Introduction to Microcontroller and Arduino

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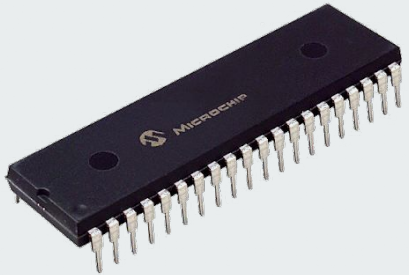
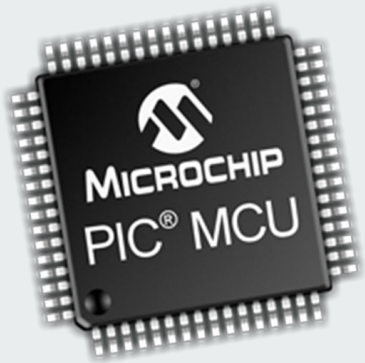
Microcontroller

- It is specially designed circuits for embedded applications and is widely used in automatically controlled electronic devices. It contains memory, processor, and programmable I/O.

- It’s types:
  - Intel MCS-51
  - 8051 microcontroller
  - AVR microcontroller
  - PIC microcontroller



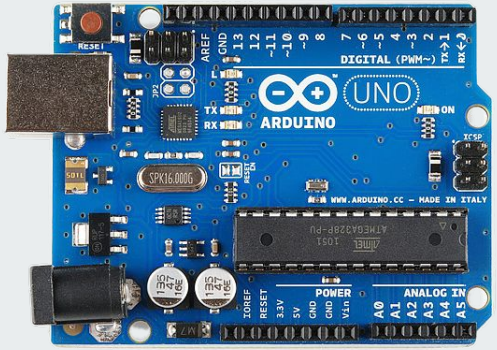


Arduino

- The Arduino board is a small microcontroller board, which is a small circuit that contains a whole computer on a small chip (the microcontroller).

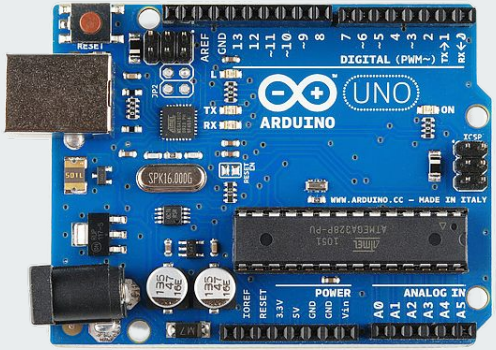
- Arduino is composed of two major parts:
  - Arduino board
  - the IDE

- IDE uses simplifier version of C and C++ programming language.



