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Smart Mopping Robot

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Abstract: This paper presents a Smart Mopping Robot designed using Arduino Nano, IR sensor, L298N motor driver, and DC motors. The system allows autonomous navigation and cleaning through obstacle detection and intelligent control. It ensures efficient mopping with minimal manual input. When obstacles are detected within 15 cm, the robot changes direction to continue operation.

Keywords: Smart mopping robot, Arduino Nano, L298N, IR Sensor, Autonomous cleaning.

I. INTRODUCTION

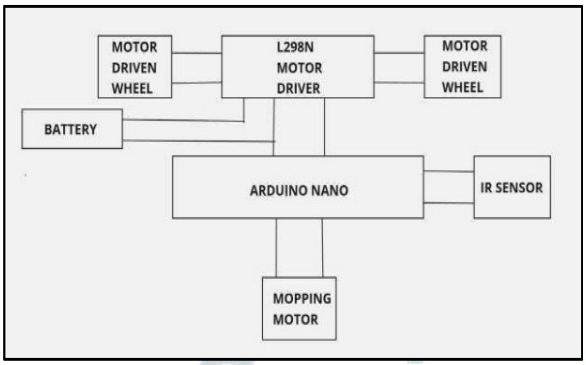
In recent years, smart home technology has revolutionized floor cleaning through innovations such as smart mopping robots. This project implements a mopping robot capable of autonomous navigation using IR sensors and Arduino Nano, powered by 12V DC motors via an L298N motor driver. It enhances cleaning with smart navigation and remote operation.

II. METHODOLOGY

The methodology involves structured steps including environmental scanning via sensors, route planning using SLAM, and motor control.Key components include LIDAR for mapping, IR sensors for obstacle avoidance, and drive motors. The Arduino Nano coordinates all processes.

III. BLOCK DIAGRAM

The block diagram illustrates the control flow of a Smart Mopping Robot using Arduino Nano, L298N motor driver, IR sensor, and dual motor-driven wheels powered by a battery.



IV.IMPLEMENTATION

The robot uses L298N motor driver to control two DC motors for movement. A dedicated motoris used formoppingoperation.IR sensors detect objects, and the Arduino Nano controls decisions based on input data. The robot is capable of navigating and adjusting its path automatically.

V. COMPONENTS

TheL298N motor drivercontrolstwo DC motors with high current rating.The Arduino Nano is a compact microcontroller board for DIY projects.A mopping motor is a compact DC motor for automated cleaning systems.IR sensors detect infrared radiation for motion detection and proximity sensing.These components are used in robotics, automation, and cleaning applications.The L298N provides reliable performance and is easy to use.The Arduino

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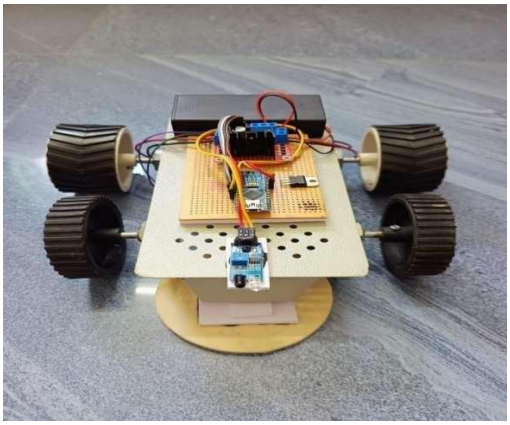
Nano is programmable using the ArduinoIDEandC/C++.Moppingmotorsprovide high torque and efficiency for cleaning robots.IR sensors offer non-contact measurement and high accuracy.These components enable efficient and effective automation and cleaning systems.

VI. EXPERIMENTALSETUP



This image shows a prototype of a Smart Mopping Robot with a 4-wheel chassis. At its center is a perforated platform holding a Arduino Nano, L298N motor driver, IR sensor, and other essential components. The front- mounted IR sensor detects obstacles, enabling autonomous navigation.

VII.RESULTS AND DISCUSSION

Experimental tests showed effective floor cleaning and navigation. On smooth surfaces, the robot took 138 seconds to clean a 1x1m area, and 180 seconds on rough surfaces. Obstacle avoidance and systematic cleaning yielded consistent results.

VIII. CONCLUSION

The Smart Mopping Robot demonstrates the effective use of low-cost electronics and sensors for autonomous floor cleaning. It simplifies household chores and has potential for further enhancement with AI-based features and cloud integration.

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