

# Mist Sprayer Arduino Based Semi-Automatic Floor Cleaning Machine

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**Abstract**— Now a days, the idea of automated floor cleaning machines are getting more attention to make our life comfortable. With the advancement of technology, the use of those automated machines are more acceptable in the market s but the reasons for non-popularity is the complex design cost of machines, and operational charges in terms of power tariff. A semi-automated floor cleaning machine is proposed in this paper which is capable of cleaning floor effectively. This semi automated floor cleaning machine is designed by keeping the basic condition for cost reduction and user friendly. The Arduino based semi automated floor cleaning is designed here which is very useful to improve the life style of mankind.

**Index Terms:** Semi-automated, Arduino, floor cleaning machine, Sanitizer mist sprayer, dry and wet cleaning, reduction in cost and efforts, simple fabrication.

## I. INTRODUCTION

These days humans lead a very hectic, enlightened and modern life. People have long working times. In this situation everybody will choose time saving methods. So we have given the robots the manual works. For career oriented and job going women it becomes so much hectic to handle home and office together [1-3]. For these problems we are going to present a cleaning machine or robot. This paper deals with floor cleansing machine which is semi-automatic. We all know that Cleaning is a very important and time consuming work in our daily life [4-5]. Also it's essential for our health. In developing countries, floor cleaning by machine is not so popular so it costs much amount of money. So we thought to develop a semi-automated cleansing device which will do dry cleaning as well as wet cleaning. It has obstacle detection also. As well as it will reduce the cost of machine [6]. Not only in household works it will help to clean large apartments like hospitals, offices, banks etc .This Autonomous robot reduces

much time in lifestyle. As it contains both vacuum cleaner and mob, we can use it in summer, rainy season and also in winter.

V. Bhute et. All [7] have made solar operated multifunctional floor cleaning machine while N. Shah et. All [8] also have designed semi-automated solar floor cleaning machine with higher efficiency. Whereas P. Ravikumar [9] have fabricated solar powered unmanned cleaning robot.

## II. REQUIRED COMPONENTS

- 100rpm Geared motors
- Wheels for motors
- Arduino UNO (Fig. 1)
- HC-05/06 Bluetooth module (Fig. 2)
- L293D motor driver board (Fig. 3)
- Standard servo motor (180 degree rotation)
- 12V Water pump
- 2x TIP31C/TIP122 NPN power transistors
- 12V Sealed lead acid rechargeable battery
- Base (Fig. 4)
- Broom
- Male-male/ female-female/ male-female jumper wires
- Male/female headers
- Bread board
- Nuts and Screws
- A 600ml plastic bottle



Fig. 1. Arduino Uno



Fig. 2. Bluetooth module

A. Arduino UNO R3

Here, we have used Arduino UNO R3 (Fig.1) as microcontroller which has 20 input/output digital pins of which 6 are PWM outputs and 6 are analog inputs. We have loaded program into it by computer software. Arduino will control the full system. It will receive signal from mobile application via bluetooth and the floor cleaning machine will work when we require.

B. HC-05 Bluetooth module

In our proposed model, we have used a HC-05 bluetooth module (Fig. 2) to make a wireless connection between mobile app and the hardware system. When we require, app will give instruction, bluetooth will receive signal and will give it to arduino. Then our floor cleaner will start to work. It has 6 pins - key/EN, TXD, RXD, VCC, GND and state.



Fig. 3. Driver Module

C. L293D Motor driver board

In our project, our main motto to use L293D motor driver board (Fig. 3) is to drive the machine in any direction. It has 16 pins. These pins can control the two DC motors in any direction. Signal will be given by mobile app and the motor ic will help to move our machine.

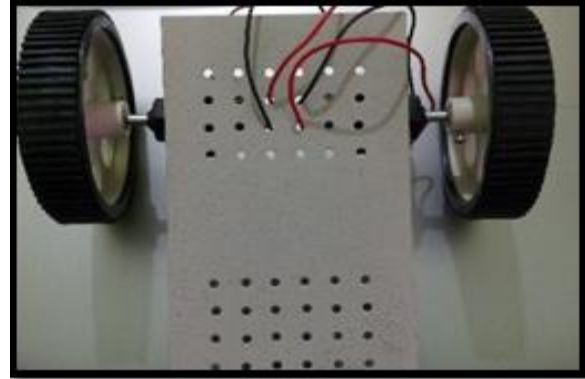


Fig.4. Base of Floor Cleaner

D. Base of floor cleaner

Here, we have used a chassis board as base (Fig. 4). It is used to keep all the circuits and electronic devices. It gives a support to other components.



Fig.5. 100 rpm Geared Motor

E. 100 rpm Geared Motor

Here we have used 100 rpm – 12Volts geared motors (Fig. 5) which are generally a simple DC motor with a gearbox attached to it. The motors having a 3 mm threaded drill hole in the middle of the shaft thus making it simple to connect to the wheels or any other mechanical assembly to control with an Arduino or compatible board. Nut and threads on the shaft are to be connected and internally threaded shaft for easily connecting it to the wheel.



Fig.6. 12V Water Pump

F. 12V Water Pump

This DC 12V Mini Submersible Noiseless Water Pump (Fig. 6) is low in cost & small size

Submersible Pump Motor which can be operated from a 12V power supply which can take up to 120 liters per hour with a very low current consumption of 220mA. We can connect the tube pipe to the motor outlet, submerge it in water, and power it & make sure that the water level is always higher than the motor. We have to remember that the dry run may damage the motor due to heating and it will also produce noise.