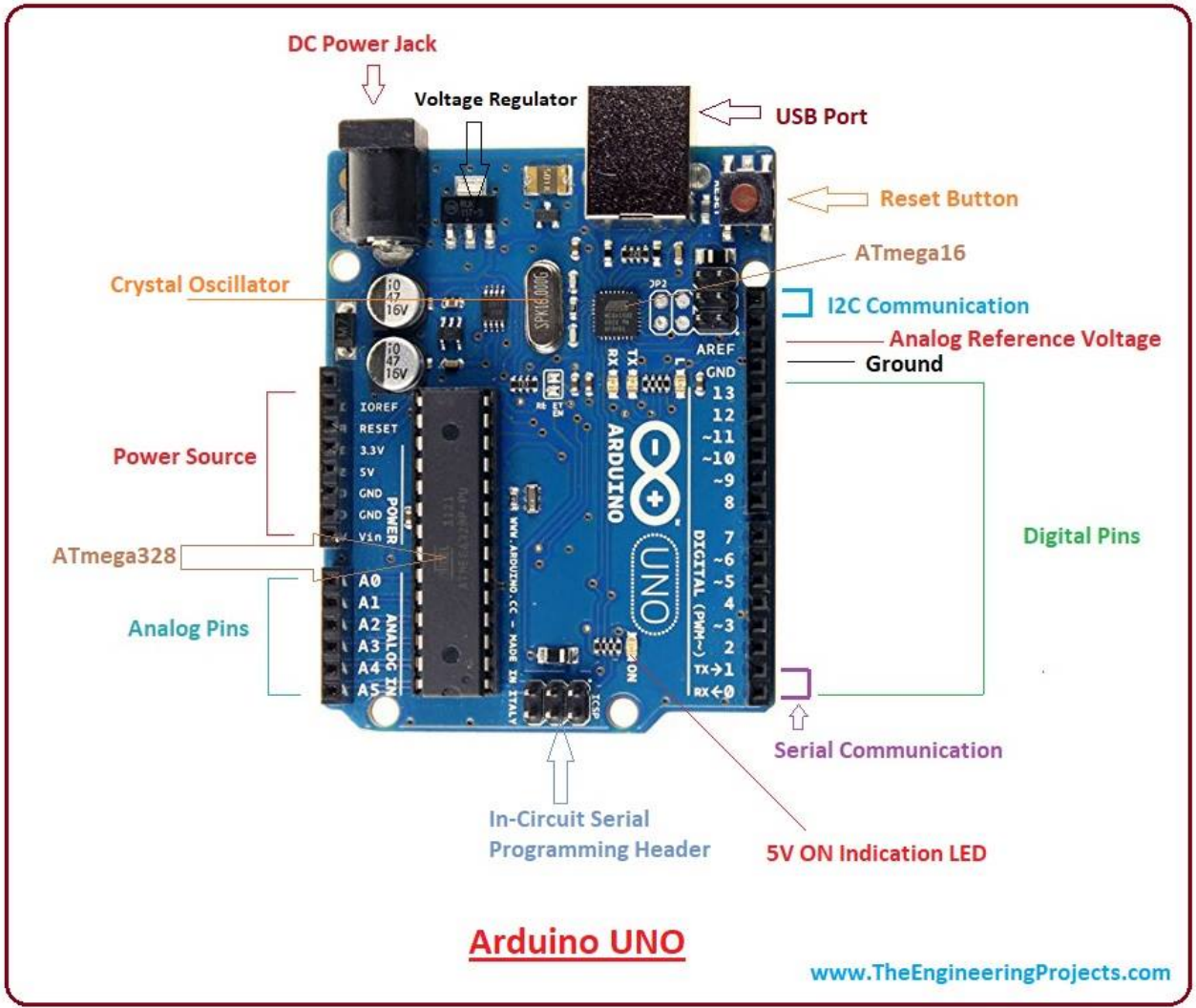
Arduino Specification

- Microcontroller: ATmega 328P
- Operating Voltage: 5V
- Input Voltage: 7-12 V
- Digital I/O Pins: 14 pins (including 6 PWM Pins)
- Analog input Pins: 6
- DC Current / pin : 40mA
- DC Current whole Pins: 200mA
- Flash memory: 32 KB
- SRAM: 2KB
- EEPROM: 1 KB
- Clock Speed: 16 MHz



Major Components of Arduino

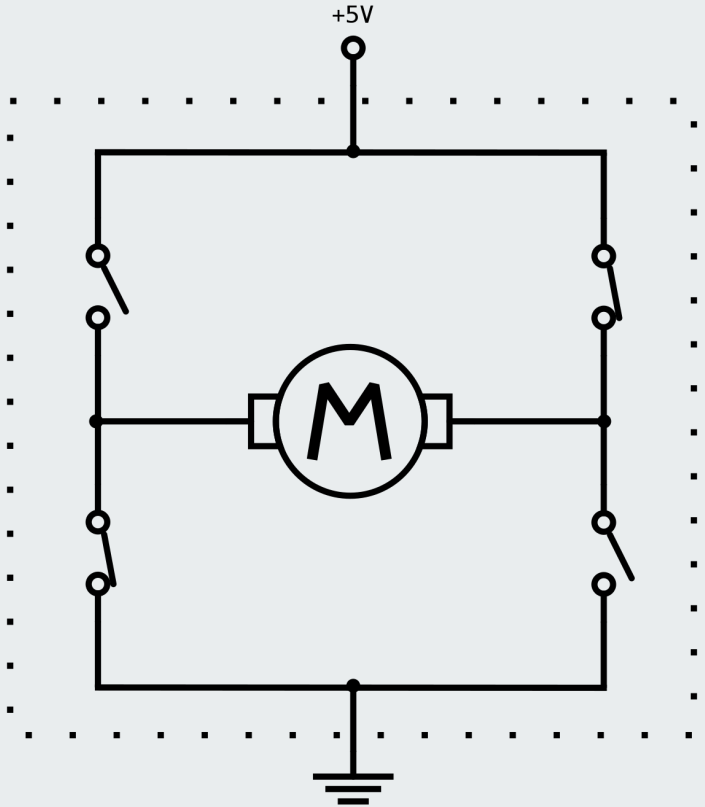
- USB Connector
- Power Port
- Microcontroller (ATmega 328P)
- Analog Input Pins (A0-A5)
- Digital Input Pins (0-13)
- Reset Switch
- Crystal Oscillator (16 MHz)
- USB Chip Interface
- RX TX LED’s


DC Power Jack
Voltage Regulator
USB Port
Reset Button
ATmega16
Crystal Oscillator
I2C Communication
Analog Reference Voltage
Ground
Power Source
Digital Pins
ATmega328
Analog Pins
Serial Communication
In-Circuit Serial
Programming Header
5V ON Indication LED
Arduino UNO
www.TheEngineeringProjects.com

Arduino - Program Structure

- Arduino programs can be divided in three main parts:
  - Structure
    - Setup() function
    - Loop() function
  - Values (variables and constants)
  - Functions.

