

## Solar based Garbage Collecting Vehicle

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**Abstract-** This paper covers the technical construction of a vehicle which is used for the cleaning. The term "cleaning" is looks simple, but we humans face a lot of problems with cleaning of general workplace, as the time and money management is necessary in such cases. A few examples are beaches, general work places, and gardens etc., where it is harmful for humans to relax, because we are using these places for relaxation purpose. RF signal is used to control this vehicle. It uses an Arduino (micro-controller) for its operation. The mechanical part is consisting Acrylic (for the frame) with PMDC motor and the wheels (plastic wheels) in our case. The material that we have used in mechanical part can be changed according to our requirement. The electronic part consisting of the Radio Frequency (RF) signal transmitter and receiver, Arduino and the circuitry with battery are mounted on the base of the vehicle. The remote acts as the controlling device for the vehicle with transmitting signal to RF receiver. The cleaning mechanism includes the garbage lifting mechanism which is made of steel.(material of the lifting mechanism is selected as required) with two PMDC motors are attached to the chain of lifting mechanism. Also there are other two motors which are used for the movement of the vehicle in forward or backward direction. This whole assembly of electronic part gets supply from the battery which is Lead acid battery. And this battery can be charge through solar panel which is mounted on the vehicle.

**Key Words:** Arduino, RF controlled Vehicle RF-Radio Frequency etc.

### 1. INTRODUCTION

Here we propose an innovative "Solar based Garbage Collecting Vehicle". Cleanliness is vital when it comes to public places, because huge number of people uses beaches and parks for relaxation purpose every day. This includes children and senior citizens too, which further increases the risk of spreading of diseases due to dirty environment and rotten garbage. RF Controlled Garbage Collecting Vehicle can be a big relief for this task of cleaning garbage from the places like beach. Here this system is a 4-wheel drive vehicle chassis equipped with a cleaning mechanism and a dustbin for Garbage collection. Two high performance, high efficiency electrical motor drives the vehicle chassis and two electrical motor drive's the cleaning mechanism. Here we have used the chain-sprocket drive for transfer of power. The system is driven by a microcontroller powered circuitry

PCB. Another PCB is used for the remote purpose which consisting of directional push buttons used to transmit commands through RF transmitter to receiver. The receiver circuit receives these commands and gives to the microprocessor which processes these commands to drive the motors as well as the lifter mechanism motor accordingly. The lifter mechanism consists of a chain sprocket arrangement to drive the garbage lifter. Collectively these four electrical motors can we wirelessly driven by a Radio Frequency based Remote control. The cleaning mechanism of the system contains the mesh which is used for the separating sand from the garbage.

### 1.1 EXISTING SYSTEM

As on today there are many garbage collecting vehicles are available in the world. Many researchers already worked on the vehicles. But the existing systems are only based on the fossil fuels. Which uses the fossil fuel for running of vehicle as well as for lifting mechanism as well. Such as diesel or petrol-based vehicles. With increase in the used of fossil fuels one day we will have a shortfall of these fuels. So, to address this ever-increasing use of fossil fuels and problems regarding garbage collection we have implemented such a vehicle which overcomes all the problems in existing system and implement to used more efficient vehicle for garbage collection.

### 1.2. PROBLEM DEFINATION

The increase in use of non-renewable energy has been an increasingly critical topic, due to the tremendous growth in energy demand that is expected to climb 35% by 2030 in comparison with current energy consumption. As a result of that an enormous pressure on existing conventional energy resources, in particular, fossil fuels such as oil and natural gas. Where they are currently providing more than 98% of the energy consumed worldwide. Dependence on fossil fuels presents a number of challenges, including: High cost, environmental damage, and lack of sustainability.

We are producing tremendous garbage on the beaches which is of different kinds. According to global study in 2015

1) 322 million tones of plastic which is as much as 900 Empire State building was the amount of plastic the world produced in 2015

2) 13 million tones of that found in our oceans that is as much as dumping two garbage trucks of plastic into the ocean every minute.

