

Automatic Lake Cleaning Robot Using Iot

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Abstract—The world is covered by 3/4th of water and in our country there were lots of water saving techniques such as dams, water tanks, lakes, pools, etc... but the important problem of the water is that it has easily get polluted by solid waste and makes bad odour causes due to the industries, humans who disposed the solid waste in the stagnant water such as ponds, lake and in the sea. Due to these water pollution the aquatic animals that living in water may dead and land animals drink the water gets infected not only for animals ,polluted water causes skin disease to human being . We have proposed a technique to control the water pollution by using robot. A new generation of river cleaning robot have been presented in this research. The enhancement accomplished by the new design & features that makes river cleaning robot with iot technology more competitive.

Keywords— microcontroller, IOT receiver, DC motor, motor driver etc .

I. INTRODUCTION

The solid waste in water can removed by using this water cleaning robot . This machine is consists of cleaner mechanism which collect & remove the wastage, garbage& from water bodies. Machine will if the waste surface debris from the water bodies, this will ultimately result in reduction of water pollution and lastly the aquatic animal's death others problems can reduce. It consists of Belt drive mechanism which lifts the debris from the water. The use of this project will made in rivers, ponds, lakes and other water bodies for to clean the surface water debris from bodies. Similarly they are lots of problems of water pollution under Godavari, Gangai River which affect the acoustic, human life & beauty of River. The biggest impact of cleaning the chemical wastes can cause respiratory disease sand it plays a challenging issue for municipality officers Water damage is classified as three types of contaminated water. They are clean water, gray water and black water clean water is from a broken water supply line or leaking faucet. If not treated quickly, this water can turn into black water or gray water, depending on length of time, temperature, and contact with surrounding contaminants. Drainage pipes used for the disposal of sewage and unfortunately sometimes there will be loss of human life while cleaning the blockages in the drainage pipes. The municipality workers are only responsible to ensure that the sewage is clean or not though they clean the ditch the sat the side of buildings, they can't clean very wide sewage. The municipality workers need to get down into the sewage slid get to clean the wide sewage. It affects the in health badly and causes skin allergies.

II. EXISTING METHOD

- *Man Power*
- Vacuum Cleaner
- Road Runner

Disadvantage of this system is Low efficiency

- *Takes more time*
- *Costly*

III. PROPOSED METHOD

To overcome those issues, we have designed and simulated a rubbish collecting system that is expected to further develop experimentally for the application in the real world. Hence, it will be able to get a wide assortment of debris, including gliding litter, trash, logs, disposed tires and others. Thus, it is expected to enhance the demand and need for a design of a river cleaning machine that is able for tidying up waste from rivers, channels and lakes and overcome the current issues. The integrated system incorporates the usage of IoT technology that has the ability to monitor and control the entire process.

IV. HARDWARE REQUIREMENTS

- ArduinoUNO.
- L293D Motor Driver or H-Bridge.
- DCMotor.
- IOT MODULE.

V. SOFTWARE REQUIREMENTS

- ArduinoIDE.
- PROTEUS SOFTWARE :The proteus design suite is a proprietary software tool suite used primarily for electronic design automation .To create schematics and electronics prints for manufacturing printed circuited boards ,Size 248 Mb

VI. LITERATURE SURVEY :

A. Metallic Scrap Collection Robot with Efficient Trajectory

We have developed an electromagnetic robot that can recognize and collect various metal scraps spread across an area. The process of recognition is carried out with the help of the image processing techniques on the images obtained through the camera installed in the area. The robot collects the scrap using the electromagnetic arm by visiting it. Our aim in this work is to control the robot's trajectory so that all the scraps identified can be collected within a minimum time by minimizing the distance travelled by the robot.

