NFC-IET, Multan

BSAI-2k24

Project Proposal

CodingMoves-RCPlus

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Abstract

This project presents the development of an IoT-based remote-controlled (RC) car using the ESP-12 (ESP8266) Wi-Fi module. The system enables wireless control of the car through a mobile phone interface designed in HTML. Users can navigate the car forward, backward, left, and right using steering control on the mobile interface, which communicates with the ESP-12 through Wi-Fi. This project combines elements of Internet of Things (IoT), embedded systems, and web development, offering an engaging and hands-on approach to learning modern wireless communication, mobile-based device control, and hardware interfacing.

Introduction

Wireless control and automation are becoming key components in modern smart systems. In this project, we design and implement an IoT-based RC car that can be controlled remotely through a mobile phone using a custom-designed HTML interface. The ESP-12 microcontroller serves as the core of the system, enabling Wi-Fi communication and GPIO control. This prototype simulates real-world applications in IoT, such as smart vehicles and remote robotics, making it an ideal project for students and enthusiasts aiming to explore embedded systems and wireless technologies.

Objectives

- To build an IoT-enabled RC car using the ESP-12 Wi-Fi module.
- To create a mobile-friendly HTML interface for controlling the car.
- To implement real-time communication between the car and a smartphone using Wi-Fi.
- To enhance understanding of IoT, embedded systems, and basic electronics.

Components Required

- ESP-12 (ESP8266) Wi-Fi Module
- L298N Motor Driver Module
- DC Motors with Wheels (x4)
- Lithium-ion Battery or Power Supply
- Jumper Wires and Breadboard (or custom PCB)
- Smartphone (with HTML interface loaded)
- Chassis for car body

Working Principle

The ESP-12 hosts a web server that serves a locally accessible HTML page through Wi-Fi. When a user connects their smartphone to the ESP-12 network, they can access the control interface. Button clicks on the interface (e.g., Forward, Backward, Left, Right) send HTTP requests to the ESP-12. The module interprets these requests and activates the corresponding GPIO pins to control the motor driver (L298N), moving the car in the desired direction. This setup provides an efficient and cost-effective method to wirelessly control hardware using IoT concepts.

Methodology

WiFi-Setup
- ESP-12 create local WiFi network for connection.

Mobile Interface Access
- User opens the HTML control page in a browser.

User Input
- Button presses on the page trgger movement commands.

HTTP Request Handling
- ESP-12 receives & processes control commands.

Motor Driver Activation
- GPIO pins control the l298N motor driver accordingly.

Car Moves
- The RC car moves in the selected direction.

Time Line

Week	Activities

Week 1 : Study of ESP-12 module, motor driver, and circuit design

Week 2 : Breadboard implementation and ESP8266 (Micro Python/C++) coding

Week 3 : Testing movement controls via mobile interface and improving responsiveness

Week 4 : Final car assembly, mobile interface polishing, and report/documentation preparation

Conclusion

This project successfully demonstrates how IoT and embedded systems can be used to build a mobile-controlled RC car using the ESP-12 Wi-Fi module. It integrates wireless control, HTML-based interface design, and hardware interfacing into a functional prototype. Such systems lay the foundation for future applications in smart vehicles, home automation, and remote robotics, offering practical insight into real-world IoT solutions.

References

- **YouTube Video (Basic Concept):** (https://youtu.be/gU-CZP2nIwQ?si=nWQ2JBPl1zxwM_1u)
- **ESP8266 (ESP-12) Documentation:** (https://docs.espressif.com/projects/esp8266/en/latest)
- **Arduino IDE with ESP8266:** (https://arduino-esp8266.readthedocs.io/)

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