

Solar Floor Cleaner Robot

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Abstract: *Households of today are becoming smarter and more automated. Home automation delivers convenience and creates more time for people. Domestic robots are entering the homes and people's daily lives, but it is yet a relatively new and immature market. However, a growth is predicted and the adoption of domestic robots is evolving. The purpose of this project is to design and implement a Vacuum Robot Autonomous. Vacuum Cleaner Robot is designed to make cleaning process become easier rather than by using manual vacuum. The main objective of this project is to design and implement a vacuum robot prototype. Vacuum Robot will have several criteria that are user friendly.*

Keywords: Ultrasonic Sensor, Node MCU ESP8266 Module, L298N Motor Driver IC, OLED Display, Battery

I. INTRODUCTION

Cleaning is important work approximate every place. Sometimes this is easy and sometimes difficult. Sometimes we assigned people for purpose of cleaning and pay money and sometimes cleaning is required in areas where presence of living being dangerous so we cannot assigned living being in every place. Some places are so that have a large floor areas in that place for cleaning purpose we need more than one person so we required some technique to compensate this problems. In advancement of science a robot come in light but in operate by a personnel. To avoid this limitations of personnel we require more technologies.

Automation is a great solution of this problem. So we make an autonomous floor cleaning robot. Ultrasonic sensor is the most important component for autonomous floor cleaning robot because ultrasonic sensor works as eyes of robot. Ultrasonic sensor useful for turning of robot by sensing the obstacle or wall. Sensing distance range set by programming. In this range robot sense the obstacle and turn back. Cleaning is Important work inexact each spot. At times this is simple and once in a while troublesome. At times we allocated individuals for reason for cleaning and pay cash and once in a while cleaning is needed in regions where presence of living being hazardous so we can't relegate living being in each spot. A few spots are so that have a huge floor territory in that place for cleaning reason we need more than one individual so we required some method to repay these issues. In headway of science a robot come in light however it works by a faculty. To keep away from this limit of faculty we require more innovations. Computerization is an extraordinary arrangement of this issue. So, we make a self-governing floor cleaning robot that worked by web of things and Arduino programming. Families of today are getting more astute and furthermore more mechanized. Home robotization conveys accommodation and makes more opportunity for individuals. Homegrown robots are entering the homes and individuals' everyday lives, yet it is yet a moderately new and juvenile market. Be that as it may, a development is anticipated and reception of homegrown robots is advancing. Reason for this undertaking is plan and actualize a Vacuum Robot Autonomous. Vacuum Cleaner Robot is intended to cause cleaning cycle to become simpler as opposed to by utilizing manual vacuum. The primary target of this undertaking is to plan and execute a vacuum robot model by utilizing NodeMCU, engine driver and to accomplish the objective of this venture. Vacuum Robot will have a few measures that are easy to use.

II. LITETUARE SUREVEY

AKASH NAGTODE(2017)

“Solar operated floor cleaning machine. He had made a project on cleaning system based on solar power. For this he has used Pv panel which convert particle of energy (photons) into electricity. He use this clean energy to power his cleaning machine”.¹

M RANJIT KUMAR (2016)

“The regular floor cleaning machines are most generally utilized as a part of airplane terminal stages, railroad stages, healing centers, transport stands, and shopping centers and in numerous other business places. These gadgets require an electrical vitality for its activity and are not easy to use. In India, particularly in summer, there is a control emergency and the vast majority of the floor cleaning machine isn't utilized successfully because of this issue, especially in transport stands. In this work, demonstrating and investigation of the floor cleaning machine was finished utilizing appropriate financially accessible programming. From the limited component investigation, we watch that the feeling of anxiety in the physically worked floor cleaning machine is inside as far as possible”.³

SANDEEP. J. MESHRAM ET AL [2016]

“Design and Development of Tricycle Operated Street Cleaning Machine” – He has developed the street cleaning machine by tricycle operated. In this research article, he framed a model especially for rural area. He concluded that the cleaning is less effective in streets”.²

MOHSEN AZADBAKHT ETAL [2014]

