GPS360º WASTE DETECTION ON SURFACE OF THE WATER &QUALITY ANALYSIS USING ROBOT.

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Introduction:

The abundant increase in population led to improper waste disposal. As water is the most important resource for living organisms. Therefore, clean water is a basic need. But the water in the lake or river is polluted by man, most of the waste is dumped into the lake and river. The waste is thrown into the water so it pollutes the lakes and rivers, because of this we cannot use this water for daily use. Water pollution continues to become a threat to economic activities along the river increases. It has been estimated that there are over 5 trillion pieces of plastic floating in the world's oceans and rivers. In recent years waste disposal is becoming a huge cause. In India there is need of automated machine which can clean trash and collect this solid waste. Currently these drains are cleared with the help of manual workers where the workers must get into drains and manually remove the waste. These workers suffered from various diseases which affect their life and reduce their immunity. So, as a solution to this problem, smaller sized garbage collection boats have been designed to collect garbage and floating solids in narrow and small areas such as streams and drainage systems. Managing the garbage consumes more time and requires a lot of manpower. So, to overcome this water pollution, the project "Automatic garbage collecting boat" is very helpful by collecting garbage floating on the water.

Objectives:

- To minimize human intervention and enhance operational efficiency, An Android application that enables remote control of vehicle movements and cleaning tasks.
- To ensure optimal lake health, the robot leverages advanced sensor technology, including a high-precision pH sensor that continuously monitors water acidity/alkalinity and informs data-driven cleaning decisions.

- To prevent the vehicle from becoming unbalanced, the collected waste should be distributed equally throughout its internal storage compartments.
- To implement a machine learning algorithm that analyses data from a turbidity sensor and ultrasonic sensors to guide an autonomous lake cleaning robot towards areas with the most accumulated debris, optimizing cleaning efficiency and resource utilization.
- Prioritizing aquatic life, the robot's design and operation are meticulously crafted to ensure the safety and well-being of all marine creatures.

Methodology:

The robot will be fitted with four dc motors. Two dc motor for movement the vehicle and two dc motor will be used for cleaning the lake. Node MCU will be attach with the vehicle to communicate wirelessly and android application to send instruction to the robot. Server process captured image and if any garbage is detected, send instruction to the boat and boat controls the motors to rotate in that direction. In the execution phase when the robot is switched on it will start communication with user android device. When the user presses the start button, it will start automatic cleaning the lake. User can also manually control the vehicle. ESP32 wireless camera is fitted on the robot, and it rotates and send the captured image to the server. Server processes the image and predict using CNN based deep learning model whether garbage is there or not. If present server sends the instruction to the robot to rotate in that direction to collect the garbage. with the PH and turbidity sensors that checks the water quality and send the data to the server for further analysis.
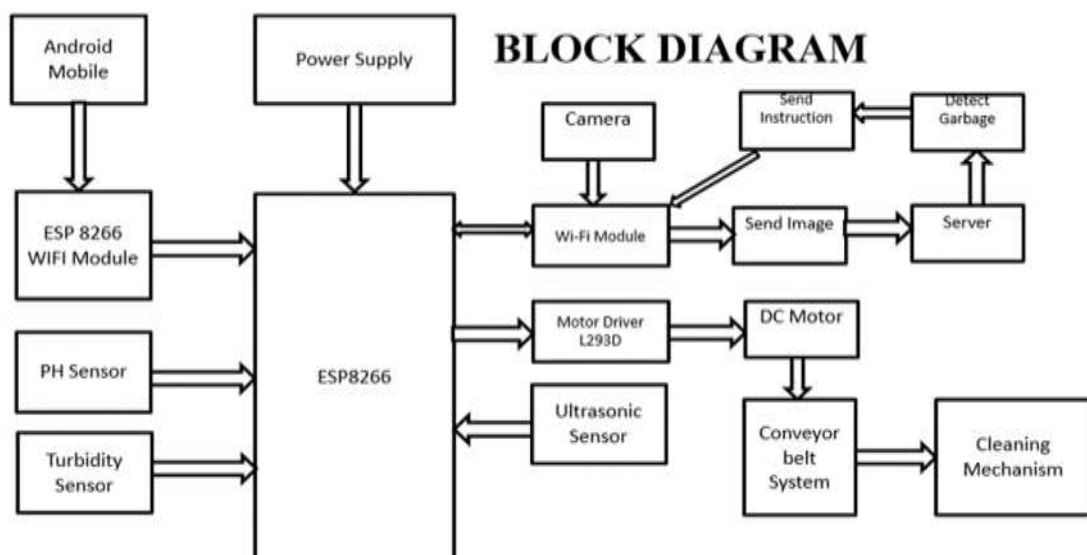

Fig 1: Block Diagram

Conclusion:

- Equipped with advanced sensors, the robot effortlessly scoops up garbage from the lake's surface.
- Powered by an ESP 8266 microcontroller and four DC motors, this innovative lake cleaning vehicle navigates using a propeller and employs sensors to monitor water quality (pH and turbidity).
- Design of Android application to control the vehicle movements and sending instruction to the vehicle for cleaning.
- To facilitate remote control and data exchange, the Android application seamlessly pairs with the ESP8266 Wi-Fi module embedded within the lake cleaning vehicle.
- The robust communication channel between the Android application and the robot empowers users to remotely orchestrate its movements, optimizing cleaning efficiency

Scope for future work:

- Inclusion of a segregation mechanism to separate non-biodegradable wastes like plastics from biodegradable wastes.
- Integration of solar panels to provide continuous power to the machine.
- Expansion of the system's capabilities to handle a wider range of waste types.
- Exploration of advanced control and monitoring technologies for remote operation.