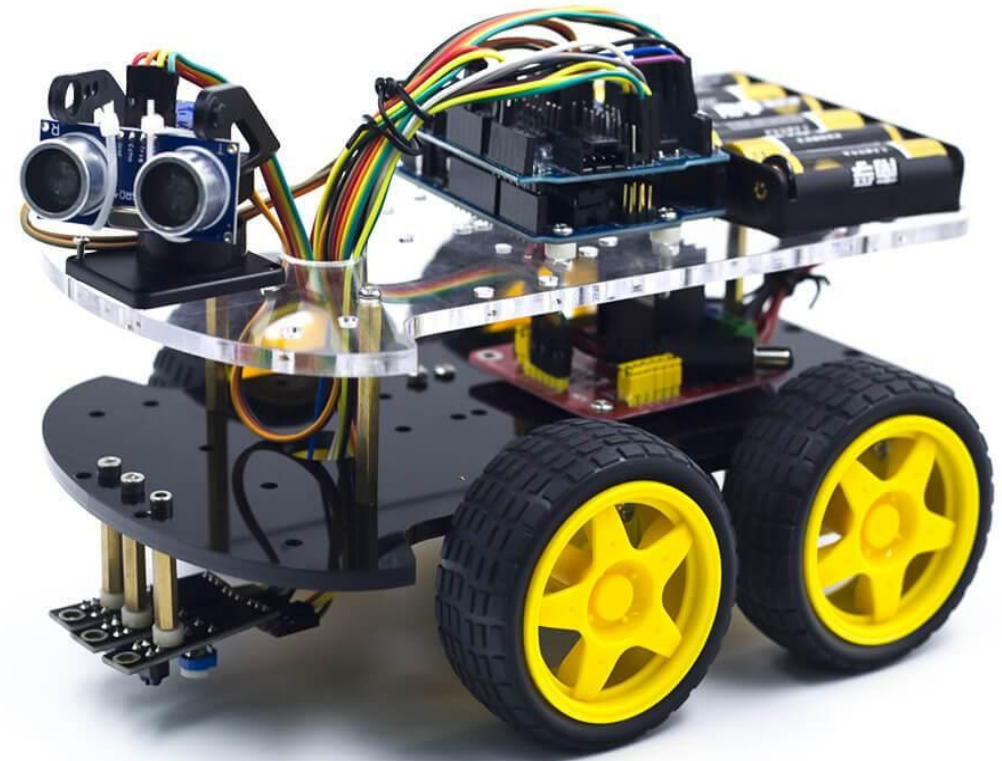


# NSDC – Junior Skills Championship Mobile robotics

Presented by:



# Agenda - Day 3

- Diodes
  - Working of a Diode
  - Biasing of diode
  - Types of diodes
  - Applications of diode
- Transistor

# Uses of diodes in Real world

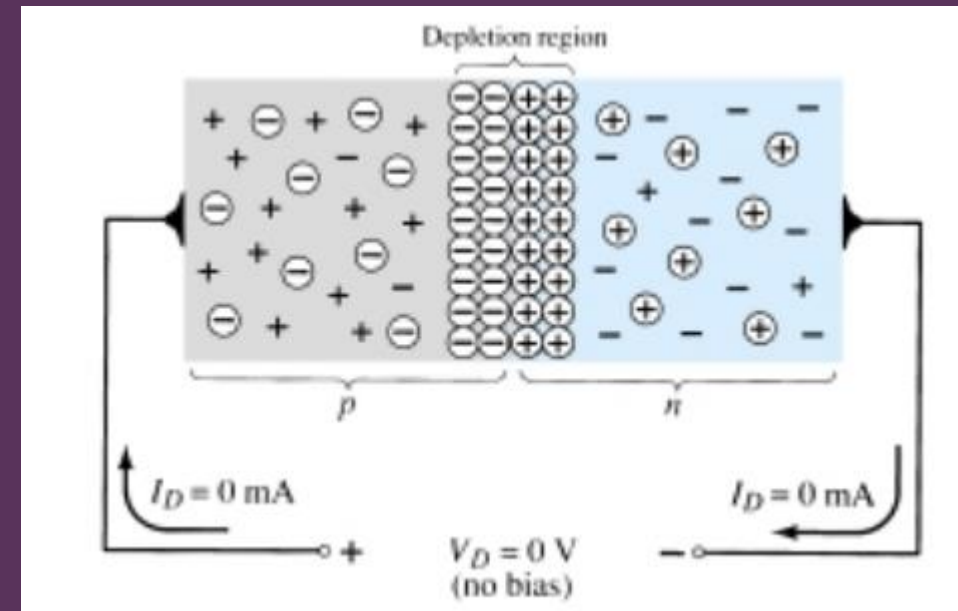
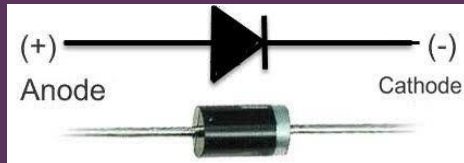


- Voltage / Power conversion  
Mobile phone / Laptop / Smart Watch charger
- AM Envelope Detector or Demodulator  
Radios, walky-talkies etc.
- LED Lights  
TV back side running LEDs  
Smart phone-controlled running LEDs  
Smart phone-controlled LED bulb
- Remote LEDs

# Diode

What is a Diode?

