Bluetooth Controlled Vacuum Cleaning Robot

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Abstract- This project presents the design and development of a Bluetooth-controlled vacuum cleaning machine, offering a smart and efficient solution for automated cleaning. The system integrates microcontroller technology, Bluetooth communication, and motorized cleaning mechanisms to allow remote operation via a smart phone application. The user can control the movement and cleaning functions of the vacuum cleaner using a mobile app. The Bluetooth module transmits user commands to the microcontroller, which processes them to navigate and operate the vacuum system. The machine ensures smooth movement and efficient cleaning. This project highlights the feasibility of wireless control for household and industrial cleaning applications, enhancing convenience and reducing manual effort.

Keywords- Vacuum cleaning, Bluetooth control, smart phone application, automation, microcontroller.

I. INTRODUCTION

This project presents a Bluetooth-controlled vacuum cleaningsystem that enables users to operate the device through a smart phone application. The system incorporates an HC-05 Bluetooth module interfaced with a microcontroller, such as Arduino Uno, to receive and process commands. The vacuum cleaner responds to user inputs, allowing real-time movement control, suction activation, and operational monitoring.The proposed system is cost-effective and user-friendly, making it suitable for household and industrial cleaning applications. By leveraging wireless communication and automation, the project aims to improve cleaning efficiency, accessibility, and convenience while reducing manual efforts.

II. HARDWAREDESCRIPTION

Materials we used in design of hardware are:

A. Arduino Uno

Arduino Uno is an open-source microcontroller board that is widely used ATmega328P microcontroller. It operates at 5V and can be powered through a USB connection or an external power supply ranging from 712V. The board features 14 digital input/output pins, 6 analog input pins, and supports communication protocols like UART, I2C, and SPI, making it versatile for various applications. With a 16 MHz clock speed, 32 KB of flash memory, 2 KB of SRAM, and 1 KB of EEPROM, it is capable of handling multiple tasks efficiently.

Fig: Arduino Uno

B.HC-05BluetoothModule

Fig:HC-05 Bluetooth Module

The HC-05 Bluetooth module is a popular choice for wireless communication in electronic projects. It operates on the Bluetooth 2.0 protocol and offers a range of up to 10 meters. It uses the 2.45GHz frequency band. The transfer rate of the data can vary up to 1Mbps.The HC- 05 module can be operated within4-6V of power supply. The HC-05 is versatile and suitable for a wide range of applications such as robotics, home automation, and IOT devices**.**

C. L298N Motor Driver

Fig:L289N Motor Driver

The L298N motor driver is a widely used dual H-Bridge motor driver that plays a crucial role in Bluetooth-controlled vacuum cleaning robots. This module enables the robot to move in different directions by independently controlling two DC motors. It supports motor supply voltages from 5V to 35V and can handle up to 2A per motor, making it suitable for driving the wheels of the vacuum cleaner efficiently. The Pulse Width Modulation (PWM) feature allows precise speed control, which is essential for smooth navigation and obstacle avoidance.The L298N is connected to a microcontroller, which processes commands received by a Bluetooth module (HC-05). When a user sends movement instructions from a mobile app, the microcontroller activates. The ENA and ENB pins of the motor driver are controlled using PWM signals, allowing the robot to adjust its speed dynamically based on cleaning requirements

III. SOFTWARE DESCRIPTION

Bluetooth RC Controller:

A Bluetooth RC controller in a vacuum cleaning machine allows remote operations for direction. A Bluetooth module (HC-05) receives user commands, which a microcontroller (Arduino) processes. The L298N motor driver controls the wheel motors for movement.

Fig:App Logo

Fig. Bluetooth RC Controlling App

The Vacuum Cleaning Robot with Bluetooth Control successfully integrates multiple components to achieve efficient and wireless cleaning. The system is controlled using a smartphone application via the HC-05 Bluetooth Module, allowing users to send commands remotely. The Arduino Uno processes these commands and controls various components such as the Scrubber Motor, Dryer Fan Motor, Water Supply Pump, and DC Motors, ensuring a smooth cleaning process. The L298N Motor Driver manages the movement of the robot, enabling it to navigate different surfaces. Additionally, the vacuum system, constructed using a plastic bottle, helps in collecting dust and debris effectively. The relay module assists in switching different components on and off as required. This project demonstrates a smart and efficient cleaning solution, with potential enhancements such as improved battery efficiency, two ways of power supplies and advanced mobile app features for better automation and control.
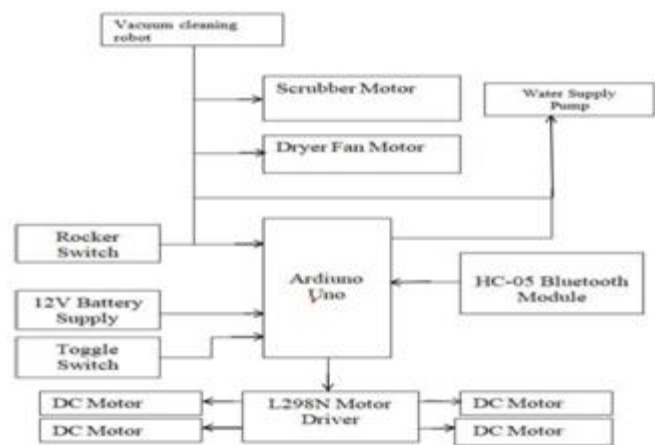
IV. PROPOSED SYSTEM

Fig: Block diagram of bluetooth controlled vaccum cleaning robot

As shown in the figure above this is the system of Bluetooth Controlled Vacuum Cleaning Robot. This system consists of various components such as Arduino Uno, HC-05 Bluetooth Module, Motors, Sensors, and Power Supply. The entire system operates based on inputs received via Bluetooth

using a mobile application. The system will function according to the commands sent from the smart phone.

V. RESULT

The Figure shows the actual Bluetooth Controlled Vacuum Cleaning Robot.

Fig. Actual Vacuum Cleaning Robot

VI. CONCLUSION

1. A vacuum cleaning robot is device designed to clean floors efficiently with minimal human intervention.
2. The design shown to be effective and cost effective.
3. This robot is equipped with various cleaning modes, such as edge cleaning and spot cleaning, and can be controlled via a smart phone app.
4. The waste from the best materials is used to create our project.
5. We employ both wired and wireless power sources.

VII. ACKNOWLEDGEMENT

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