Fig.7. Servo motor (180 degree rotation)

G. Standard Servo Motor

Here we have used a Servo motor (Fig. 7) which is a rotational or translational motor to which power is supplied by a servo amplifier and serves to apply torque or force to a mechanical system like an actuator or brake. It allows for precise control in terms of angular position, acceleration, and velocity which is associated with a closed-loop control system which considers the current output and alters it to the desired condition. Here the speed is determined by the frequency of the applied voltage and the number of magnetic poles.

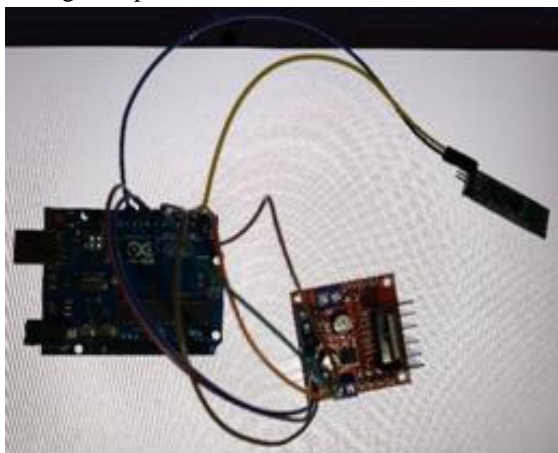


Fig. 8. Practical Circuit

III. BLOCK DIAGRAM

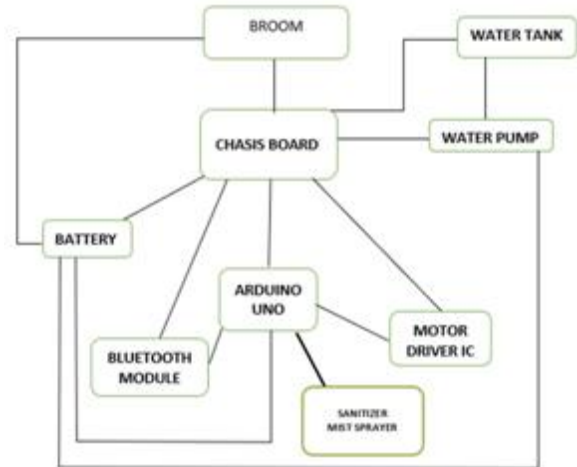


Fig. 9. Block Diagram

IV. PROBLEM STATEMENT

We know that fully automatic floor cleaning machines and robots are already exit in market. But those are so expensive. So it's not possible for everyone to afford those products. That's why we need to think for a machine which fulfils our desires at a reduced cost.

V. OUR PROPOSED MODEL FOR THE SOLUTION

Here we design a semi-automatic floor cleaning machine (Fig. 9) which can be the substitute of fully automated machines, where as some of the works will have to be done by manually, but still it will save the time and will be helpful for people [10-11].

At first we need a chassis board and we have connected motors into that. One motor is connected in front of the board with the mop and other two motors are connected with the wheels. Then we have placed a broom on the chassis board. Moreover, a water pump is connected with the board and a water tank is attached with the pump.

The mop is used for wet cleaning purpose. The motor helps the mop to work. Other two motors are helped the wheels for working. The water pump is used to supply water for cleaning. The water tank is used to store water. Here, we are using broom instead of vacuum suction motor

to reduce some money. We know after brooming we have to put the dust or dry waste in dustbin but if we use vacuum cleaner then also we have to clean this

manually. So some manual work will be needed but cost is low which is more advantageous.

Now, we need a control system. Here, we have used an Arduino-UNO with Bluetooth connection. At first, we have made the connection of Arduino with Bluetooth module by jumper wires.

This total system is used to control the machine. Arduino gives the indication, Bluetooth makes the connection and the shaft of the motor IC helps to move the machine towards left, right, forward and backward direction [12]. Pin connections (Fig. 10) are given below:

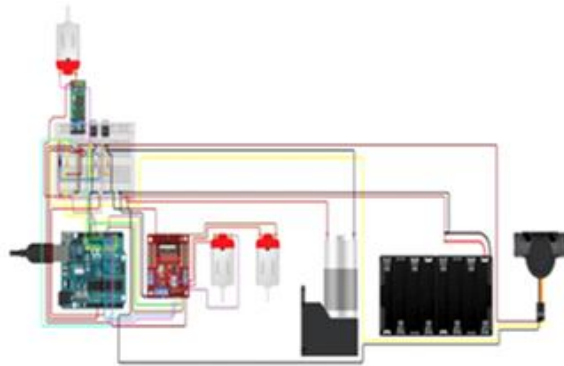


Fig. 10. Circuit Diagram

After cleaning the floor by mop, we add a sanitization section (optional). The two terminals of the sanitizer mist-spray are connected with Arduino with the help of Bluetooth controller. The total procedure is controlled by Bluetooth controller application of android mobile.

## VI. CONCLUSION

The use of this advanced technology is not only reduces cost significantly but also reduces the human effort while increasing the powerfulness of floor cleaning. Reduced human effort implements more frequent floor cleaning which results in increase in overall cleanliness and supports healthy well-being. Arduino based semi automated floor cleaning machine is designed here having higher impact in long run in future for developing country.

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