

# Beach Cleaning Robot

Mr.Prathamesh Jangam<sup>1</sup>, Miss. Sneha jangam<sup>2</sup>, Miss.Rutuja kadu<sup>3</sup>, Mr. Mubbashir Kazi<sup>4</sup>, Prof. Sanobar Shaikh<sup>5</sup>

<sup>1,2,3,4</sup>UG student, Department of Electrical Engineering, Pillai HOC college of Engineering and Technology, Rasayani, Maharashtra, India

<sup>5</sup>Department of Electrical Engineering, Pillai HOC college of Engineering and Technology

**Abstract-** This project based on design and fabrication of the beach waste cleaning machine. The work has done looking at the present situation of our oceans which are dump with corer liters of sewage and loaded with pollutants, debris, toxic materials, etc. The government of India has taken possession to clean oceans, beaches and for that many projects are done in various cities. By taking this into exercise, this robot has designed to clean beach surface. The design of robot on using wireless Technology such as GSM application. Radio frequency application. The robot connected to solar panel. The user can control the robot via a program . The commands from user are sent via radio frequency controller for processing, By wireless communication and collect the garbage, waste like like glass, bottles, plastics and papers, etc. From the experiment, it can be clearly indicated that the robot is superior to handle, good control capability, and operate environmentally friendly.

**Index terms-** Solar panel, Robot, Chaupati, Machine

## 1. INTRODUCTION

In present days, the world has become a very busy. This is mainly because of the rapid increase in population as well as different resources. Along with these two factors, there is another factor which is increased at very high rate, which is the amount of garbage is to be disposed. This has become one of the biggest problems which are not just for our country, but the whole world has come to face today. This problem is not limited to the towns and cities, but even in villages, the collecting and disposing of garbage has become a head ache for the community and also for the society. With related to human beings health. Hygiene and cleanliness of the environment, the garbage disposal is very important. The most common ways of disposing garbage are bins and bags, both these methods are implemented

manually. This means that garbage disposal becomes a very highly time-consuming and difficult process, and places such as schools, restaurants, hotels, offices etc. To overcome this possible adversity, an automatic system, implemented with the use of electronics, introduced in some places, would prove to be highly efficient. It would do the job done easily, with minimum labor and hazards to health, as well as time and money being saved in the process. This idea was the basic background for us to undertake this project. The thought of easily doing the task of collecting and disposing garbage was highly motivating, because as we are university students, we are very much familiar with this job. So that is where the base of our project was laid.

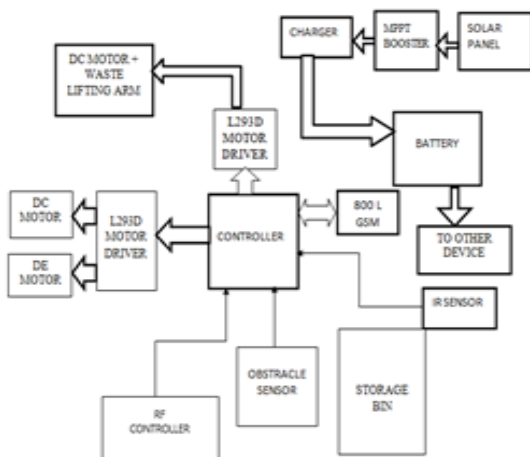
## 2. LITERATURE SURVEY

The main motive of this project is to develop a automated waste cleaning and waste disposing machine. We decide to make a machine based on microprocessor so that we can control it very effectively. Before start to making the project we are doing some surveys. While did that surveys we are visited some areas in our city (Mumbai). And observed the different conditions of that place.

Firstly we are going to Dadar chaupati, when we reached there we saw that tremendous amount of plastic bottles, Glass bottles, Plastic bags, etc. are everywhere. And also all the peoples which are present there no one will think about that they are only enjoying their eat something and throw the rapper of it anywhere. After sometimes spend at dadar chaupati. We are went to Girgaon chaupati where we see the same conditions as like dadar chaupati, after that we are going to aksa beach, where we saw that very large amount garbage is there than the dadar and girga on chaupati.

