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ARDUINO BASED DRY & WET AUTOMATIC FLOOR CLEANER

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Abstract:
Automatic floor cleaner is an automated machine that facilitates the user to keep their place clean and hygienic. Many industries are working in the automation field to make autonomous cleaners. This paper deals with the development of automatic floor cleaner. Now a day's major emphasis is given on the field of robotics for decreasing human efforts. Our aim is to construct a floor cleaner which will be fully automatic providing dry and wet cleaning as well as UV sterilization. The current market is occupied by cleaners with only one or two functionality. For its cost reduction and simplicity, we are using Arduino. The cleaner will be a step for providing comfortable life by resolving problems in traditional floor cleaning methods.

Keywords: *Automated; Robotics; Emphasis; Sterilization; Arduino.*

1. Introduction

For cleaning the houses, offices, streets, industries we mostly use the broom. But by using broom some health issue can occur like skin disease, back pain etc. It also requires more mankind power and time. Hence now in present days as technology is growing in every field, we also use robots for cleaning purpose. But cleaning robots are very costly and only some of them give facility of dry cleaning as well as wet cleaning. In India for houses cleaning robots are not used because a normal person cannot afford it due to high cost. In India, robots are used for street cleaning, railway station and airport cleaning which are controlled manually. In this paper, we are designing a fully automatic floor cleaner. which is capable of wet cleaning as well as dry cleaning. In this, we also use UV lamp for germ sterilization by which we can avoid acid or other hazardous liquid. For mapping of room, we use different technology. But here we use IR sensor for edge detection and obstacle detection. In this project we also use Arduino UNO microcontroller. By this project, we tried to reduce the cost of mopping robot as compare with other mopping robots.

2. Literature Review

Initially, floor cleaning is done by using hands or different handmade instruments. Such kind of cleaning requires a lot of humans affords. As the dependency of human on technology increases more and more products are launched for making human life easy. When electricity came into a role the concept of vacuum cleaner is introduced. Vacuum cleaners are constructed to clean any dry surface, this type of cleaning required very less application of muscle power. Then the concept of mobile robots is introduced. They are programmed in such a manner that they can move around in their environment. Currently, the market is occupied by various companies which are manufacturing such variety of robots. These floor cleaners are distinguished on the bases of their cleaning action such as dry cleaning or wet cleaning. Some of the major companies working in the field of automatic floor cleaners are Dyson, iRobot, Neato Robotics.

The problem occurring with the current floor cleaners is that they are used in households for wet or dry cleaning but they are not suitable for infection remover.

3. Materials and Methods

3.1. Arduino Uno

The Arduino Uno is a microcontroller board which has ATmega328 from the AVR family. There are 14 digital input/output pins, 6 Analog pins, a 16 MHz ceramic resonator, USB connection, power jack, and also has a reset button. Its software supported by a number of libraries that makes the programming easier.

3.2. Ultrasonic Sensor

This sensor is used to measure the distance. It transmits ultrasonic waves and receives the reflected waves and measures the distance to the target by computing the time between the emission and reception. It has 4 pins TRIG, ECHO, GND & VCC. It emits the ultrasonic waves through the trig pin and receives the waves through echo pin when the waves get reflected back from the target.

For measuring the distance:
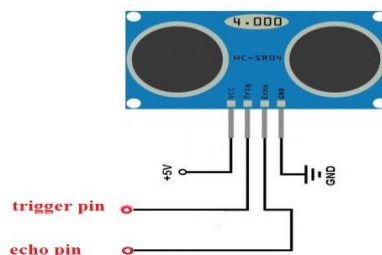Distance= ½ (speed of sound * time taken)

Figure 1: ULTRASONIC SENSOR [1]

3.3. IR Sensor

 IR sensors are used for object detection, edge detection etc. It has IR emitter LED for emission and an IR Photodiode for detection. It works on the principle that when there is any object then the waves reflect back and hence the object is detected by it.
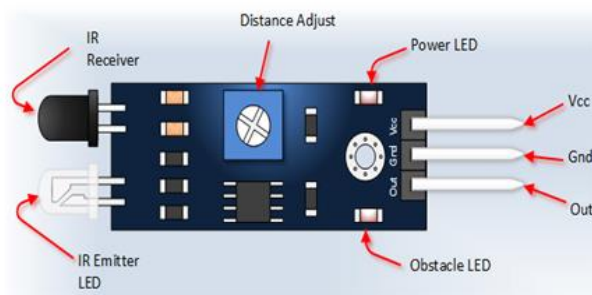

Figure 2: IR SENSOR [2]

3.4. DC Motor

A simple DC motor is used for the motion of the machine. It converts the electrical energy to the mechanical energy and is connected with the wheels of the cleaner to move it in all directions. Other motors are stepper motor, servo etc. DC motors are available as brushed as well as brushless.

