

“Automatic Operated Robot for Cleaning the Tracks Like Places & Roads”

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Abstract –

At present, there is a growing emphasis on cleanliness and beauty in the world as well as in India. In this, the government and the people are inclined towards how to improve the cleanliness and beauty of the roads, the densely populated areas, the social area, and the railway stations and bus stations. Because they believe that cleanliness and beauty will keep their health good and cool. That is why the Prime Minister of India has launched the swachh bharat and sundar bharat like as Clean India and Beautiful India campaign.

Yet in many parts of India, there is still a lack of awareness among the people about cleanliness. That is what we have observed. People have forgotten that cleanliness and beauty are not limited to cities but also in villages. So in this, our experiment is our emphasis on how cleanliness and beauty can be implemented in a modern way. We have noticed in some places that cleaning of roads, densely populated areas, areas of the society and railway stations and bus stations are done by the employees of the Municipal Corporation and Nagar Parishad who collect the garbage with their own hands and then collect it and dispose of it outside the village. As the employees are collecting garbage with their own hands, they can get various diseases and they may even die. So our Automatic Operated Robot for cleaning experiment can solve this problem again.

We have built a machine for this, so the employee can operate the machine remotely, and also the machine will first find out where the waste is and then put the waste in the storage tank with the help of a vacuum cleaner. And when the storage tank is full, it will throw the garbage out of the village. So all the work will be done automatically by this machine and also the health of any employee will not be endangered.

Key Words: Automatic Operated Robot, Swachh Bharat, Sundar Bharat, Cleaning, Wastage, Garbage, Workers, Storage Tank

1. INTRODUCTION

In current scenarios of India, Our prime minister is taken an initiative as Swachh Bharat Swasth Bharat Mission, it impacts that's everyplace & road is cleaned & beautiful. But

It is found that in most of the places like big cities roads, bus Stand, Railways & airports, it is seen that most of the places, floors & roads were cleans manually by the worker. So it takes more time to clean it & it's hygienic to worker's health because the worker was picking up the garbage by their own hands & then put it into the storage tank.

So, our solution is to create automation in our living society, in which we have to create an automatically operated robot for cleaning the dust, garbage on the tracks like places, roads & floors. Then the robot is collecting all the waste in the collecting tank & then removes it on the wastage Area. Also, the robot is operated automatically by using remote control or computers.

1.1. Problem Statement :-

In current scenarios of India, Our prime minister is taken an initiative as Swachh Bharat Swasth Bharat Mission, it impacts that's everyplace & road is cleaned & beautiful. But It is found that in most of the places like big cities roads, bus Stand, Railways & airports, it is seen that most of the places, floors & roads were cleans manually by the worker. So it takes more time to clean it & its hygienic to worker's health because the worker was pick up the garbage by their own hands & then put it into the storage tank.

1.2. Problem Solution :-

So, our solution is to create an automation in our living society. In which we have to create an automatically operated robot for cleaning the dust, garbage on the tracks like places, roads & floors. Then the robot is collect all the waste in the collecting tank & then remove it on the wastage Area.

Also, the robot is operated automatically by using remote control or computers.

2. OBJECTIVE & SERVEY

Objective:-

1. System Operates Rechargeable batteries so no need for electricity required.
2. The system is used for cleaning purposes in actual places & also outdoor used to like to clean the roads.
3. To reduce the extra labour cost for cleaning purposes.

4. The system is operating in mobile apps like Bluetooth Terminal Apps.
5. The system gives maximum efficiency & Eco-friendly, hence less maintenance required.
6. The proposed system is used to clean the railways' tracks.

3. DESIGN & SPECIFICATION

Technical Specifications:-

1. Solar Panel:-

- i. Capacity: - 12 V 15 Watt (01 Nos.)
- ii. Material: - Photovoltaic cell

2. Vacuum Cleaner: -

- i. Input Power Supply:-7.4 V DC,
- ii. Maximum Vacuum Pressure :- ≥ 2.3 Kpa
- iii. Body Material: - Plastic

3. Camera:-

- i. Video Capture Resolution: - 720pixel
- ii. Memory Storage Capacity:-128 GB
- iii. Battery operated: - 12V 8 Amp (DC)

4. Battery: -

- i. Capacity: - 12 V 8 Amp DC (02 Nos.)

