

AUTOMATIC FLOOR CLEANING ROBOT

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Abstract - Several parts are integrated by the automatic floor cleaner mentioned above to effectively navigate and clean interior spaces. This device's primary function is to coordinate the actions of numerous sensors and actuators using an Arduino microcontroller. The main tool for identifying obstructions and estimating the cleaner's distance from walls or other objects is the ultrasonic sensor. Concurrently, the infrared sensor improves detection performance, especially in the case of lowlying obstructions or imperfections in the surface. A Bluetooth module is integrated to provide wireless connectivity with a smartphone or other compatible devices, facilitating communication and control. Through a specific smartphone application, users may remotely control the cleaner, change its settings, or keep an eye on its condition. Rechargeable battery power allows the device to be portable and self-sufficient while cleaning. Known for its dependability and effectiveness, BLDC (Brushless DC) motor powers the cleaning mechanism. Precise control over the motor's direction and speed is possible when paired with an electronic speed controller and motor driver. With this configuration, the cleaner can modify its approach to cleaning in response to changes in the surroundings or user preferences.

Key Words: Microcontroller, Vacuum, Cleaning, Path Vacuum, Arduino, BLDC Motor,

1.INTRODUCTION

Cleaning is a necessary but frequently disregarded task. Cleaning has always been seen as a time-consuming activity in the modern world, when time is money. Nonetheless, it is impossible to compromise health and cleanliness. Several steps were taken to construct automated floor scrubbers. But the majority of these robots were inefficient or wired. The intelligent floor cleaning robot AUTOMATIC FLOOR CLEANER is most useful for home and workplace applications. The control mode is automatic. In addition, the robot saves time and energy by doing dry cleaning in parallel. The area of the room may determine how long cleaning takes. Consequently, the user may concentrate on his main activity, leaving the cleaning to the robot. Furthermore, our robot is less expensive than other robots.

2. Block diagram

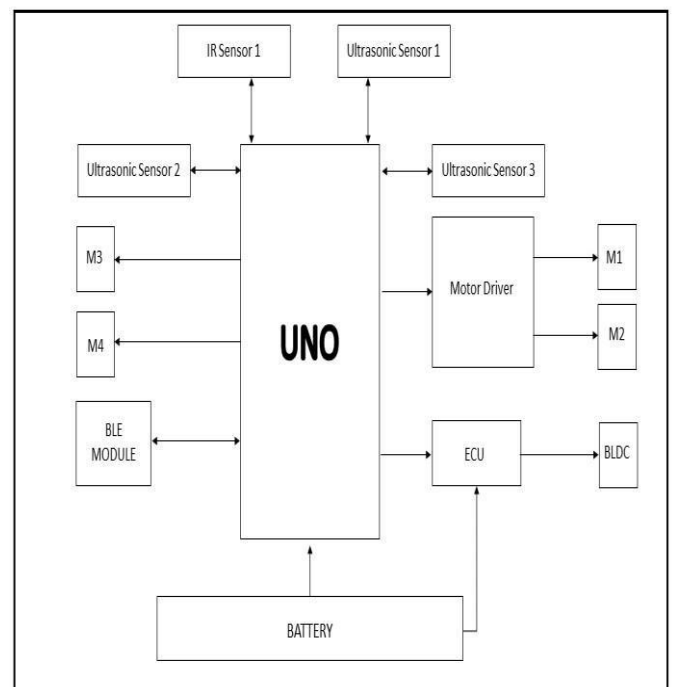


Fig.1 block diagram

We have made this robot using Arduino. Arduino Uno as a brain of our project with 3 ultrasonic sensors for object detection one infrared sensor for fall detection and for wireless connectivity we have used Bluetooth also our machine has 2 wheel control using lm29 motor driver which is connected to Uno. once we start the project the Uno loads the BLDC motor which we have used for vacuum purpose our robot can efficiently clean the room and remove dust also we have adding 2 brushes which are connected to motor which always move left motor is clockwise direction and right motor will move anticlockwise direction so that they can bring the dust near the vacuum end and the motor can such the dust next when the motor is start Uno starts sensors and then as per the sensor reading it send data to motor driver to act accordingly example when there is no object the robot will move forward when the object is detected in front the robot will move left when detected at left sensor the robot will move right and then the IR sensors does not detect floor the robot will move back.

3. OBJECTIVES

- To simplify human life.
- To Avoid time wastage during clean
- To identify the specification no each components.

