Project Report

on

SOLAR POWERED WATER TRASH COLLECTOR

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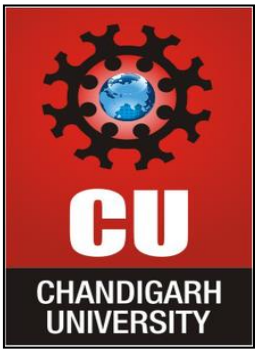

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CONTENTS

1.INTRODUCTION

Water is most important resource for human and all living beings. So the cleaniness of water is necessary but the water bodies like ponds, rivers, lakes is get polluted by humans. Due to this, the impurities present in water can cause hazardous disease. There is penalty of water on earth in liquid form of our country is converted to being unfit for consumption. There are lot of trash in the oceans, rivers and other water bodies does not disappear, and this is becoming a big problem for our environment. Biodegradable materials like papers and food easily decompose, degrade and are eaten by microorganism in the ocean. However, material such as plastics, metals and glass do not degrade as well but we know that glass and metals tend to be heavy enough that they sink to the bottom of ocean. While, most plastic objects float on the surface of ocean. After some time, water sweep these floating trash into big patches of garbage in the middle of the ocean. The “Great pacific garbage patch” is one of the biggest garbage patch across the globe which lies in the northern pacific ocean. This trash is harmful for aquatic animals or marine life and it can even reach humans through food chain. Floating debris or marine debris is the waste produced by human that has deliberately or accidentally been released in a sea or ocean.

Fig 1. Floating debris.

There are many methods and innovation which are currently use by different countries to clean the marine environment. We can prevent the problem of river trash at small scale with the help of these method and innovations. We have to make every possible way to overcome this situation. Our project tries to get overcome this water pollution and clean the water which can be very useful for our planet Earth. The boat is totally work on solar power which get energy from sun rays, and stored the energy in battery. We can use this project at anywhere and at any time. This project will work on the principle of wireless controlling of arduino using mobile application. It consists of a conveyor belt which is constantly running, electronics component, bluetooth connectivity and mobile application controlling of whole setp. A trash collector is installed below the conveyor belt and for stability of whole project in water, air filled tube is installed below it. The mobile application is used to control the movement of boat and manipulation of direction of boat. The project has a potential to become great socio-economic advantage. This project does not require any external supply of energy, as we are using solar plate to acquire energy therefore it is economic in energy usage.

2. LITERATURE SURVEY

There are many types of ideas proposed till now for the Solar powered water trash collector. Some of the ideas are listed below: M Mohamed Idhris et.al.[2] has proposed a semi-automated sewage clean system which helps in cleaning the sewage automatically and helps in decreasing the spread of diseases due to direct human intervention into sewage. This system is easy to operate and cheap to fix the drainage problems. In this project battery is the main source of power for entire electrical circuit design. For effective working of the circuit relays and switches are used and to remote controlling operation Rf transmitter and receiver are used. This design or system can be used in all type of drainages like large, small and medium. It is efficient way to control the disposal of sewage with regular filtration of wastes.
N Kiran Kumar et.al.[3] the Bluetooth based garbage collection robot using Arduino microcontroller. In this design they have utilized to control the cleaning machine. The electronic setup is operated through mobile on Bluetooth. Different sensors and scanners are used to identify natural and artificial waste. In this project after identifying the waste, the natural waste can be recycled for organic waste for cultivation. On the other hand, synthetic waste can be recycling for reuse.
Ketan H Pakhmode et.al.[4] the solar powered water surface garbage collecting boat. In this paper they proposed a system which works by using solar energy and for movement of boat, Bluetooth module is used. An ultrasonic sensor is also used for object detection using transmitting and receiving signal which send the signal to Arduino. A conveyor belt is used for loading garbage from water surfaces and container installed on this boat will collect the garbage. Ultrasonic sensors are also attached to the container which can sense the level of garbage. As the garbage increased beyond the level, it will give signals to Arduino. Then, motors get command from Arduino to stop collecting the garbage by conveyor belt.
Sirichaiwatanasophon et.al.[5] the garbage collection robot on the beach using wireless communication. This paper presents a robot which is built on caterpillar wheels, size 52*74*17 cm. Power is supplied from 12v 30Ah battery which is connected to 40w solar cells. The robot can move with average speed of 0.5 metre per sec, on the sand via wireless communication and collect the big garbage with side 12.5*49 cm.
Apoorva S. Chaithanya et.al.[6] the autonomous garbage collector robot. This article presents the garbage collector robot for footpath using Arduino controller. The size of robot is 50*40cm and built on a metallic base which is powered by battery of 12v, 7.5Ah. This system is design to collect garbage at footpath, public places like school and colleges. This system cannot be used on muddy surface but it can use on mostly cemented and on the beach. The robot is built in such a way that when it is started it will move on path defined in the program. When it encounters the obstacles, then the motion will proceed according to the applied program.
So, in the above-mentioned papers mostly they have shown how we can design a garbage collector in rivers. Some of these papers used battery for power and there are also many papers who use solar energy as the power source for controlling the boat. They have installed a conveyor belt which helps in the collection of trash from the water surfaces.

