

DESIGN & FABRICATION OF SOLAR POWERED WATERWAY WARDEN

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ABSTRACT

This project emphasis on design and fabrication of solar powered water waywarden. The work has done looking at the current situation of our national rivers which are dump with crore liters of sewage and loaded with pollutants, toxic materials, debris etc. The government of India has taken charge to clean rivers and invest huge capital in many river cleaning projects like "Namami Gange," „Narmada Bachao" and many major and medium projects in various cities like Ahmadabad, Varanasi etc. By taking this into consideration, this machine has designed to clean river water surface. Nowadays almost all the manufacturing process is being atomized to deliver the products at a faster rate. Automation plays an important role in mass production. In this project we have fabricated the remote operated river cleaning machine. The main aim of the project is to reduce the man power, time consumption for cleaning the river. In this project we have automated the operation of river cleaning with help of a motor and chain drive arrangement. Some needs of automation are described below. Here using RF transmitter and receiver are to control the cleaning machine. Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc., of these sources, pneumatics form an attractive medium for low-cost automation.

I. INTRODUCTION

Water is very essential for human beings and other living beings to survive. There is a huge amount of water present on the earth body but a large amount of that is not suitable for usage. With the rapid increase in population, the scenario of cleanliness and hygiene especially with respect to waste management has degraded tremendously over the years and is still at risk. The dumping and overflow of garbage near rivers and other water bodies pollutes the water.

The quality of water in major rivers has deteriorated to a greater extent. Wastes in the water body constitute of household wastes, kitchen waste, bathroom waste, Toilet waste water, wastes from industries, various firms, and cattle farms etc. which are dumped in the water bodies at a tremendous rate. The waste water accumulation gives rise to various disease-causing carriers and germs like malaria and typhoid etc. which effects humans and causes death. The water bodies carry various disease- causing pathogens from area to area which gives rise to diseases like cholera, diarrhea etc.

A floating waste collector is a device which is used to collect the waste disposed in the water bodies by floating and travelling to the various sections of the water body. It consists of a medium bath tub having large surface area in contact with water which helps the machine to float with ease and good height to withstand more load without drowning, two dc motors are placed inside the tub which are used to run two propellers fitted at two side of the tub.

Over the tub a wooden plank is placed on top of which, a solar panel is mounted, the solar panel charges the battery absorbing heat from the sun and the battery powers the pump and the motors. The pump is placed along with a container supported by a clamped rod fixed to the funnel, fixed with nuts and bolts at one end of the boat.

A square funnel made of aluminum sheet having a nylon net placed in middle is connected to the tub with the help of nuts and bolts having its head at the water level which is connected to the pump for suction of water and is drained into the water body again. The wastes collected in the funnel can be removed later manually.

II. WORKING PRINCIPLE

This paper proposes Solar source-based cleaning vehicle for floating waste on river water surface. The main aim of our project is to lift the waste debris from the water surface and dispose them in tray. The present inventions for river cleaning machine mostly using petrol or diesel operated machines. In our project the main source we have used the solar power. That is why we have given the name of project is to “Solar powered water waywarden”.

We have used four motors in our project. All of them are DC gear motor. First motor we have used is for conveyor to lift wastage from river and the speed of the conveyor motor is 30 RPM and operated at 12 volts second motor which is used for the forward motion to move vehicle in forward direction. The third motor which is used for the change direction of the vehicle and it is mounted at the backward end of our vehicle. The fourth and fifth both the motor are used for the collect more waste near to the conveyor belt lower end which is in contact with the water.

These all five motors are operated at 12 volts DC. In our vehicle we have used Arduino Nano for all the control operation. The Arduino Nano is a heart of our vehicle. All the speed of the motor is control by Arduino Nano by the Bluetooth module. Because for the remote operation we have installed the Bluetooth module so from our mobile we can control the vehicle.

The Arduino is operated by 5-volt DC but our battery output is 12 volts so for Arduino Nano supply we have used IC 7805. The IC 7805 is connected to the output of diode bridge circuit at the end of IC 7805 gives the 12-volt DC output for the Arduino Nano.

