Design and Development of Lake Cleaning Robot using IOT Technology

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Abstract: Surface Water Cleaning robot are going to be employed in surface water bodies like rivers, lakes, ponds where there's accumulation of wastes like plastics, etc. it's designed to gather and take away wastes from the water surface. The integrated system incorporates the usage of loT technology that has the flexibility to watch and control the whole process. This Robot won't only benefit humans by cleaning water for his or her everyday usage but also will protect the lifetime of aquatic animals.

Keywords: IoT, Autonomous Vehicle, Obstacle detection, Robot.

I. INTRODUCTION

Natural lakes and all kinds of artificial lakes make the living environment beautiful. However, with the increase of the activities of human being, the pollution of the floating garbage on the surface of the lake is more and more serious. Governing the pollution of the floating garbage on the surface of the lake is more and more urgent. It can be seen by observation that the velocity of the water flow in the lake is very low. Sometimes it is almost zero. Most of the floating garbage distribute over an area near the bank of the lake. At present, almost all this floating garbage is cleaned manually, which is time consuming, expensive in cost, and low in efficiency. To solve the abovementioned problem, we have designed an autonomous ship for cleaning the garbage floating on a lake.

Fig. 1 Water Pollution

There are various sources of pollution such as domestic and industrial sewage which results in water pollution. The garbage consumed by the aquatic animals severely effects its health and sometimes leads to death. The Water that is contaminated is utilized by the humans for consumption which is harmful for the health. It is very risky for humans to clean water bodies, and it is also costly.

II. ON BOARD DIAGNOSTIC

This project is constructed on loT-based lake cleaning robot. The hardware a part of the project consists of sensors, which is able to sense the pH level of the water and other such parameters. the applying will provide guidelines for the employment of the water. Thus, water are often wont to the simplest of their knowledge which is able to avoid the wastage of water and therefore the pollution of water the topics of the investigation were waterways and water bodies in our territory which were influenced by the problem of plastic waste flotsam and jetsam, for instance of plastics from the branches of data and did profound examination on kind of plastic that been found. within the examination we discovered waste examples contains plastics plastic packs which we use in way of life having microns going from 40microns or more.

III.PROBLEM STATEMENT

In the absence of disposal facilities, the practice of dumping garbage into nearby water bodies has become quite common in recent years and has posed long-term negative impacts both on biodiversity of the world and still as on the local environment. Many animals that survive or within the sea consume flotsam by mistake, because it often looks the same as their natural prey. Bulky plastic debris may become permanently lodged within the digestive tracts of those animals, blocking the passage of food and causing death through starvation or infection. to attain clean water body for reduction of river pollution & to realize the sweetness of lake by clean water bodies.

IV.METHODOLOGY

In this methodology, we are using a boat which is battery operated and a belt conveyor is used to collect a garbage present in small and big water bodies. With the help of this conveyor, we can collect the garbage like plastic bags, plastic bottles, etc.

Hardware Requirements and Software Requirement:

ESP32 may be a series of low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. A buzzer may be a small yet efficient component to feature sound features to our project/system. Sound thanks to the inner oscillating circuit present inside it. But the one shown here is most generally used because it are often customised with help of other circuits to suit easily in our application. H bridge is an electronic circuit that permits a voltage to be applied across a load in any direction. H-bridge circuits are frequently utilized in robotics and lots of other applications to permit DC motors to run forward & backward. These control circuits are mostly utilized in different converters like DC-DC, DC-AC, AC-AC converters. A DC motor is any of a category of rotary electrical motors that converts electrical energy current into energy. the foremost common types depend upon the forces produced by magnetic fields. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The ultrasonic sensor (or transducer) works on the identical principles as a radar system. An ultrasonic sensor can convert power into acoustic waves and contrariwise.
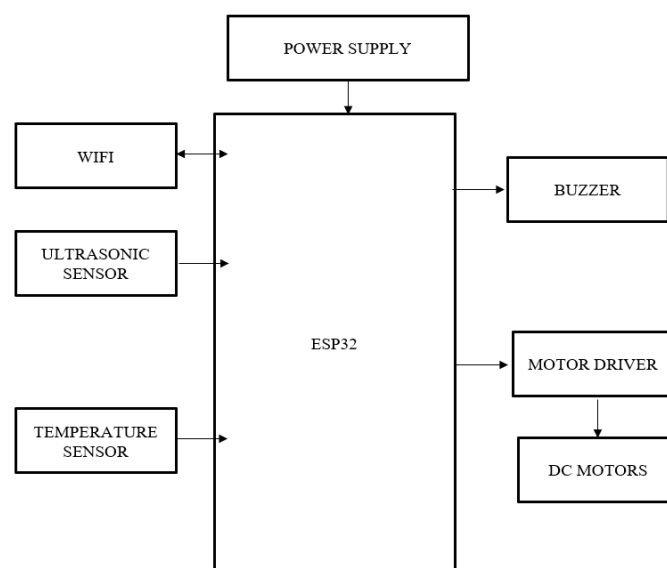
V. DESIGN AND IMPLEMENTATION

