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IOT Based Voice Controlled Mini Car

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Abstract

The Design and Development of an IoT Based Voice Controlled Mini Car project focuses on creating a compact and intelligent robotic vehicle controlled using voice commands through the Internet. The main objective is to design a mini car with a Wi- Fi enabled microcontroller capable of executing movement commands such as forward, backward, left, right, and stop reliably. The system is intended to reduce manual effort and improve efficiency by providing real-time and remote vehicle control. It uses embedded systems, wireless communication, and voice recognition technologies for accurate and fast response. This project demonstrates a cost- effective and practical application of IoT in robotics, automation, and educational prototype development.

I. INTRODUCTION

The Internet of Things (IoT) is a rapidly growing technology that enables devices to communicate and be controlled remotely through the internet. With the advancement of wireless communication and embedded systems, voice-controlled automation has become an important part of modern smart systems. The IoT Based Voice Controlled Mini Car is designed to demonstrate how voice commands can be used to control a robotic vehicle using internet connectivity. This project uses a Wi-Fi enabled microcontroller such as ESP8266 or ESP32, which receives voice commands from a smartphone or voice assistant through an IoT platform. The received commands are processed and used to control DC motors through a motor driver, enabling the car to move in different directions such as forward, backward, left, right, and stop. This eliminates the need for manual remote controllers and provides a more

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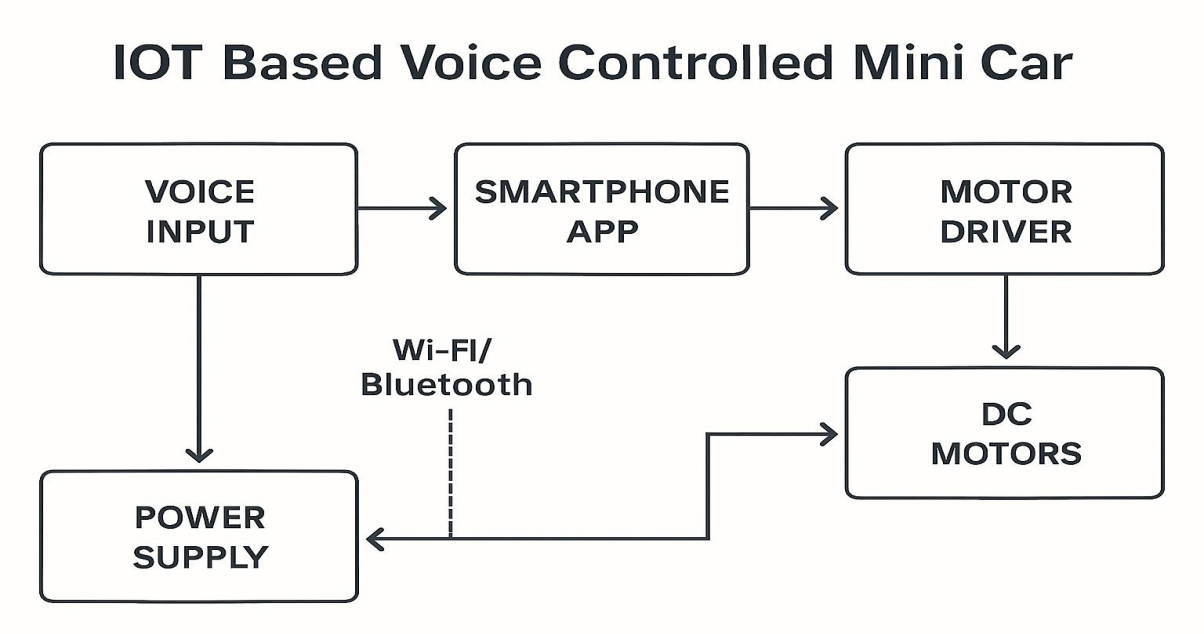
convenient and user-friendly control method. The system integrates voice recognition, wireless communication, and embedded control technologies to achieve real-time operation. It also demonstrates the concept of remote accessibility, allowing users to control the vehicle from any location with internet access. This project is useful for understanding IoT concepts, robotics, and automation systems. The IoT based voice-controlled mini car can be applied in smart vehicles, surveillance robots, and assistive technologies. It serves as an educational prototype that helps students learn about IoT, microcontrollers, and wireless control systems in a practical and effective way.



II.OVERVIEW OF SYSTEM

The IoT Based Voice Controlled Mini Car is a smart robotic vehicle designed to be controlled using voice commands through internet connectivity. It uses a Wi-Fi enabled microcontroller such as ESP8266 or ESP32 to receive commands from a smartphone or voice assistant via an IoT platform. The microcontroller processes the received commands and controls the DC motors through a motor driver to move the car in different directions. This system eliminates the need for manual remote controllers and provides a more convenient and efficient control method. Voice commands are transmitted

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through the internet, allowing real- time and remote operation from any location. The project integrates embedded systems, wireless communication, and voice recognition technologies. It demonstrates the practical application of IoT in robotics and automation systems. This project is useful for educational purposes, prototype development, and understanding modern smart control technologies.