3.METHODOLOGY

This system method includes the implementation of proto-type device work robotically and controlled through the mobile application. For the prototype format drawing up the timeline and reading related works will be step one. After looking into benefits and downsides of previous studies in the subject of a Solar powered water trash collector, we can start using the plan to implement layout and automation method for run. The steps can will be in the following process chart:

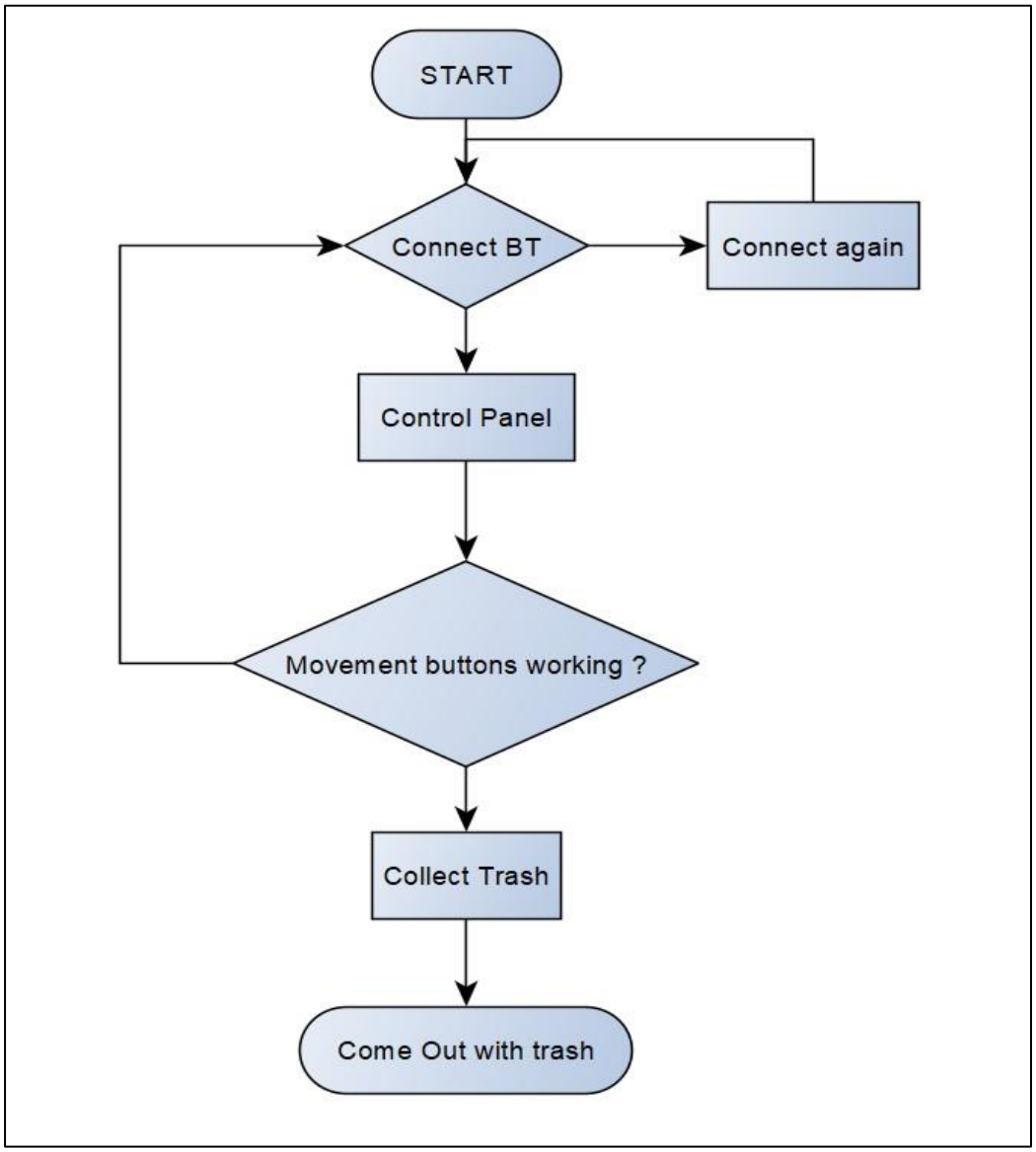

Fig2. flowchart

3.1. Material utilized

1. Arduino uno
2. Bluetooth module

3. 100rpm motors *2
4. Solar plate
5. battery
6. Conveyor belt
7. Motor driver L298N

3.2. Work done

Following are the steps that were to be taken for the proper functioning of the supposed model:

We are using solar panel for energy source and it is used to convert light energy into electrical energy. This acquired energy is stored into the battery and this power energy is used for all electronic and electrical devices. Microcontroller Arduino is used and it is programmed that will give command to change the motion of the boat, movement of conveyor belt etc. No external power supply is required in this project except solar energy. We are using the Bluetooth module which are connected to Arduino and which can be operated by using mobile app. The app we are using named as New_boat. The motor will operate as it receives the command from Arduino. After then conveyor will start continuously and start collecting the garbage through water. The conveyor belt will transfer the garbage to garbage container. The capacity of container is 10kg, it can withstand upto 10kg load of trash at single time.

3.3. Approximate cost

S No.	Components	No. of units	Cost in Rs