Introduction to H - Bridge

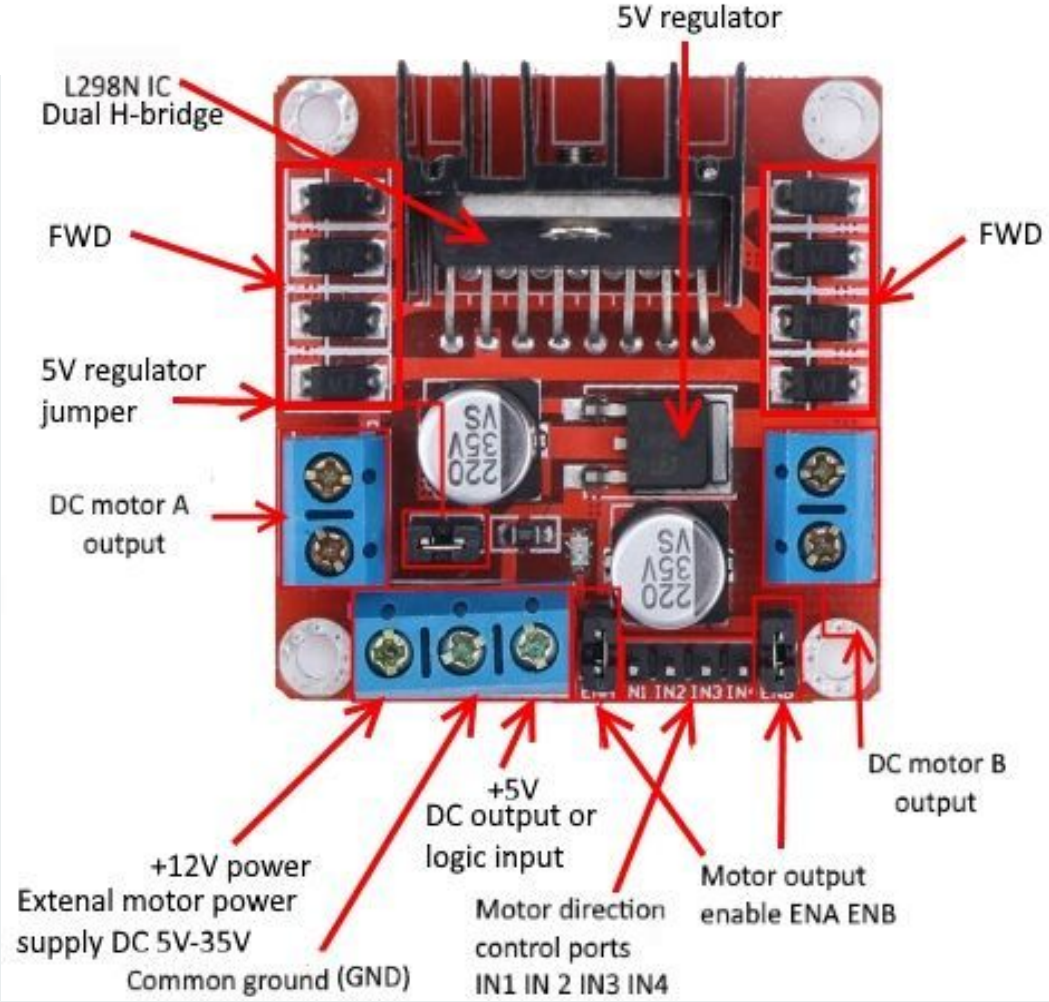


Applications of H-Bridge Circuit

- The most important application of the H-Bridge circuit as the motor driver circuit.

- In Robotics Technology, H-bridge circuits are used.