5. Spray Pump Stick with Nozzle:-

- i. Battery:- 12 V - 12 AMP
- ii. Motor 80 and 100 psi auto cut-off
- iii. Plastic material high quality.

6. Storage Tanks:-

- i. Garbage Storage Tank: - 20 Lit Plastic Body (Mounted Horizontally)
- ii. Water Storage Tank: - 16 Lit Plastic Body (Mounted Horizontally)

7. Air Blower:-

- i. Rated Voltage: 6-12VDC
- ii. Rated Current: 1Amp
- iii. Rated Airflow: 16CFM
- iv. Rated Power: 10W
- v. Outlet Diameter: 33mm
- vi. Fan Speed: 3000-3500rpm

8. Brusher: -

- i. Motor Speed: - 300 RPM (02 Nos.)

9. Robot Body Construction:-

- i. Metal Body Size: - 3 x 2 (Inches)
- ii. Rotating Wheels Material: - Fiber (04 Nos.)

10. Electronics Circuit:-

- i. Jumbo LCD Display (LM016L, 16 x 2)
- ii. Atmega 16 Microcontroller,
- iii. Buzzer,
- iv. HC05 Bluetooth module,
- v. Relays 12V 2Amp,

vi. L293D & 7805 IC are used to maintain voltage fluctuation fixed linearly.

4. CONSTRUCTION

1. Chassis of Robot:-

In the chassis of a robot, it contains the 4 x 2.5 inches rectangular shape metal body having a thickness is 15 mm. The function of the chassis of the robot is to provide base support.



Fig -1: Chassis of robot

2. Storage Tanks:-

In storage tanks, the proposed design of an automatic operated robot, we have to use two types of storage tanks.

- i. Garbage Storage tank: - 20 Lit Plastic Body (Mounted Horizontally)

In this storage tank, it is used to store the garbage, waste materials, etc. having the capacity of the tank is 20 lit. & it is made up of plastic with a rectangular shape.

- ii. Water Storage Tank: - 16 Lit Plastic Body (Mounted Horizontally)

An in-water storage tank is used to store the water or cleaning detergent. The Pump stick with nozzle is connected to the water tank. The capacity of the tank is 16 lit. & it is made up of plastic with a rectangular shape. The main function of the water tank is to spray the required quantity of water for cleaning the tracks.



Fig -2: Storage Tank

3. Solar Panel:-

The Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged, connected assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications.

The capacity of the solar panel is used in the proposed automatic operated robot is 12 V 15 watt.

Use:-

The solar panel is provided for to charge the two battery having range 12 V 8 Amp.

Panel Specification:-

1. 15Watts / 18 Volts
2. Dimension: 360*290*17mm
3. Poly Solar Panel with Aluminum Framing Figure: 4.5.8. Solar Panel
4. Output/ Current: 0.75 Ampere
5. Usage: To charge 12Volts batteries



Fig -3: Solar panel

4. Camera:-

The camera is used to move or run the robot as per the command of the observer the camera is also used to capture images or recordings. In the proposed system, the camera technical specifications as:-

Video Capture Resolution: - 720pixel, Memory Storage Capacity:-128 GB. The whole camera action is to be run by Battery supply 12V 8 Amp.



Fig -4: Camera

5. Battery: - 12 V 8 Amp DC (02 Nos.)

In this system there are two gel type batteries are used, having capacity 12 V 8 Amp Which is used to run the whole system like a vacuum cleaner, spray nozzle, brusher, etc. Specification of Battery:-

1. Voltage – 12 V 8 Amp
2. Capacity Rating - 20
3. Capacity –8



Fig -5: Battery

6. Vacuum Cleaner:-

Vacuum Cleaner is used in the proposed system is to suck the wastage material on the road, place & tracks. The vacuum cleaner is mounted upon the chassis. The pressure generated by the cleaner is more than or equal to 2.3 Kpa.