### 1.3. PROPOSED SYSTEM

The proposed system is to automatically collect the garbage. The system become cost effective and compact as the components such as a Motor driver IC, IR sensor, charge controller etc. are integrated with Arduino. Arduino is compiled with c language and program is uploaded in the Arduino board. The signal is given from Radio frequency transmitter (Remote), and then this signal is received by the radio frequency receiver which is integrated with Arduino. Now Arduino gives signal to motor driver IC so that it can control the operation of motors. Also the IR level sensor is situated in the dustbin which gives signal to Arduino when dustbin gets full. After that Arduino gives this signal to buzzer so that there will be indication of dustbin gets full.

### 2. BLOCK DIAGRAM

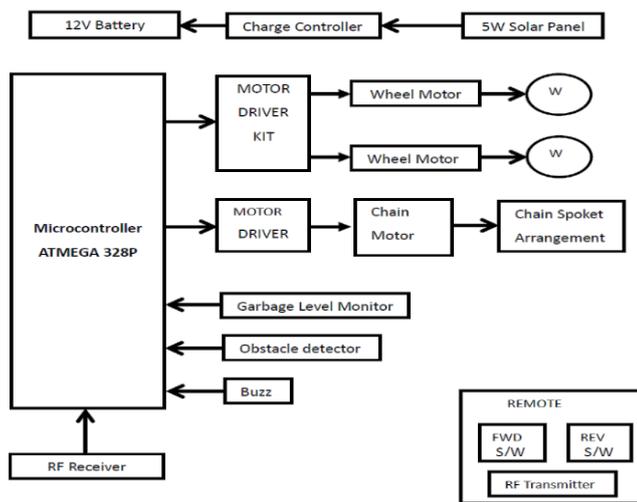


Fig.1. Block diagram [5]

### 2.1. BLOCK DIAGRAM DESCRIPTION

Figure shows the block diagram of solar based garbage collecting vehicle using Arduino ATMEGA328P. The main aim of the project is to collect the garbage automatically by using Arduino. The system contains the 5W solar panel which is used to charge the battery. Since, the output of solar panel is not constant but we require a constant output voltage for charging purpose, so we have used the charge controller. Again, this supply from battery is used to run the vehicle motors as well as electronic circuitry.

The remote of the vehicle has RF transmitter. Which always transmit the signals to RF receiver which is connected to the Arduino. According, to our need for movement of vehicle as well as for movement of lifting mechanism we used the remote control. According, to signal given by remote the

Arduino gives it to respective motors through motor controller.

### 2.2. SOFTAWRE DESCRIPTION

For programming of Arduino IDE software is use. Arduino integrated development environment (IDE), which is across platform application written in the programming languages processing and wiring. It has a code editor with tool like a text cutting and pasting, searching and replacing text automatic indenting, brace matching, and syntax highlighting and provides very easy one click process to compile and upload programs to an Arduino board. It also includes a message area, a text console, a toolbar with buttons for common functions and a hierarchy of operation menus. A program written with the IDE for Arduino is termed a sketch. Sketches are saved on the development computer as text file extension. ino. The Arduino IDE supports the languages C and C++ using particular rules of code structuring. The Arduino IDE supplies a software library from the wiring projects, which provides many common input and output procedures.

