

# Bluetooth Controlled Car Using Arduino

## Project Overview

A **Bluetooth-controlled car** is a wireless robot that can be driven using a **smartphone app** via **Bluetooth communication**. The car responds to commands like **forward, backward, left, right, and stop** using an **HC-05 Bluetooth module**, an **Arduino**, and an **L298N motor driver**.

## Objectives

- ✓ **Control a car wirelessly using a smartphone and Bluetooth.**
- ✓ **Process Bluetooth commands on Arduino.**
- ✓ **Drive DC motors with an L298N motor driver.**
- ✓ **Create a simple smartphone app for easy control.**

## Components Required

1. **Arduino Uno** – Main microcontroller.
2. **HC-05 Bluetooth Module** – Wireless communication.
3. **L298N Motor Driver Module** – Controls the motors.
4. **DC Motors (2x)** – Drives the car.
5. **Wheels & Chassis** – Robot body structure.
6. **12V Battery or Power Bank** – Power source.
7. **Jumper Wires & Breadboard** – For connections.

## How the System Works

1. The **Bluetooth module (HC-05)** receives commands from a smartphone via a **Bluetooth app** (like "Bluetooth Terminal" or a custom app).
2. The **Arduino processes the commands** and controls the **motor driver** accordingly.
3. The **L298N motor driver** controls the **DC motors** for movement in different directions.
4. The car moves based on the received commands:
  - **"F"** → Move **Forward**
  - **"B"** → Move **Backward**
  - **"L"** → Turn **Left**
  - **"R"** → Turn **Right**
  - **"S"** → **Stop**

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## Circuit Diagram

### Bluetooth Module HC-05 to Arduino

#### HC-05 Pin Arduino Pin

VCC	5V
GND	GND
TXD	RX (D0)
RXD	TX (D1)

### L298N Motor Driver to Arduino

L298N Pin	Arduino Pin	Function
IN1	D4	Left motor forward
IN2	D5	Left motor backward
IN3	D6	Right motor forward
IN4	D7	Right motor backward
ENA (PWM)	D9	Left motor speed
ENB (PWM)	D10	Right motor speed
VCC	12V Battery	Motor power
GND	GND	Ground connection

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## Arduino Code for Bluetooth Controlled Car

```
#include <SoftwareSerial.h>

SoftwareSerial BT(0, 1); // RX, TX for Bluetooth Module

#define motorA1 4
#define motorA2 5
#define motorB1 6
#define motorB2 7

void setup() {
  pinMode(motorA1, OUTPUT);
  pinMode(motorA2, OUTPUT);
  pinMode(motorB1, OUTPUT);
  pinMode(motorB2, OUTPUT);

  BT.begin(9600); // Start Bluetooth communication
  Serial.begin(9600); // Start serial monitor
}
```

```
void loop() {
  if (BT.available()) { // If data is received from Bluetooth
    char command = BT.read();
    Serial.println(command); // Print command for debugging

    if (command == 'F') {
      moveForward();
    } else if (command == 'B') {
      moveBackward();
    } else if (command == 'L') {
      turnLeft();
    } else if (command == 'R') {
      turnRight();
    } else if (command == 'S') {
      stopCar();
    }
  }
}

void moveForward() {
  digitalWrite(motorA1, HIGH);
  digitalWrite(motorA2, LOW);
  digitalWrite(motorB1, HIGH);
  digitalWrite(motorB2, LOW);
}

void moveBackward() {
  digitalWrite(motorA1, LOW);
  digitalWrite(motorA2, HIGH);
  digitalWrite(motorB1, LOW);
  digitalWrite(motorB2, HIGH);
}

void turnLeft() {
  digitalWrite(motorA1, LOW);
  digitalWrite(motorA2, HIGH);
  digitalWrite(motorB1, HIGH);
  digitalWrite(motorB2, LOW);
}

void turnRight() {
  digitalWrite(motorA1, HIGH);
  digitalWrite(motorA2, LOW);
  digitalWrite(motorB1, LOW);
  digitalWrite(motorB2, HIGH);
}

void stopCar() {
  digitalWrite(motorA1, LOW);
  digitalWrite(motorA2, LOW);
  digitalWrite(motorB1, LOW);
  digitalWrite(motorB2, LOW);
}
```

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## How to Use the Bluetooth Controlled Car

1. **Assemble the car** with the Bluetooth module and motor driver connected.
2. **Upload the code** to the Arduino using the Arduino IDE.
3. **Install a Bluetooth controller app** on your smartphone (e.g., "Bluetooth Terminal" or a custom-built app).
4. **Pair the HC-05 module** with your smartphone via Bluetooth settings (PIN: **1234** or **0000**).
5. Open the **Bluetooth app** and connect to HC-05.
6. Send the commands to control the car:
  - **"F" → Forward**
  - **"B" → Backward**
  - **"L" → Left**
  - **"R" → Right**
  - **"S" → Stop**

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## Features & Benefits

- ✓ **Wireless control** via Bluetooth.
- ✓ **Simple and efficient movement logic.**
- ✓ **Easy to assemble and modify.**
- ✓ **Compatible with Android apps.**
- ✓ **Can be upgraded with sensors for autonomous driving.**

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## Future Enhancements

**Add obstacle detection** using an ultrasonic sensor.  
**Use a smartphone app with a graphical joystick.**  
**Implement speed control with PWM.**  
**Integrate Wi-Fi (ESP8266) for IoT control.**  
**Use a camera for FPV (First-Person View) driving.**