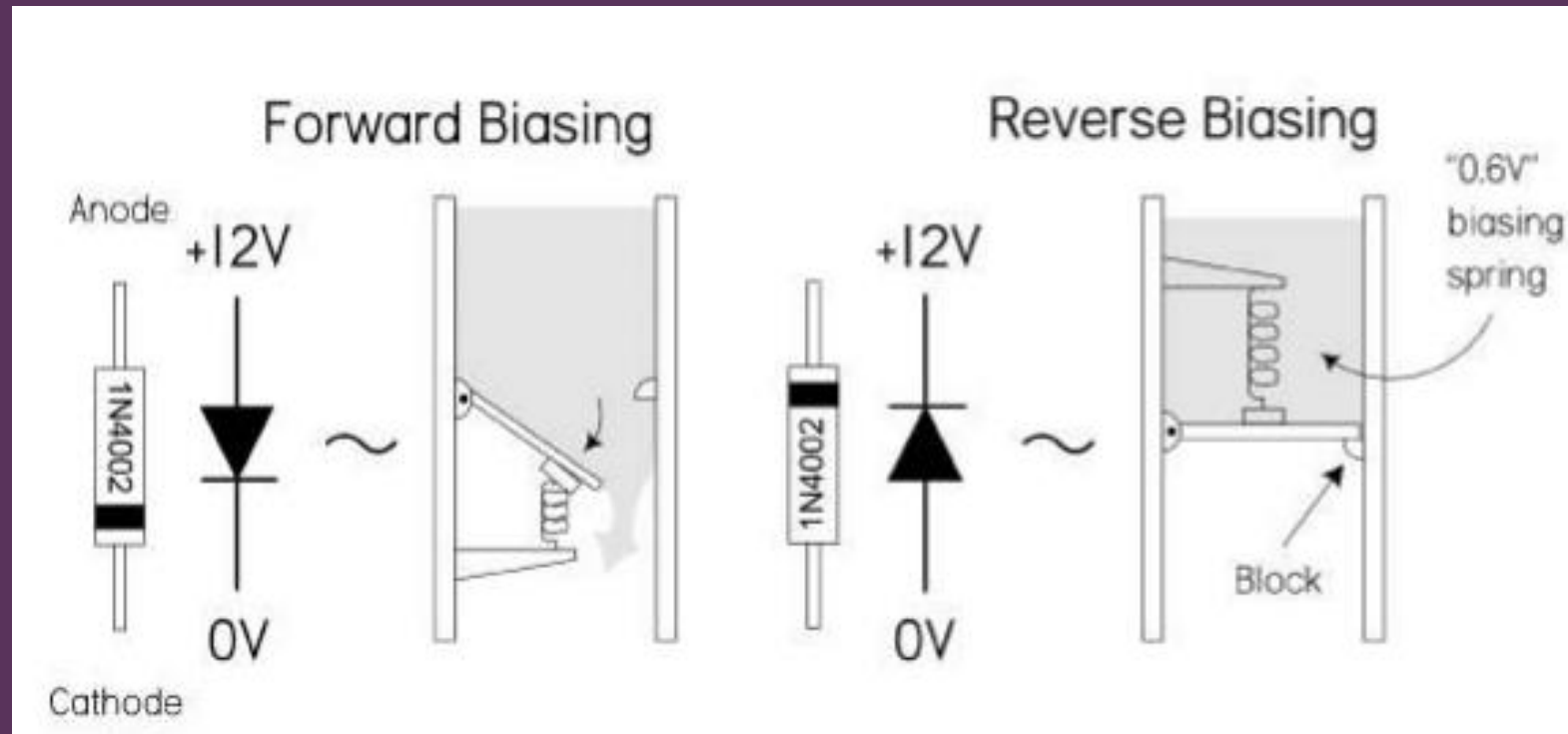
- Diode is a two terminal two-layer semiconductor device