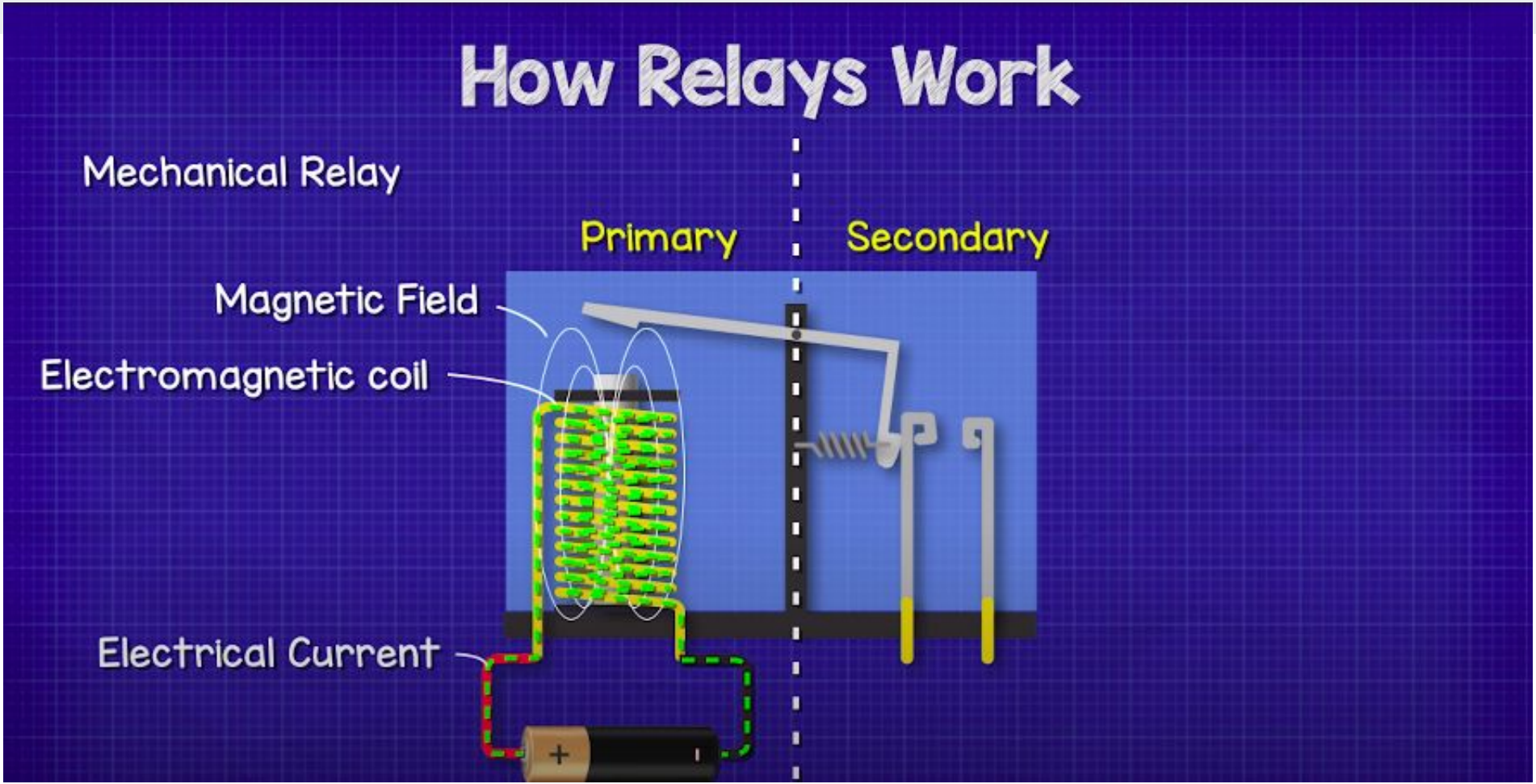
Motor Driver (L298N)