“Design and fabrication of a tractor powered leaves collector machine equipped with suction-blower system”- “The authors explained about the fabrication of leaves collector machine by tractor powered blower. He has framed the machine by using chassis, pump, blower, gearbox, hydraulic jack. They concluded total power consumption of that machine is around 14634 W which can cover up to 20m range in distance”.⁴

MANREET KAUR[2014]

“Design and fabrication of floor cleaner robot (manual and automatic). The author designed a robot to clean floor in both automatic mode as well as manual mode. His robot was equipped with IR sensors for obstacle detection, four motors and water pump. He concluded with convenience of dual mode operation of easy floor cleaning”.⁵

MANYAJAIN, PANKAJ SINGH RAWAT (2016)

“This project is used for domestic and industrial purpose to clean the surface automatically. When it is turned on, it sucks in the dust by moving all around the surface (floor or any other area) as it passes over it. In the modern era, the automatic floor cleaner is required. Thus, the cleaner is designed in such a way that it is capable of cleaning the area reducing the human effort just by starting the cleaning unit”.⁶

SAHIL BHARTI, S.R. SANDHAVE(2016)

“To develop an automated cleaning assistance this helps in cleaning flat surface with the ease of remote control with greater efficiency at work. The surface cleaning machine that is proposed in this project is the device that helps in cleaning of surface. There are many functions that have to co-ordinate for the motion control”.⁷

Dr. J. HAMEED HUSSIAN(2017)

“This module of automatic floor cleaning machine by micro controller is run to clean the floor and sweeps the dust away. In this module a remote controlled car has gear motor is attached at front axis in between the front wheels, this motor is attached with a cleaning brush at front, and the gear motor is connected to 12volts battery and the remote car is attached with 9volts battery. The remote car is controlled by the micro controller”.

ABHISHEK PANDEY(2020)

“This Paper reviewed the requirement of a residence Cleaning Automatic robot. For keeping time there's a requirement of programmed system that cleans alone without person interventions. Also, they considered how precisely to help those that have physical disabilities. Because that they had to induce this done, they needed a cleaning system that may add accordance from what we are saying, thus supporting a physically someone.”

III. HARDWARE DESCRIPTION

3.1. OLED Display



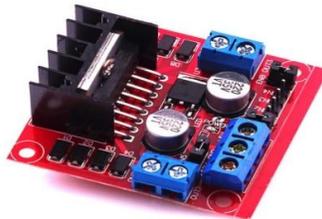
These displays are small, only about 1" diagonal, but very readable due to the high contrast of an OLED display. This display is made of 128x64 individual white OLED pixels, each one is turned on or off by the controller chip. Because the display makes its own light, no backlight is required. This reduces the power required to run the OLED and is why the display has such high contrast; we really like this miniature display for its crispness!

This breakout can be used with either an SPI or I2C interface - selectable by soldering two jumpers on the back. The design is completely 5V-ready, with an onboard regulator and built in boost converter. It's easier than ever to connect directly to your 3V or 5V microcontroller without needing any kind of level shifter

FEATURES OF OLED

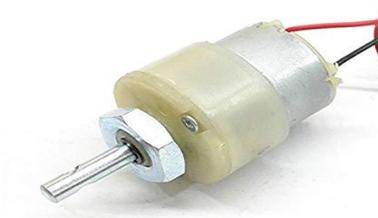
- Type: graphic
- Display format: 128 x 64 dots
- Built-in controller: SSD1306BZ
- Duty cycle: 1/64
- +3 V power supply
- Interface: 6800, 8080, serial, and I2C

3.2. L298N MOTOR DRIVER MODULE:



The L298N is an integrated monolithic circuit in a 15- lead Multiwatt and PowerSO20 packages. It is a high voltage , high current dual full-bridge driver de-signed to accept standard TTL logic level sand drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the in-put signals. The emitters of the lower transistors of each bridge are connected together rand the corresponding external terminal can be used for the connection of an external sensing resistor. An additional Supply input is provided so that the logic works at a lower voltage.