Then we search on internet about all beaches and rivers and their conditions in our nation. From that we got some information. Also we know that India is very holy country & while celebrating a lots of festivals like Ganesh visarjan, Navratri, because of that lots of water pollution occur. The water pollution is very important problem in the oceans, rivers, and small water ponds .and also due to increase in water pollution in the form of waste debris; it is affects the life of aquatic animal and make their life danger. Similarly, sometimes the aquatic animal eats water surface waste considering it as a food; which ultimately cause the death of aquatic animals. Also Due to polluted water many skin diseases to humans are occurs .But while collecting that information through survey we see, at some places river clean up machine is made to extracted the waste from the water and also the from the river side but this machine is totally mechanical based and required fuel for its operation, and we also search about some machines which are used for the purpose like to clean the river side ,beaches ,etc. while did that search we realize that the machines which are made up to this time are mechanical based which requires fuel, also some are used by the electronics based also they required electricity for their operation but they are not controlled that much efficiently and automatically . So from that all the information we finally decide to make beach cleaning robot which totally based on solar power and microprocessor based system, so that the system will make the robot fully controllable, very efficient and easy to use.

### 3. DESIGN METHODOLOGY



### WORKING PRINCIPAL (OPERATION)

The above diagram shows the basic block diagram of our project. In which we AT-MEAGA 328P microcontroller as a brain of our project. Through this we can control our project. Many components are required to complete this project. Basically, we use DC MOTOR for the motion of our project. For driving this motors we use L293D MOTOR DRIVER, one motor driver can drive the two motors, so we use one motor driver for driving 2 DC motors (wheels) and one motor driver for motion of weight lifting arm. Basically our project is solar based. So we use solar panel for giving power to the robot. With the solar panels we use MPPT Booster for maximum absorption of power at different conditions, then use a battery for storing the power. We also use a STORAGE BIN for storing the waste, and the IR SENSOR is mounted on the top of the BIN, this is because when BIN is full with the garbage to a particular level, the IR sensor will detect it and give a alarm or message to the operator, that is "YOUR STORAGE BIN IS FULL" this communication is done through the 800L GSM MODEM. In which we use a SIM. So that the message will send to the register mobile number. For the controlling of our project we use RF CONTROLLER. By using we can control our project upto 100 meters of ranges. Finally all this components are interfacing with the microcontroller for better controlling and operation.

### 4. HARDWARE REQUIREMENTS

#### POWER CONSUMPTION

The source of power for the robot is the lead acid battery 12V 30Ah. The voltage regulator (LM7805) is used to reduce the 12 DC from battery to 5 Vdc for supplying the microcontroller and Forty watts of solar cell is used to charge the battery.

#### MICROCONTROLLER:

The Arduino Uno is a microcontroller board in perspective of the ATmega328. It has 14 pins (of which 6 can be used as PWM yields), 6 straightforward information sources, a 16 MHz aesthetic resonator, a USB affiliation, a power jack, an ICSP header, and a reset get. It contains everything anticipated that would help the microcontroller; just interface it to a PC with a USB

connection or power it with an AC-to-DC connector or battery to start



FIGURE 1

**HALF H DRIVER:**

The HALF H MOTOR DRIVER is actually a one of the type of current amplifier. It is actually a L293D (a dual H- type bridge motor driver). It takes a low current signal and provide a high current control signal. This high current control signal is used to drive the motor. It has two h-bridge driver circuits. This motor driver can drive two DC motors simultaneously at a time. And is also drives the motor in both forward and reverse direction.

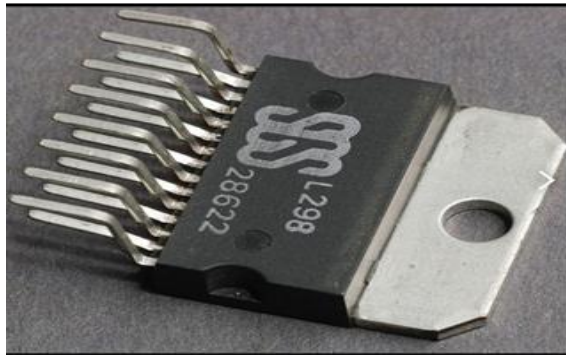


FIGURE 2

H-bridge is consist of four switches. As refer to the below structure of H-Bridge, the switches S1, S4 are closed and switches S2, S4 are open so the positive voltage is applied across the motor .By opening the switches S1, S4 and closing switches S2, S3, this voltage is reversed, so the operation of the motor will be reverse .

