# DC Motor Control

DC motors follow a very simple working principle: lead current through one, and it will rotate. The direction of rotation depends on the direction of the current, and the rotation speed depends on the pulse width of the current.  The stepper motor should be connected via an external driver (e.g L298N motor driver) to the Arduino board in order to provide enough current to the motor.

**Before Setup:**
No libraries needed, but depending on your circuit the amount of pins needed may vary. While you can build a circuit that simply turns a motor on or off with only one pin, if you want speed and direction control you're going to need a motor driver, which requires two pins.

```
const byte dirPin = 8;  //Pin for controlling direction
const byte speedPin = 9; //Should be a PWM pin for speed control
```

**In Setup:**

```
void setup() {
  pinMode(dirPin, OUTPUT);
  pinMode(speedPin, OUTPUT);
}
```

**After this, you can use e.g the following methods:**

```
digitalWrite(dirPin, HIGH/LOW);   //For direction control
digitalWrite(speedPin, HIGH/LOW); //For simple drive/stop control
analogWrite(speedPin, speed);     //For precise speed control
```

**Good to know:**

- Do not drive the motor directly from Arduino board pins, this may damage the board.
- Motors require a certain pulse width to start turning, so `analogWrite()` values under 100 might not have any effect. Clever usage of the map function can be helpful. `map(speed, minSpeed, maxSpeed, minWorkingSpeed, maxWorkingSpeed)`

- Quickly changing the direction of rotation at high speeds drains a lot of current. Therefore it is advised to decelerate or stop before going the other direction.
- For more convenient control, and some quality-of-life improvements, libraries like DC_Motor.h may be nice to use. Found in this article.

**Examples:**

```
//In this example the DC motor is programmed to first rotate to
//one direction for 3 seconds, pause for 1 second, rotate to the
//other direction for 3 seconds and then pause for 1 second. This
//is repeated infinitely in the loop. By analogWriting the value
//255 we are driving the motor with full speed.

const byte dirPin = 8;
const byte speedPin = 9; //Should be a PWM pin for speed control

void setup() {
   pinMode(dirPin, OUTPUT);
   pinMode(speedPin, OUTPUT);
}

void loop() {
   digitalWrite(dirPin, HIGH); //Forward
   analogWrite(speedPin, 255);
   delay(3000);

   digitalWrite(speedPin, LOW); //Stop
   delay(1000);

   digitalWrite(dirPin, LOW); //Reverse
   analogWrite(speedPin, 255);
   delay(3000);

   digitalWrite(speedPin, LOW); //Stop
   delay(1000);
}
```