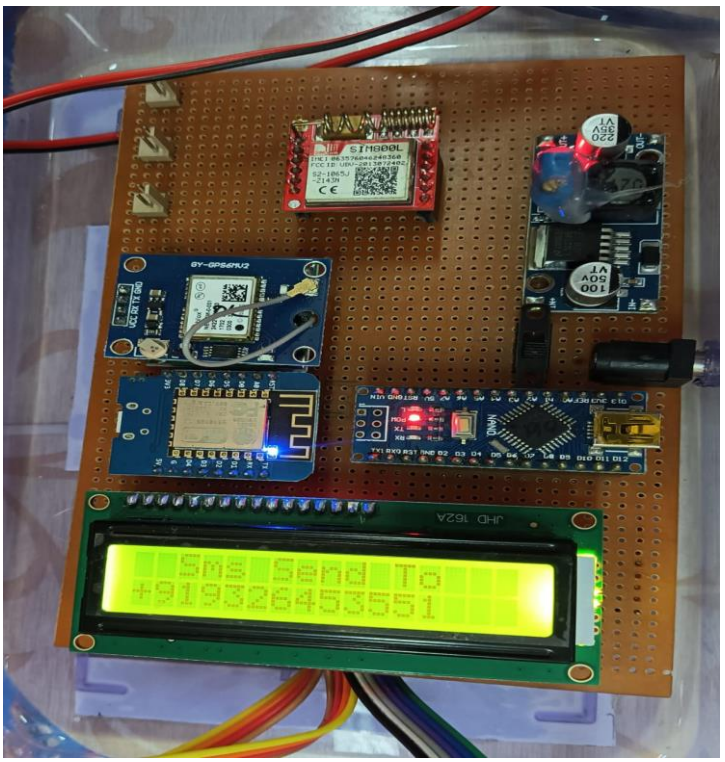
water surface, preparing it for subsequent separations and treatments. Following the initial collected the oil and water mixture using DC pump motor, the subsequent escalated separates these two substances. This segregated is achieved using an oils skimmer belt consisted of polyurethane material. The belt is designed for efficiently segregation the oil from the water, allows the oil to be collated in one container while the water is directed into another container. Once seperated, each substances can went through additional processing as required. Basically, the oil skimmer belt serves as a tool to diverge the oil and water components, facilitating their individual collection for further treatments or disposals.

When the oils and water have been successfully separated in the previous step, the subsequent tasking is to released any exceeding water back into the water surfacing. This processed is achieved by employing another DC pump motor, which is controlled by an L298 Motor driver module. Essentially, the DC pump motoring is utilized for drawing in and discharge the exceeding water from the separation processed, allowing it to be return to the water surface. The L298 Motor driver module serve as the control mechanic for this pump motoring, regulating its operation and ensuring precise control over the releases of water. In summarily, this tasking involves the controlled discharges of exceeding water using a DC pump motor controlled by the L298 Motor driver module, effectively completing the separating processing and returning the water back to its original environments. In the lasts staged of the process, when the container holding the extracted oil reaches its capacity, it becomes necessarily to transfer the oil to another localization for further handlings. To accomplish this, a DC pump motoring is utilized to facilitation the transfers of the oil from one container to others. However, to ensure uninterrupted oil collection from the water surface an additional container is required for storing the extracted oil. This extras container serve as a backups, allowing for continuous oil collection with non needing to pause the skimmed processed. By having a spares container readied, the systems can maximizes its oil collection efficiencies, ensuring that no oil is lost during the transfers processed due to capacity constraints. Essentially, the utilization of an additional container enhance the overall effectiveness of the oils skimming operations, enable seamless oil transfers and contributing to the successful cleanups of oil-contaminated water surface In the finally step, all four stages of the oils skimming processed are seamlessly incorporating and automated through the Blynk app. This means that users can control and monitoring the entire processed remotely using their smartphones or tables. The app allowing for the activating of the DC pump motors for collecting oils and water from the water surface, the operations of the oils skimmer belt to separates the oil from the water, the releases of exceeding water back into the water surface using another DC pump motor controlled by the L298 Motor driver module, and the transfers of oil to another localization when the container becomes full.

