Development of Aqua Robot for Floating Collection in Water Body

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Abstract—**This paper present theory on "Development of aqua robot for floating debris collection in lake". This robot can successfully clean the floating debris over the water surface. The aim of this project is to clean the lakes & other water bodies. This robot is cost-effective and can be controlled by remote. Here we make use of Arduino UNO Microcontroller based platform to develop our robot. Manufacturing cost are kept very affordable. Maintenance of this robot is easy. The robot can collect wastes weighing up-to 5kg. Floating debris collecting robot can save many aquatic animals.**

1. INTRODUCTION

Living organisms need water to survive. Water covers over 79% of the earth's surface, amongst them only 3% of water is capable of drinking. Water is called as the universal solvent. Toxic materials can be easily dissolved in the water bodies. Water can be easily polluted by human activities. The major problem that living organisms facing in today's world is water pollution.

The serious threats to nature that today's world is facing is contamination of plastics in water bodies. Every year about 8 million tons of plastics waste enters into the water bodies. Nearly 700 species including endangered aquatic species are known to have been affected by floating water debris. This has become a reason for significant worry to the world, particularly the creating nations.

When there is blockage of seepage then flood of water from seepage happens, due to which seepage water will discover its own direction somewhere else causing serious issues. By focusing on the above issues our project aims to develop the low-cost system that replace human force for floating waster scooping.

2. RELATED WORK

The title of the paper is "Design and fabrication of remote-controlled sewage cleaning machines", and the authors are M. Mohamed Idhris. C. Manoj Kumar. The problem statement is floating debris collection on the surface of water. And the wiper motors are used for robot movement. The outcome of the paper is the wastage which flows on the water surface gets collected.

The title of the paper is" Unmanned floating waste collecting robot", and the authors are Disha Biswas,Abir,MkRisti,Arnab. This paper was published on Dec 2019-in IEEE Region 10 conference. The problem statement is that toxic products produced by plastic cause a threat in the environment and it is also threatening to human beings also. And here 2 propellers are made to connect to a DC motor and are used for robot motion. Conveyor belt for trash collection. The outcome of the model is it collects floating trash that is a saviour for aquatic species.

The title of the paper is "Review on Advance River Cleaner" with authors Pankaj Singh Sirohi, Rahul N, Shubham Gautam, Vinay. The paper was published in October 2017 in the 7th International conference on control, Automation and system. The paper focused on Floating debris collection on the surface of water. The system uses the turbine rotates with the help of a servo motor which is monitored by joysticks. The conveyor belts are used to pick up the waste. The result obtained is, it collects floating waste present on the river out of the river and it is then used for solid waste arrangement.

Here the title of the paper is" A floating waste scooper robot on water surface", and the authors are Niraman , Jakkrit sumro, Monthain. The problem focused on is that the floating trash has ruined the water purity. Here the model was prepared using a radio frequency transmitter and receiver and keypad for controlling robot movement. Conveyer belt to collect floating debris. The result obtained is that the scooper is able to collect the waste and it is evaluated, The weight of plastic bottles collected by robot is compared to that of humans a scoop net.

3. METHODOLOGY

The brain of the robot is arduino microcontroller. At the beginning the user enter the water body and then the direction of the robot is controlled by RF module. The movement of the aqua robot in the water body is mainly due to two turbines, all these components are assembled on Cha c board. Microcontroller turn on the motor and robot starts moving forward. The direction of the robot is changed using servo motor in order to move to the desired location. The propeller attached to the robot starts collecting all the floating waste and can be disposed.

At the beginning the user enter the water body and the whole action is controlled by RF module. RF module consists of both receiver and transmitter part. The directional control established using programmable microcontroller and ATmega 328IC, 32bit manually controlled using RF transmission.

