

Solar Based Garbage Cleaning Boat

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Abstract— The aim of this project is to focus on the working model of the river waste cleaning boat powered by solar. As we know the population of India is increasing day by day and due to this the pollution also gets increased. The garbage which is produced by the people is the main cause of pollution. The most of the garbage is dumped or just thrown in the lake, river or other water resources. The garbage which is thrown in the water such as lakes, rivers and other water resources due to which the water gets polluted because of which the water will harm the humans as well as aquatic life. In many of the cities of India this is the major problem. To overcome this water pollution our project “Solar Based Garbage Cleaning Boat” is very helpful by collecting the garbage which is floating on the surface of water by a conveyor belt mechanism and put down in the trash collector. This project is very efficient and works on solar energy; no external power supply is required. We have a battery to store the energy and use this energy for cleaning the water surface. The main aim of this project is to minimize the manpower and time taken for cleaning the water bodies.

Keywords— Solar, Motor, Conveyor Belt, Trash collector, Garbage, Pollution.

I. INTRODUCTION

Cleanliness is the basic need of human society. We need to keep our environment and surroundings clean, but we limit ourselves to the areas in our own surroundings or our society. Maximum of the waste is thrown in the water bodies like seas, rivers, lakes, ponds etc. Hence it causes a high amount of water pollution.

Our project aims to get rid of this waste and clean the water surfaces. The whole world is currently facing a lot of problems regarding the poor condition of the environment we live in. Floating bottles, plastic bags and even toys have become a part of the marine environment in these recent times. Pitiful photos of such plastic debris washed ashore on the remote shorelines have frequently made headlines in news. Most of this plastic pollution is attributed to an increase in tourism, shipping, and fishing activities, etc. India is also drastically affected by this degradation and which has caused an increase in water pollution. In India, a very common problem is water pollution.



Fig. 1: Waste garbage in the water.

To combat this challenge, we present an innovative project aimed at developing a solar power-based water trash collecting boat. This project combines renewable energy technology, waste collection mechanisms, and sustainable

practices to provide an efficient and eco-friendly solution for cleaning up our water bodies. The primary objective of this project is to design, develop, and deploy a solar power-based water trash collecting boat capable of efficiently removing floating debris from water surfaces.

The boat is totally works on solar power, which is free of cost. This boat will not require any external supply of energy so it saves the money. In day time the boat will stored the energy with the help of sun rays which are falling on the solar panel and at night time boat will start working and collect the garbage. The Main advantage of working at night time is the fewer crowds. In this way we support to “The Swatchha Bharat Abhiyan”.

II. MOTIVATION

As India is developing in terms of technology very rapidly, it is quite important that the devices which are introduced need to be updated on a regular basis. Nowadays, all the devices are more dependent on digital technology rather than analog technology. So, people in the government cleaning sector can start using this boat in their Cleaning activities.

III. PROBLEM STATEMENT

In the absence of garbage 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 area and as well as on the local environment.

IV. SYSTEM DESCRIPTION

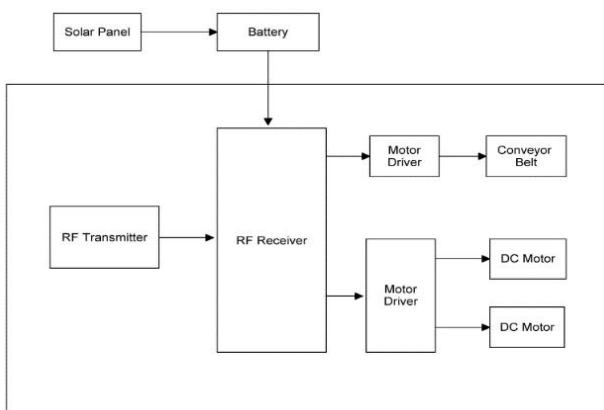


Fig. 2 Block diagram.

Our Main aim in this project is to lift waste from the water surface and collect them within a tray. We know that solar panels convert light energy into electrical energy which is

DC in nature. Solar panel output energy is given to the charge controller that controls DC output of solar which is pulsating in nature and fed pure DC to charge the battery. As we know that battery is used to store the energy. This stored energy is given to all this circuitry for overall operation.

It consists arrangement of conveyor which is place on shaft of motor. Due rotation of motor conveyor rotated. As the conveyor is move, it collect water debris, waste garbage and plastics from water bodies. As the machine is placed within the water the waste debris in water will get lifted and it moves in upward direction. As the waste debris reaches the upper extreme position it'll get dropped within the tray. Hence this may end in cleaning of water surfaces and safe collection of waste debris from water.