# Diode

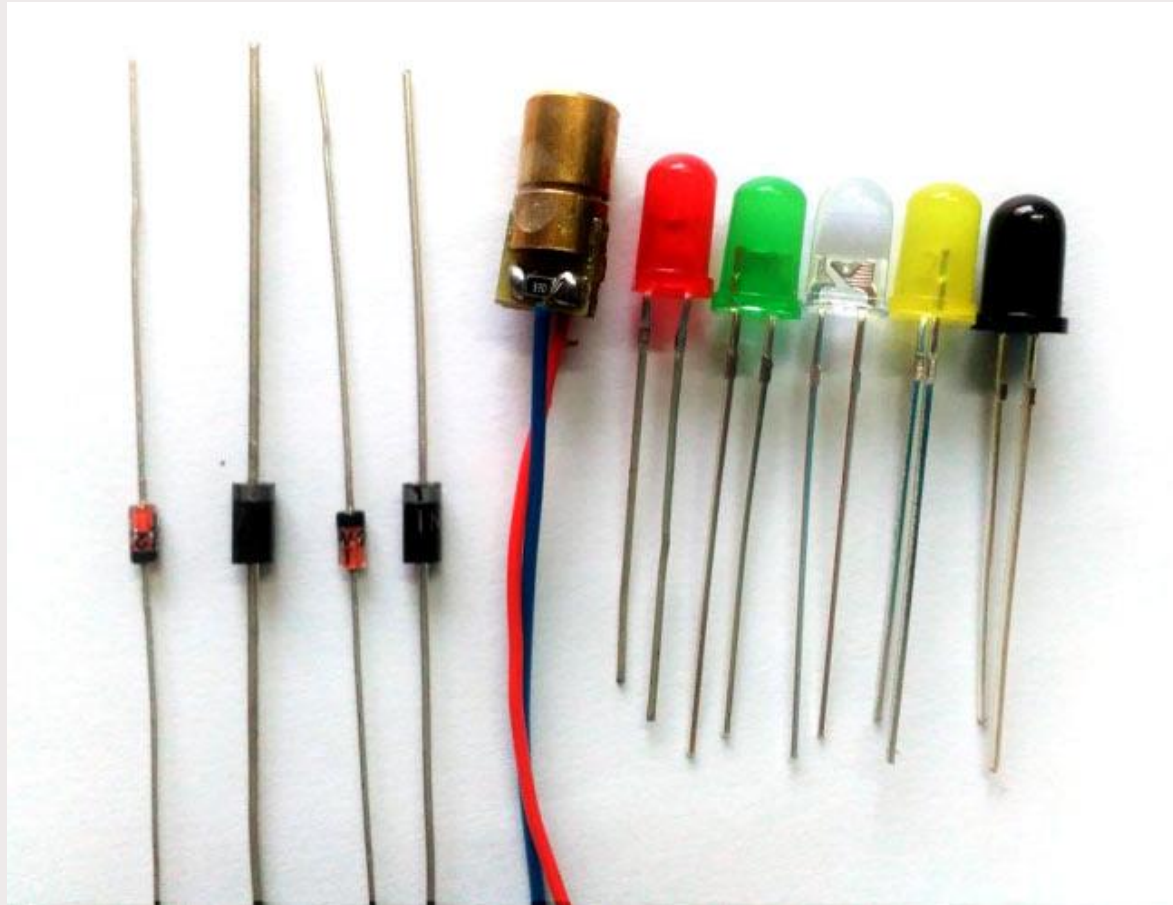
## Diode Operation

- Diode is a two terminal two layer semiconductor device