RF RECEIVER:

Receiver part consisting of two motor for direction controlling and other one for picking up the wastage. Microcontroller, that controls the movement of robot. Signals from RF transmitter are examined. Arduino IC board was already programmed to perform specified task, next signals are sent to driver boarding accordingly

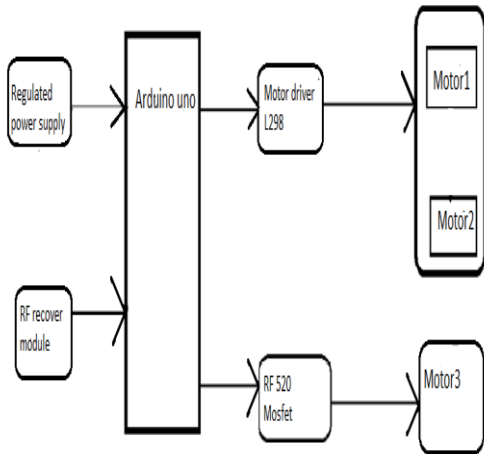and dumping the trash into the tub and also to control the movement of robot.

Fig:Receiver block diagram

RF TRANSMITTER:

RF transmitter module consists of power supply, regulator to remove noise or disturbance, RF transmitter block consists of 4 switches D0, for collecting the waste, D1,for throwing the waste to the tub,D2 and D3 to turn left and right direction. In transmitter we supposed to give data physically by press button so that if RF frequency matches that data means it will receive data, it will do further actions like turn left and right and waste picking.
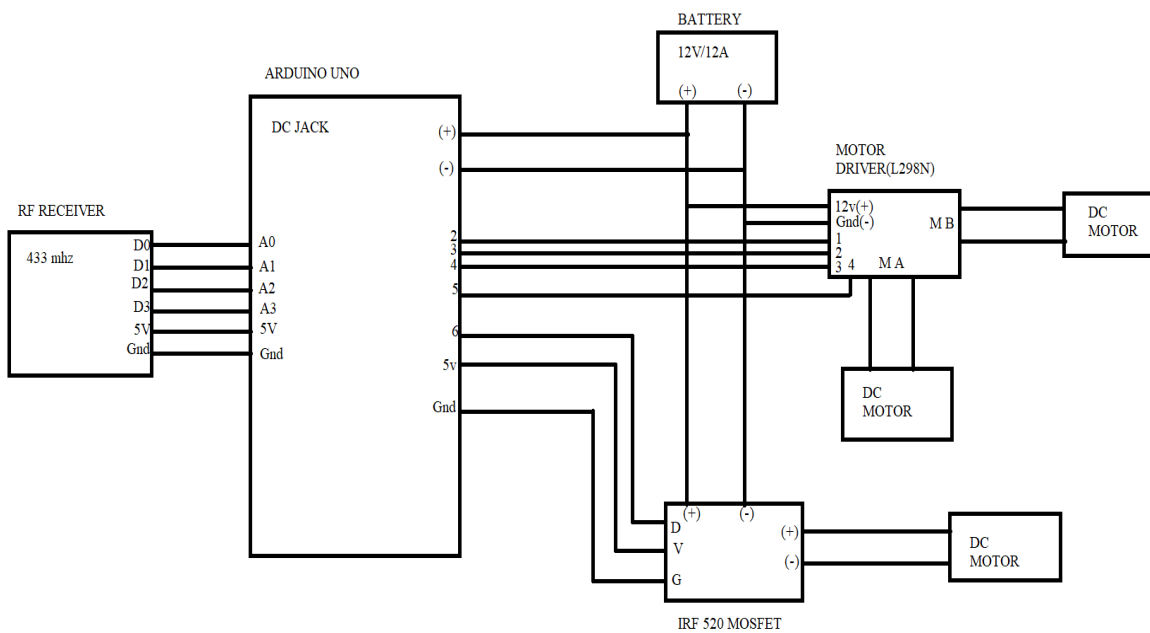
Through a software Arduino ide a program is fed into Arduino board, and software can be easily installed in any systems. Output from this Arduino board is transmitted to the motor driver board. Processor used in this project is ATmega 328D, this helps to decodes information received from push buttons of transmitter and again it transmit a signal to the motor driver board.

