

Group – 11

Soumava Paul 16EE10056

Yerramsetty Rohit 16EE10055

Experiment 8

Aim:

- Interfacing a DC motor driver (L293D)
- Driving a DC motor-based fan using the motor driver
- Controlling the fan motor speed using PWM sent from PC via serial monitor
- Controlling the fan motor speed based on temperature sensing with LM35

Theory:

A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver act as an interface between Arduino and the motors. The most commonly used motor driver IC's are from the L293 series such as L293D, L293NE, etc. These ICs are designed to control 2 DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor. L293D has 16 pins.

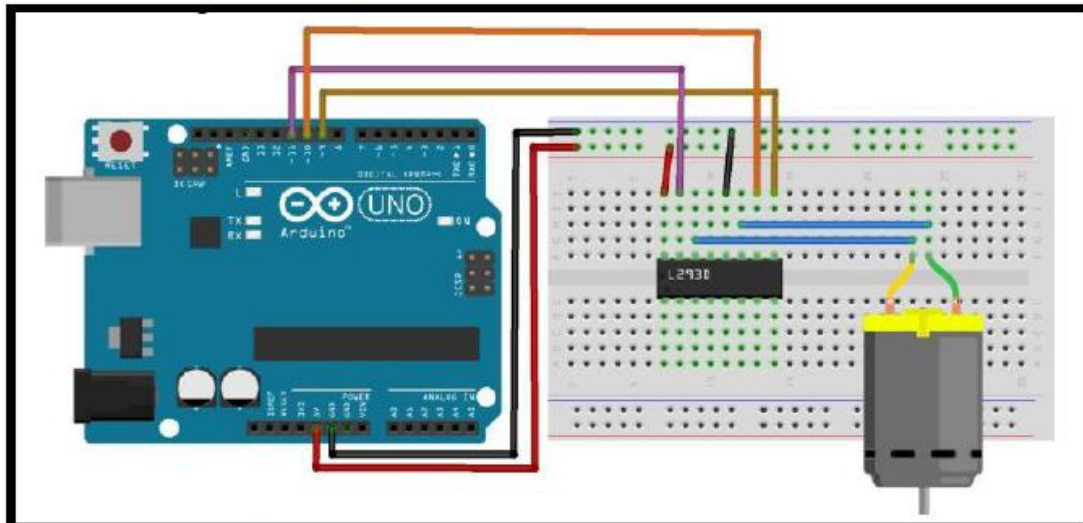
Apparatus Required:

- Arduino Uno Board
- PC with Arduino installed
- Motor driver IC -L293D
- DC Motor
- Temperature Sensor LM35

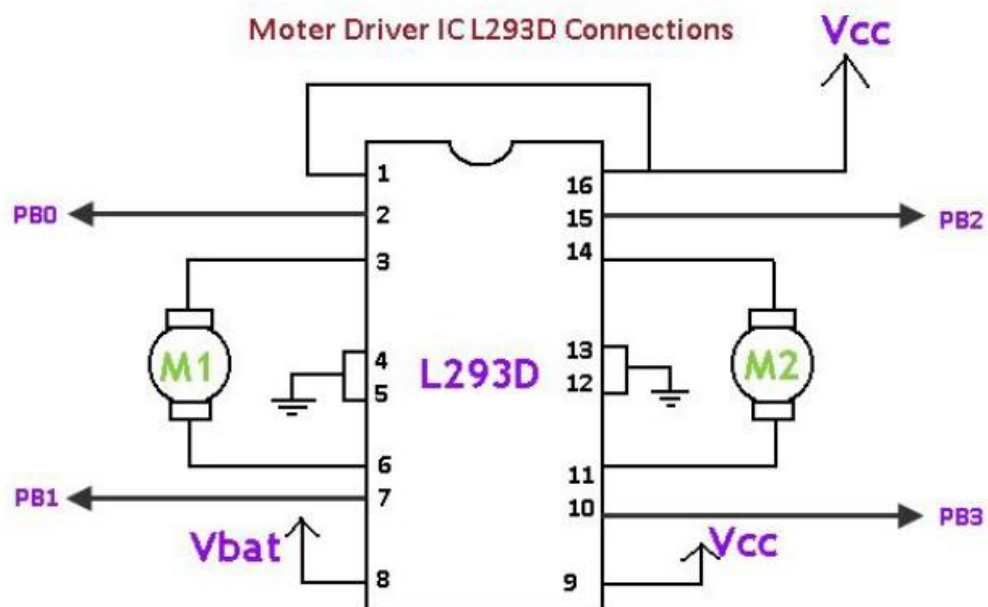
Procedure:

- We connect the circuit as shown in the figure with the addition of power supply on all the Vcc terminals and Ground as well.
- Serial.print and Serial.begin were incorporated and presence was displayed on serial monitor.
- Using Serial Monitor as input, we decide the speed of the motor fans.
- The speed fed as numbers is taken input as characters.
- LM35 is used as a temperature sensor and based on the temperature we decide certain span range for this sensor and appropriately decide the speed.

Circuit Diagram:



Motor Driver IC L293D Connections



Interfacing a DC motor driver (L293D) and driving a DC motor-based fan

Code

L293D_Interfacing

```
#include <AFMotor.h> //Import Motor.h Library

AF_DCMotor motor(1);

void setup() {
  Serial.begin(9600); // Open Serial communication at baud rate 9600 bps
  Serial.println("Testing the Motor");

  motor.setSpeed(200); // Set the motor speed at 200 to 255 PWM
}

void loop() {
  Serial.println("Turning Backward");
  motor.run(BACKWARD); // the other way
  delay(4000); // delay at 1 second
  // Serial.println("Turning Forward");
  // motor.run(FORWARD); // the other way
  // delay(4000); // delay at 1 second
  Serial.println("Release or Stop");
  motor.run(RELEASE); // Motor will stop
  delay(4000); // delay at 1 second
}
```

Controlling the fan speed using PWM sent from PC via Serial Monitor

Code

L293D_PWM

```
#include <AFMotor.h> //Import Motor.h Library

AF_DCMotor motor(1);

void setup() {
  Serial.begin(9600); // Open Serial communication at baud rate 9600 bps
  Serial.println("Testing the Motor");

  motor.setSpeed(200); // Set the motor speed at 200 to 255 PWM
}

void loop() {
  // Read any serial input
  if (Serial.available() > 0) {
    int m_speed = Serial.readStringUntil('\n').toInt();
    Serial.println("New speed : ");
    Serial.print(m_speed);
    motor.setSpeed(m_speed);
  }

  Serial.println("Turning Backward");
  motor.run(BACKWARD);
  delay(10000);
}
```

Controlling the fan speed based on temperature sensing by LM35

Code

LM35_L293D

```
#include <AFMotor.h> //Import Motor.h Library
int lmPin = A1;
AF_DCMotor motor(1);
void setup() {
    Serial.begin(9600); // Open Serial communication at baud rate 9600 bps
    // Serial.println("Testing the Motor");
    motor.setSpeed(100); // Set the motor speed at 200 to 255 PWM
}

float tempC(){
    float raw = analogRead(lmPin); //
    float percent = raw/1023.0; //
    float volts = percent*5.0; //
    return 100.0*volts; //
}

void loop() {
    // Read any serial input
    Serial.println(tempC());
    if (tempC() > 28.0){
        int m_speed = 200;
        Serial.println("High Temperature, Increasing Speed.");
        motor.setSpeed(m_speed);
    }
    else{
        int m_speed = 100;
        Serial.println("Normal Temperature, Maintaining Speed at 100");
        motor.setSpeed(m_speed);
    }

    // Serial.println("Turning Backward");
    motor.run(BACKWARD);
    delay(1000);
}
```

Conclusion

DC motor requires high power to drive, an Arduino board cannot provide sufficient power for the same. So, we have to use an additional driver IC L293D. It is capable of driving two dc motors at a time. The rotating speed of the DC motor was controlled using both serial monitor and temperature sensor by interfacing it with L293D and temperature sensor LM35. The IC is used as a regulator to control multiple DC motors in action and it is important to note that we need to supply power to all the power terminals for even one of the motors to work. The serial monitor takes input as ASCII characters so if we want to enter a specific speed above 9, we need to form a string by concatenating the characters and converting them into integers.