# Diode

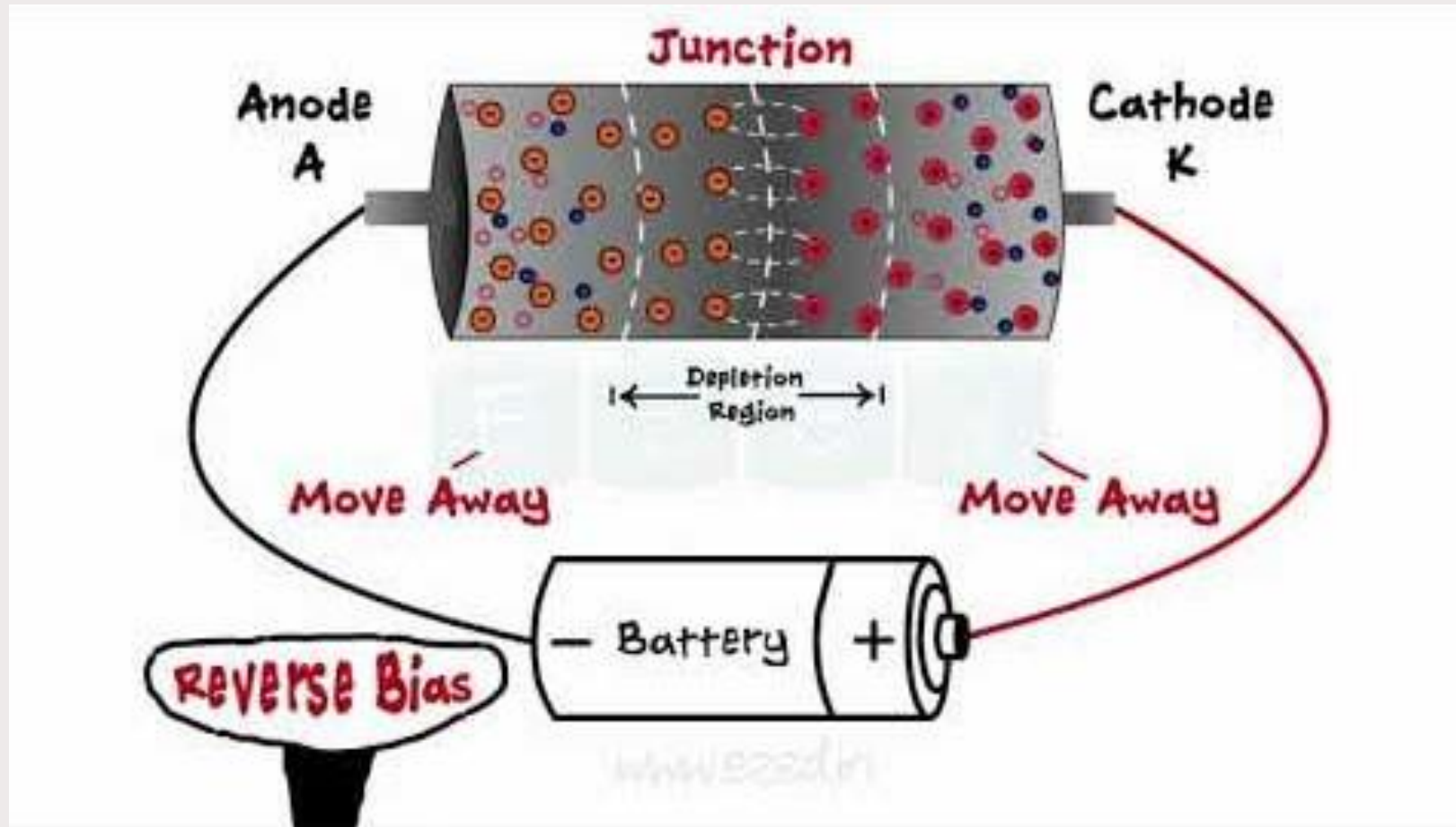
## Physical Diode





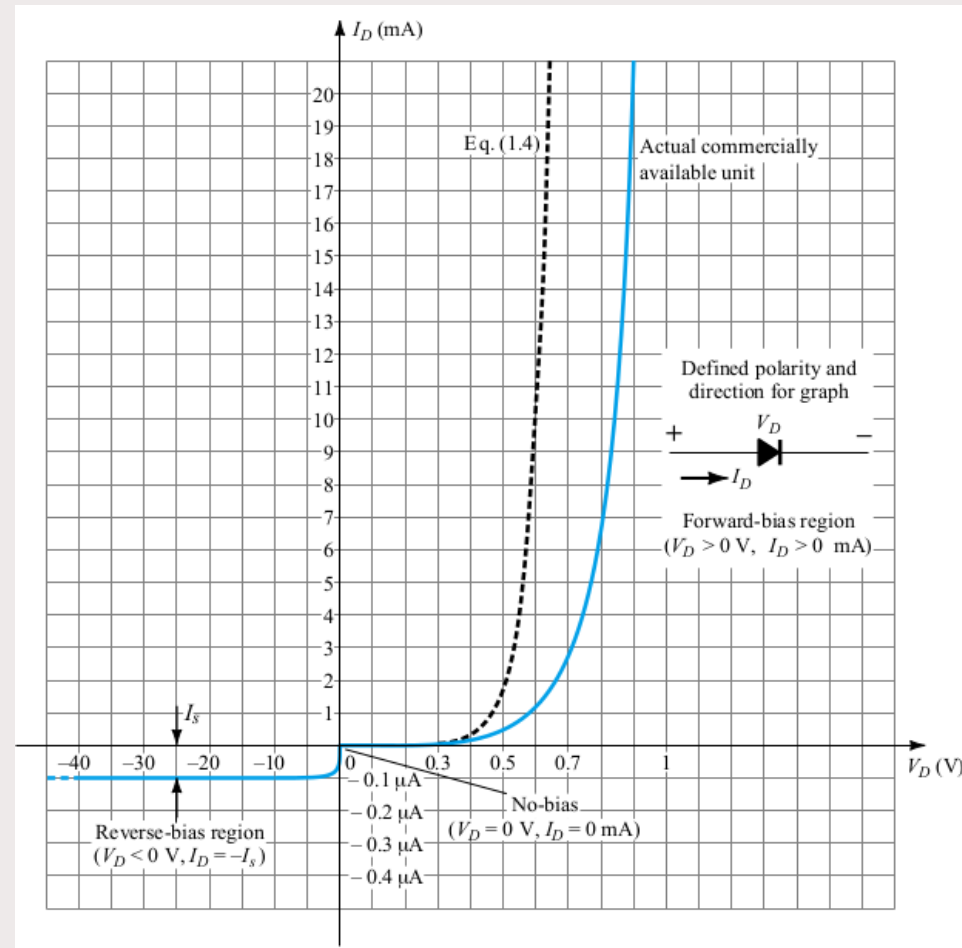
# Diode

## Diode Operation



# Diode

