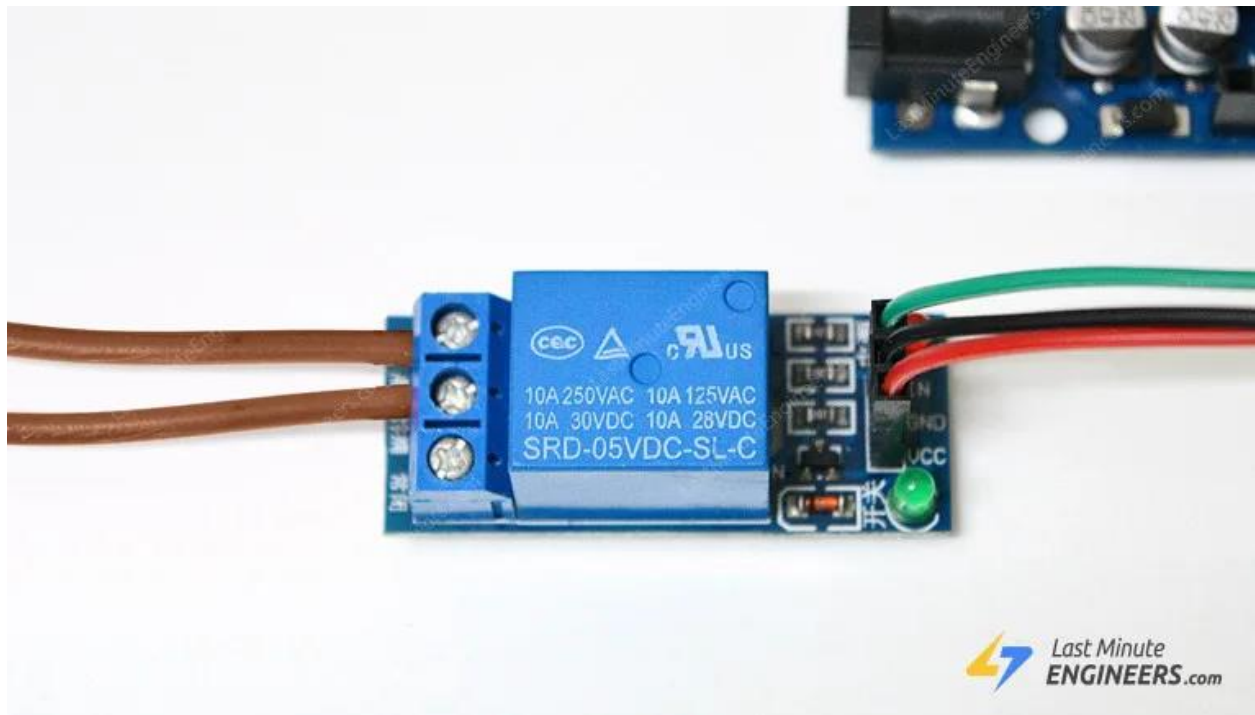# ONE CHANNEL RELAY MODULE

Got an arduino project that needs to control something running on mains voltage? A lamp? A motor? Here's the catch—your arduino operates at just 5 volts, while most household devices run on much higher voltages. So, how do you bridge that gap safely?

This is where relay modules come in. These compact, affordable modules act as electrically controlled switches, allowing your low-power arduino to control high-voltage appliances without breaking a sweat (or anything else).

In this tutorial, we'll show you how to hook up a one-channel relay module to your arduino and use it to turn on and off devices like a lamp or motor. But before we dive into wiring and code, let's take a quick look at how a relay works.

HOW DO RELAYS WORK

A relay is essentially an electrically operated switch. It uses a small electrical current to control a much larger electrical current. This allows one circuit to turn another circuit on or off, even if they're at completely different voltage levels.

RELAY BASICS

Here's a small animation showing how a relay links two circuits together.
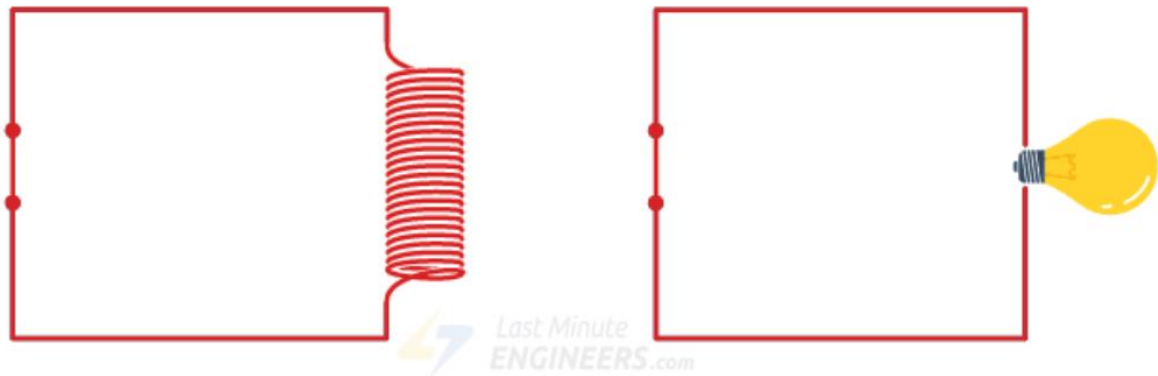
Inside a relay, you'll find a coil of wire wrapped around a core. This coil acts as an electromagnet. When a small current flows through the coil, it generates a magnetic field. This field attracts a small metal arm called the armature.