V. COMPONENTS

- **RF Module:** The RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. RF transceiver module will always work in a pair that is it needs a Transmitter and Receiver to send and receive the data. A transmitter can only send information and a Receiver and can only receive it, so data can send from one end to another.
- **L293D Motor Driver Board:** The 293D is used to provide bidirectional drive current up to 600mA and voltage from 5V to 36V. L293D consist of the output clamping diodes for protection.
- **Motor:** The motor which is placed in the boat it can help to move the conveyor belt in any direction and collect the garbage. It can also help for moving the wheels of the boat in left or right side as well gives the direction to the wheels for moving in forward or backward direction.
- **Battery:** This boat is fully operated by battery. The battery which can run the conveyor belt and wheels so man can easily operate the boat and it requires very less effort.
- **Solar Panel:** A solar panel consists of photovoltaic cells, which can be used to generate electricity through photovoltaic effect. This energy used to charge the batteries. Solar output is given to the DC Regulators.
- **Propeller (Wheel):** Propeller is used for giving the motion to the boat. The flopped Propeller is motorized in the boat so it can easily give the direction to the boat for moving in forwarding or backward direction.
- **Conveyor Belt:** In this machine we used the polyvinyl Conveyor Belt. This is controlled by the RF Module system using a motor driver circuit. This collects all

floating waste from the water surface and discharges it into the dustbin (Garbage collector).

- **Relay Module:** This module provides the protection to the microcontroller from the higher load current.
- **Pipes:** Polyvinyl chloride (PVC) is synthetic plastic polymer. These pipes are air enclosed. Pipes are used as a base of model (boat).
- **Garbage collector:** The garbage collector is made up of fiber material and it is connected with the conveyor belt so it can store the garbage which is collected by the conveyor belt and the water which is left in the dust material garbage collector can also remove that water.

VI. WORKING

In this project the foremost aim of this machine is to lift waste garbage from the water surface and dispose of it within the tray (garbage collector). It consists of an arrangement of conveyor which is placed on the shaft of the motor. Due rotation of motor conveyor rotated. Because the conveyor is moved, it collects water debris, waste garbage and plastics from water bodies because the machine is placed within the water the waste garbage in water will get lifted and it moves in an upward direction. Because the waste debris reaches the upper extreme position it'll get dropped within the tray. Hence this will end in cleaning of water surfaces and safe collection of waste debris from water. Propeller (Wheel) is used to drive the machine on the river and run with the help of a PMDC motor. The total electrical devices are controlled by an RF transmitter and receiver which are used to manage the machine remotely.

Collecting Mechanism is employed in our project to beat real time issues as thanks to water tension garbage is difficult to collect. By using this four bar mechanism, it rotated at a particular angle intended to gather the rubbish for the model. it's two windows open and shut as the user wishes using remote to ON and OFF the mechanism. Water wheel is bolted on a shaft which is placed aboard the frame. The aim of a water wheel (propeller) is to maneuver the machine forward or backward on water. Motor is used to rotate the water wheel with the assistance of a chain drive mechanism.

VII. APPLICATIONS

- It is applicable to reduce water pollution in rivers and ponds.
- It is useful to remove the sediments present in the water bodies to keep it clean.
- Can be easily installed for domestic sewage treatment.
- It is useful to remove eichhornia (Water plants) from the top of the river.

- It is also useful in fisher collect plant to collect solid impurities and dead fishes from river.

VIII. ADVANTAGES

- Use of renewable energy Sources.
- Easy to use and flexible.
- Need less manpower.
- Maintenance cost is low.
- Cost effective.
- Eco-friendly.
- This is efficient method.

IX. CONCLUSION

This boat can prove to be a helping hand in controlling the increasing problem of water pollution. This is simple and cost-effective water cleaning Mechanism. And is generally intended to support water trash cleaning and eliminating water contaminations like plastics, wastes, water trash which is coasting on stream and lake surface. This project is for keeping up human wellbeing and for expanding the existence of sea-going creatures.

Solar based trash removal systems will successfully replace manual drainage cleaning ways. So, it is economical and efficient using solar energy. This type of system is designed and fabricated successfully it works satisfactorily.

The water trash Collector concept can prove to be a helping hand in controlling the increasing problem of water pollution. It will also greatly reduce the problems caused by floating waste.

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