1	ARDUINO UNO	01	330
2	HC-05 bluetooth module	01	140
3	100rpm motors	02	240
4	Battery	01	570
5	Solar plate	01	550
6	Motor Driver L298N	01	90

Approx. Total Cost – Rs3,000/

3.4. Work place

1. IDE Arduino
2. MIT App developer
3. WORKSHOP- All the hardware steps were to be taken in the workshop with the specific tools required to complete our work.
4. Home – some of the electrical connection is done in Home.

3.5. Work plan

Work Plan	Time span
Selection of project based on real life problem	1-09-2021 to 7-09-2021
Selection of components and purchasing	01-10-2021 to 20-10-2021
Learning required modules	7-09-2021 to 20-09-2021
Deploying of code on system and testing working of prototype	25-10-2021 to 30-10-2021
Troubleshooting and report writing	1-11-2021 to 17-11-2021

3.6. Output of project

In this paper, Solar powered water trash collector has designed which is very economical, easy to operate and helpful for water cleaning and it can be modified with more cleaning and loading capacity and efficiency. It is very useful for society by cleaning nearby rivers and lakes. Hence, by using this trash collector system we are cleaning the water surface and maintaining the water without trash and waste materials. An Arduino is used for controlling all part of systems by using an android mobile with WIFI and Bluetooth. The solar panel acquired the energy from sun ray and these energies is stored by battery. From power of this battery the Arduino and all electrical and electronic system will be controlled. We have made an android app ie. New_boat from MIT app developer by controlling from Bluetooth. By using this application, we can control the movement of system.

Fig3. Final Result of Project

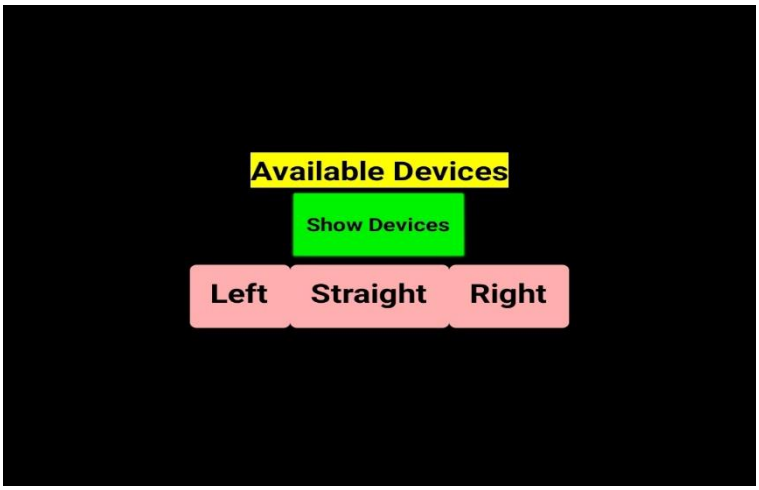

Fig4. Application