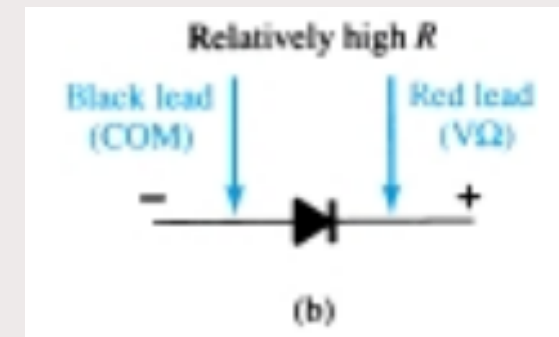
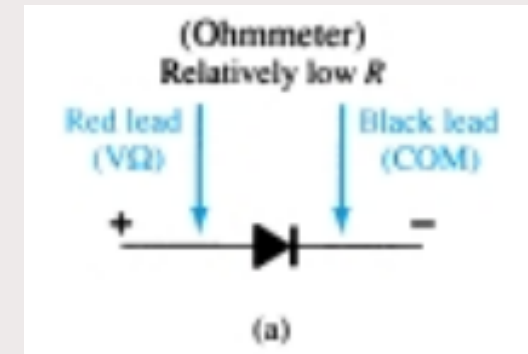
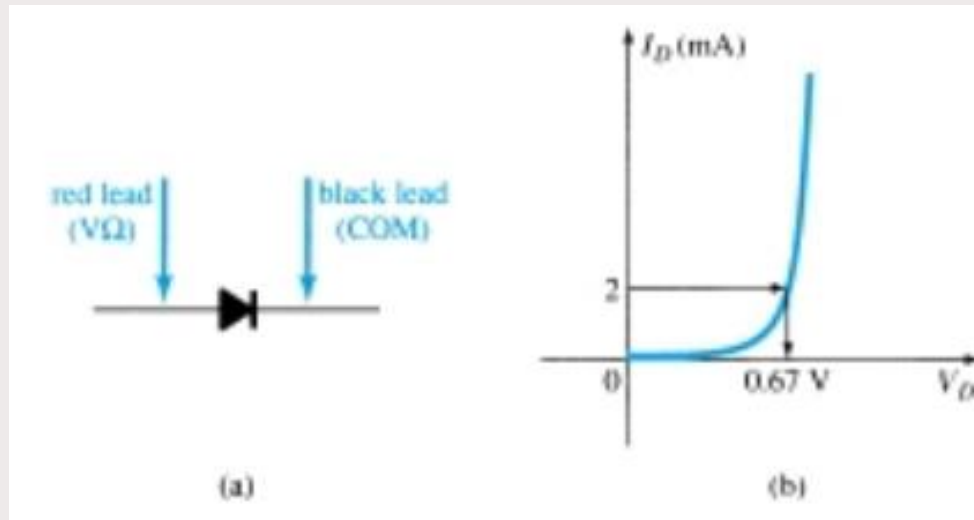
## Diode V-I Characteristics