III. PROJECT OBJECTIVES

The main objective of this project is to design and develop an intelligent, efficient, and economical IoT based voice controlled mini car capable of performing directional movements such as forward, backward, left, right, and stop through voice commands. The project aims to reduce manual effort and improve user convenience by eliminating the need for traditional remote controllers and enabling wireless operation through internet connectivity. It also focuses on understanding the working of Wi-Fi enabled microcontrollers, motor driver circuits, DC motors, and IoT communication protocols. Another objective is to design a compact, reliable, and user-friendly system suitable for educational institutions, laboratories, and prototype development. The project further aims to enhance practical skills in system integration, programming, hardware assembly, testing, and troubleshooting of embedded and electronic components.

IV. PROBLEM STATEMENT

In many educational institutions, research laboratories, and prototype development environments, robotic vehicles are commonly controlled using manual remote controllers or wired systems. These traditional control methods limit flexibility, require close-range operation, and do not provide smart or remote accessibility. Manual control systems also lack integration with modern technologies such as voice recognition and internet-based communication. Existing smart robotic systems available in the market are often expensive and complex, making them unsuitable for small-scale learning and experimentation purposes. There is a need for a compact, low-cost, and intelligent robotic

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vehicle that can be controlled remotely using voice commands through internet connectivity. Therefore, the problem is to design and develop an IoT based voice controlled mini car that reduces manual control effort, enhances user convenience, and provides reliable real-time operation using wireless communication and embedded systems technology.

V. METHODOLGY

The methodology of the IoT Based Voice Controlled Mini Car begins with selecting the required hardware components such as ESP8266/ESP32 microcontroller, motor driver (L298N), DC motors, chassis, and power supply. The hardware components are assembled properly by connecting the microcontroller to the motor driver and motors. The microcontroller is programmed using Arduino IDE to receive and process commands through Wi-Fi communication. An IoT platform such as Blynk or a voice assistant application is configured to convert voice commands into digital signals. These signals are transmitted through the internet to the microcontroller. The microcontroller processes the received commands and sends control signals to the motor driver. The motor driver controls the direction and movement of the DC motors accordingly. The system is tested to ensure proper response to voice commands such as forward, backward, left, right, and stop. Necessary troubleshooting and adjustments are made to improve performance and reliability. Finally, the complete system is evaluated for efficiency, responsiveness, and proper functionality.

HARDWARE USED: -

Sr. No	Component Name	Rating / Specification	Qty
1	ESP8266 NodeMCU ESP32	3.3V Logic, Wi-Fi Enabled	01
2	Motor Driver	5V–35V, Dual H-	01

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	Module (L298N)	Bridge	
3	DC Gear Motor	6V–12V DC, 100–300 RPM	02
4	Robot Chassis	Acrylic/Plastic, 2-Wheel/4-Wheel	01
5	Wheels	Compatible with DC Motors	02
6	Castor Wheel	Support Wheel	01
7	Battery	7.4V Li-ion / 9V Battery	01
8	Battery Holder	7.4V / 9V Compatible	01
9	Connecting Wires	Male-to-Male / Female Jumper	As required
10	Breadboard (Optional)	Standard	01
11	Switch	12V DC	01
12	Smartphone	Android with Voice Assistant	01

VI. RESULT

The IoT Based Voice Controlled Mini Car was successfully designed, assembled, and tested to perform movements based on voice commands. The microcontroller was able to receive commands through the IoT platform using Wi-Fi connectivity without any delay. The system responded accurately to voice instructions such as forward, backward, left, right, and stop. The motor driver effectively controlled the DC motors according to the received signals. The wireless communication between the smartphone and the vehicle was stable and reliable. The car demonstrated smooth movement and proper directional control during testing. The system operated efficiently using the provided power supply without major issues. The integration of voice recognition and IoT technology

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was successfully achieved. The project met its objective of reducing manual control effort and improving user convenience. Overall, the developed system proved to be effective, reliable, and suitable for educational and prototype applications.

VII. CONCLUSION

- The IoT Based Voice Controlled Mini Car was successfully designed and implemented using embedded and wireless communication technologies.
- The system effectively executed movement commands through voice input with reliable and real-time response.
- Integration of Wi-Fi enabled microcontroller and motor driver ensured smooth and accurate vehicle control.
- The project reduced manual effort and demonstrated a user-friendly method of robotic control using IoT.
- Overall, the system proved to be cost-effective, efficient, and suitable for educational and automation applications.

VIII. REFERENCES

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