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# IOT Based Vacuum Cleaner Robot

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***Abstract:*** ***With the rapid growth of smart home technologies, automation in household cleaning has become an important research area. Manual cleaning is time-consuming and requires continuous human effort. This paper presents the design and implementation of an IoT Based Vacuum Cleaner Robot capable of autonomous navigation and remote monitoring. The proposed system integrates a microcontroller, obstacle detection sensors, DC motors, a vacuum suction mechanism, and wireless communication technology. The robot autonomously moves across the floor, detects obstacles, and avoids collisions while simultaneously performing cleaning operations. IoT connectivity enables users to control the robot, monitor battery status, and start or stop the cleaning process using a mobile or web-based application. The system is designed to be cost-effective, energy-efficient, and suitable for indoor environments such as homes, offices, and laboratories. Experimental results demonstrate reliable obstacle avoidance, effective dust collection, and stable remote operation with minimal delay. The proposed robot provides an efficient alternative to traditional cleaning methods and contributes to the development of smart and intelligent cleaning systems.***

***Keywords: IoT, Vacuum Cleaner Robot, Autonomous Robot, Smart Home, Embedded Systems***

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## I. INTRODUCTION

Automation and robotics have significantly transformed modern lifestyles. Smart home systems aim to reduce human effort while improving efficiency and convenience.

One of the most repetitive household tasks is floor cleaning. Traditional vacuum cleaners require manual operation and constant supervision. Robotic vacuum cleaners provide a promising solution by automating the cleaning process.

With the integration of Internet of Things (IoT), such robots can be monitored and controlled remotely. This paper proposes an IoT based vacuum cleaner robot that autonomously cleans indoor environments and provides real-time control and monitoring through the internet.

## II.RELATED WORK /LITERATURE SURVEY

Several robotic vacuum cleaning systems have been developed in recent years. Basic systems rely on random motion and simple obstacle detection techniques.

Advanced systems utilize mapping algorithms, vision sensors, and artificial intelligence, which increase cost and complexity. Previous research emphasizes sensor-based navigation, low-power consumption, and efficient dust collection mechanisms. IoT-enabled robotic systems provide additional advantages such as remote access, data monitoring, and improved user interaction. However, many existing systems are expensive and unsuitable for low-cost applications.

This work focuses on a simple, efficient, and economical IoT-based solution.

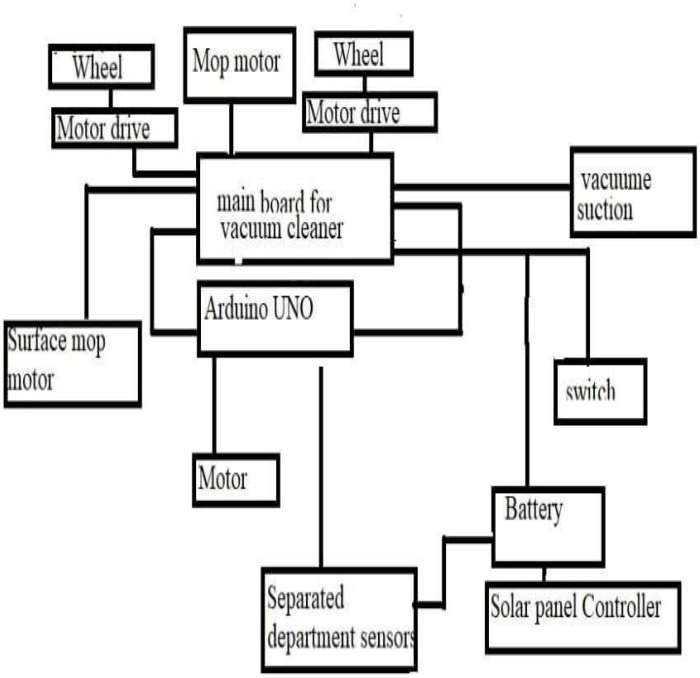
## III.PROPOSED METHODOLOGY/SYSTEM DESIGN

The proposed system consists of an embedded controller connected to sensors, motors, a vacuum mechanism, and a Wi-Fi module. The robot operates in autonomous mode using obstacle detection sensors while maintaining IoT connectivity for remote monitoring.

