
Lab name : Introduction to Integrated Robotic Car System

Description : This lab focuses on understanding the integration of various components required to build a functional robotic car. Throughout the session, participants will learn to program the car's movement, control sensors, and manage power systems. **Key learning objectives include:** **Sensor Integration:** Participants will configure and calibrate sensors like ultrasonic and infrared to help the car navigate obstacles. **Motor Control:** Detailed programming of motor movements allows the robotic car to achieve complex movement patterns, including turns and speed adjustments. **Microcontroller Programming:** The microcontroller acts as the car's "brain," enabling control over inputs and outputs to achieve autonomous operation. By the end of this lab, students will have a functional model that can navigate a basic track autonomously.

Level : easy

Lab Guide : Basic Assembly and Motor Control

Objective:

Familiarize with assembling the robotic car chassis and programming basic motor control for forward and backward movement.

Materials Needed:

- Robotic car chassis
- Motors with driver module (e.g., L298N)
- Microcontroller (e.g., Arduino Uno or similar)
- Battery pack
- Jumper wires

Steps:

1. Assemble the Chassis:

- Attach wheels and motor mounts to the chassis as instructed in your kit.
- Ensure the motors are securely fastened to avoid movement issues.

2. Connect Motors to Motor Driver:

- Attach each motor to the motor driver module, connecting the motor's output pins to the motor driver's OUT pins.
- Connect the motor driver's power and ground pins to the microcontroller's corresponding pins.

3. Program Basic Motor Control:

- Write a simple Arduino code to control the motor movement. Use the code below to make the car move forward.

```
CODE (C++)
const int motorPin1 = 3;
const int motorPin2 = 4;
```

```
void setup() {
    pinMode(motorPin1, OUTPUT);
    pinMode(motorPin2, OUTPUT);
}

void moveForward() {
    digitalWrite(motorPin1, HIGH);
    digitalWrite(motorPin2, LOW);
}

void moveBackward() {
    digitalWrite(motorPin1, LOW);
    digitalWrite(motorPin2, HIGH);
}

void stopCar() {
    digitalWrite(motorPin1, LOW);
    digitalWrite(motorPin2, LOW);
}

void loop() {
    moveForward();
    delay(2000);
    stopCar();
    delay(1000);
    moveBackward();
    delay(2000);
    stopCar();
    delay(1000);
}
```

- **Testing:**

- Power on the robotic car and upload the code.
 - Verify the forward, stop, and backward movements are functioning as expected.
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