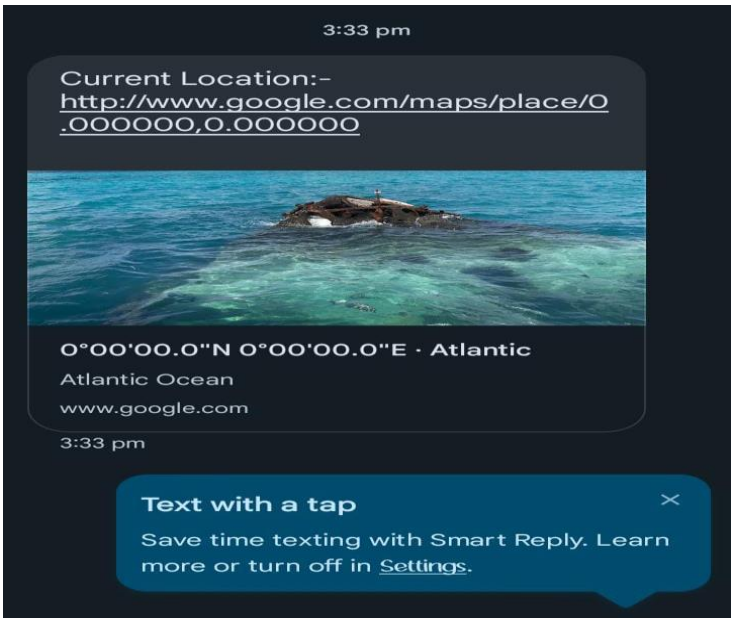
By utilizing the Blynk app, users can easily overseeing the entire oil skimming operations, receiving real-time updates on the progresses, and make adjustments as necessary without the needs for manual interventions. This automations streamlines the processed, enhances efficiencies, and ensuring that the oils skimming systems operate smoothly and effectively. Ultimately, the integrating of the Blynk app into the oils skimming processed offers conveniences, flexibilities, and

control, making oil spills cleanup operations more efficiencies and managing.

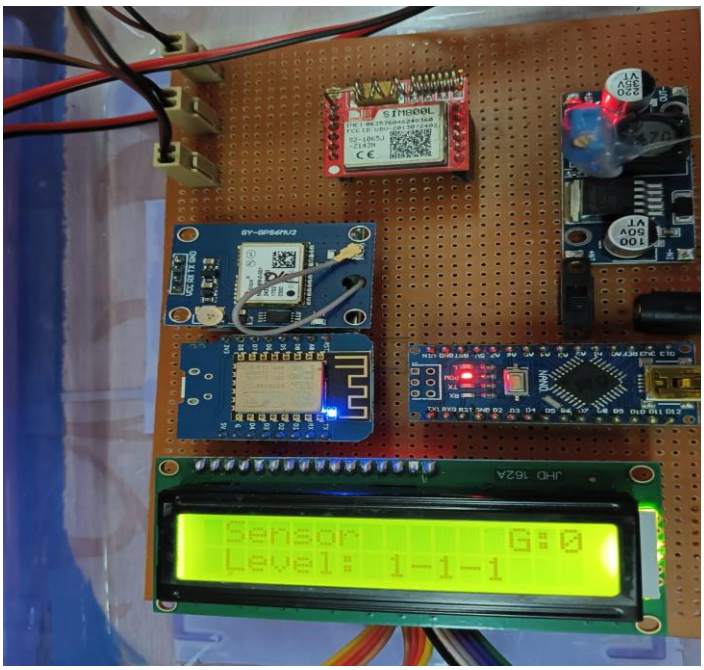




Updating the GSM module with information from the SIM card and displaying messages on the LCD screen.
This means that the GSM module, which allows devices to communicate over cellular networks, is being updated with data from the SIM card, like phone number or network credentials. Meanwhile, messages received by the device are shown on the LCD display for the user to read.