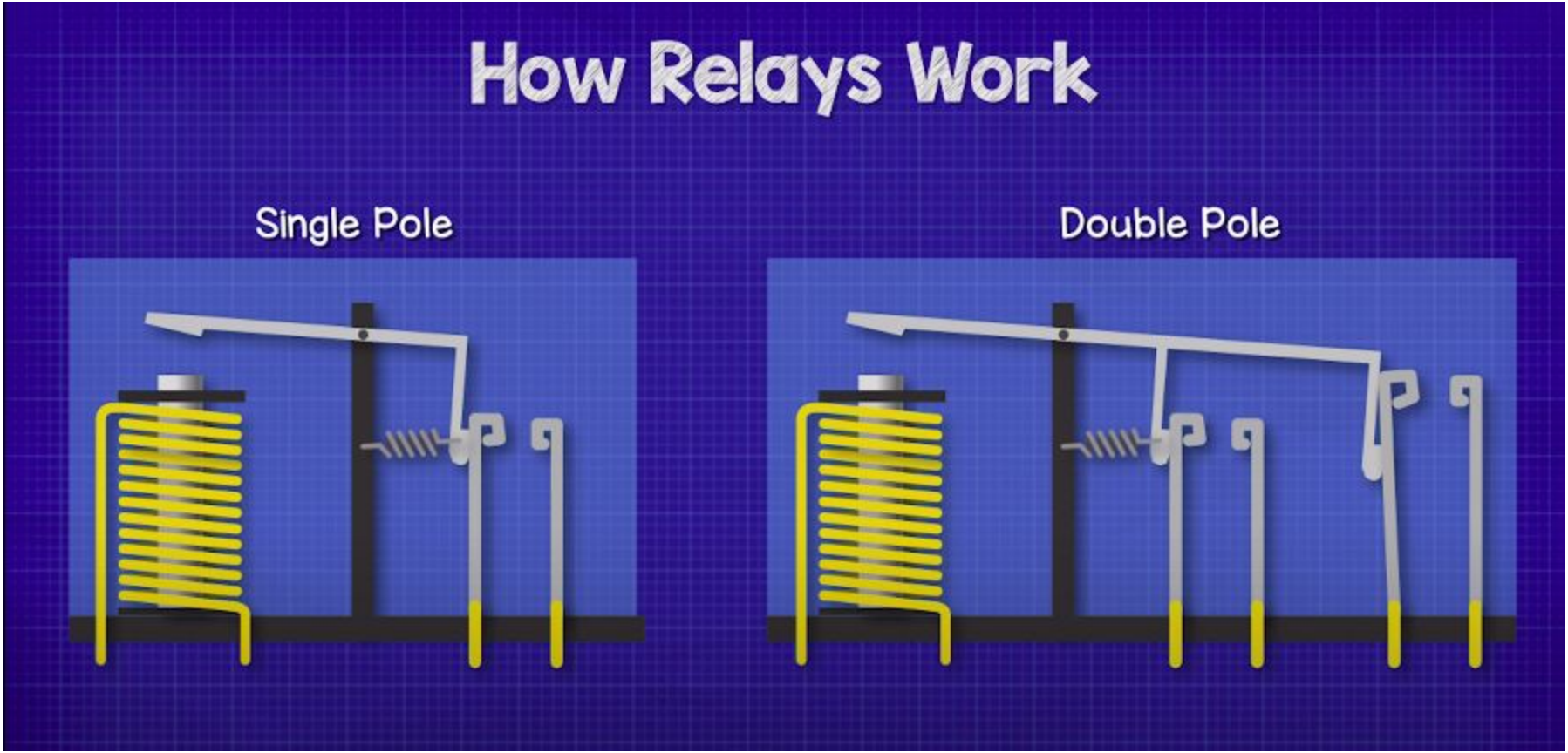
Relay

- Electro-Mechanical Switch
- works on the principle of **electromagnetic induction**

