

# AUTOMATIC FLOOR CLEANER WITH UV DISINFECTION SYSTEM.

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## ABSTRACT

The automatic floor cleaner is a system that enables advance cleaning by attaching or connecting three cleaning medium in one. Current project work enables the vacuum cleaning, mopping and UV Sterilization in a single machine. The cleaning purpose is specifically carried out by continuous relative motion between a scrubber and the floor surface, and bacteria cleaning by UV LED strip.

**Keyword :** - Automatic floor cleaner , vacuum cleaning , mopping , and UV Sterilization etc....

## 1.INTRODUCTION

In the present day scenario all the members of family are busy with their work and are not getting proper time to clean the house. The cleaning machine helps to clean and mop the floor. This is done by simply pressing a switch and the robot does the work. This also reduces the labor used in factories for cleaning floor. automatic cleaning machine that does all the cleaning, mopping work and UV sterilization with turning ON the button.

This machine can be controlled manually with the help of a mobile Bluetooth. The main moto of the project is to make this affordable and suitable for Hospitals, colleges, Industrial floors, Airports, Offices, Hotels, Commercial Complexes, Dairies, Laboratories, Canteen, Health centers etc..

## 2. LITERATURE SURVEY

Historical proof suggests that carpet/floor cleaning processes emerged at some point in the nineteenth century. The industrial revolution stimulated new thoughts of cleanliness in Europe and North America. There are many types of surface cleaning machines/robots available in the market such as Commercial cleaning robots: (a) floor cleaning robots, (b) pool cleaning robots, (c) solar panel cleaning robots, (d) lawn cleaning robots, (e) window cleaning robots.

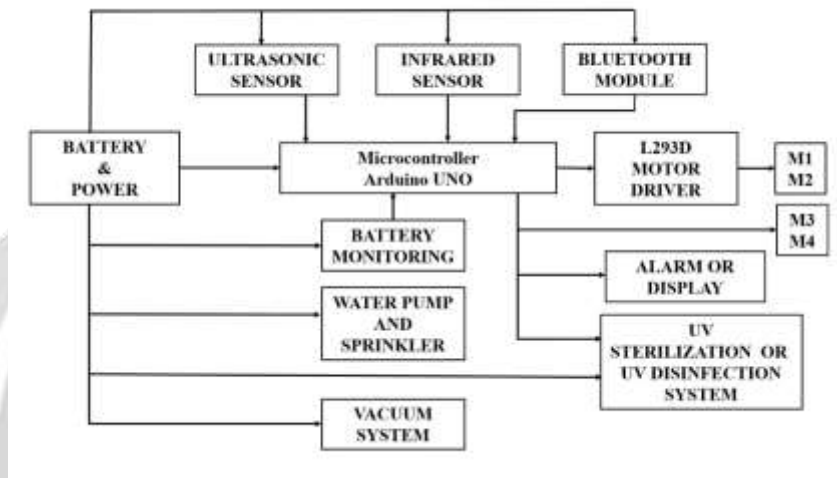
Floor cleaning is mainly of two types- dry cleaning and wet cleaning. In dry cleaning, which mainly involves removal of dust and fine substance and in wet surface cleaning consists use of sanitizer with water and other floor sanitized to clean the floor of waste waters. Before the creation of the industrial revolution people blanketed their carpets/floor by means of covering them with drug gets or thick, heavy woolen items that spread beneath tables and other uncovered areas. Drug gets included in opposition to spills and other stains.

Rich people used canvas fabric to cowl carpet whilst away on holidays and at some stage in social occasions held in their homes. The lack of ventilation caused houses to fill with dirt, dust and soot, which induced

people to search for approaches to easy their homes. Societies positioned sizable value on their houses at that time, which sparked an innovative mind-set to clean houses more efficiently.

Basically, cleaner machines are divided into their cleaning processes like floor mopping, vacuum cleaning, etc. But in some cleaning machine consist of an obstacle avoidance system using infrared sensors while some consist of laser mapping technique. Each cleaning machine has its own advantages and disadvantages. For example, the operating speed of laser map speed is relatively faster, requires less time and energy efficient, but not economical, while obstacle avoidance based robots is a time consuming system and less energy efficient due to random cleaning but economical.

### 3. BLOCK DIAGRAM



**Fig-1:** Shows the block diagram of automatic floor cleaner.

#### 3.1 Arduino UNO

Arduino plays a fundamental function in automation. it acts as brain of the machine. Required voltage is 3.3 volt. It has digital 54 i/o pins, 12 analog output pins 4 UARTs (Universal Asynchronous Reception and Transmission), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.



