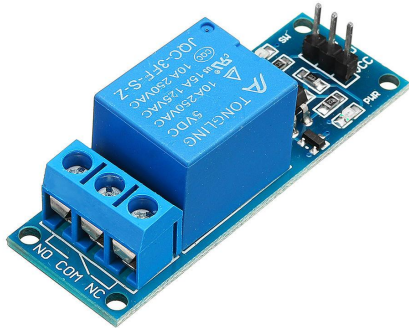# Relay Module
(Technical Note)

ZERO2MAKER

What is Relay Module?

A relay is an electromagnetic switch, which turns on or off depending on the input signals. It consists of movable contacts (NO-normally open, COM-common, and NC-normally close) and an electromagnetic circuit consisting of armature, coil, and yoke that energizes and de-energizes the relay according to the voltage applied (called operating voltage). Generally used as an interface between electrical and electronic circuits, a relay drives the high power circuits with low power outputs.

Scientific Fact and Applications

Relays were introduced as the digital amplifier. Over time, its mechanism has evolved from basic electromechanical circuit of controlling the operation with the electrical current, fields, and coil to modern multichannel relays working as a digital switch.
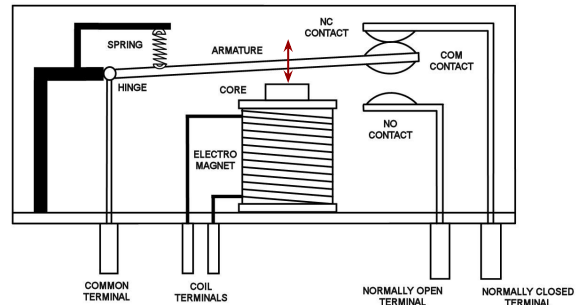
Applications:

Controlling High Voltage Appliances
Low voltage circuits can control high voltage switching operations using a relay connected in between, as the switching operation is made by the change in magnetic field, thus the actual circuits are not connected with wires, which increases safety.

Boolean Algebra
Relays are able to perform the basic operations of boolean logic. For example, the boolean AND function is achieved by normally connecting open relay contacts in series and the OR function by normally connecting open contacts in parallel.

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Relay Module
(Application Note)

Project

To glow bulb under the presence of human beings in the ambience using PIR sensor

Procedure

PIR Sensor:
- Connect **GND** pin of sensor to **GND** of Arduino
- Connect **2nd** pin of sensor to **11th** pin of Arduino
- Connect **Vcc** of sensor to **5V** of Arduino

Relay Module:
- Connect **Vcc** of module to **5V** of Arduino
- Connect **GND** pin of module to **GND** of Arduino
- Connect **SIGNAL** pin of module to **12th** pin of Arduino
- Connect **NO** pin of relay to power plug

Bulb:
- Connect one wire to power plug
- Connect another wire to **COMM** pin of relay
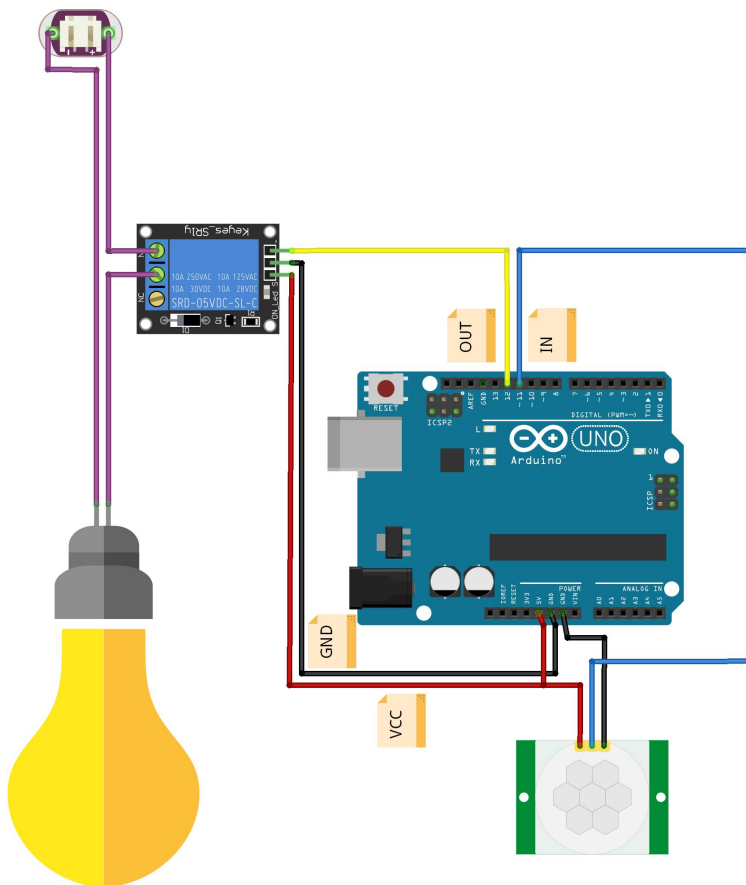
Challenge Yourself

1. Design a model of a automation system that can automatically open and close the door on arrival and exit
2. Make a system to automate cooling appliances to start on presence of human beings in the room

Components Required

Component	Part No.	Qty
Arduino UNO	EMX-00001-A	1
PIR Sensor	EMS-00006-A	1
Relay Module	EMA-00008-A	1
Bulb		1

Code

```c
#define relay 12 /*Connecting signal pin of the relay to pin 12 of Arduino*/
#define pir 11 /*PIR Sensor is connected to pin 11 of Arduino*/
void setup()
{
  pinMode(relay,OUTPUT); /*Mentioning relay as Output*/
  pinMode(pir,INPUT); /*Mentioning pir as Input*/
  digitalWrite(relay,LOW);
/*Initializing relay to Normally open configuration*/
}
void loop()
{
  int pir_value = digitalRead(pir);
/*reading the value of pir sensor and storing the value in pir_value*/
  if(pir_value==HIGH) /*Checking if value of pir is HIGH*/
  {
    digitalWrite(relay,HIGH);
/*Putting the relay to ON state*/
  }
  else if(pir_value==LOW)/*Otherwise checking if value of pir is LOW*/
  {
    digitalWrite(relay,LOW);/*Then putting the relay to OFF state*/
  }
}
```