How Relays Work

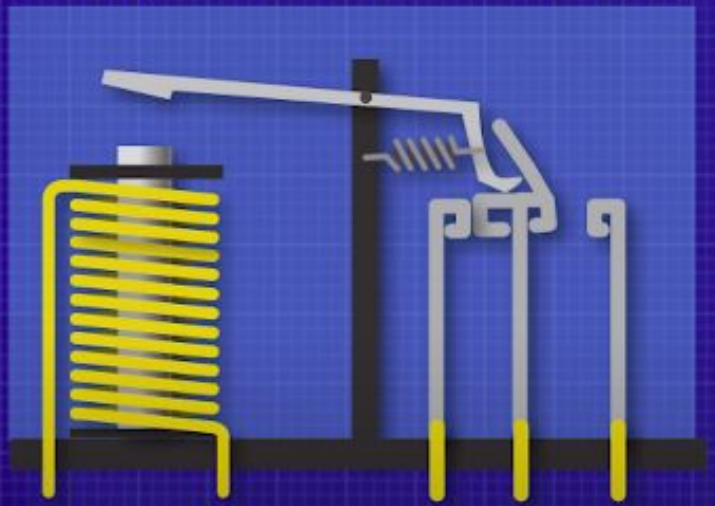


How Relays Work

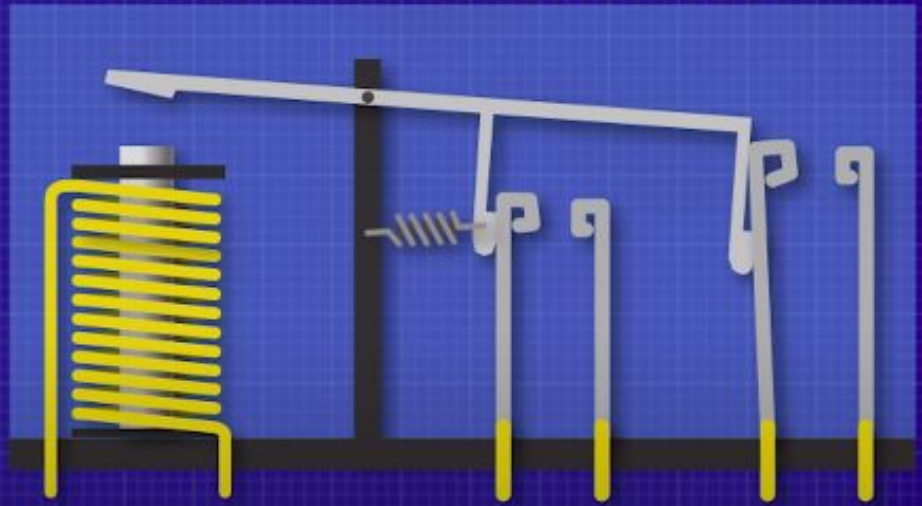


How Relays Work

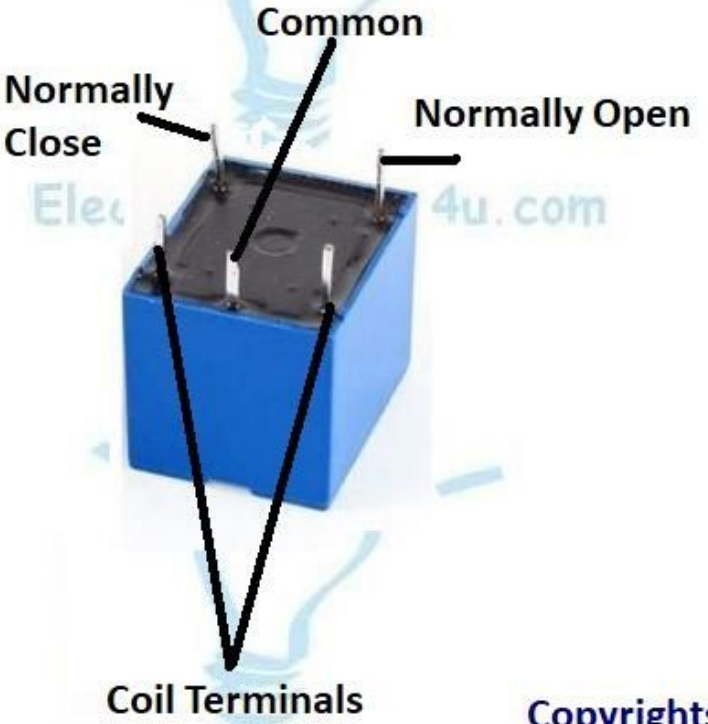
Single Pole Double Throw



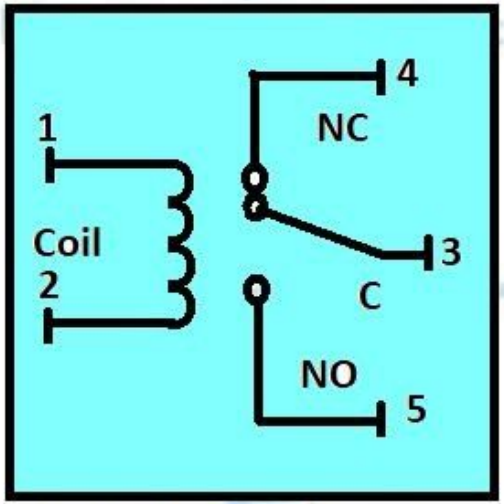