Disadvantage

Cannot be used in different locations

B. Development of an autonomous beach cleaning robot

The paper discusses two aspects of the robot: the refuse collection mechanism and the autonomous navigation system. In order to enable effective collection of refuse from a sandy surface, we developed a mechanism that mimics cleaning of a floor using a broom and dustpan. To identify its own position, the robot was equipped with a scanning range finder, which measured the position of two poles placed at the corners of the designated work area

Disadvantages

works only on water surface cannot be multiuse .

C. Mechanism that collected items as if humans clean a floor with a broom and dustpan

We have been developing a compact beach cleaning robot "Hirottaro 3". In order to collect small refuse effectively on a sandy surface, the robot was equipped with a. Furthermore, the robot was capable of traveling autonomously on the sandy beach that had insufficient natural landmarks by self-localization using poles and a scanning range finder. This paper reports the performance evaluation of refuse collection and autonomous navigation on the sandy beach

Disadvantage

Unable to collect at sand

D. Review on the Development of Road Cleaning and Scrap Collecting Robotic Vehicle

This paper shows continuous examination done on the advancement of Road Cleaning and Scrap Collecting Robotic Vehicle and its uses on different surfaces. As neatness of our condition has its own ideal conditions which makes it a basic topic of research nowadays as it goes under Swacchh Bharat Abhiyan, an activity taken by the legislature of India additionally it favors green collecting structures and we pointed conveying cleaner streets by utilizing least endeavors.

Disadvantage

Needs 2 different mechanism to operate complex structure too.

E. Garbage Collection Robot on the Beach using Wireless Communications

This article presents the garbage collection robot on the beach using wireless communications. The user can control a robot via a program developed from Visual Basic 2005 application based on Window XP. The commands from user are sent via IOT to the processor for processing The results of robot performances were found that the robot can move with an average speed of 0.5 meters per second on the sand via wireless communication and collect the big garbage with side 12.5 x 49 cm, for example, glass bottles, and plastic, etc.

Disadvantage

Size constraint and controlling range is small .

VII. BLOCK DIAGRAM

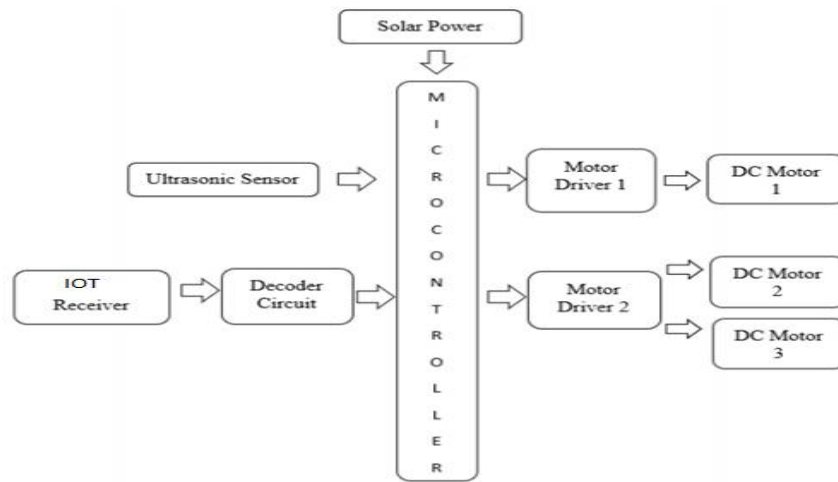


Fig -1: Block Diagram

The river cleaning robot is integrated into three segments shown in Figure 1.

