ARDUINO RELAY TUTORIAL

INTRODUCTION

We can control high voltage electronic devices using relays. A Relay is actually a switch which is electrically operated by an electromagnet. The electromagnet is activated with a low voltage, for example 5 volts from a microcontroller and it pulls a contact to make or break a high voltage circuit.
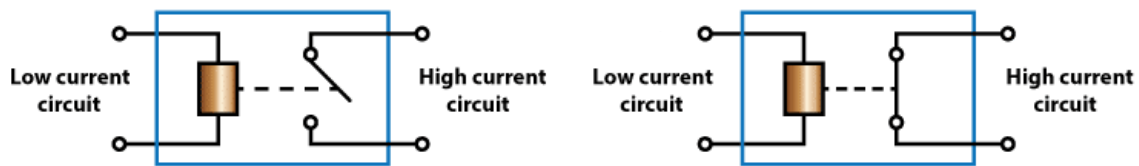

Figure 1. Deactivated Relay and Activated Relay

RELAY MODULE

As an example for this Arduino Relay Tutorial we will use the HL-52S 2 channel relay module, which has 2 relays with rating of 10A @ 250 and 125 V AC and 10A @ 30 and 28 V DC. The high voltage output connector has 3 pins, the middle one is the common pin and as we can see from the markings one of the two other pins is for normally open connection and the other one for normally closed connection.

On the other side of the module we have these 2 sets of pins. The first one has 4 pins, a Ground and a VCC pin for powering the module and 2 input pins In1 and In2. The second set of pins has 3 pins with a jumper between the JDVcc and the Vcc pin. With a configuration like this the electromagnet of the relay is directly powered from the Arduino Board and if something goes wrong with the relay the microcontroller could get damaged.
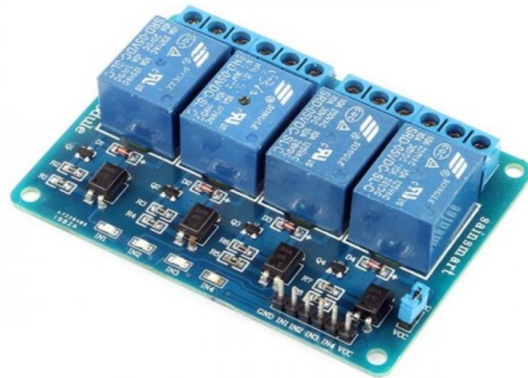

Figure 2. Relay used in the garage

CIRCUIT SCHEMATIC

For better understanding let's see the circuit schematics of the relay module in this configuration. So, we can see that the 5 volts from our microcontroller connected to the Vcc pin for activating the relay through the Optocoupler IC are also connected to the JDVcc pin which powers the electromagnet of the relay. So, in this case we got no isolation between the relay and the microcontroller.
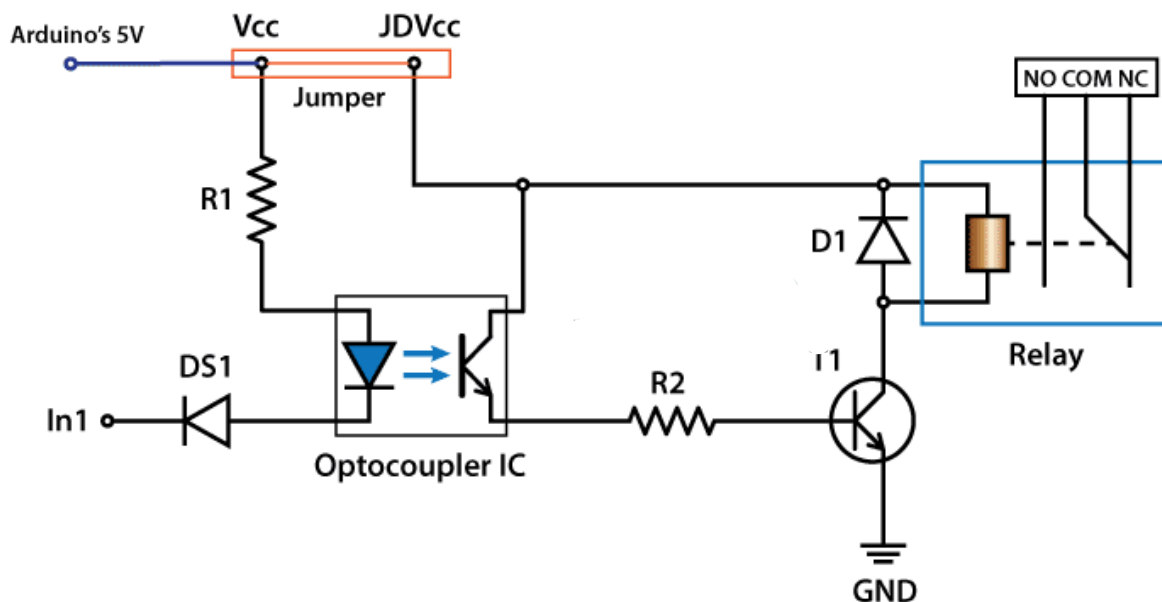