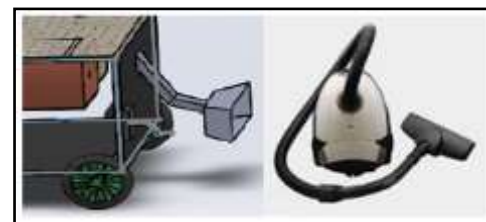


Fig -6: Vacuum Cleaner

7. Spray Pump Stick with Nozzle:-

In which the pump stick with nozzle is attracted to the water storage tank. The nozzle is used to spraying the water or cleaning detergents for cleaning the road or tracks. The general specification of the pump motor is 80 and 100 psi & steel made stick.



Fig -7: Spray Nozzle

8. Blower & Brusher:-

The blower & Brusher are used to clean the dirty places. The Air Blower fan speed is 3000 to 3500 rpm. Also in Brusher, we have to use one shaft with two rotary Motor having Speed: - 300 RPM.

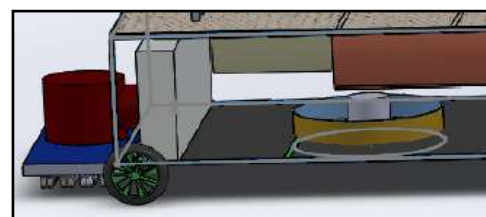


Fig -8: Blower & Brusher

9. Wheels:-

The Robot wheels are made up of fiber having size 20 diameter of each wheel. The basic function of wheel is to move or rotate the robot.



Fig -9: wheels of robot

10. Electronics Circuit:-

- i. Jumbo LCD 16*2 Yellow
- ii. HC-05 Bluetooth Module
- iii. Atmega 16 (Microcontroller)
- iv. L293D IC
- v. LM317 IC, Green Connector

5. WORKING:-

1. The robot is operated manually or automatically with the use of the Wi-Fi module (Internet Network) / Bluetooth module or either the robot is operated on a computer & mobile app.

2. The camera is installed at the base of the robot. The use of a camera is the operator will run or move the robot easily in forwarding or backward direction. Also, the observer has been seen the robot properly works as cleaning the track or not.

3. The robot is run the non-renewable energy resources like solar energy or either we providing rechargeable batteries. So we used the solar plate in our system. & the battery O/P terminal is connected to each component like a Vacuum cleaner, blower, Brusher, & camera.

4. A vacuum cleaner with a storage tank is connected at the base of the robot. The use of a vacuum cleaner is to suck all the dust particles or garbage & The Storage tank is used to store all the dust particles & garbage.

5. Brusher is used to clean the track if any particle is remaining during the process. The brusher is connected to the backside of the robot.

6. The blower is used to clean the mid-portion of the track by using the high speed rotating fan.

7. The 4 wheels of the robot are generally made of plastic & rubber combination. Also, the robots give indications when the tank is full.