The microcontroller used in this project is Arduino UNO which has 14 digit input output pins. We connect it to computer with usb cable or 12V battery to get started. Motors cannot operate directly, because power obtained is small it is of only 5V, but motor requires 12V so L298 is IC used in driver board. The input signal given to IC board is converted into pulses that helps to operate the motors. Through the battery we provide a power supply which helps for collecting trash

Fig: Transmitter block diagram

Fig: Receiver circuit diagram

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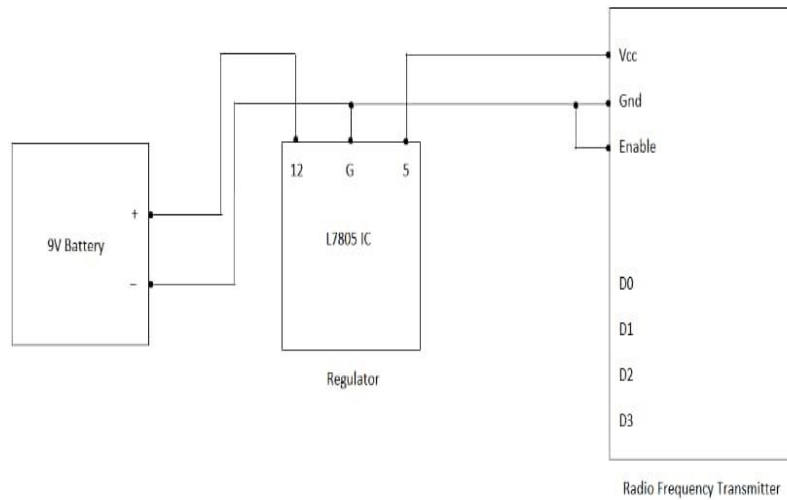**ISSN: 2278-0181**
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Fig:Transmitter circuit diagram

4. RESULTS

The robot is deployed on the water where there is more concentration of the plastic waste or non-biodegradable waste. Then the robot is turned on using the Blynk app which is connected wirelessly utilizing the Node MCU. After tuning on the robot, the robot gets force flexibility. From that point, a camera is turned on which is used to find where precisely the waste is located. Using the controllers developed using the Blynk app, we will navigate the robot towards the waste by taking a gander at the live stream broadcasted by the camera. After reaching the destination, the Escalator is switched on. The escalator collects flotsam and jetsam on the water body. The load cell will measure the amount of debris collected by the robot in terms of kilograms. After reaching the maximum threshold in kg, the escalator is switched off. The robot efficiently completing the procedure will be traced back towards the bank of the rivers or ponds afterwards, the waste will be segregated and recycled.
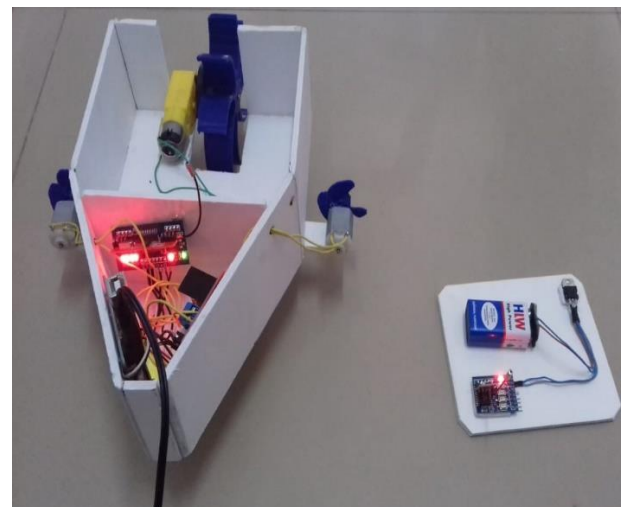

Fig: RF transmitter and receiver module.

5. CONCLUSION

The conclusion of this project is to design the robot which helps to collect the floating trash on the surface of the water on the basis of literature and research on different journal and paper.

Aqua robot is designed for cleaning the water debris floating on the water bodies, by using this we can collect many floating wastes like plastic bottles, bags, flowers without any human interaction and then waste can be easily disposed, the movement of aqua robot is controlled by RF module.

This project "Development of aqua robot for floating debris collection in lake" is less costly and eco friendly

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