NAVODAYA INSTITUTE OF TECHNOLOGY, RAICHUR

DEPARMENT OF COMPUTER SCIENCE & ENGINEERING

IOT Lab

Program - 04

04 Develop a program to control a DC motor with Arduino board

🔧 Components Required

- Arduino Uno (or any compatible board)
- 1 × DC motor
- 1 × Motor driver IC/module (L293D, L298N, or an H-bridge module — **never connect motor directly to Arduino pin**)
- External power supply for motor (e.g., 6V or 9V battery pack, depending on motor rating)
- Breadboard + jumper wires

⚡ Why use a motor driver?

Arduino pins can supply **only ~40mA current**, while motors need much more.
A driver like **L293D / L298N** acts as an interface, allowing Arduino to safely control direction and speed.

🔌 Circuit Connections (Example: L293D driver IC)

Motor connections

- Motor → L293D pin 3 (OUT1) and pin 6 (OUT2)

Control signals from Arduino

- Arduino D8 → L293D pin 2 (IN1)
- Arduino D9 → L293D pin 7 (IN2)
- Arduino D10 (PWM) → L293D pin 1 (Enable1, ENA)

Power

- L293D pin 16 → 5V (logic supply)
- L293D pin 8 → External motor supply (e.g., 6–12V, depending on motor)
- All grounds (Arduino GND, L293D GND, motor power GND) → common

---

🧠 Logic of the Program

1. **ENA (Enable)** controls motor **speed** using `analogWrite()` (PWM).
2. **IN1 / IN2** decide **direction**:
   - IN1 = HIGH, IN2 = LOW → Motor forward
   - IN1 = LOW, IN2 = HIGH → Motor reverse
   - Both LOW → Motor stop

🖥 Arduino Program (DC Motor with L293D)

```
// Pin definitions
int ENA = 10;  // PWM pin for speed control
int IN1 = 8;   // Motor driver input 1
int IN2 = 9;   // Motor driver input 2

void setup() {
 pinMode(ENA, OUTPUT);
 pinMode(IN1, OUTPUT);
 pinMode(IN2, OUTPUT);
}

void loop() {
 // Motor Forward
 digitalWrite(IN1, HIGH);
 digitalWrite(IN2, LOW);
 analogWrite(ENA, 200);  // Speed (0-255)
 delay(3000);

 // Stop
 digitalWrite(IN1, LOW);
 digitalWrite(IN2, LOW);
 delay(2000);

 // Motor Reverse
 digitalWrite(IN1, LOW);
 digitalWrite(IN2, HIGH);
 analogWrite(ENA, 150);  // Lower speed
 delay(3000);

 // Stop
 digitalWrite(IN1, LOW);
 digitalWrite(IN2, LOW);
 delay(2000);
}
```

✏️ Steps to Perform the Experiment

1. Connect the **motor, driver IC, and Arduino** as described.
2. Upload the sketch from Arduino IDE.
3. Observe the motor:
    o Runs **forward** at speed ~200 PWM for 3 seconds.
    o Stops for 2 seconds.
    o Runs **reverse** at speed ~150 PWM for 3 seconds.
    o Stops again.
4. Repeat in loop.
5. Try changing the `analogWrite(ENA, value)` (0–255) to control speed.