Double Pole Single Throw



5 Pin Relay (SPDT) Wiring



Diagram



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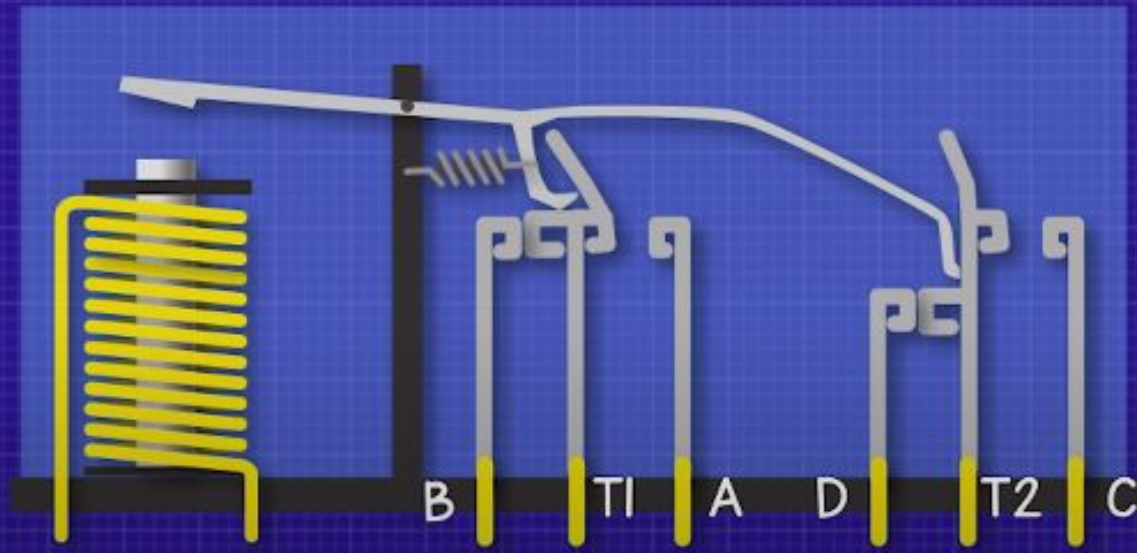
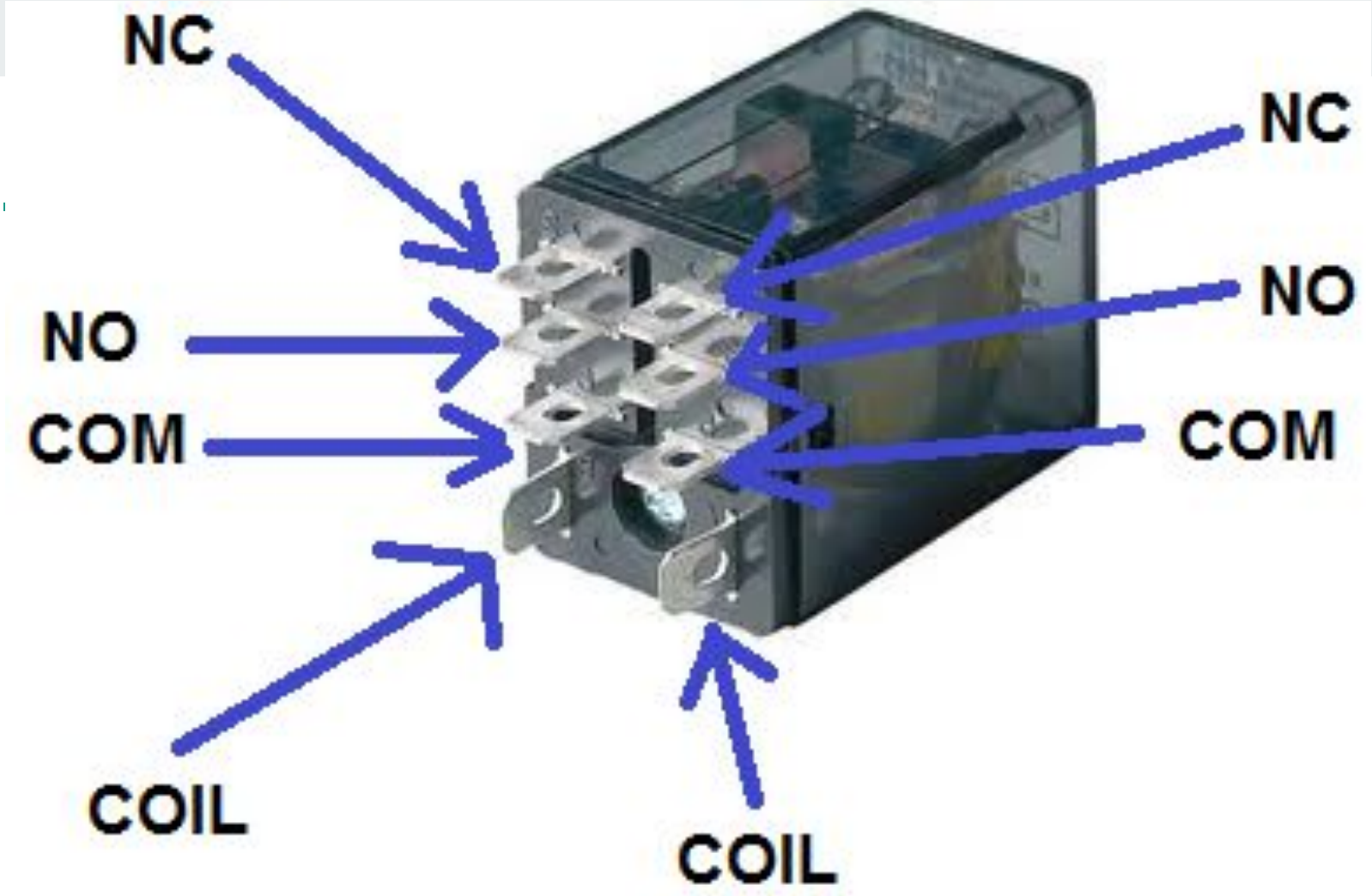
How Relays Work