3.5. Motor Driver

L293D is a Motor Driver IC which is used to connect the motor with the microcontroller and provide them sufficient voltage supply. L293D has 16-pins in which 4 are input pins, 4 are output pins, 2 are enable pin, 4 GND pins and 2 pins for power supply. It is used to control two DC motors simultaneously to rotate in any direction. It works according to the concept of H-bridge. The voltage has to change its direction to rotate the motor in clockwise or anticlockwise direction. We can't connect the motors directly to the microcontroller as it will only provide 5V which is not sufficient to run the motors, so we have to use motor driver IC L293D.
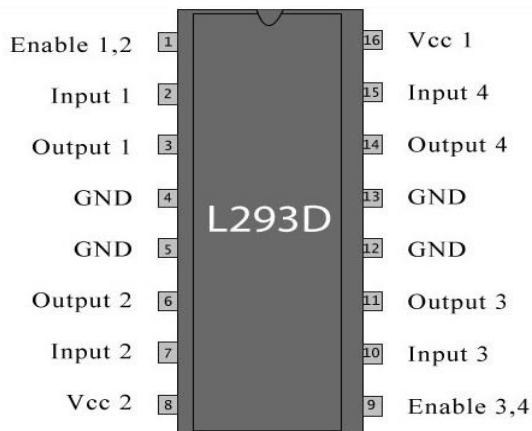

Figure 3: MOTOR DRIVER L293D [3]

3.6. UV Lamp

It is the invisible light that is present on the outer side of violet rays in the spectrum. Thus called ultraviolet light. It has wavelength between 100nm and 400nm. UV rays are efficient in killing the germs and thus this UV lamp can be used for the sterilization action.
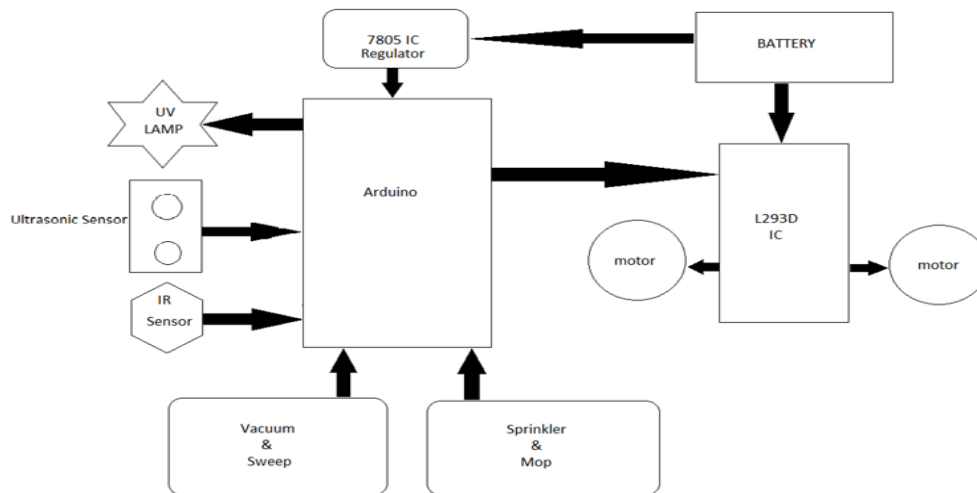
4. Design

Figure 4: Block Diagram

5. Working

Automatic floor cleaner is an autonomous robotic machine that helps the user in cleaning their places. Arduino microcontroller is used for the processing and connection of different components like sensors, motors, another IC (L293D) etc. It uses IR sensor and ultrasonic sensors for the detection of objects and distance and the Arduino gives the signals to the motors to take turn according to the position. For sweeping, it makes the use of brushes and vacuum pump and provides wet cleaning via the combination of water sprinkler and roller. At last, it also kills the germs of the floor via UV lamp present at the tail end of the machine.
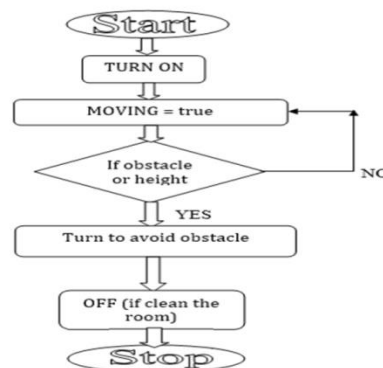

Figure 5: Flow Chart

6. Conclusion

This paper facilitates efficient and economical floor cleaning. The cleaner can perform three actions that are dry cleaning, wet cleaning, & UV sterilization. This research shows a better & simple construction. With the help of UV Lamp, it is possible to kill more than 90% of germicides. This feature increases its application area in hospitals as well as industries.

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