4. COMPONENTS

4.1 Arduino Uno

A micro controller board based on atmega2560. It has 16 Analog pins and 14 digital I/O pins. Can be used as PWM output, (hardware serial ports), 16 MHz crystal oscillator, a USB connection, a power jack, reset button.

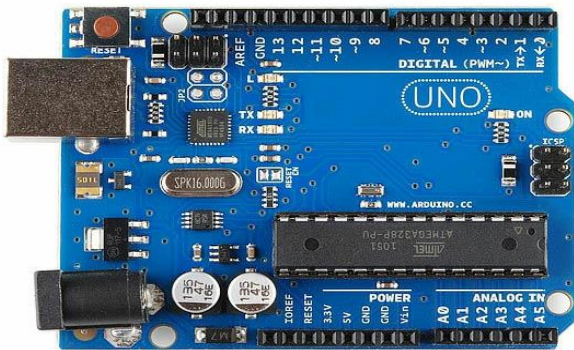


Fig.2 Arduino uno

4.2 IR Sensor

An Infrared (IR) sensor detects infrared radiation in the form of heat, converting it into an electrical signal. Commonly used in electronic devices, security systems, and appliances, IR sensors enable functions like proximity sensing and remote control operation. They operate by detecting variations in IR radiation, making them versatile in various applications.



Fig.3 IR Sensor

4.3 Motor Driver L298N

The L298N is a dual H-bridge motor driver integrated circuit, facilitating bidirectional control of two DC motors or one stepper motor. Operating voltage ranges from 4.8V to 46V, with a peak current of 2A per channel. It includes built-in protection diodes and allows for PWM motor speed control

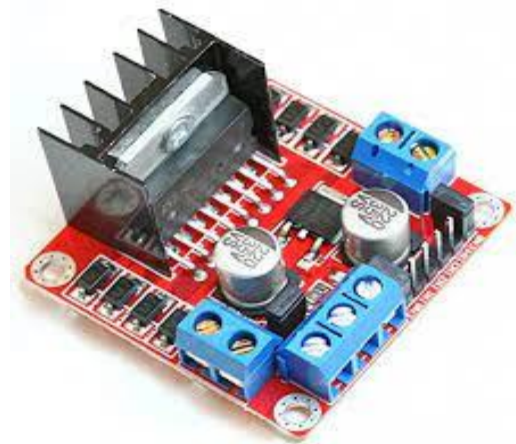


Fig no .4 motor driver l298N

7.4 100 Rpm Gear Motor

A 100 RPM gear motor is a low-speed electric motor equipped with gears to achieve a rotational speed of 100 revolutions per minute. These motors are commonly used in robotics, automation, and small-scale applications where precise and controlled movements at a moderate speed are required, offering efficiency and reliability



Fig 5 100rpm gear motor

7.5 Bluetooth Module HC-05

The HC-05 is a popular Bluetooth module for wireless communication in electronics projects. Operating on Bluetooth 2.0/2.1, it supports Serial Port Profile (SPP) for easy serial communication. With a range of up to 10 meters, it's widely used for connecting microcontrollers, such as Arduino, to smartphones and other devices.



Fig no 6. Bluetooth module

7.6 BLDC Motor

A Brushless DC (BLDC) motor is a type of electric motor that uses electronic commutation instead of brushes for switching the magnetic field. Known for efficiency and durability, BLDC motors find applications in drones, electric vehicles, and appliances. They offer precise control, longer lifespan, and reduced maintenance compared to traditional brushed motors



Fig no 7. BLDC Motor

10. Future scope

- Used disinfectants to kill bacteria using UV light.
- Improving the life of the product.
- Better battery backup.

11. Conclusion

The automatic floor cleaner, integrating Arduino, ultrasonic and IR sensors, Bluetooth module, battery, BLDC motor, motor driver, buck converter, and electronic speed controller, offers efficient and convenient cleaning solutions. The Arduino facilitates sensor data processing and motor control, ensuring precise navigation and obstacle avoidance. Ultrasonic and IR sensors detect obstacles and edges,

enabling seamless operation even in complex environments. The Bluetooth module allows remote control and monitoring via a smartphone app, enhancing user convenience. The BLDC motor, powered by a reliable battery and regulated by an electronic speed controller, ensures consistent and energy-efficient cleaning performance. The integration of a motor driver and buck converter optimizes power management, prolonging battery life. In essence, this system provides an intelligent, adaptable, and user-friendly solution for maintaining clean floors with minimal intervention, showcasing the synergy of advanced technologies in modern home appliances

11. References

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