### 3. SYSTEM DESIGN

#### 1) VEHICLE CIRCUIT DESIGN

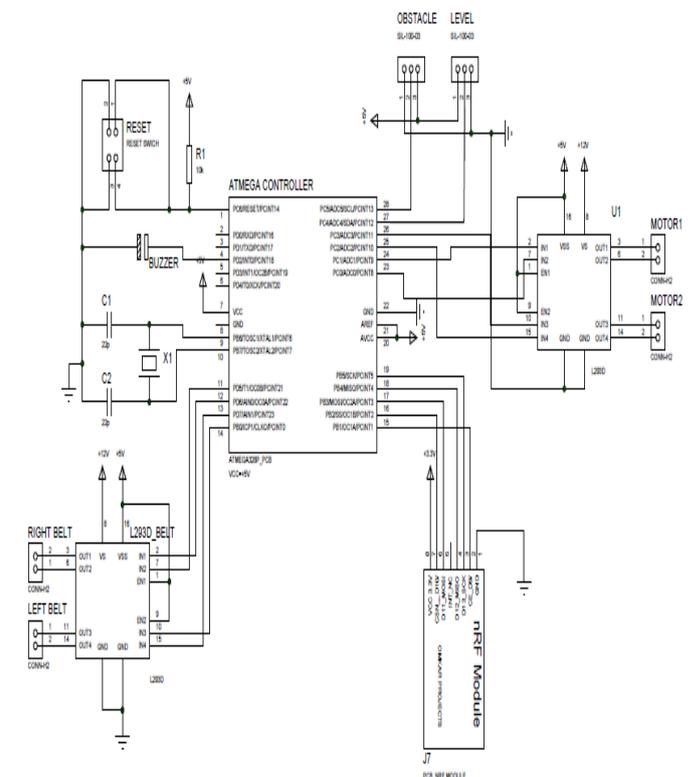


Fig.2. Vehicle circuit

## 2) REMOTE CIRCUIT DESIGN

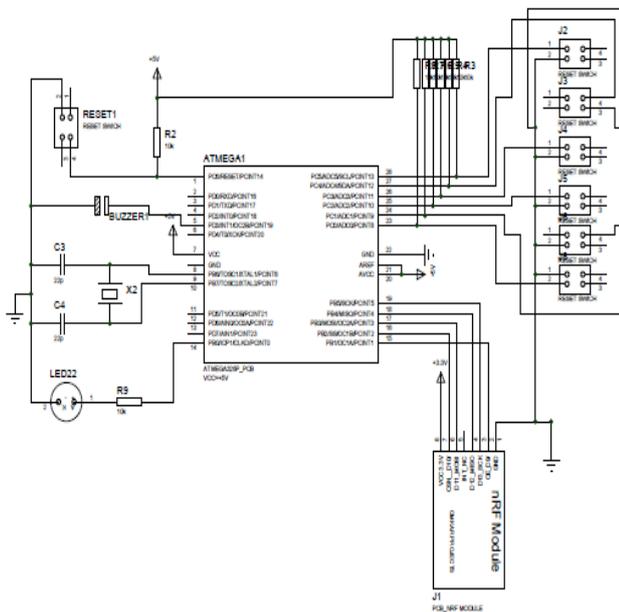


Fig.3. Remote circuit

The steps of algorithm are:

- 1) Initialize the ports, Driver IC, RF model, Sensors etc
- 2) Give supply to remote with 9V battery and to vehicle circuit with 12V battery
- 3) Give signal from remote switches to transmitter
- 4) Now receiver receives them and given to Arduino
- 5) Now through Arduino the controlling signals are provided to respective motors

## 4. ADVANTAGES

1. Affordable cost
2. Manpower requirement is less
3. Consumes low power
4. Time efficient method of garbage collection
5. Compact size, Easy to handle
6. Programming is simple
7. Less maintenance cost
8. Minimum Hardware requirement
9. Components can easily be replaced
10. Components are easily available in market

## 5. LIMITATIONS

1. In case of faults in sensor, system will collapse.
2. Only forward and backward movement. It can't turned

## 6. CONCLUSION

This is a proposed model of solar based garbage collecting vehicle using Arduino board. The vehicle is build with a Remote which is consisting radio frequency transmitter connected to Arduino controller. Now vehicle circuit consist of receiver which receives signal from transmitter and gives to Arduino where the motor driver IC's are connected. The vehicle consists of lifter mechanism for lifting the garbage. This is control through the two Dc motors. Also vehicle movement is control with another two DC motors. So with this it automatically collects the garbage.

## 7. FUTURE SCOPE

The project only controls through the Radio frequency control remote.. Further this project enhanced by developing the app which will control through Wi-Fi module and the vehicle can be control through mobile app.

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