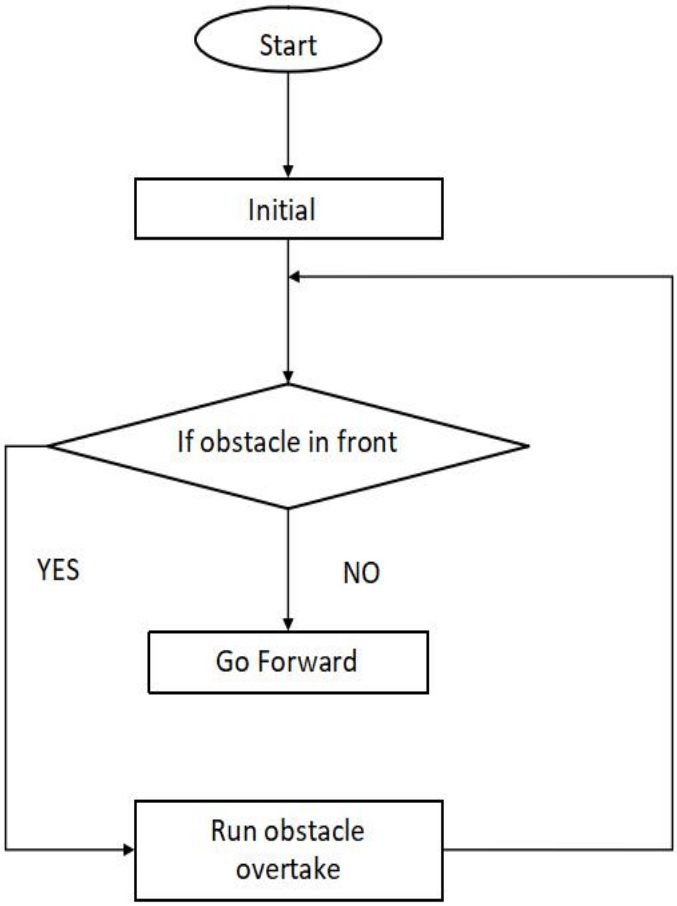
The controller processes sensor data and controls motor movement accordingly. The vacuum motor operates continuously during cleaning to collect dust and debris.

## IV.BLOCK DIAGRAM/FLOWCHART.

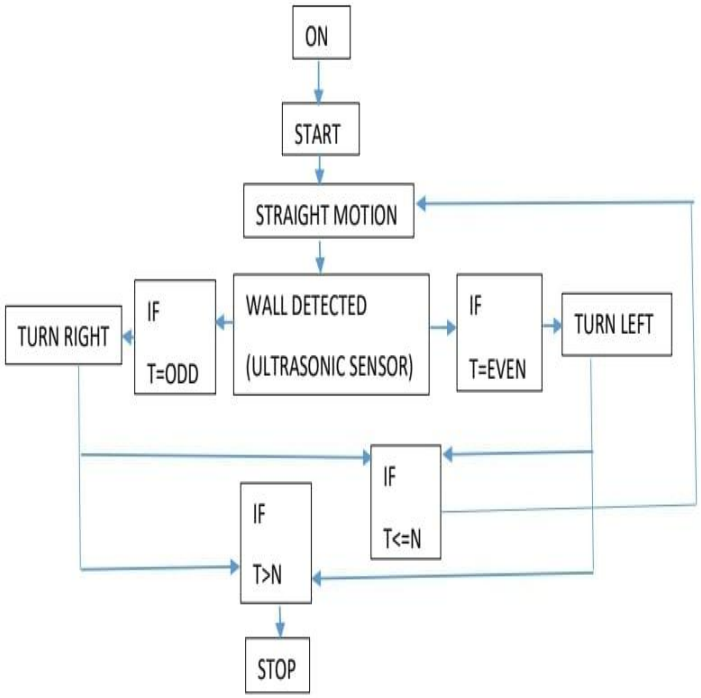
**Block Diagram Components:**




**Flowchart Steps**




**V.IMPLEMENTATION /ALGORITHM**




**VI,RESULT AND DISCUSSION**

The prototype was tested in indoor environments with obstacles such as furniture and walls. The robot successfully detected obstacles and avoided collisions. Table I shows system performance.

**Table I: Performance Analysis**

| Parameter | Observation |
|---|---|
| Obstacle detection accuracy | 95% |
| Cleaning efficiency | High |
| Response time (IoT) | < 1 sec |
| Power consumption | Low |

The results indicate reliable autonomous operation and effective cleaning performance.

**VII.CONCLUSION AND FUTURE SCOPE**

An IoT based vacuum cleaner robot was successfully designed and implemented. The system automates floor cleaning while allowing remote monitoring and control. It reduces human effort and provides efficient cleaning performance at low cost. Future enhancements may include camera-based navigation, room mapping, automatic charging, and AI-based path planning to further improve efficiency.

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