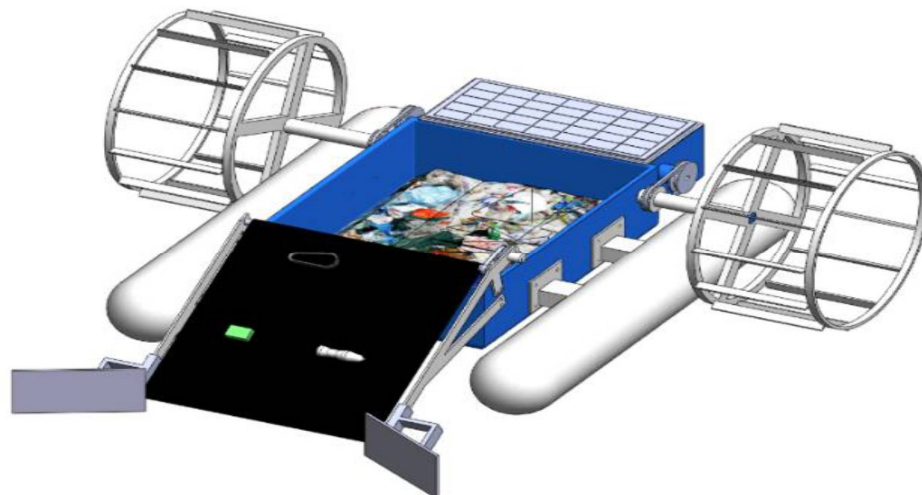
The first segment of the system involves the input source of the mechanism that consists of the magnetic switch mobile phone application and solar panel. The processor development was the second segment of system development. In this segment, the microcontroller processor is integrated using the Arduino IDE software is to perform coding of the source code. The

software enables compilation of the necessary commands and source code into the NODEMCU V2 processor. Meanwhile, the third segment of the system focused on the output source for the mechanism. The output source consists of the integration of mechanical segments such as DC motors the circuit diagram for this system designed using Proteus software, software developed by England Lab center Electronics Ltd for schematic capture, simulation, and printed circuit board layout design [9-10]. This circuit diagram consists of an Arduino, motor driver, switches and motors as shown in Figure. The controller acts accordingly on the DC motor of the robot. The robot in the project can be made to move in all the four directions using the android phone. The direction of the robot is indicators using LED indicators of the Robot system. In achieving the task the controller is loaded with program written using Embedded 'C' Languages.

VIII. MECHANISM:

A. Waste that will be able collected by this robot is floating on the surface of waterways, such as bottles, plastic cans, covers, and etc... It is collected through a belt conveyor then placed in the designed place. This conveyer designed rotating continuously. Cleaning work by naturally provide great maneuverability and collect trash easily.

IX. EXPERIMENTAL SETUP



X. MECHANICAL REQUIREMENTS

Axle Shaft: It as the place for the propeller to rotate, thus the robot could move correctly.

Power Cell: The power of the system has to be consumed by the solar power, the harvested energy has made the battery at least $\frac{1}{4}$ times longer than only using battery. It is perhaps is a small value, but could be designed for larger capacity if only the space could be created in future study for the solar cell.

Ultrasonic Sensor: the electronic device measures target of the distance object by emitting ultrasonic waves & converts reflected sound wave into electrical signal. The waves travel faster compared to speed of audible sound (i.e. the sound that humans can hear) Obstacles will be detected and send as an alert message to Iot server. Principle of the ultrasonic sensors emits short, high –frequency sound pulses at regular intervals. Range: 40 to 70 kHz, the frequency determines the range and resolution.

Dc Motor: It consists of a stator, an armature, a rotor and a commutated with brushes. DC motors are attached to wheels of the robot for paddling. DC motors is any type of rotators electrical machines that converts direct current

electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all the types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the directions of current flow in the part of the motor.

Motor Driver: It is a integrated circuit chip used as a motor controlling device is autonomous robots & embedded circuit L293D & UL93D are most commonly used motor drive IC, the direction of motor based on the command or instruction receives from the controller. It receives the signal from the microprocessor, it transmits the converted signal to motor. This signal can receive from microcontroller but it cannot change the input value of signal (i.e.: high voltage to low voltage), it will pass the same signal that receive from the microcontroller.

Arduino Microcontroller It consists of both physical programmable circuit board and, software piece that runs on your computer code to the physical board.

Front Slab: It is used for directing the waste on the water surface and introducing it to the conveyor so that the trash could be transferred to trashcans.

Trashcans: These are used for the place of waste after erected by front slab and conveyor.