**Fig-2:** Arduino UNO

### 3.2 DC Motor

DC motor is an electrical machine which convert electric power into mechanical power output. Normally the motor output is a rotational motion of the shaft. The input may be DC supply or AC supply. But in DC motor direct current is used.

### 3.3 Sprinkler System

Since the mopping machine is to make the surface wet. To achieve this we have designed a sprinkling mechanism. Water is stored in a chamber that has an opening controlled by a motor pump. By turning ON the motor water or cleaning liquid starts flowing from the chamber. It is connected to a shower type arrangement. The sprinkler system has a number of holes arranged sequentially. This arrangement ensures equal wetness across the width.

### 3.4 Bluetooth Module

For the communication of the robot with the mobile phone we are using the Bluetooth device. The Bluetooth device (HC-06) is attached to the machine that receives the data from the mobile and also it can transmit the data. It converts the serial port into Bluetooth.



Fig-3: Bluetooth Module [2]

### 3.5 Motor Driver

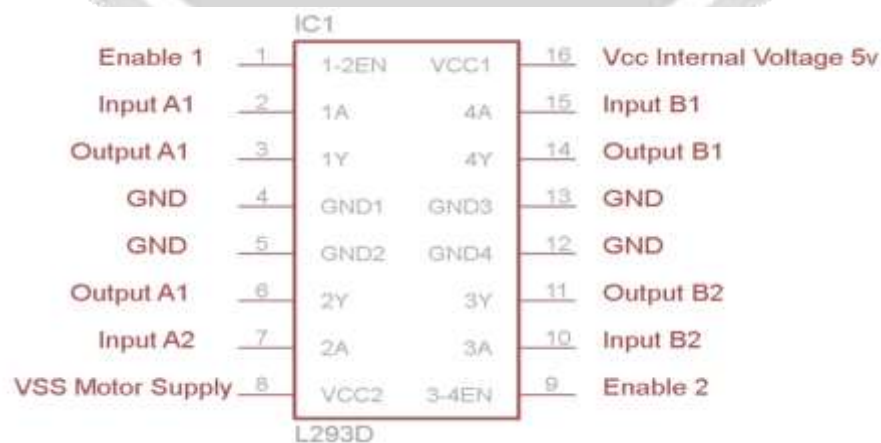


Fig-4: Motor Driver

For motor control we using L293D motor driver ,it consists of 16 pins 8 on each side. We can control maximum 2 motors connecting on each side. On the left side two terminals OutputA1 and OutputA2 are connected to two terminals of motor and similarly OutputB1 and OutputB2 are connected to motor terminals. The inputs from the Arduino board are connected through InputA1, InputA2, InputA3, and InputA4. Accordingly motor moves forward, backward, left side and right side.

If positive terminal of motor (i.e. pin3) is high and negative terminal of motor (pin6) is low motor moves forward. If pin3 is low and pin4 is high then motor moves backward. The motor stops rotating when both the terminals are same.

### 3.6 UV Strip

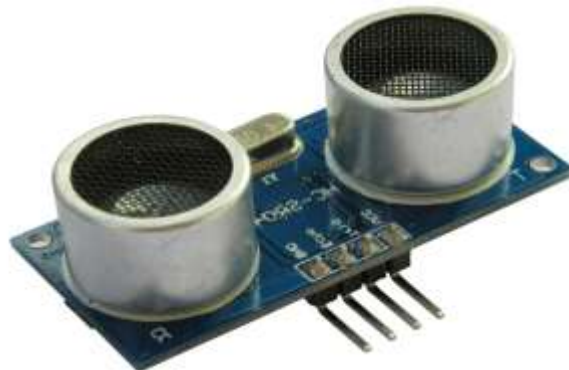
UV surface disinfection is used to kill germs and prevent the spread of bacteria and fungi. The UV surface disinfection will vary according the type of the material to be disinfected. This relates to both the type of germ (e.g. bacterium coli and their stains) and to the texture of the surface. Disinfection can only occur if the germs see the UVC. For UV sterilization, we use the UV LED strip. This strip is attached to behind of the machine, after mopping floor UV sterilization process is completed by UV strip.



**Fig-5:** UV strip

### 3.7 Sensors

1. Ultrasonic Sensor- In this machine ultrasonic sensor is used it is compact and measures the distance from 2cm to 4m. this ranger is a best for any robotic utility or any different initiatives requiring correct ranging information. this sensor can be associated right now to the digital i/o lines of your microcontroller.



**Fig-6:** Ultrasonic Sensor

2. IR Sensor-The infrared sensor consists of two eyes. First eye sends the infrared light and the second eye capture the reflection of the infrared light. It measures the distance which is Transfer to Arduino through analog input to perform further operations based on the distance.