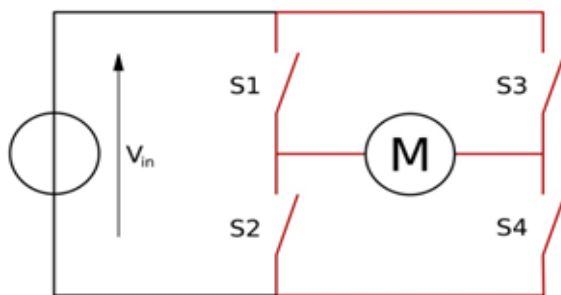


FIGURE 3

**DC MOTOR**

When the DC motor starts, at starting it will draw a lot more current, and also if you stall them, they also draw a very high current. They can operate in both forward and reverse direction, by switching voltage polarity. So by using different voltage polarities we control the direction of dc motor. Usually rotate at very high speed. Usually greater than 3000 RPM. for getting slower running need gearing.

**MAXIMUM POWER POINT TRACKING**

Maximum power point tracking (MPPT) is a technique used commonly with wind turbines and photovoltaic solar systems to extract the maximum power under all the conditions. At the start it is used with solar power, the main principle applied is generally to sources with variable power: for example, thermo photovoltaic. The efficiency of the system is increase so that the load characteristic changes to keep the power transfer at highest efficiency. This load characteristic is called the maximum power point tracking (MPPT).

**SOLAR PANEL**

Photovoltaic solar panels absorb sunlight and produce electricity in the form of dc power. A solar photovoltaic module is an assembly of photovoltaic solar cells which are available in different voltages and wattages. Solar photovoltaic panels are used to generate power and this power is commonly used for commercial and residential applications. Some special solar photovoltaic modules include concentrators in which light is focused by lenses, so that the efficiency of the power generated will be high.



FIGURE 4

### GSM MODEM

The GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION) (SIM 800L) modem receives message about for what it is used, GSM modem is used for the two way communication between robot and the user. Actually in which operator use the SIM who has number, through this number the two way communication between operator and the robot is done



FIGURE 5

### IR SENSOR

An infrared sensor is a device, which emits the infrared radiation in order to sense some objects or aspects of the surrounding, The emitter is basically an IR LED and the detector is basically an IR Photodiode which is sensitive to the infrared light of the same wavelength because it emitted by the Infrared LED, when the infrared light falling on the photodiode, the output voltage and resistance will be change in proportional to the magnitude of the infrared light received.

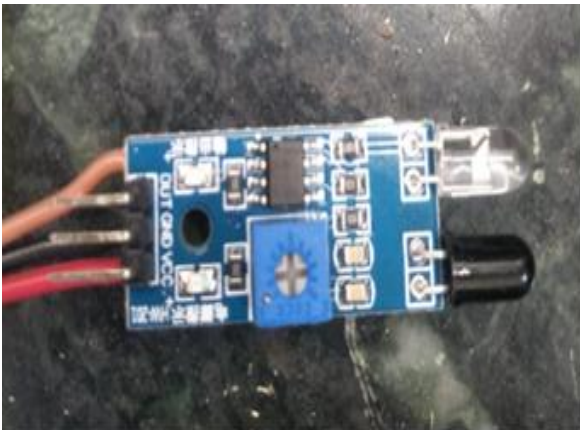


FIGURE 6

## 5. SOFTWARE REQUIREMENTS

### EMBEDDED C

- Basically Embedded C is term which is given to programing language which written in C language
- Embedded C is language extensions for the C Programming language given by the C Standards. That is simply it is extension of C programing language.
- This programing language requires non-standard diffusion to the C language in order to supports different kind of features like multiple distinct memory, and fixed-point arithmetic.

### PROTEUS ISIS [SYSTEM DESIGN]

- The Proteus ISIS is Design Automation application which contains schematic capture, simulation, PCB Layouts Etc.
- This software is runs on the Windows operating system. And it is also simple to use.
- The microcontroller which is used in Proteus ISIS works by applying hex file and/ or a debug file. Then it simulated along with any analog and/or digital electronics which is connected to it.
- This feature enables this application to use in a broad area of project prototyping such as temperature control, user interface design, motor control Etc.

## 6. ACKNOWLEDGEENT

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## 7. CONCLUSION

As a project general conclusion, we highlight the input towards the pollution reduction in our society or environment. It is clear that our project is a prototype, but we could say that we are found base to create something bigger. On the other hand, the electric part and the use of different computer software to reach the desired goal of making an

automatic robot. In this paper, design of prototype model and waste cleaning robot is proposed which is used at beaches to cleaned it and maintain the surrounding environment clean and hygiene. It is very easy to handle and also its operation is easy. Our proposed robot is also used at different places like gardens, different campuses, sports grounds etc. For maintaining its hygiene and for cleaning purpose. At present, we are working on fabrication and mechanical parts development of this project. Progress which is so far is successful and good.

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