

AQUATIC VEHICLE SYSTEM FOR RIVER CLEANING BY WATER ROBOT USING ARDUINO

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Abstract -This paper offers the plan of a financially savvy push-button controlled nonsubmersible waste gathering aquatic vehicle used in waterways, lakes, streams, or seas. We labour a version of the robot wherein there are propellers associated with DC engines push ahead, in reverse, from side to side. An application-based Bluetooth command framework to steer the robot from afar and a waste keeping mat to decontaminate the water from the fine residue particles. The excavator mechanism is used to manage the bigger trash to the assortment box. It also includes a sensor setup for safeguarding against spill over. We finished an equipment model that comprises a micro-controller for controlling all components of the robot. A smartphone is very well used to control the Aquatic vehicle. We have finished the work taking under consideration of the streams in our country, filled with sewage and stacked with toxins, harmful materials, garbage, and so on. The fundamental point of the task is to diminish labour and time utilization for cleaning the stream.

Key Words: Aquatic Vehicle, Waste management, Water Robot.

1. INTRODUCTION

Water pollutants in India have now reached a disaster. Every river gadget in India polluted to a great extent. Amongst the most intense intimidation to cosmos that the ever-evolving world is dealing with nowadays is a ductile injection in the water bodies. This plastic contamination may pose a hazard to aquatic animals. Major causes of pollution are because of the discharges from Industries, release of crude and utilized household water, runoffs from rural and urban areas, oil leaks, sediment settles, high amount of nutrients, piling up of harmful wastes and salt intrusion into coastal basins. The supply of

grade water is vital not only for direct use by the common masses, but also as a medium for various aquatic balances, which helps in sustaining many species of plants and animals. Water levels situated in the urban regions of our nation suffer the most because of pollutants as we use them for dumping the unprocessed sewage and solid wastes, wherein most times, it changes the water bodies into landfills. A great deal of cash and effort is being spent by the government and personal firms on cleaning and maintaining them at regular intervals. Hence, we introduced a Water-Robot to beat the issues faced by the water bodies.

2. LITERATURE SURVEY

There was much work-related & research wiped out the shape of a literature survey to amass the knowledge & skills needed to finish this project. This led us to come back across various project work, thesis & technical papers amid various reviews given on them. We will discuss several papers & the works done in them & then reviewing by comparing them to our project work. [1]. A model of the unmanned water robot constructed within which there are two propellers which with two DC motors to manoeuvre forward, backward, application-based Bluetooth device to control the unmanned robot a distance, and an automated arm to create it effortless together with the trash. A conveyor-belt association escorting the waste to the gathering bin, and a sensor arrangement to cover overflowing of debris. [2]. The most aim of this computing device is to carry the waste debris from the water surface and dispose of them within the tray. Here we are fabricating the operated river cleaning machine. The gathering plate and chain drives are rotating always by the motor. It couples the amassing plate between the two chain drives to gain the waste substances from the river. It throws the accumulated wastage

on the collecting tray with the help of the conveyor. An RF transmitter and receiver control the whole setup. [3]. During this project, the turbine rotates via the flow of river water, and the mechanical equipment association; We organize two conveyor belts. The primary conveyor scopes up the stable waste and therefore, the 2nd conveyor belt attached to draw stable waste out of the river for strong waste management. This setup comprises it drives a waterwheel conveyor mechanism that collects and gets rid of the wastage, garbage & plastic wastage from water bodies. [4]. The integral layout of the waste collecting boat is based on the Catamaranboat with hulls placed on either side and therefore, the conveyor belt placed in between. They compose the robots of a solar computerized tracking system, an amphibious system, a rotary gather system, a rotary collection device, and then on. [5]. This journal brings to light the suggested plan of a waste-collecting boat for cleansing functions in local vicinity functions like streams, lakes, ponds and sewers. The waste-collector boat belittles, and a mechanized system competent enough accumulates unsettled debris off the surface and storing them it for the time being. The trash moves automatically to the top of the system.

3.DESIGN METHODOLOGY

The prime aim of the project is to clean the water bodies; Thus, the planning of the robot is way more difficult for various reasons. Hence, the materials required for the development should satisfy all the requirements. The fundamental need of the project to float on the water. To attain that, two PVC pipes are used because of their lightweight nature. The PVC pipes are 50 centimeters each and 65 mm in diameter. We supported the two long PVC pipes using the help of an aluminum composite panel 4 mm Exterior grade. We attached the PVC pipes to the aluminum composite panel using PVC clamps. This light and hard structure support the overall weight of the system. We attached an excavator within the front of the aquatic vehicle with the aim scooping the waste and also directing the unwanted items inside the bin. We placed the bin on top of the Aluminum composite panel and lined with a filter to get rid of and purify the water further. We attached the motors to either

side of the structure placed on top of the aluminum composite panel and with propellers to navigate through the water body. A 12-Volt Excavator uses the power from the battery. We planned an aquatic vehicle to take into consideration various scenarios it will face within the future.

4. COMPONENTS USED

The components appropriate for performance have been adopted by drawing into many factors contained within the continuous function of the Aquatic vehicle. The essential requirements for the projects are a micro-controller, power supply, communicating module and motors. The various variety of components used in this project are.