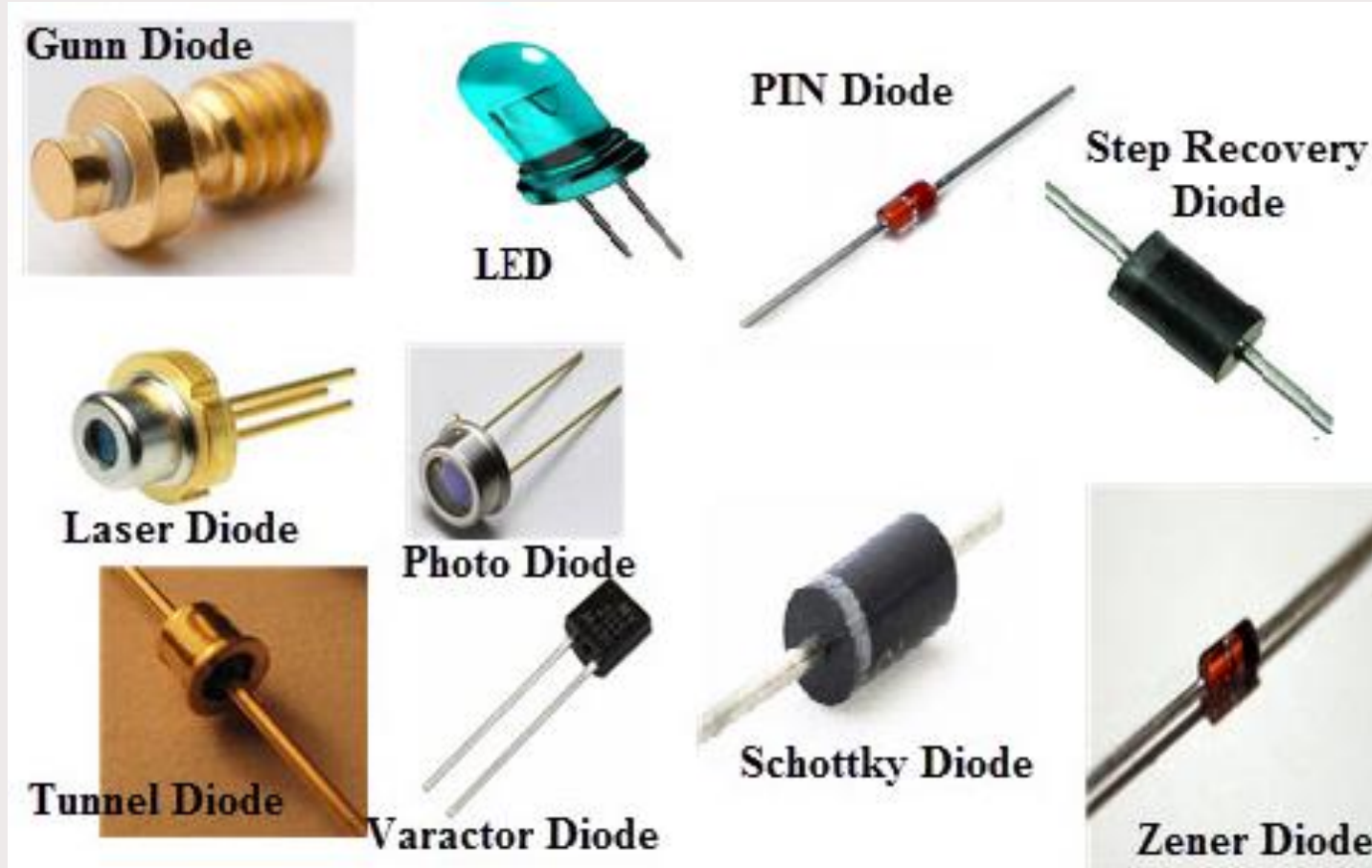
# Diode

## Diode Testing



# Diode

## Diode Types



# Diode

## Diode Types

Generic



Schottky



Shockley



Constant current



Zener



Light-emitting



Photo-



Step recovery



Tunnel



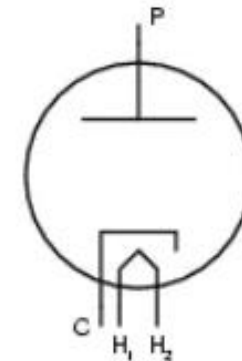
Varactor



PIN

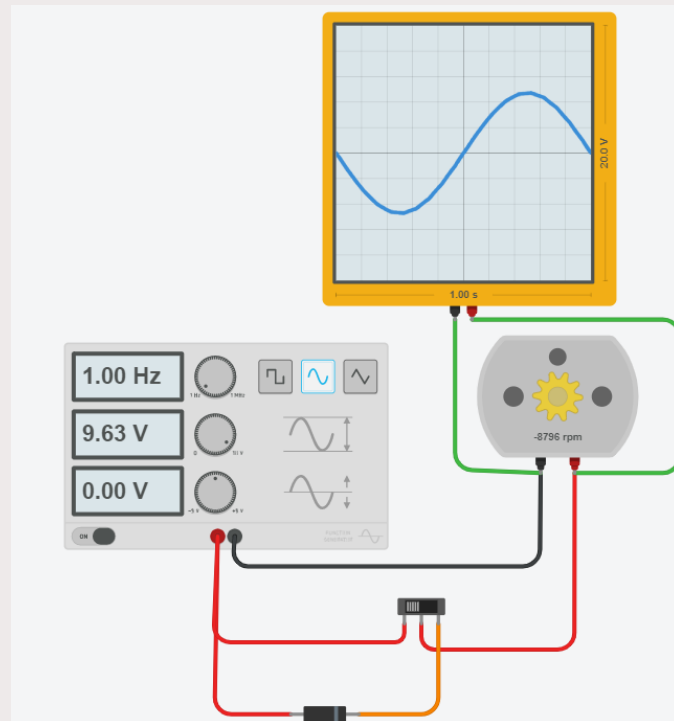
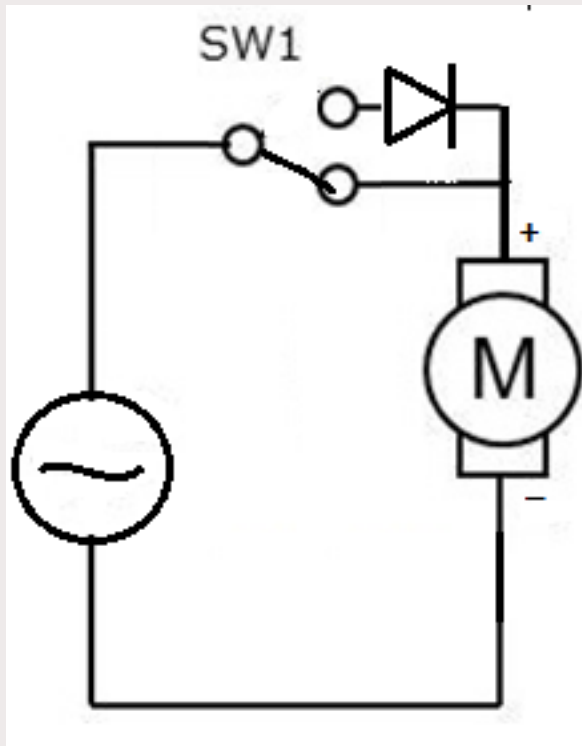


