# Introduction

The L293D is a high voltage, high current, 4 channel single integrated motor drive, designed to connect standard DTL or TTL logic level, drive inductive loads (such as relay coil, DC and stepper motor) and switching power transistors, etc. In order to simplify the application of the double bridge, each channel of the L293D is equipped with an enable input. L293D logic circuit with independent power supply can work at lower voltage. In addition, the L293D also features a built-in clamping diode.

L293D is suitable for switching applications with frequencies up to 5 kHz.

Pin Description
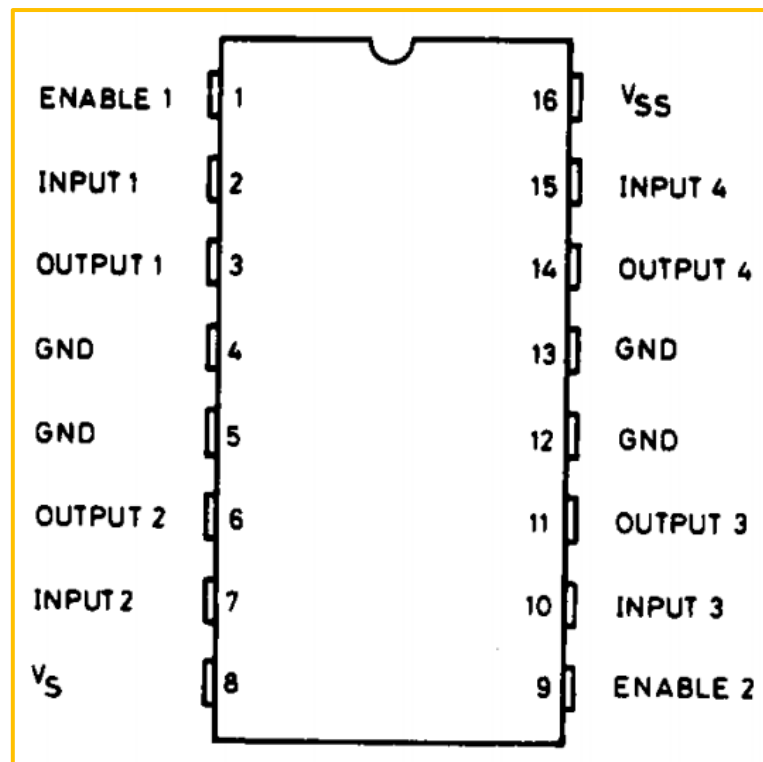
L293D Features

L293D current output capacity is up to 600 mA per channel

L293D peak output current is up to 1.2 A per channel (non repetitive)

Easy to enable

L293D has over temperature protection

Logic "0" input voltage is up to 1.5 V (high noise immunity)

Built-in clamping diode

Working Principle

L293D uses a 16 pin DIP package, it internally integrates the bipolar H- bridge circuit, all the opening are made into type n. The bipolar pulse width modulation mode has many advantages, such as continuous current; motor operating four quadrant; micro oscillating current when the motor stops, playing a "dynamic lubricant" role; the stability, the low speed, etc. L293D generates an enable signal through an internal logic. The input of the H-bridge circuit can be used to set the direction of rotation of the motor, the enable signal can be used to adjust the pulse width (PWM). In addition, two H-bridge circuit is integrated into the one chip, which means that the chip can control 2 motors at the same time. Each motor requires 3 control signals, EN12, IN1 and IN2, in which the EN12 is enable signal, IN1 and IN2 are motor rotation direction control signal. When IN1 and IN2 are respectively 1 and 0, the motor is rotating positively, otherwise, the motor is rotating negatively. Selecting a PWM to connect the EN12 pin, the motor speed can be adjusted by adjusting the duty cycle of PWM. Selecting a I/O port to connect the IN1 and IN2 pins through the reverser 74HC14 so as to control the positive and negative rotation of the motor.

Experiment Purpose

The aim is to introduces how to use L293D module to realize the positive and negative rotation of motor.