- Arduino Uno
- Bluetooth Module
- Motor driver
- Ultrasonic Sensor
- WI-FI Module
- L298 Bridge IC
- DC Motors
- Battery

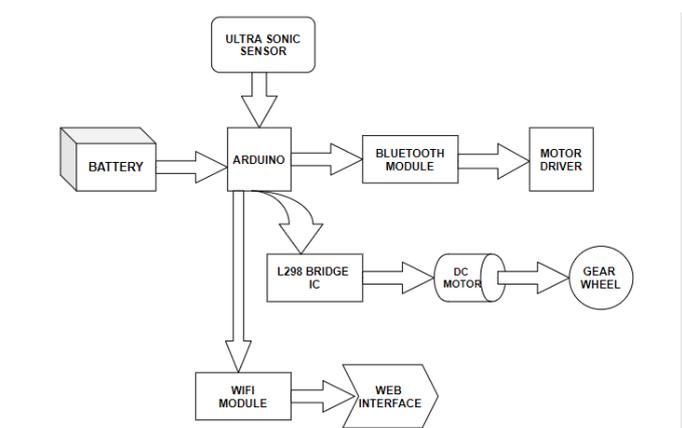


Fig 1: Block Diagram

5. WORKING PRINCIPLE

The fundamental purpose of this project is to clean the floating solid debris discharged by different reasons within the

water reserves. We illustrate the assembly of this approach within the design section of the paper. The finished arrangement accomplished the floating nature because of the elasticity pressure incorporated with the help of PVC pipes at the bottom of the arrangement. We use an Aluminium composite panel, which is light and hard to support the load of the entire structure. The propellers on either side of the system not only provide cohesion to the system, but also ensure that the robot can carry in any direction. The motion provided by whirling the propeller in respective directions with the help of DC motors controlled by motor drivers is linked to the Arduino board and energized by a 12V battery.

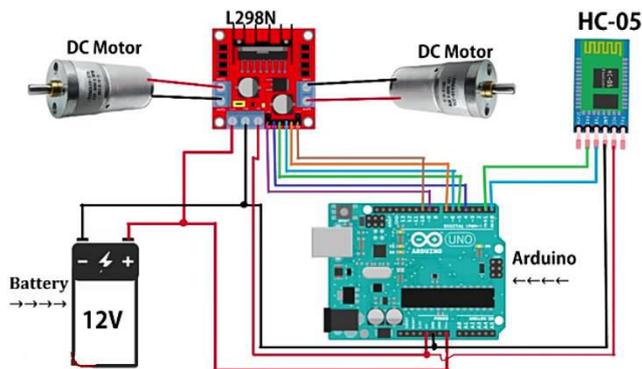


Fig 2: Circuit Diagram

The excavator mechanism is being used here simultaneously with the rubble from the water body. The L298 dual motor driver is used to regulate the motor movement appropriately. The motor is in-turn connected to gear for free movement of the Excavator’s hand.

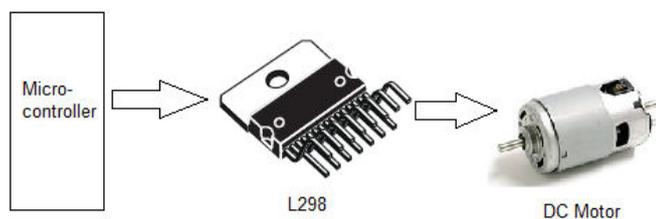


Fig 3: Excavator Mechanism

A trash-collecting bin was placed at the centre of the aluminium panel to gather the waste. The base of the bin contains a filtering cloth to purify the collected water from minute dust particles, and we used an ultrasonic sensor

attached to the system above the bin to forestall the overloading of the trash collector.

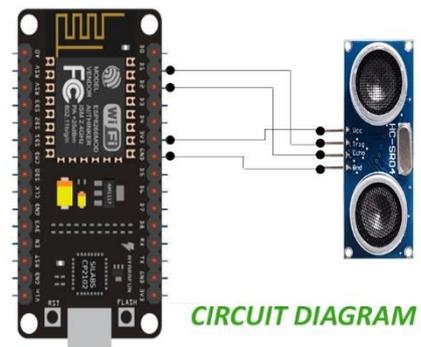


Fig 3: Wi-Fi Module with Ultrasonic sensor

As trash increases, the space between the ultrasonic and therefore the trash decreases. It sends this live data to the Arduino and then processes the information through the assistance of the Wi-Fi module. It represents this data within the Blynk Application. They often control this whole system using a mobile application with the help of a Bluetooth module.

6. RESULTS

The main aim of the project is to scale back the pollution present in any water body. Another important intention of the design is to cut back the manpower, time utilization, and therefore, the cost spent on the manual cleaning of the rivers. The result got by the Aquatic Vehicle is that the base can move in the forwarding, backward, left, and right directions. A mobile application is used to supervise the motors. We use serial communication to establish a connection between the mobile application and Bluetooth. The base successfully moved within the water body. The excavator was ready to withdraw the waste present within the water. A 12-volt DC motor and L298 Bridge IC are used to administer the excavator. The excavator mechanism is timed by using the micro-controller to which we attach the bridge IC. The Excavator mechanism was successfully controlled. As mentioned within the abstract, we attach the Aquatic Vehicle with a sensor arrangement for cover against the overloading of the bin. The ultrasonic sensor is ready to provide the

appropriate data based on the distance. We successfully got the output.



Fig 4: Output in Blynk

7. CONCLUSION

This project, “Aquatic Vehicle System for river cleaning by water robot using Arduino” intended on analysis on various journals and literature precisely applicable and constructed in consonance so it can provide resilience application. We design it as a workable solution, keeping in mind the necessity for cost-effectiveness. However, it is plenty of room for growth and improvement technologically. The most important development, which might be done in this technique is using non-conventional energy resources as an influence source. India being a Tropical country, may use solar power to provide power to the system. Also, the capacity of the machine may be increased for cleaning bigger water bodies just like the Seas or Oceans, where wave energy may be a replacement for powering the system. We can even improve for deep cleaning. Complete Automation would help to reduce the possibilities of human errors. This project is meant with the hope that it proves to be useful in river cleaning, thus taking a step towards the eradication of pollution.

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