

## # ESP32 Internet-Controlled Car with LCD Text Display

### ## Introduction

This project demonstrates how to create an ESP32-based internet-controlled car using a web interface. The system allows the user to control the car via Wi-Fi using a joystick-style web page. Additionally, the user can input text through the web interface, which is displayed on an I2C LCD mounted on the car. This makes the system interactive and enhances usability.

### ## Objectives

- Control a car wirelessly using Wi-Fi.
- Create a web-based joystick controller.
- Display user-input text on an LCD screen.
- Provide options to add and clear text from the web interface.

### ## Components Required

- ESP32 DevKit V1
- L298N Motor Driver
- 2 DC Motors
- HC-05 Bluetooth Module (optional for alternate control)
- I2C 16x2 LCD Display
- Battery Pack (9V/12V for motors)
- Jumper Wires
- USB Data Cable (for ESP32 programming)

### ## Wiring Guide

#### ### ESP32 to L298N Motor Driver

ESP32 Pin	L298N Pin
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19	IN1
21	IN2
22	IN3
5	IN4
18	ENA
23	ENB
GND	GND

#### ### ESP32 to I2C LCD

LCD Pin	ESP32 Pin
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VCC   5V
GND   GND
SDA   GPIO 21
SCL   GPIO 22

## ## Web Interface Features

- Joystick-style buttons for movement
- Add Text input box
- Clear Text button
- Mobile-friendly responsive layout

## ## ESP32 Code Summary

The ESP32 hosts a web server where users can control the car and send text to the LCD. The code handles:

- Wi-Fi connection
- Web server setup
- Car movement functions
- LCD text display functionality

## ## Usage Instructions

1. Upload the program to the ESP32.
2. Open Serial Monitor to find the IP address.
3. Enter the IP address in a mobile browser.
4. Use joystick buttons to control the car.
5. Type text in the input box to display on the LCD.
6. Press \*\*Clear Text\*\* to remove text from the LCD.

## ## Observations

- ESP32 is efficient in hosting web pages.
- I2C LCD provides useful feedback for the user.
- System can be expanded with ESP32-CAM for live video.

## ## Future Enhancements

- Add speed control via PWM slider.
- Add phone tilt control using gyroscope.
- Streaming camera view using ESP32-CAM.
- Full mobile joystick with drag movement.

## ## Conclusion

This project successfully demonstrates web-based remote control using ESP32 along with real-time LCD text display. It is ideal for IoT learning, robotics, and automation applications.