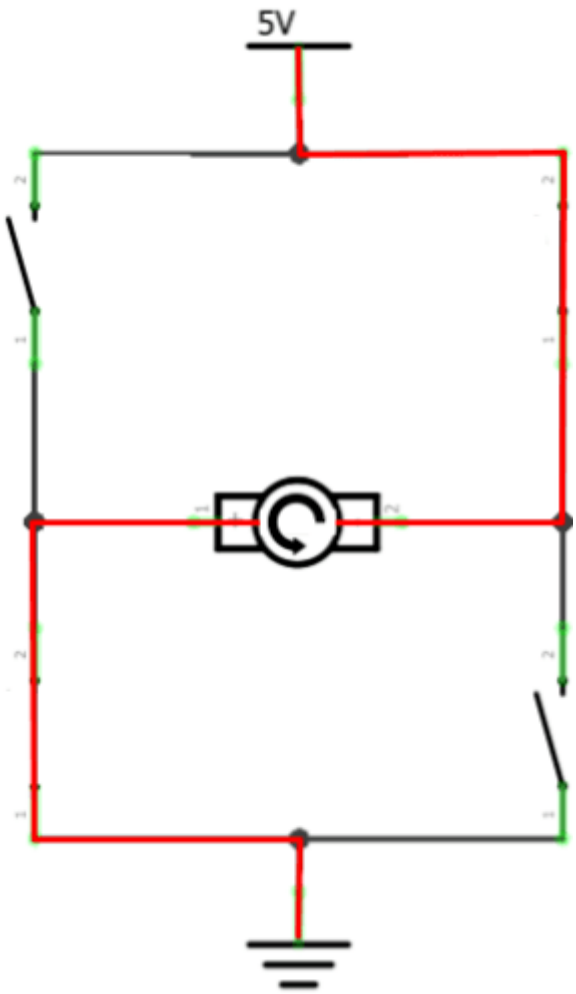
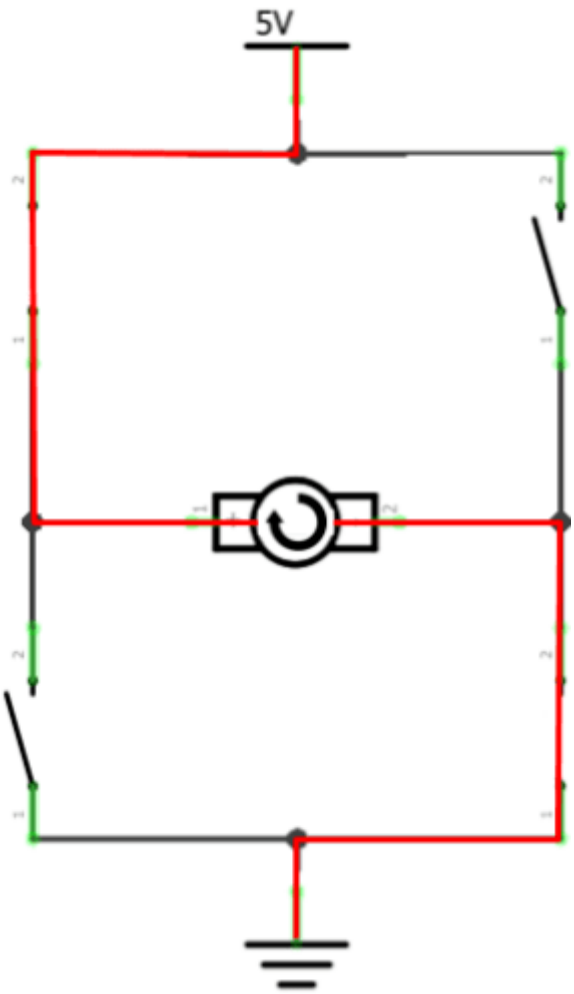
L293D Motor Driver with Arduino

Driving a Motor with Arduino

A good way to control a motor is to use an H-bridge. This is a type of circuit that allows you to reverse the current flow of the motor, therefore giving you direction control.

An H-bridge contains four switches and a motor at the center, forming an H-like shape. Turning any two of the switches on reverses the motor's current, which can change its direction.

Direction 1	Direction 2
	

The L293D has two of these H-bridges inside it, allowing you to control up to two DC motors or one stepper motor.

L293D Pinout

Pin	Pin name
1	Enable 1
2	Input 1

Pin	Pin name
3	Output 1
4	GND
5	
6	Output 2
7	Input 2
8	V_{CC2}
9	Enable 2
10	Input 3
11	Output 3
12	GND
13	
14	Output 4
15	Input 4
16	V_{CC1}

The pins with names containing the same numbers form a single channel in the L293D that can control one motor.

Each pin type has a specific function:

- Enable pins turn the motor on/off and control its speed.
- Input pins control the direction of the motor.
- Output pins connect to the motor to drive it.
- GND pins are ground connection pins.
- Pin 8 is the motor power connection.
- Pin 16 is the IC power connection.