Component List

◆ Arduino Nano mainboard

◆ Breadboard

◆ USB cable

◆ L293D drive*1

◆ 4N35 Optocoupler*1

◆ DC motor*1

◆ fan blade*1

◆ Some wires

Wiring of Circuit

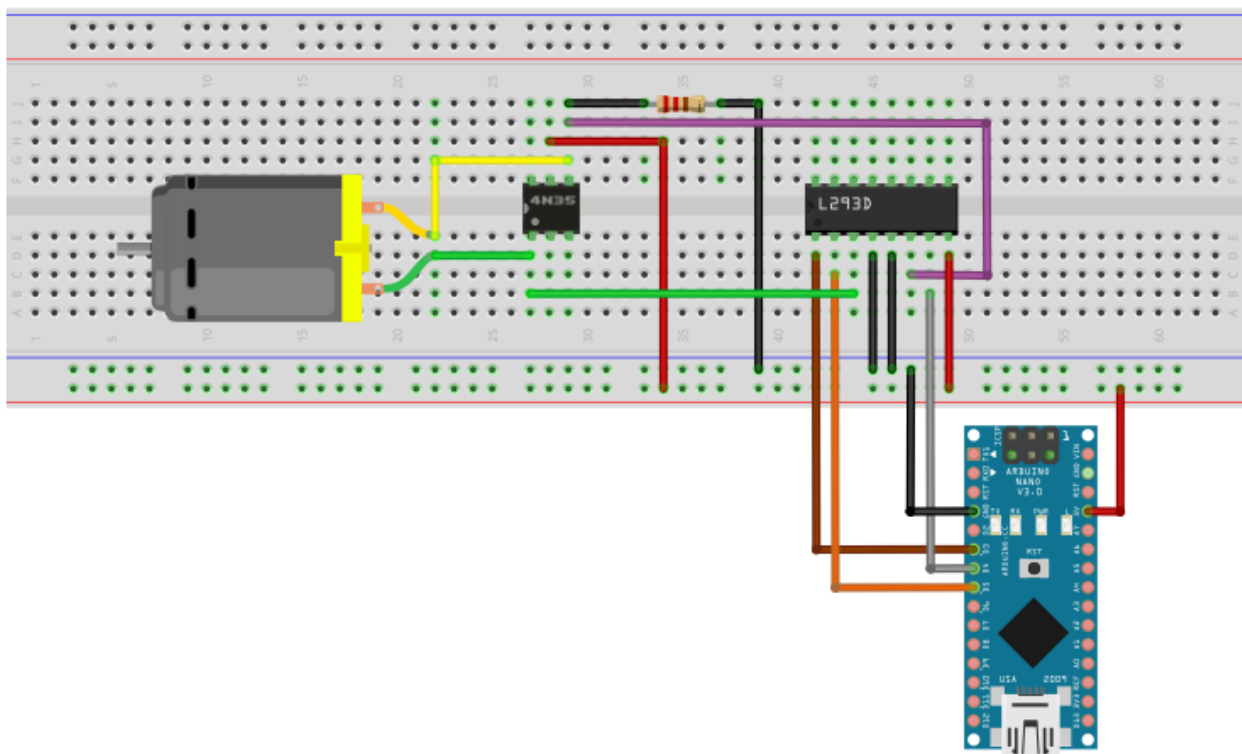| Arduino Nano	L293D
3	1

5	2
GND	4
GND	5
4	7
+5V	8

DC motor	4N35
+5V	2
GND	5

L293D	4N35
3	1
6	4

s

Code

```
#define ENABLE 3
#define DIRB 4
#define DIRA 5
int i;

void setup() {
  //---set pin direction
  pinMode(ENABLE,OUTPUT);
  pinMode(DIRA,OUTPUT);
  pinMode(DIRB,OUTPUT);
 Serial.begin(115200);
}

void loop() {
  //---back and forth example
Serial.println("One way, then reverse");
  digitalWrite(ENABLE,HIGH); // enable on
  for (i=0;i<5;i++) {
    digitalWrite(DIRA,HIGH); //one way
    digitalWrite(DIRB,LOW);
    delay(500);
    digitalWrite(DIRA,LOW);  //reverse
    digitalWrite(DIRB,HIGH);
    delay(500);
  }
  digitalWrite(ENABLE,LOW); // disable
  delay(4000);
```

```
Serial.println("fast Slow example");
  //---fast/slow stop example
  digitalWrite(ENABLE,HIGH); //enable on
  digitalWrite(DIRA,HIGH); //one way
  digitalWrite(DIRB,LOW);
  delay(1000);
  digitalWrite(ENABLE,LOW); //slow stop
  delay(3000);
  digitalWrite(ENABLE,HIGH); //enable on
  digitalWrite(DIRA,HIGH); //one way
  digitalWrite(DIRB,LOW);
  delay(1000);
  digitalWrite(DIRA,LOW); //fast stop
  delay(3000);

//Serial.println("PWM full then slow");
  //---PWM example, full speed then slow
  digitalWrite(ENABLE,HIGH); //enable on
  digitalWrite(DIRA,HIGH); //one way
  digitalWrite(DIRB,LOW);
  delay(2000);
  analogWrite(ENABLE,128); //half speed
  delay(2000);
  digitalWrite(ENABLE,LOW); //all done
  delay(10000);
}
```

Experiment Result