6. FLOW CHART OF WORKING STAGES OF SYSTEM

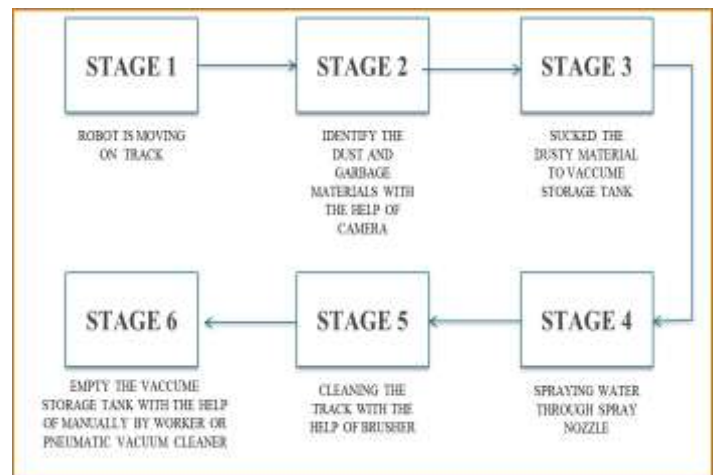


Chart -1: Flow Chart of Working Stages of System

7. BLOCK DIAGRAM OF SYSTEM

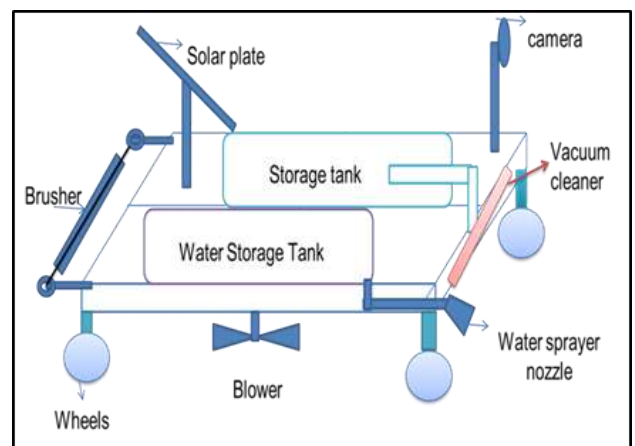


Fig -11: Block Diagram of System

8. PROPOSED DESIGN OF AUTOMATIC OPERATED ROBOT

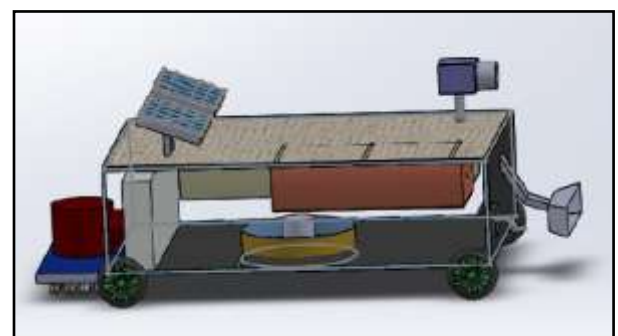


Fig -12: Side View of CAD Model

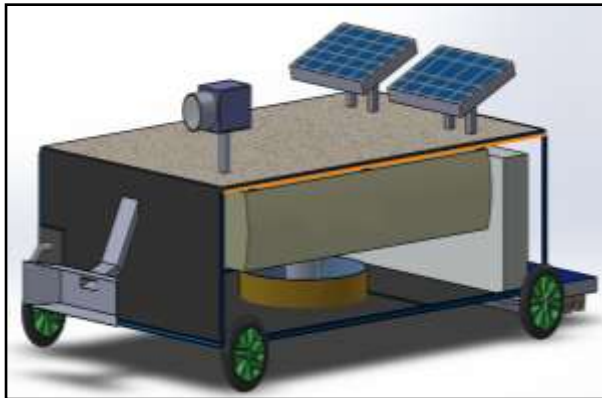


Fig -13: 3D View of CAD Model

9. FUTURE ASPECTS

In the future, the automatically operated robot for cleaning systems will be useful in small scale and large scale industries for cleaning purposes. Also, this system is used in a large amount of Textile and cotton industries, because in this industries the raw material is used like cotton, So In the cotton industry, a large number of cotton particles and cotton dust enter the body of the employees through the nose while working, while a large number of employees suffer from heart and respiratory diseases. So at that time, our automatic cleaning robot is best for this.

10. CONCLUSION

We conclude that the Automatic Operated Robot for Cleaning the Tracks like Places & Roads is used in modern society as well as the rural areas for cleaning purposes. We are also hopeful that this robot is very useful for cleaning in the municipality zones and private zones. This is our small attempt to enhance or increases automation in the field of cleaning.

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