3.3. 12V DC GEAR MOTORS



Features

- 60 RPM 12V DC motors with Gearbox
- 3000RPM base motor
- 6mm shaft diameter with internal hole
- 125gm weight
- Same size motor available in various rpm
- 0.5kgcm torque
- No-load current = 60 mA(Max), Load current = 300 mA(Max)

3.3. 12V-1.3Ah BATTERY



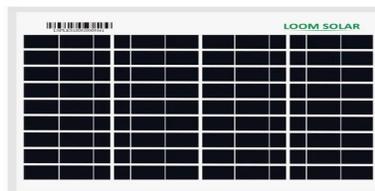
- Rated voltage : 12V
- Capacity: 1.3Ah
- Technology : AGM
- Rechargeable batteries features : maintenance-free
- Body dimensions : 97x43x52mm
- Storage time : 6-9 years
- Leads : 4,8 mm connectors
- Weight : 0.58kg
- Rechargeable batteries application alarm systems, power backup systems

Additional information:

Gross weight: 581.9 g

Manufacturer part number: SB 1.3-12

SOLAR PANEL:



Solar energy begins with the sun. Solar panels (also known as "PV panels") are used to convert light from the sun, which is composed of particles of energy called "photons", into electricity that can be used to power electrical loads.

Solar panels can be used for a wide variety of applications including remote power systems for cabins, telecommunications equipment, remote sensing, and of course for the production of electricity by residential and commercial solar electric systems.

Software:

- For Programming "Aurdino IDE" Version 1.8.13
- For PCB design "Proteus Design Suite" Version 8.10

IV. WORKING

The robot starts by activating a simple switch and it starts cleaning the floor. Floor cleaning robot has one switch that is connected with battery.

First step is to on switch. The robot start moving in forward direction set by the programming.

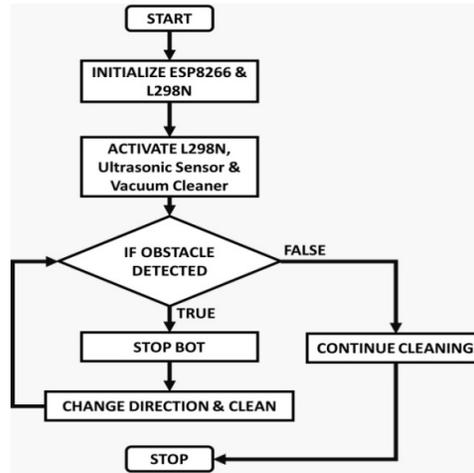


Figure 4.1: Flow Chart

Figure illustrates a simplified flowchart of the working of the robot. When the bot is switched on the suction and mopping mechanism turns on, then ultrasonic sensor checks for the presence of any head-on obstacles. In case of any head-on obstacles it takes a clockwise or an anti-clockwise turn, in case of absence of obstacles, it checks for any impact on the bumpers. If any impact is detected, the robot moves away from the impacted object and in absence of impact it moves forward and checks for any head-on obstacles and the loop continues.



Figure 4.2: Solar Floor Cleaner Robot

V. RESULT

Floor cleaning robot is developed to make floor cleaning process easier. This can be used in power plant like nuclear power plants because in that places the harmful radiations are placed and cause serious health problems. To avoiding this, we can send a robot to perform the whole operation. In colleges and other places where large floor area is present, we can use floor cleaning robot to clean that areas. In industries we required cleaning in large areas as well as small areas and both areas can be clean without need of personnel. By this we can save money and time.

VI. CONCLUSION

There are so many cleaning and wiping robots present in the market however just some of them are moderate and monetary. There are exceptionally less robots that incorporate both cleaning and wiping. With this work, we attempted

to diminish the expense of the robot and make it more viable with the Indian Users and the Industries. The primary purpose of the Cleaner Robot is to clean the floors efficiently. As earmarked, it can clean the dirt with efficacy. The robot can detect obstacles and can avoid those to clean the area.

The use of innovative technology not only reduces cost significantly but also reduces the human effort while increasing the effectiveness of floor cleaning. Reduced human effort means more frequent floor cleaning which results in increase in overall cleanliness and supports healthy well-being. Small steps in technological advancement like this will have higher impact in long run in future, making India a better country.

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