When the collected wastage level will increase above the desired limit the IR proximity sensor will sense and gives the signal to the Arduino Nano and automatically the conveyor motor will Stop. Our vehicle is easily control by the phone. Using our vehicle the required human effort to clean water surface will be very less.

III. COMPONENTS AND DESCRIPTION

Components used

1. Frame body
2. DC motor
3. conveyour belt
4. Rollers
5. Bearing
6. Bearing bush
7. Solar panel 8.battery
9. Waste collecting tray
10. Propeller
11. Charge controller.
12. PVC pipe
13. Foarm sheet

IV. DESIGN CALCULATIONS

Battery-8V/2Amp Panel-12V/3wattCurrent (I) = P/V

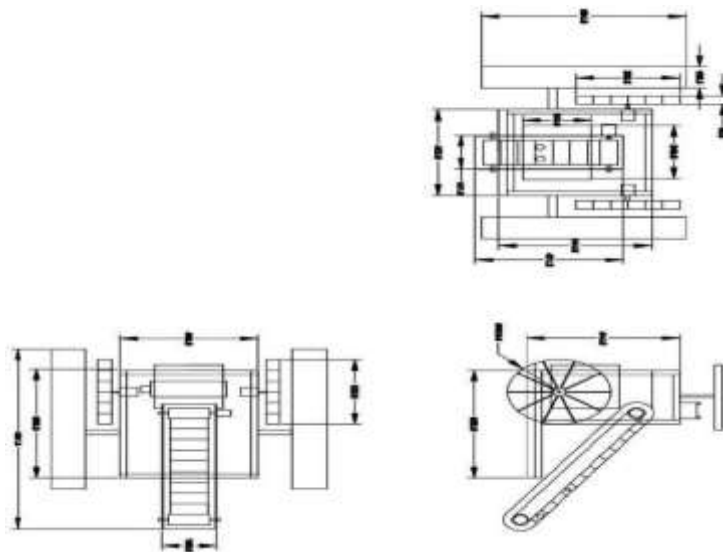
I = 3/12 I =0.25Amp

Charging Voltage = 9V/250mA

Charging Time = (Battery Watt/Panel Watt) *2 =(16/2.25) *2= 14.22hrs

Discharge Time = (Battery Amp Hr./Total currentConsumed) = 2000mA/1270=1.57hrs

DESIGN AND DRAWING



PROJECT IMAGES



V. CONCLUSION

In modern days the plastic and polythene wastes have a major contribution in the increasing rate of pollution of water. The plastic waste does not decompose and keeps floating on the water bodies which in turn pollute the water. The work states about the designing and fabrication of a floating waste collector. The various problems

like degradation of the marine ecosystem, breeding of disease-causing germs, fall in the farm production rate, business and transport using waterways etc. that the humans and animals are facing due to the pollution of water are the main reasons behind the development of this machine. This machine is designed and fabricated with the aim to provide a light weight, portable, automated machine with smart controlling which will collect all the floating wastes by recycling of water and without any human physical intervention with low energy consumption and totally power by solar energy. The development of the machine is done based on analysis and research on various works regarding to the work that has been done earlier, the mechanism, materials used, advantages and disadvantages along with the future works have been deeply analyzed and taken into count for further improvement. The machine consists of a bath tub with two PVC pipes having caps attached to it for support is used for better floating, solar panel mounted on top powering the batteries, motors and pump, rotary mechanism used in propellers for movement of machine driven by the motors. A funnel with a filter is used for the collection of wastes and for its separation later. The whole system is controlled by an Arduino Uno microcontroller board with two 4 channel relay switches using the integer data type and switch looping statement for the required coding done on the microcontroller. This work has an impact on the reduction of wastes in water and in the life of the workers cleaning the wastes manually by providing them comfort and ease of working using a smart monitoring system that saves time and energy along with maintaining good health and hygiene.

VI. FUTURE SCOPE

In future this project can be improved to sort more categories of waste. In this system we can use advance conveyor system and conveyor material for increasing the efficiency of collection of garbage. We can use the solar panel for providing power to the boat instead of battery operation. To modify the size of boat according to its waste collecting capacity is increases. This project makes only for small lake and by doing some modification in its size and capacity it can be used in big lake and river like Ganga.

VII. REFERENCE

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