Double Pole Double Throw

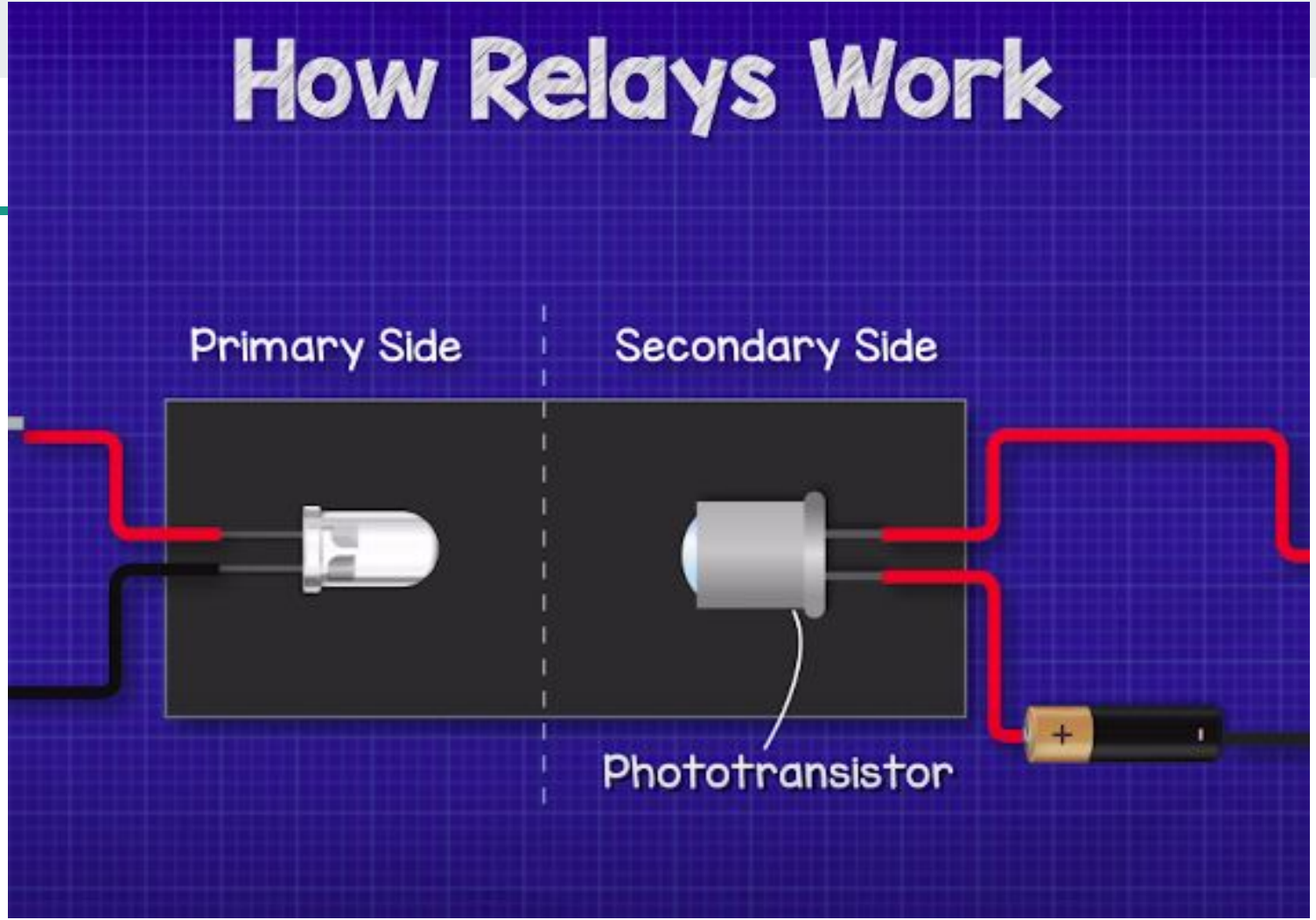


DPDT is used to control 2 states on 2 separate circuits


NC
NO
COM
COIL
COIL
NC
NO
COM

Solid State Relay

- Have no moving parts
- Uses Electrical and Optical properties of Semiconductors


How Relays Work
Primary Side
Secondary Side
Phototransistor