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## Automatic Floor Cleaning Robot Using Arduino

*S. S. Saravana Kumar*

*Assistant Professor*

*Sri Chandrasekharendra Saraswathi Viswa Maha Vidyalaya (SCSVMV University).*

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### ABSTRACT

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. This paper explains the way to build and program so that the robot can move around freely and clean a specific area. It cleans the floor using brushes attached with the motor and with help of cleaning fluid while moving. It uses Ultrasonic sensors to detect the obstacles and hence change its direction while moving and also preventing the cleaner to fall from height. This paper details the development of Automatic Floor Cleaner. The project is used for domestic and industrial purpose to clean the surface automatically. When it is turned ON, it starts cleaning while moving all around the surface (floor or any other area) as it passes over it.

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Keywords: Arduino, Google Assistant, SSID, Blynk.

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### 1. Introduction

Automation is part of every economy whether developing or developed nations. It facilitates dynamics in the field of technology and so automation is an inevitable and necessary part of every country. In order to overcome the time and human intensity associated with floor cleaning automated floor cleaning systems have been purposed. This paper discuss the automatic floor cleaning process using obstacle avoidance principle with the help of ultrasonic sensor and Arduino UNO. The controller is used to drive the motors and the cleaning units and a three sensors are used to avoid the obstacles. This can be useful in improving the lifestyle of mankind and also be extended to vacuum cleaning.

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### 2. System Model

#### Arduino UNO

The Arduino UNO is a standard board of Arduino. Here UNO means 'one' in Italian. It was named as UNO to label the first release of Arduino Software. It was also the first USB board released by Arduino. It is considered as the powerful board used in various projects. Arduino.cc developed the Arduino UNO board. Arduino UNO is based on an ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input / Output pins (I/O), shields, and other circuits. The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms.

#### Ultrasonic Sensor

Ultrasonic sensors (also known as transceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an

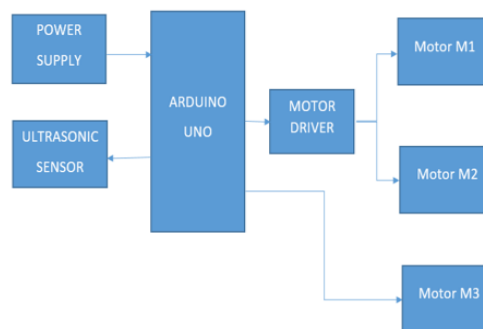
\* S. S. Saravana Kumar. Tel.: +91 99405 17232.

E-mail address: [ssk.saravana@gmail.com](mailto:ssk.saravana@gmail.com)

object. Ultrasonic transducer that comes with 4 pin interface named as Vcc, Trigger, Echo, and Ground. It is very useful for accurate distance measurement of the target object and mainly works on the sound waves.

### Motor Driver L293D

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC). It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, hence H-bridge IC are ideal for driving a DC motor. In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently. Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller. There are two Enable pins on l293d. Pin 1 and pin 9, for being able to drive the motor, the pin 1 and 9 need to be high. For driving the motor with left H-bridge you need to enable pin 1 to high. And for right H-Bridge you need to make the pin 9 to high. If anyone of the either pin1 or pin9 goes low then the motor in the corresponding section will suspend working. It's like a switch.



**Fig. 1 - Block diagram of proposed system**

## SOFTWARE

### Arduino IDE

Arduino is a both an open source software library and an open-source breakout board for the popular AVR micro-controllers. The Arduino IDE (Integrated Development Environment) is the program used to write code, and comes in the form of a downloadable file on the Arduino website. The Arduino board is the physical board that stores and performs the code uploaded to it. Both the software package and the board are referred to as "Arduino."

### WORKING

Once the system is ON, the power supply is given to Arduino using power source and the vehicle starts movement with the help of motor driver and caster wheel (used to eliminate use of extra two wheels) until the obstacle is detected, if any obstacle is detected, the robot changes its direction using the motor driver and program which is dumped into the Arduino. The robot keeps changing its direction and continues its movement through which the robot covers the entire room and with the help of cleaning fluid supply and brush which is attached to motor the cleaning process is done while the robot is in movement.

## 3. Conclusion

Automatic floor cleaning robot with cheap cost and user friendly developed with Arduino UNO, DC motors, Ultrasonic sensor and cleaning unit using obstacle avoidance concept. Based on the results of the design and testing of floor cleaning robot system developed concluded as the robot cleans the floor automatically using cleaning fluid and brush with the help of brush while the robot is in movement with the guidance of ultrasonic sensor and motor driver. Vacuum cleaning, battery monitoring, lighter body weight are some future scope of this project.

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