#### 4. APPLICATIONS AND FUTURE SCOPE

There are so many cleanings and mopping machine present in the market, but only some of them are affordable and economical. There are very few machine that include both cleaning and mopping.

With this machine, we reduce the cost of the machine and make it more compatible with the Indian Users The automatic floor cleaning machine suitable for Hospitals, colleges, Industrial floors, Airports, Offices, Hotels, Commercial Complexes, Dairies, Laboratories, Canteen, Health centers etc.

To further enhance the navigation performance of the robot, feedback sensors such as optical encoders can be integrated. Cleaner brushes can be added to vacuum cleaning mechanism to increase the efficiency of dust collecting. Lithium polymer batteries can be used to reduce the weight of the robot which can further lead to the reduction of power consumption

#### 5. CONCLUSIONS

There are so many cleanings and mopping machines present in the market, but only some of them are affordable and economical. There are very fewer cleaner that include UV sterilization or both cleaning and mopping.

With this work, we tried to reduce the cost of the cleaner and make it more compatible with the Indian Users and the Industries.

#### 6. REFERENCES

- [1] R. Bormann, J. Hampp and M. Haggel, "New brooms sweep clean - an autonomous robotic cleaning assistant for professional office cleaning," 2015 IEEE International Conference on Robotics and Automation (ICRA), Seattle, WA, 2015, pp. 4470- 4477.doi:10.1109/ICRA.2015.7139818.
- [2]. Shah Vatsal. (2015). Floor Cleaning Robot with Mobile App or Autonomous. 10.13140/RG.2.1.4565.9288
- [3]. Z. Zhao, W. Chen, C. C. Y. Peter and X. Wu, "A novel navigation system for indoor cleaning robot," 2016 IEEE International Conference on Robotics and Biomimetic (ROBIO), Qingdao, 2016, pp. 2159-2164.doi: 10.1109/ROBIO.2016.7866649
- [4]. Ansari M Bilal, M. Aadil Arshad, Muhammad Kashif, Nandkishor S. Kale, Prof. D. M. Ugle, A Literature Review on "Design & Development of Floor Cleaning Machine" IJSRD International Journal for Scientific Research & Development| Vol. 6, Issue 01, 2018.
- [5]. Ms.R.Abarna, S.Devadharshini, S.Dhileep, M.Dinesh R.Poongodi, Design And Fabrication Of Automatic Floor Cleaning Machine, International Journal of Science and Engineering Research (IJSER),Vol 6 , Issue 4 April 2018.
- [6]. Muhammad Kashif Shaikh Ghaffar, M. Aadil Arshad, Nandkishor S.Kale, Ansari M Bilal, Prof. D. M.Ugle, A RESEARCH PAPER ON "DESIGN AND DEVELOPMENT OF FLOOR CLEANING MACHINE "International Journal of Advance Engineering and Research Development (IAERD) NCSOSET-2018, Volume 5, Special Issue 06, April-2018.
- [7]. Nirav Shah, Rohit Jadhv, Amogh Malekar, Hasim Shah "REVIEW PAPER ON FLOOR CLEANING MACHINE "International Journal of Scientific Development and Research (IJSRD) www.ijedr.org ,Vol.5, Issue 08,2018.
- [8]. Akanksha Vyas, Satyam Chourasia, Shubham Antapurkar,Raghvendra Prasad "ARDUINO BASED DRY & WET AUTOMATIC FLOOR CLEANER' 'International Journal of Engineering Technology an Management Research,, Vol.5 (Iss.2: SE): February 2018.
- [9]. Kim J., Mishra A., Limousine R.,Scafuro M., Cauli N.,Santos-Victor J., Mazzolai B. and Cavallo F., 2019. Control strategies for cleaning robots in domestic applications: A comprehensive review. International Journal of Advanced Robotic Systems, [online] 16(4), p.172988141985743.
- [10]. Sharvari Nikesh Ghate , Karan Rajendra Sali ,Avinash Sureshprasad Yadav, Namita Sandeep Neman, Jagdish Chahande "Design and fabrication of Automatic Solar Panel Cleaning System" International Journal of Innovative Research in Science, Engineering and Technology,Vol. 8, Issue 3, March 2019
- [11]. Chetan thakur, Senthil Kumar, Vaisakh KP, Sayanth A Kumar, Gaurav Dasgupta, Remote Controlled Autonomous Floor Cleaning Robot , International Journal of Recent Technology and Engineering (IJRTE)ISSN: 2277-3878, Volume-8, Issue-2S11, September 2019.

[12]. Madan Jagtap, Uttam Mourya, Suhas Deore , Akash Shrimandle , Faisal Usmani “Multitasking floor cleaning machine” International Journal of Scientific & Engineering Research, Volume 10, Issue 5, 2019

