

Voice controlled robot

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Abstract— This paper presents the design and implementation of a Bluetooth-based voice controlled robot using Arduino. The system enables users to control a robotic vehicle through voice commands given via a smartphone application. The commands are transmitted wirelessly using a Bluetooth module (HC-05) to the Arduino microcontroller, which processes the input and controls the motors through an L298N motor driver. The robot uses N20 motors for movement. In addition, a separate Bluetooth module (BT kit) is used to establish communication with the mobile device and support auxiliary components such as a speaker. The robot can perform basic operations such as forward, backward, left, and right movements. This project demonstrates the integration of wireless communication and human-machine interaction. It can be applied in assistive technologies, automation, and remote-controlled robotic systems.

Index Terms— Arduino, Bluetooth, Voice Control, Robotics, Wireless Communication, L298N Motor Driver, N20 Motors

I. INTRODUCTION

Robotics is an important field in modern technology that combines electronics, control systems, and programming. With the advancement of wireless communication, controlling robotic systems has become more efficient and user-friendly. Voice-controlled robots provide a convenient way for humans to interact with machines using simple voice commands.

This project focuses on the design and implementation of a Bluetooth-based voice controlled robot using Arduino. The system uses a smartphone application to convert voice commands into signals, which are transmitted via Bluetooth. An HC-05 Bluetooth module is used to send commands to the Arduino for controlling the robot's movement through an L298N motor driver. Additionally, a separate Bluetooth module (BT kit) is used to interface with the mobile device and support audio output through a speaker.

The robot is capable of performing basic movements such as forward, backward, left, and right based on

user commands. This project demonstrates the practical application of wireless communication and control systems in robotics.

System design:

A. Hardware Components

The hardware components used in this project include Arduino UNO as the main controller, HC-05 Bluetooth module for receiving control commands, L298N motor driver for controlling motor operations, and N20 motors for robot movement. In addition, a separate Bluetooth module (BT kit) is used for interfacing with the mobile device and supporting audio output through a speaker. A battery is used to provide power supply to the entire system.

B. Software Requirements

The software requirements for this project include Arduino IDE for programming the microcontroller and a mobile application for voice command input. The application converts voice commands into signals that are transmitted via Bluetooth to the system.

Working principle:

The working of the system is based on wireless communication using Bluetooth technology. The user provides voice commands through a mobile application, which converts speech into corresponding control signals. These signals are transmitted via Bluetooth to the HC-05 module connected to the Arduino.

The Arduino microcontroller receives the commands and processes them to generate appropriate control signals for the L298N motor driver. Based on the received command, the motor driver controls the direction of the N20 motors, allowing the robot to move forward, backward, left, or right.

In addition, a separate Bluetooth module (BT kit) is used to interface with the mobile device and handle audio output through a speaker. Thus, the system integrates voice input, wireless communication, and motor control to achieve the desired operation.

Circuit description:

The circuit consists of an Arduino UNO, HC-05 Bluetooth module, L298N motor driver, N20 motors, and a separate Bluetooth module (BT kit). The HC-05 module is connected to the Arduino to receive control signals from the mobile application via Bluetooth communication. The received signals are processed by the Arduino to control the movement of the robot.

The L298N motor driver is interfaced with the Arduino digital pins to control the direction and operation of the motors. The N20 motors are connected to the output terminals of the motor driver. The enable pins of the driver are used to control motor speed if required.

The separate Bluetooth module (BT kit) is connected to a power supply and is used to interface with the mobile device for audio output through a speaker. A battery is used to provide power to the entire system, and proper grounding is maintained to ensure stable operation.

Wireless power transfer system mainly consists of transmitter circuit, receiver circuit and magnetic coupling between coils.

Advantages:

The proposed system offers several advantages. It provides wireless control of the robot using Bluetooth communication, making it easy to operate without physical connections. The use of voice commands makes the system user-friendly and convenient. The design is simple and cost-effective, using easily available components. The system is flexible and can be modified for various applications.

Additionally, the use of separate modules for control and audio interfacing improves functionality and system organization.

Applications:

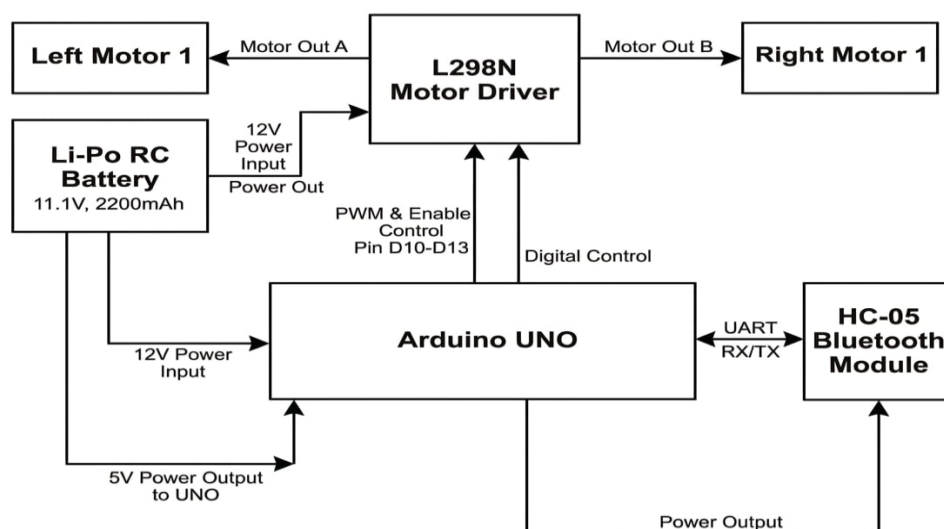
The proposed system can be used in various applications such as assistive robotic systems for physically challenged individuals, home automation and smart control systems, and basic industrial automation for material handling.