Figure 3. Circuit Schematic 1

In order to isolate the microcontroller from the relay, we need to remove the jumper and connect separate power supply for the electromagnet to the JDVcc and the Ground pin.

Now with this configuration the microcontroller doesn't have any physical connection with the relay, it just uses the LED light of the Optocoupler IC to activate the relay.
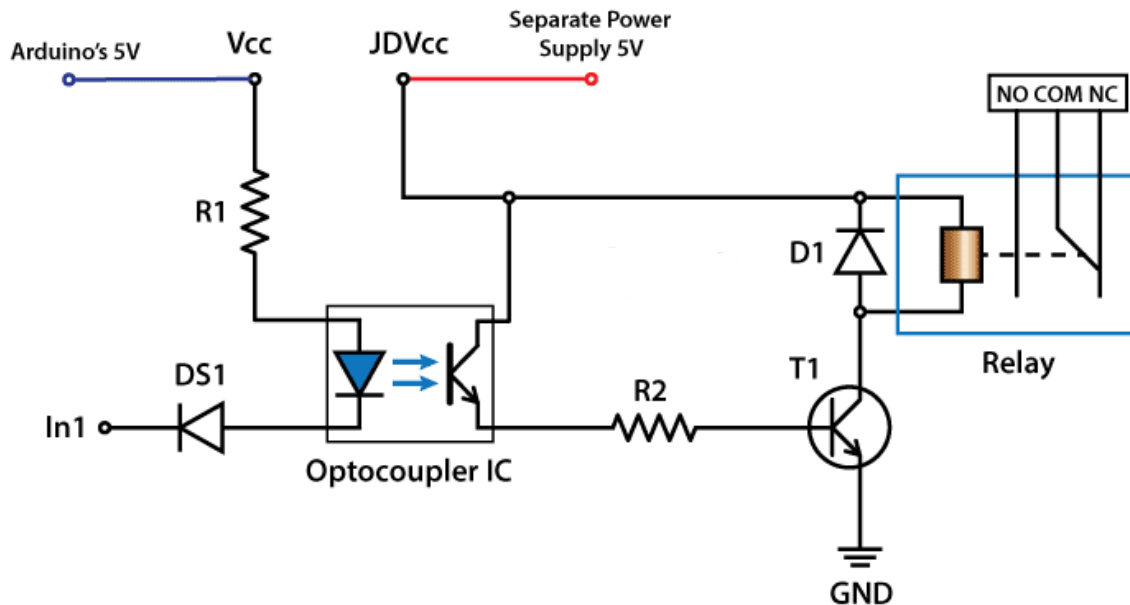