When the armature is pulled by the magnetic field, it physically moves. This action connects the larger, higher-power circuit you want to control.

When the small current stops flowing through the coil, the magnetic field disappears, and the armature returns to its original position, breaking the circuit.

So, by turning the small current on or off, you're able to control a high-power circuit without handling it directly.

RELAY OPERATION

A typical relay has five pins that stick out from the bottom.

1 Coil 1
2 Coil 2
3 COM - Commom
4 NC - Normally Closed
5 NO - Normally Open
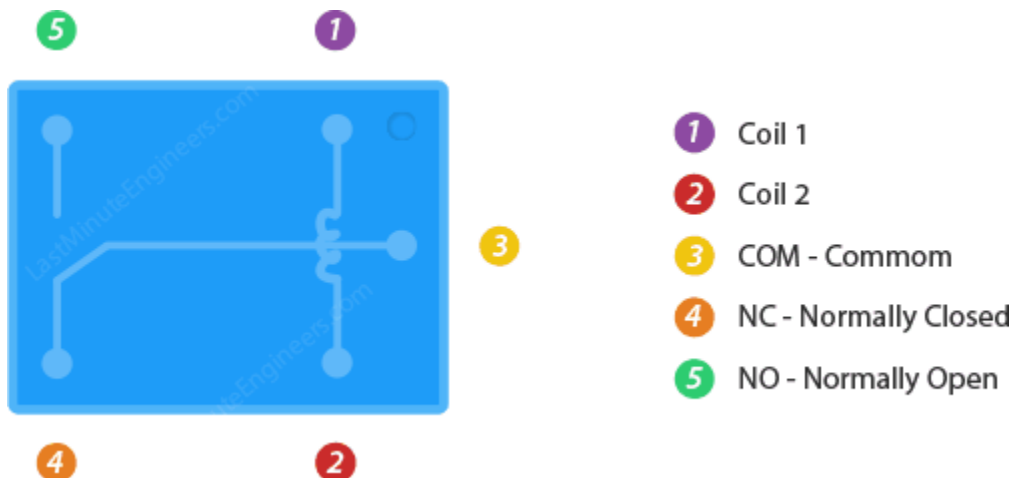
Three of these pins are used for connecting the device you want to control. These three are called nc (normally closed), no (normally open), and com (common).

The remaining two pins (coil1 and coil2) connect to the electromagnet coil inside the relay. Applying a voltage across these pins energizes the coil.

The device you're controlling—like a light or motor—is connected between the com pin and either the nc or no pin. If you want the device to stay on by default, you connect it between com and nc. Or, if you want it to stay off until you activate the relay, you connect it between com and no.
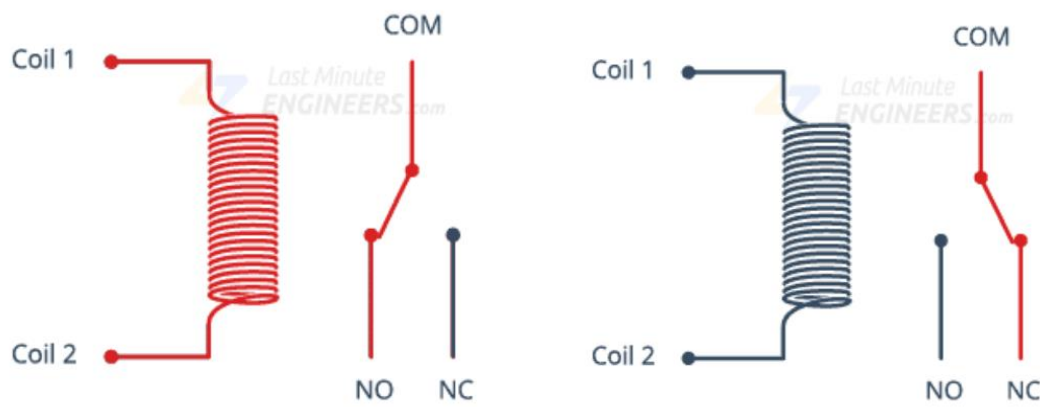
When the relay is inactive (no current going through the coil), the com pin is connected to the nc pin. That means electricity can flow through this path, powering any device connected to nc.

However, when an electric current flows through the coil, it generates a magnetic field. This magnetic field attracts the armature, causing it to move. This movement breaks the connection between com and nc, and instead makes a new connection between com and no. This changes the path of the electricity, powering any device connected to no.

Once the current stops flowing through the coil, the magnetic field disappears, and the armature returns to its original position. The com pin reconnects to the nc pin, and the no pin opens again, returning the relay to its normal state.

REFERENCE:

https://lastminuteengineers.com/one-channel-relay-module-arduino-tutorial/