Limitations:

The proposed system has certain limitations. The operation of the robot depends on the Bluetooth range, which restricts control to a limited distance. The system requires clear voice commands for proper functioning, and background noise may affect performance. Additionally, the robot does not have autonomous capabilities and operates only based on user input.

Conclusion:

The project successfully demonstrates the design and implementation of a Bluetooth-based voice controlled robot using Arduino. The system enables wireless control of the robot through voice commands using a mobile application. The integration of HC-05 and a separate Bluetooth module (BT kit) allows effective communication and audio interfacing. The use of L298N motor driver and N20 motors ensures proper movement of the robot. This project highlights the practical application of wireless communication and control systems in robotics.

Circuit diagram:

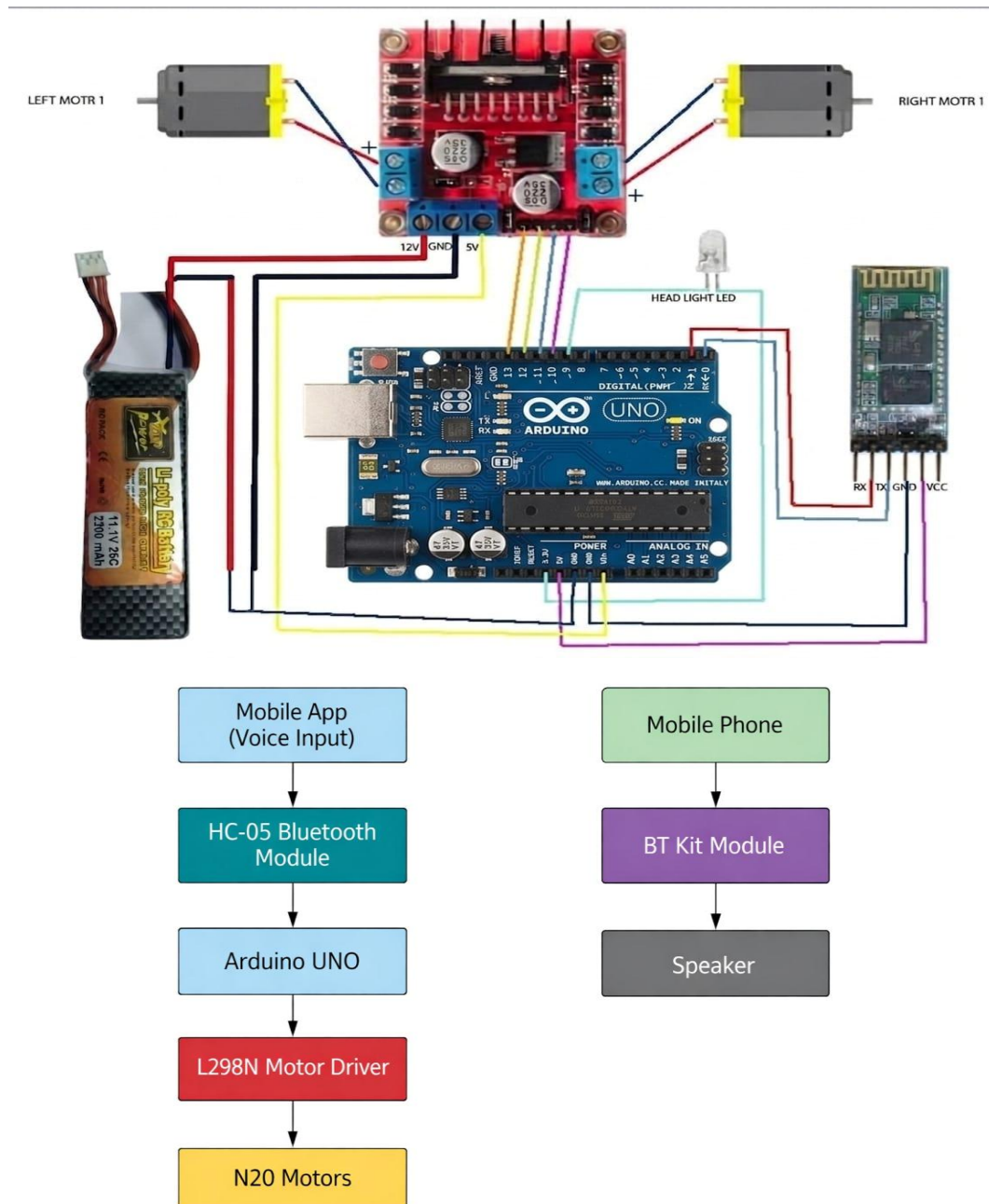


Fig. 1. Block Diagram of the System

II. RESULT

The developed system was tested under various conditions to evaluate its performance. The robot successfully responded to voice commands such as forward, backward, left, and right through the mobile application. The Bluetooth communication between the mobile device and the system was stable within the specified range.

The HC-05 module effectively transmitted control signals to the Arduino, while the L298N motor driver ensured proper operation of the N20 motors. The

separate Bluetooth module (BT kit) successfully interfaced with the mobile device and supported audio output through a speaker.

Overall, the system performed as expected, demonstrating reliable wireless control and smooth movement of the robot.



Electronics and Informatics, 2024. Available:
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III. CONCLUSION

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