Propellers: This will be connected to two DC motors therefore; it could be controlled including turning move and upward & backward. A tube-like boat body is used as the main body of the robot. This design is chosen to enable robot floating on the water.

Microcontroller: It is a small computer on a single metal oxide semiconductor integrated circuit chip microcontroller contains one or more CPUs along with memory and programmable input output peripheral. They run one specific program and are dedicated to a single task. Microcontroller can take input from the device them controlling and retain control by sending the device signal to different parts of device.

Conveyor: which is used for the delivery system of the waste from the water to the designated trashcans? A conveyor belt is the carrying medium of a belt conveyor system. Typically, conveyor systems consist of a belt stretched across two or more pulleys. The belt forms a closed loop around the pulleys so it can continually rotate. One pulley, known as the drive pulley, drives or tows the belt, moving items from one location to another. The conveyor belt carries the garbage to the dustbin and drop it over there.

Decoder: It is a circuit used to change the code into a set of signals, it has reversed of encoding. A digital decoder converts a set of digital signal into corresponding decimal code.

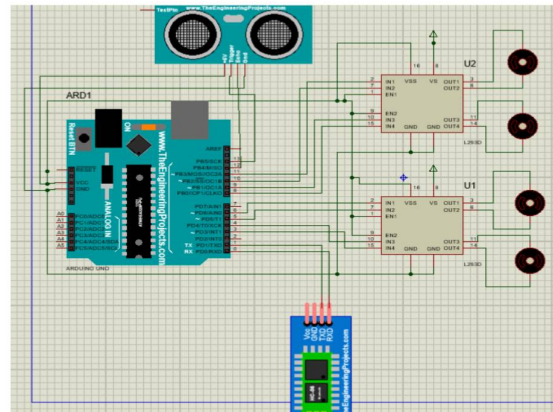
Relays: These are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show, when a relay contact is normally open (NO), there is an open contact when the relay is not energized. Relays activate the wheel motors and to control the speed of the paddle.

XI. RESULTS

A. The result to the complete system is given below with step by step process

Turn ON the power supply. After that all the components gets activated. However, to meet the functional design necessary for some particular application, this model, perhaps, will be changed. In order to maintain the main function of this robot, here is several of the main function that should be accommodated by a river cleaning robot designed in this study as depicted in Figure 5. These features could be breakdown into more tangible components, they are: The system will be fully controlled by microcontroller that is now very much used in IoT application.

- a) GPS module will be connected to Arduino and thus introducing the possibility to locate the robot when its working with a large area of water, minimizing the possibility of the robot miss-controlled or lost during the operation.
- b) For solar cell, the harvested energy has made the battery at least $\frac{1}{4}$ times longer than only using battery. It is perhaps is a small value, but could be designed for larger capacity if only the space could be created in future study for the solar cell.
- c) IoT system will be managed by some sort of cloud system that allows IoT features, such as Amazon Web Services (AWS).
- d) The waterproof ultrasonic sensor will be applied in the system, since the robot will work with the watery environment. However, the ultrasonic sensor will still be protected physically by some sort of shield.
- e) PH sensor will be located thus introducing a monitoring system of a pH level of surrounding water in the river through a robot



X. ADVANTAGES

- Man power is reduced due to automated self-service.
- The robot gives non conventional and makes eco friendly.
- Its maintenance cost is low.
- The human interaction is low this is the main advantage.
- The cleaning of garbage in the water makes the pollution free & keeps the environment healthy.
- Harvesting of garbage in the water makes flow of water in the pipelines.

XI. CONCLUSION

The problem of water logging due to plastic paper, sand, metal leads to pest growth and it favors diseases like malaria, typhoid etc. This is unsafe for human life. The proposed system cleans the garbage present in small land big lake and minimizes the use of fuel operated garbage collector. The aquatic animals can save & reduced the time, efforts, and diseases for human by cleaning the lake by this robot.

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