Fig. 2 Block Diagram

The Lake Cleaning System robot can travel in water with the assistance of DC motors connected to ESP32. The robot consists of two DC motors, relay, ultrasonic sensor, gripper, IR sensor, trash can and transistor. The motors are connected to the ESP32 through the relay which helps within the movement of the robot. The speed of the motor is kept at face value to urge proper movement. The ultrasonic sensor which is connected to the ESP32is used for the detection of objects when the robot moves on the water surface. The output from the sensor acts because the input for the gripper. This gripper

is mounted on the front side of the bottom with an appropriate ground clearance. the rubbish collected by the gripper is now pushed into a bin which is placed right behind the mechanism. The robot continues to gather the rubbish until a specific height of the bin is reached.

In this system we are employing a boat which is battery operated and a belt conveyor is employed to gather a garbage present in small and large water bodies. With the assistance of this conveyor, we will collect the rubbish like plastic bags, plastic bottles, beverage cans, food wrappers, paper bag, straws, marine debris, etc. we will use this boat beside the slum areas, where we are able to find a lake river or dam. because the people living during this slum areas use this water for daily usage like drinking and bathing their health could also be affected. With this technique resources like petrol and diesel may be saved.
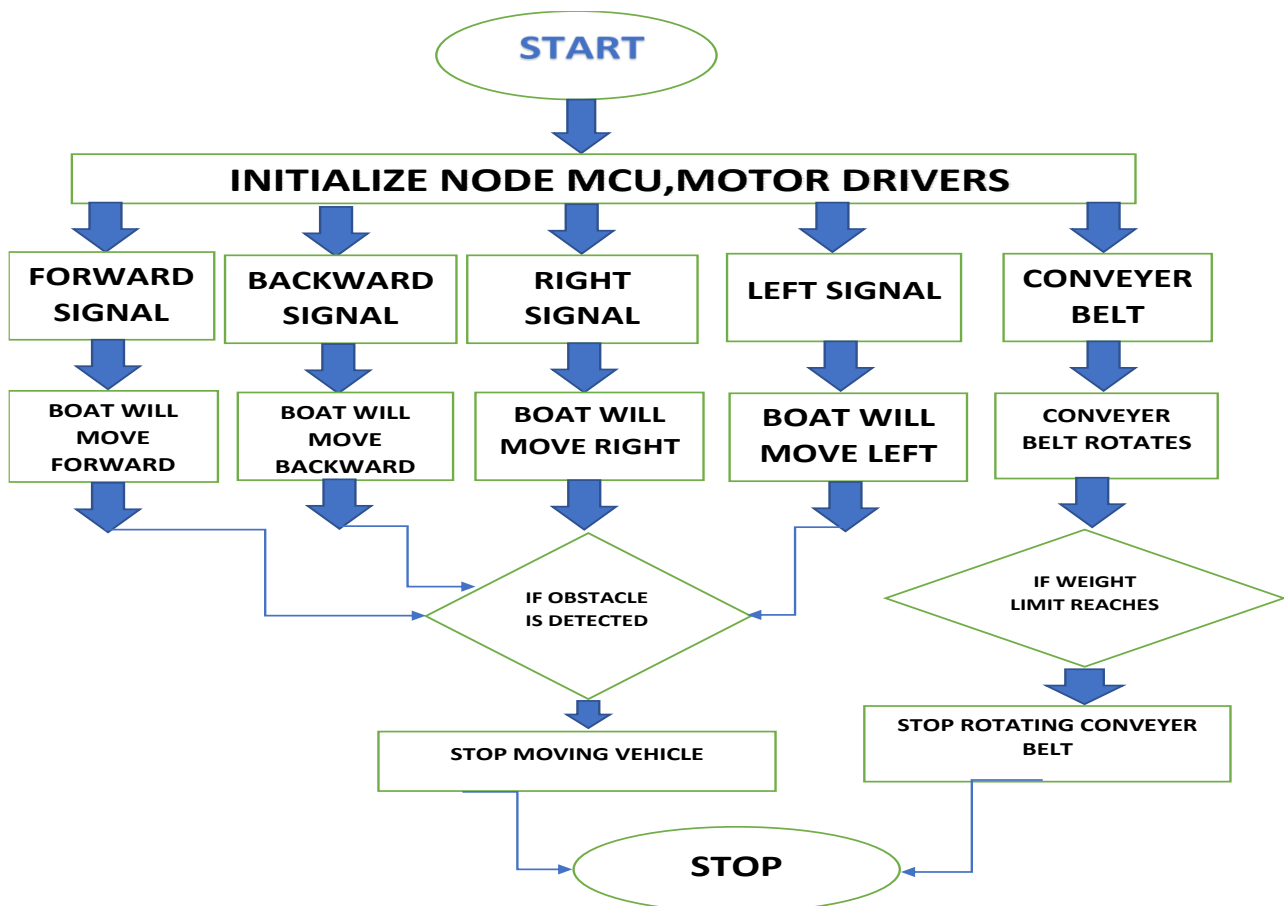