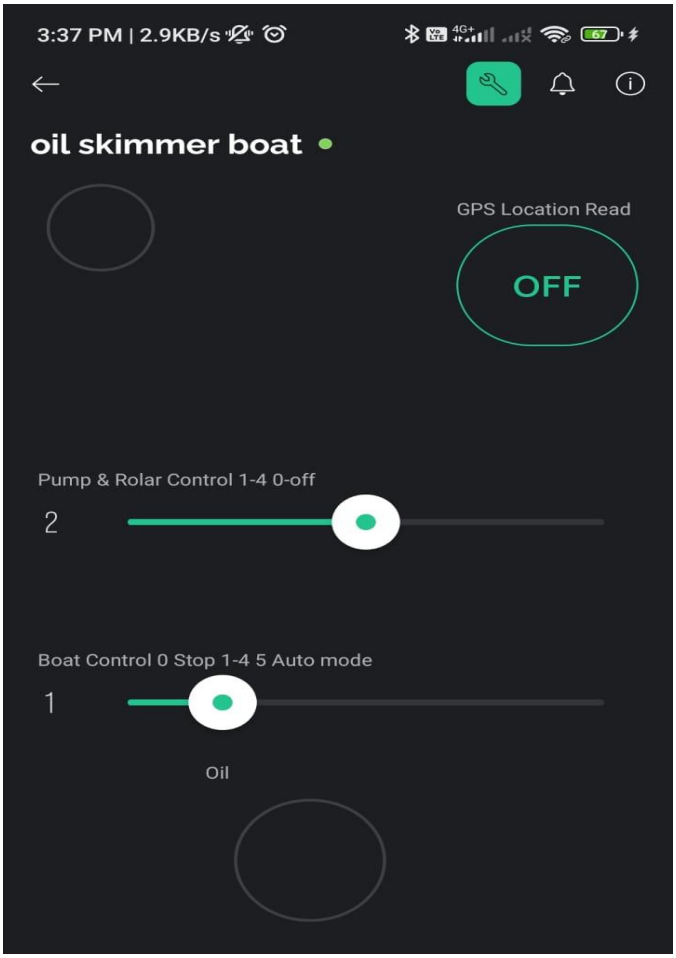


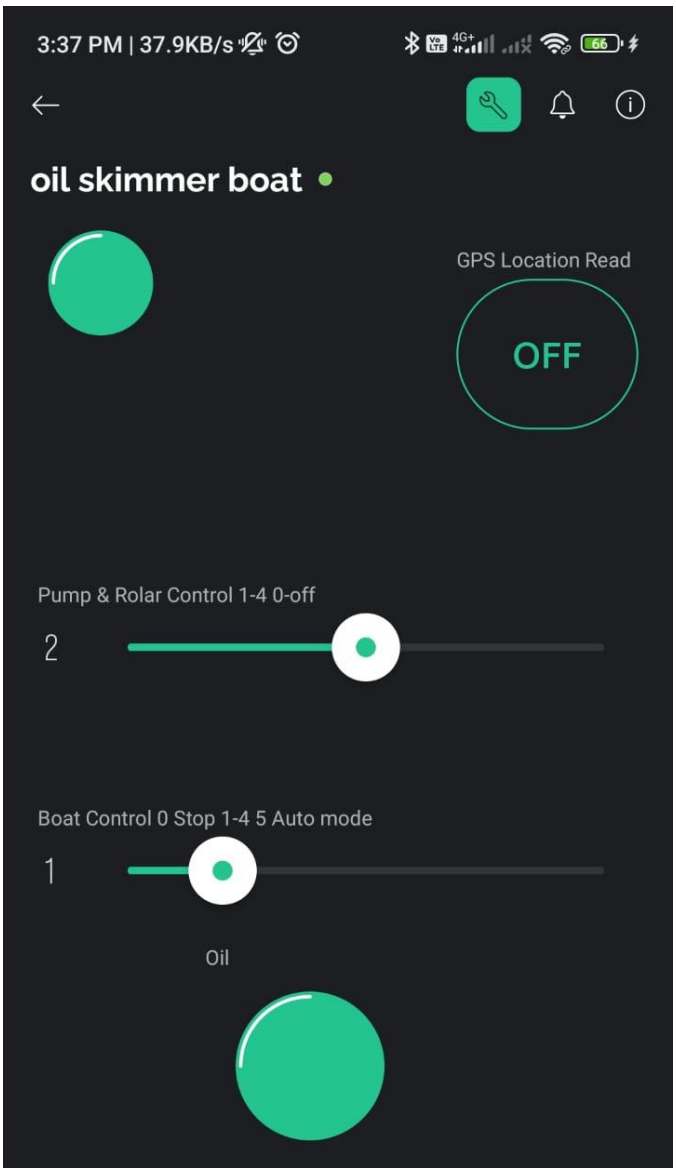
Notification of location update sent to the designated phone number



Detection of contaminated water and oil by using Float Sensor.

- Level 1:- Oil detected.
- Level 0:- Oil not detected.





Pump & Rolar Controller:
It consists of 4 buttons.

- Button 1: - Collection Of Contaminated Water
- Button 2: - Rotation of skimmer belt to separate contaminated water and oil.
- Button 3: - Disposing of purified water.
- Button 4: - Transfer of collected oil in another tank.

Boat Controller:
It consists of 5 buttons.

- Button 1: - Forward movement of the boat.
- Button 2: - Backward movement of the boat.
- Button 3: - Rotation of the boat in clockwise direction.
- Button 4: - Rotation of the boat in anticlockwise direction.
- Button 5:- Set the boat in automation mode.

10. CONCLUSION

Internet of Things based oil skimmer works project offer efficaciously solutions for managing oil spill clean-up operations. Merging with careful selected components includes optimized boat dimensions, turbine motors, and polyethylene skimmer belt, system efficiently splits oil from water surfaces. Integration with IoT capabilities thru Blynk app allowing for monitor from remote control, upgrading operational efficiency. Extensive tests reveal that skimmer mechanism, driven by a 12V, 4Amp battery, efficiently gathers oil whilst minimizing power usage. Utilization of polyethylene belt further boosts efficiency. Furthermore, compact design ensures facile maneuverability in various conditions. In summary, this project shows how technological innovation can tackle environmental challenges such as oil spills. Providing sustainable and efficient clean-up solution, it contributes to environmental protection and ecosystem conservation. Ongoing improvements bring hope to enhancing effectiveness in real-world applications.

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