Figure 4. Circuit Schematic 2

There is one more thing to be noticed from this circuit schematics. The input pins of the module work inversely. As we can see the relay will be activated when the input pin will be LOW because in that way the current will be able to flow from the VCC to the input pin which is low or ground, and the LED will light up and active the relay. When the input pin will be HIGH there will be no current flow, so the LED will not light up and the relay will not be activated.
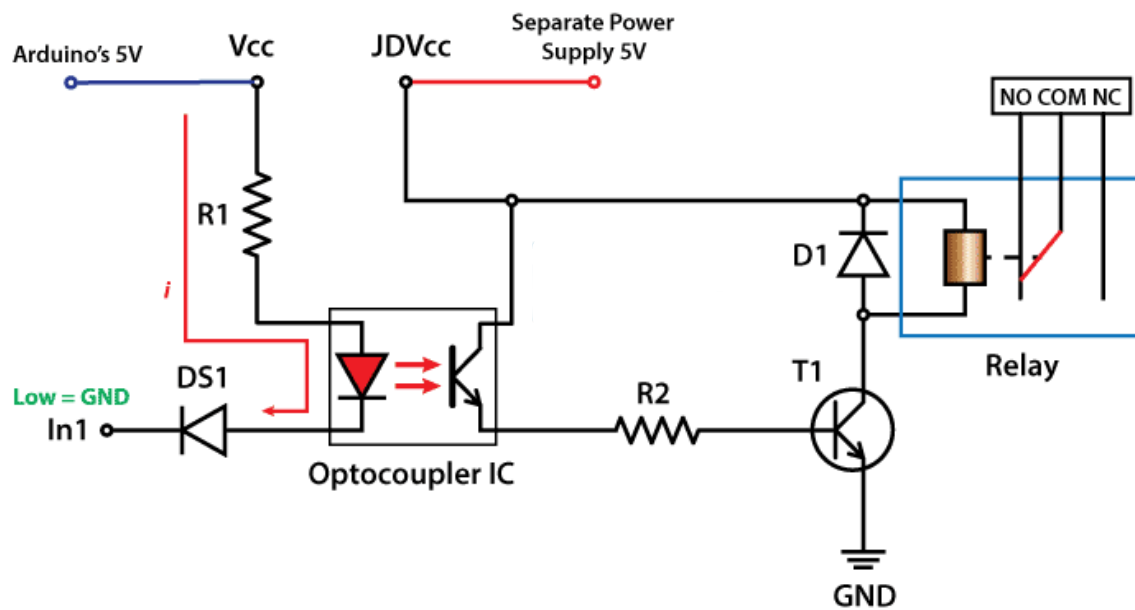
Figure 5. Circuit Schematic 3
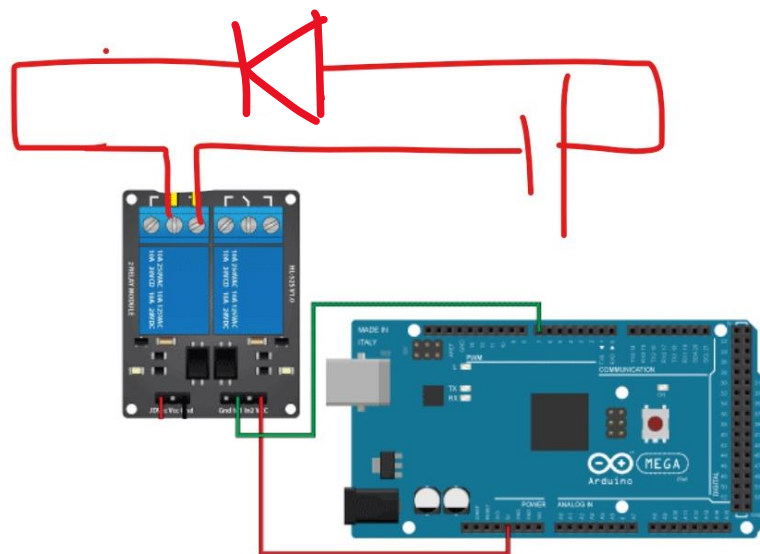
THE CONNECTION

Figure 6. Connection Circuit Diagram

THE CODE

```
1.  int in1 = 7;
2.
3.  void setup() {
4.  pinMode(in1, OUTPUT);
5.  digitalWrite(in1, HIGH);
6.  }
7.
8.  void loop() {
9.  digitalWrite(in1, LOW);
10. delay(3000);
11. digitalWrite(in1, HIGH);
12. delay(3000);
13. }
```