Fig. 3 Block diagram

The robot is operated via smartphone. Directions will be given to the boat via an application on a smartphone. We can give directions using remote control/smart phone and the conveyer belt collects waste in the collector basket. When the collected waste limit reaches up to the limit it indicates us by a glowing LED which will eventually stop the robot.

VI. RESULTS

The system is going to be fully controlled by microcontroller that's now pretty much employed in IoT application. the method starts once the coding of simulation been verified. within the first stage, once the switch is closed then the motor will move during a forward direction. When the second switch is closed the motor will move in reverse direction. within the third stage when the switch is closed, the motor will stop to point out that the system is ended. The waterproof ultrasonic sensor are going to be applied within the system, since the robot will work with the watery environment. However, the ultrasonic sensor will still be protected physically by some form of shield.
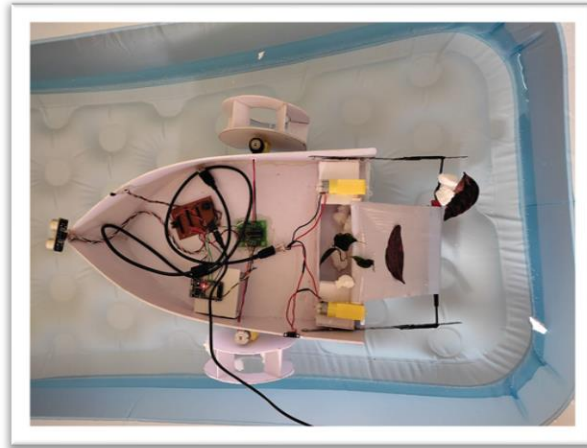
Fig. 4 Image of Proposed Project

VII. CONCLUSION

The Proposed Lake cleaning robot is effective and user friendly which picks up a large form of flotsam and also replaces labor steps. It can prevent humans from direct contact and risk of health issues with infectious microbes during manual process. The integrated system incorporates the usage of loT technology that has the flexibility to observe and control the whole process. The proposed design contains a high potential to beat environment problem for inland waterways.

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