Vacuum tube

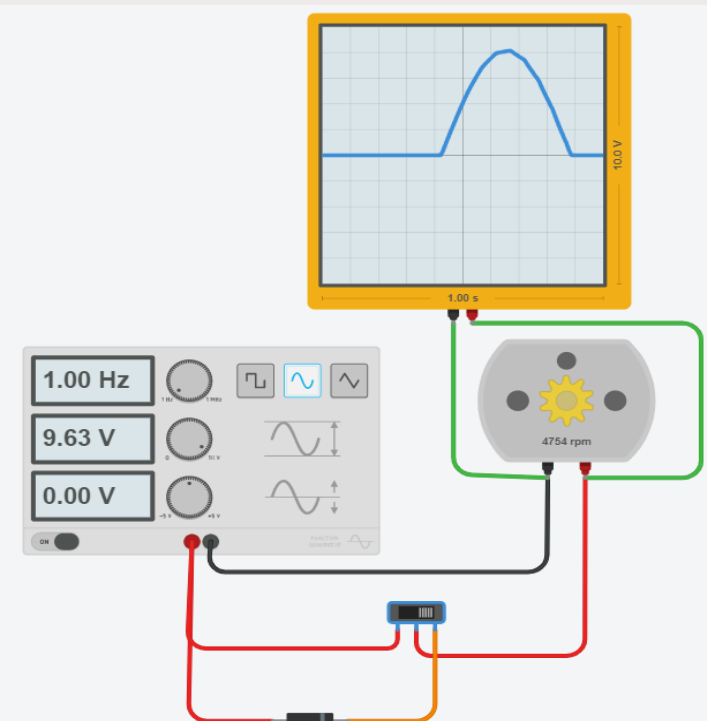


A = Anode  
K = Cathode

# Diode to convert AC to DC

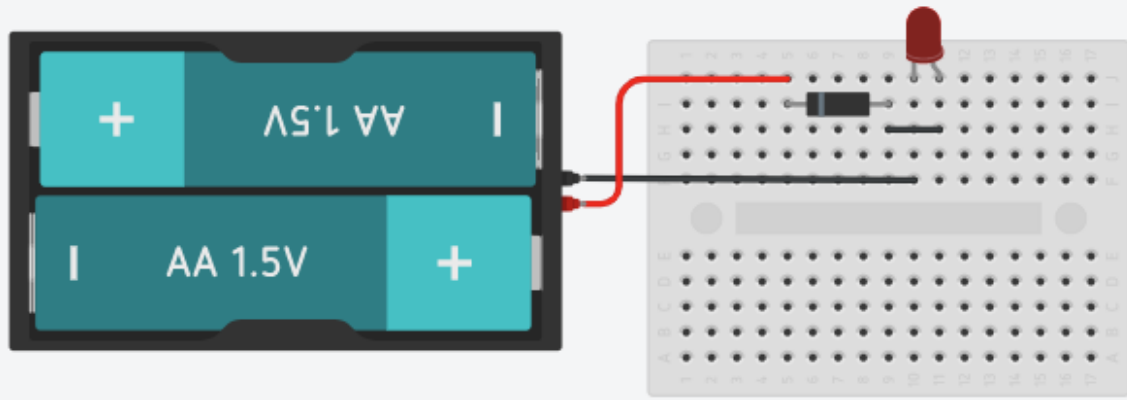


**When Switch is in OFF AC signal will pass to the motor and motor rotates in both direction**

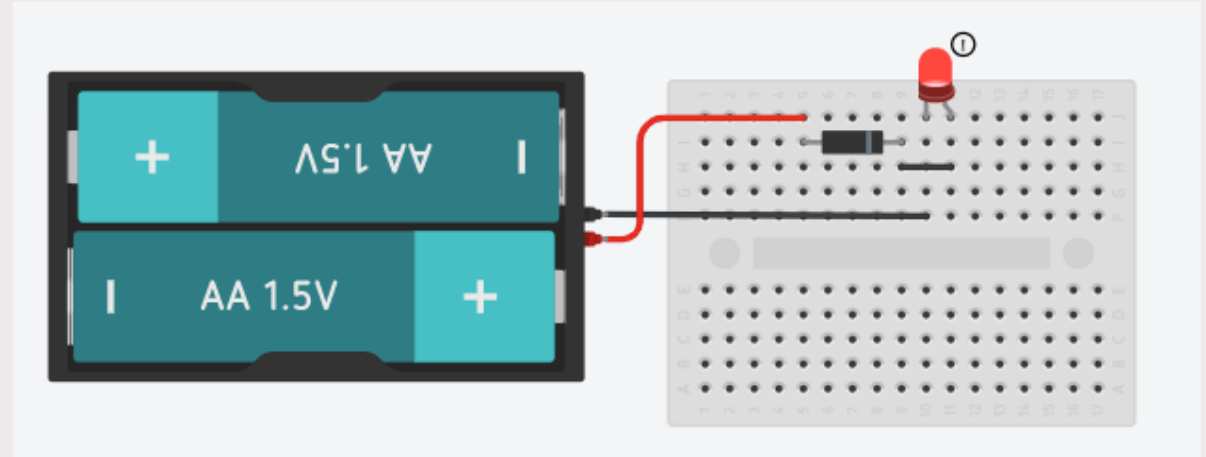


**When Switch is in ON, AC signal pass through diode and converts into DC and then pass to the motor. Motor rotates in one direction**

