ESP8266 Autonomous Car Project

Project Overview

This project is an Autonomous Car controlled by an ESP8266 Wi-Fi module and L298N motor drivers.

The car moves forward and automatically avoids obstacles using an ultrasonic sensor when 'Autonomous Mode' is activated.

A web-based control panel allows users to:

- Enable/Disable Autonomous Mode
- See real-time distance readings from the ultrasonic sensor.

How It Works

1. When 'Autonomous Mode' is OFF:
   - The car remains stopped.
   - The web interface still updates the distance sensor readings.

2. When 'Autonomous Mode' is ON:
   - The car moves forward.
   - If an obstacle is detected (less than 20cm away):
     - The car stops
     - Moves backward for a short time
     - Turns right
     - Continues moving forward

3. Web Interface (192.168.4.1):
   - Shows real-time distance sensor readings (updates every 100ms).
   - Includes a button to toggle 'Autonomous Mode' ON/OFF.
   - Uses AJAX technology for fast and smooth updates without reloading the page.

Hardware Components

1. ESP8266 NodeMCU - Main microcontroller, handles Wi-Fi and control logic.
2. L298N Motor Driver (x2) - Controls four DC motors.
3. DC Motors (x4) - Two on the left (connected together), one front-right, one back-right.
4. Ultrasonic Sensor (HC-SR04) - Measures distance for obstacle detection.
5. Power Supply - Battery pack for motors, ESP8266 powered via USB.

How to Set Up

1. Upload the code to the ESP8266 using the Arduino IDE.

2. Connect to the Wi-Fi hotspot created by the ESP8266 ('ESP8266_Car').

3. Open a web browser and go to '192.168.4.1'.

4. Press the button to enable/disable 'Autonomous Mode'.

Final Notes

- The web interface updates in real-time every 100ms for fast response.

- The car reacts instantly to obstacles, avoiding collisions.

- The project demonstrates IoT-based robotics with a simple Wi-Fi control system.

This project is designed for hands-on learning in embedded systems, IoT, and robotics.