

3.5 Interfacing of DC Motor and Relay

3.5.1. Interfacing a DC Motor with Arduino

A **DC motor** requires more current than an Arduino can supply, so we use a **motor driver IC** (L293D, L298N) or a **transistor** to control it.

Circuit Components

- **Arduino Uno**
- **DC Motor**
- **L298N Motor Driver Module / L293D Motor Driver IC / NPN Transistor (e.g., TIP120)**
- **Power Supply (9V or 12V for motor)**
- **Diode (1N4007) - for protection**
- **Resistor (1k Ω) - if using transistor**

Code for Controlling DC Motor

```
int motorPin1 = 9;
int motorPin2 = 10;

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

void loop() {
  digitalWrite(motorPin1, HIGH);
  digitalWrite(motorPin2, LOW);
  delay(2000); // Run motor for 2 sec

  digitalWrite(motorPin1, LOW);
  digitalWrite(motorPin2, LOW);
  delay(2000); // Stop motor for 2 sec

  digitalWrite(motorPin1, LOW);
  digitalWrite(motorPin2, HIGH);
  delay(2000); // Reverse direction for 2 sec

  digitalWrite(motorPin1, LOW);
  digitalWrite(motorPin2, LOW);
  delay(2000); // Stop motor
}
```

Explanation:

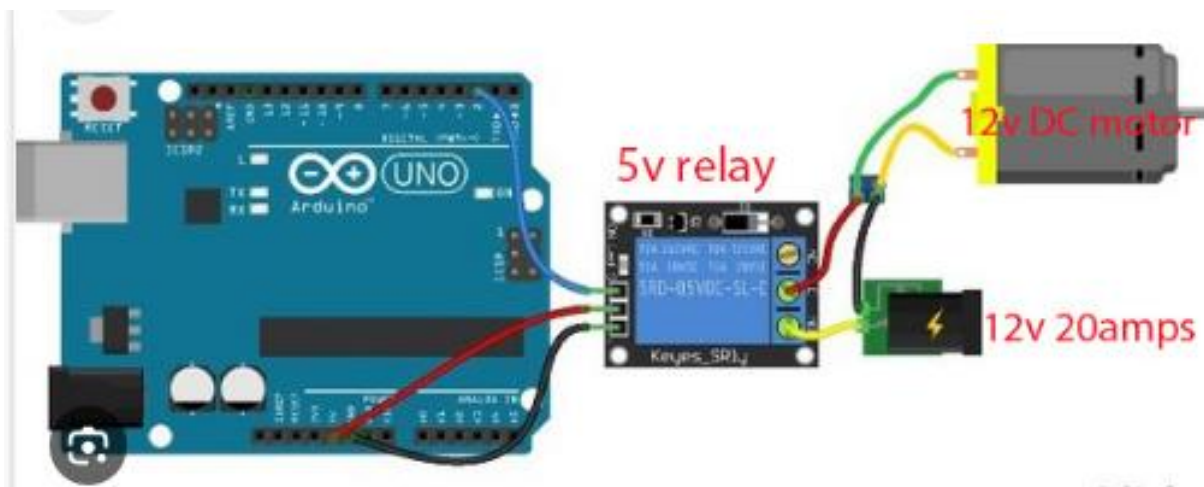
- Turns the **DC motor ON**, stops it, and then **reverses the direction** every 2 seconds.

3.5.2. Interfacing a Relay with Arduino

A **relay** is an electrically operated switch that allows **Arduino to control high-voltage appliances** (like a bulb or fan) with a small signal.

Circuit Components

- **Arduino Uno**
- **Relay Module (5V)**
- **NPN Transistor (BC547 / 2N2222)**
- **Diode (1N4007) - for protection**
- **Resistor (1k Ω)**
- **AC Load (Bulb, Fan, etc.)**

Circuit Diagram**Code for Controlling a Relay**

```
int relayPin = 8;

void setup() {
  pinMode(relayPin, OUTPUT);
}
```

```
void loop() {  
  digitalWrite(relayPin, HIGH); // Turn ON relay  
  delay(5000); // Keep it ON for 5 sec  
  digitalWrite(relayPin, LOW); // Turn OFF relay  
  delay(5000); // Keep it OFF for 5 sec  
}
```

Explanation:

- The **relay turns ON** for **5 seconds**, then **turns OFF** for **5 seconds**.
- Used to **control high-voltage appliances** using Arduino.

Applications of DC Motor & Relay with Arduino**DC Motor:**

- Robotics & Automation
- Conveyor Belts
- Smart Fans

Relay:

- Home Automation (Control lights, fans, etc.)
- Industrial Applications
- Smart IoT Systems