Controlling L293D

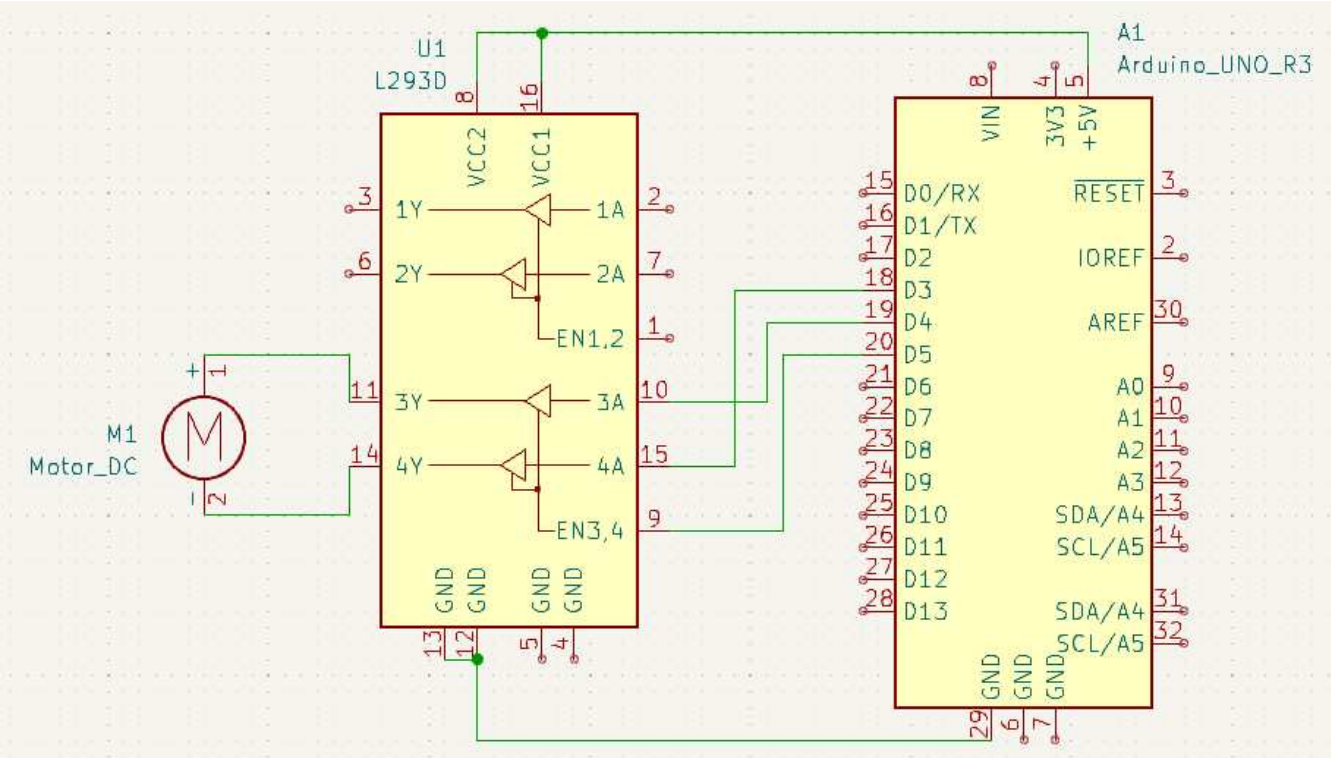
The Enable pins turn their motors on/off. A HIGH state enables the motor; a LOW state disables it. You can also send PWM signals to control motor speed. A duty cycle of 0% stops the motor; a duty cycle of 100% runs the motor at full speed.

The input pin pairs of the H-bridge control the direction of their motor. If input A is high and input B is low, the motor spins one direction. If input A is low and input B is high, the motor spins in the opposite direction. If the inputs' states are the same, the motor stops.

H-Bridge control summary:

Input (Enable, In A, In B)	Motor Direction/Speed
0, any, any	Stopped
1, 1, 1	Stopped
1, 1, 0	Direction 1
1, 0, 1	Direction 2
1, 0, 0	Stopped
PWM, any, any	Varied speed

Schematic



Example Code

```
// Define pin constants
#define EN  5
#define IN1 4
#define IN2 3

boolean isReversed = false;

void setup() {
  // Configure pins as output
  pinMode(EN,  OUTPUT);
  pinMode(IN1, OUTPUT);
  pinMode(IN2, OUTPUT);
}
```

```
void loop() {
  for (int i = 0; i < 256; i++) {
    // Increment the speed from 0 to 255
    setMotorSpeed(i, isReversed);
    delay(10);
  }

  delay(3000); // Run at full speed for 3 seconds

  for (int i = 255; i > 0; i--) {
    // Decrement the speed from 255 to 0
    setMotorSpeed(i, isReversed);
    delay(10);
  }

  // Stop the motor and wait a little bit
  stopMotor();
  delay(2000);
  isReversed = !isReversed; // Reverse the motor
}

// Motor control functions

void setMotorSpeed(int speed, boolean reverse) {
  // Set the speed of the motor.
  analogWrite(EN, speed);
  digitalWrite(IN1, reverse);
  digitalWrite(IN2, !reverse);
}

void stopMotor() {
  // Stop the motor.
  analogWrite(EN, 0);
  digitalWrite(IN1, LOW);
  digitalWrite(IN2, LOW);
}
```