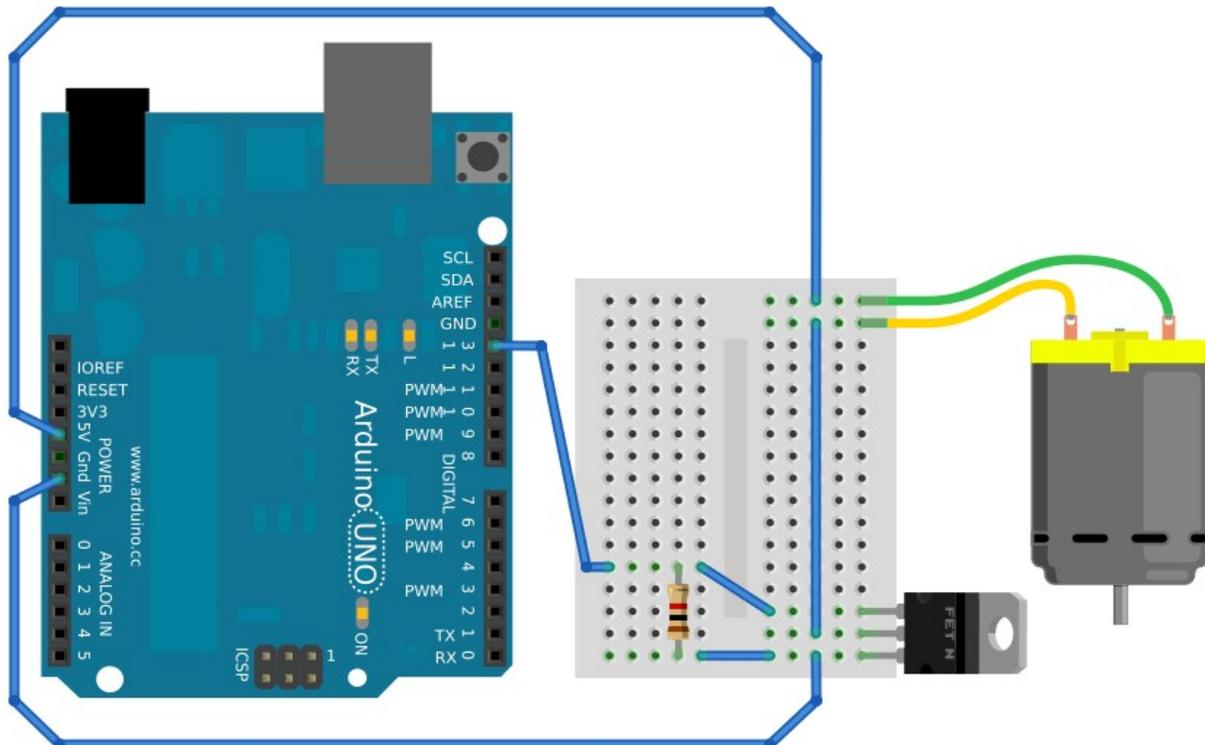


Motor

- this is for motors small enough to be powered from the on-board 5V source on the Arduino board.
- digital outputs can only provide 20mA (constant, 40mA briefly) on the Arduino board, making it necessary to use a transistor to amplify the signal and switch the motor
- the transistor used in this example is a MOSFET, N-Channel type, Model 75321 (provided in kit)
- use a breadboard for connecting all parts to your Arduino
- **use the software sketch “blink” for testing:** The motor should turn on and off in synch with the LED on pin 13

To understand why the resistor is needed, try this:

- power down
- detach the jumper wire from pin 13
- take out the resistor
- power up. The motor should be OFF.
- momentarily connect the jumper you took from pin 13 to the 5V from your Arduino: Motor ON!
- now, when you take the jumper away from the 5V, the motor ...keeps running! Why? Because to turn it off, the resistor is needed to drain the tiny electric charge from the gate of the MOSFET to the ground. Without resistor, the charge stays, and the MOSFET does not turn off the motor for a long time.



Use this circuit only with the program “blink” or in programs that turn the motor “on” and “off”. Do not use it with code like the one shown on the next page, which operates the output in [PWM](#) mode. For PWM on inductive loads like motors or solenoids, you need an additional diode working as a snubber. [Read here](#) why. (technically, this circuit would need a snubber, too, but survives without because of the low incidence of voltage spikes – only one every so often)

Sample Code: using a knob (potentiometer) to change motor speed

- The circuit for this setup **is not shown in this document**, but you can watch [this video](#) about it.

Attention: Do not run the circuit without a diode (available from the “Extras” bins) as shown in the video, or the MOSFET transistor will be destroyed.

```
// running a motor at speeds set by a potentiometer

int motor = 9;
int potentiometer = 5;

void setup(){
  pinMode(9,OUTPUT);
  pinMode(5,INPUT);

  Serial.begin(9600);
}

void loop(){
  int value = analogRead(potentiometer);
                                     //read input value: range between (0,1023)
  int motor_speed = value/4;
                                     //PWM can only ouput 255 different values

  analogWrite(motor,motor_speed);

  Serial.println(motor_speed);//for testing purposes
}
```

Source:

<http://www.instructables.com/id/PWM-with-Arduino-step-by-step-guide/>