# Diode as a Switch



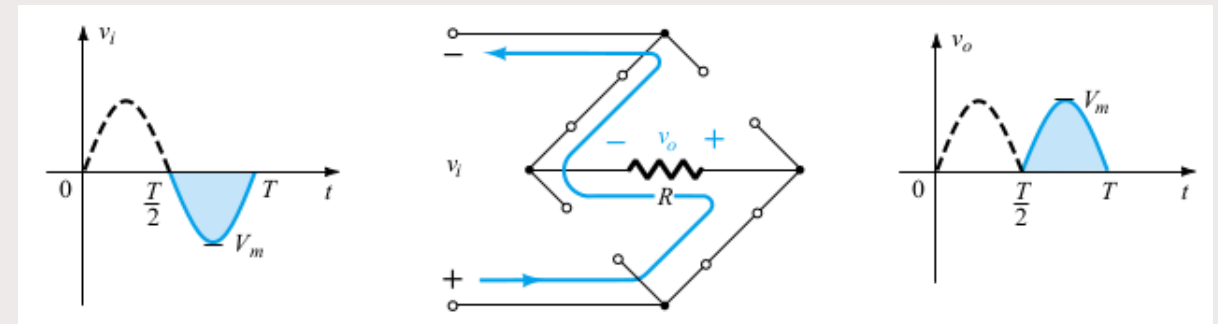
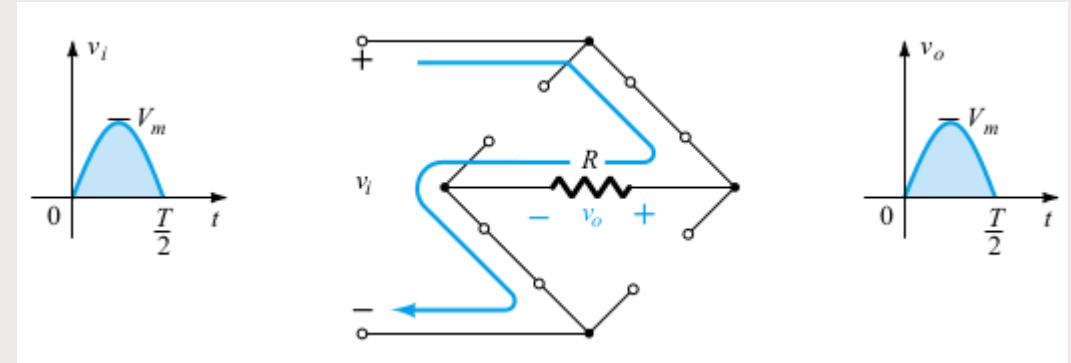
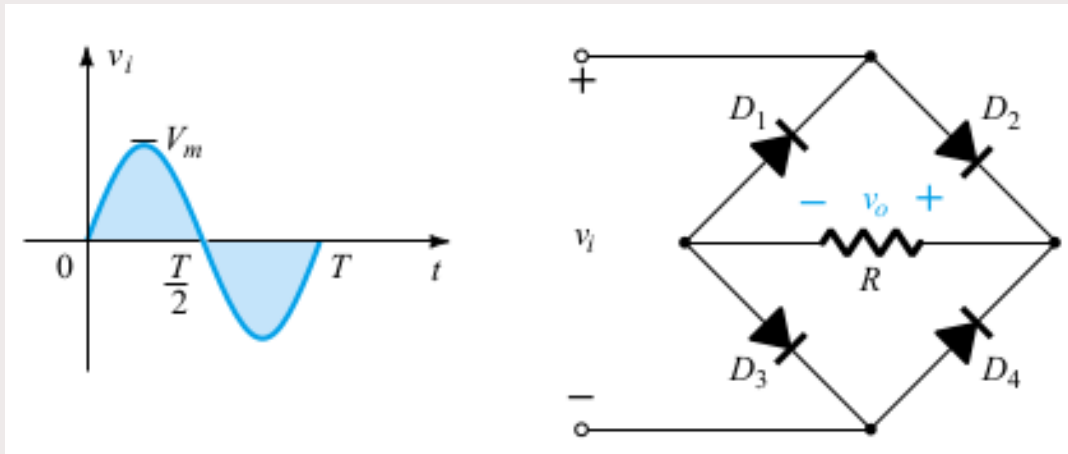
**Diode as a Switch in OFF**



**Diode as a Switch in ON**

# Diode Rectifier

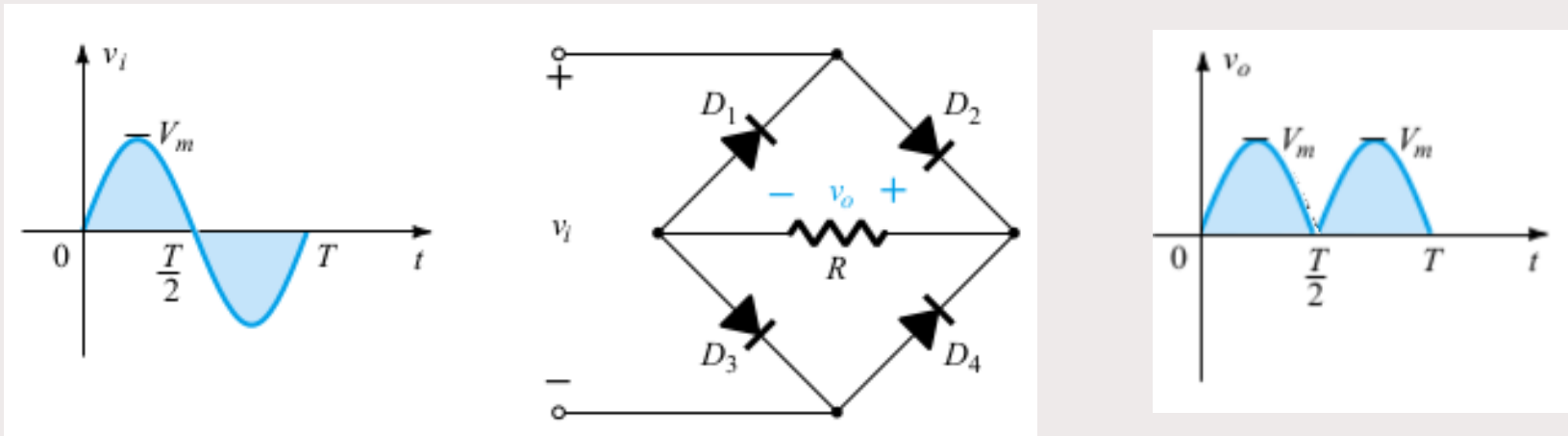
## Diode Rectifier





# Diode Rectifier

## Diode Rectifier



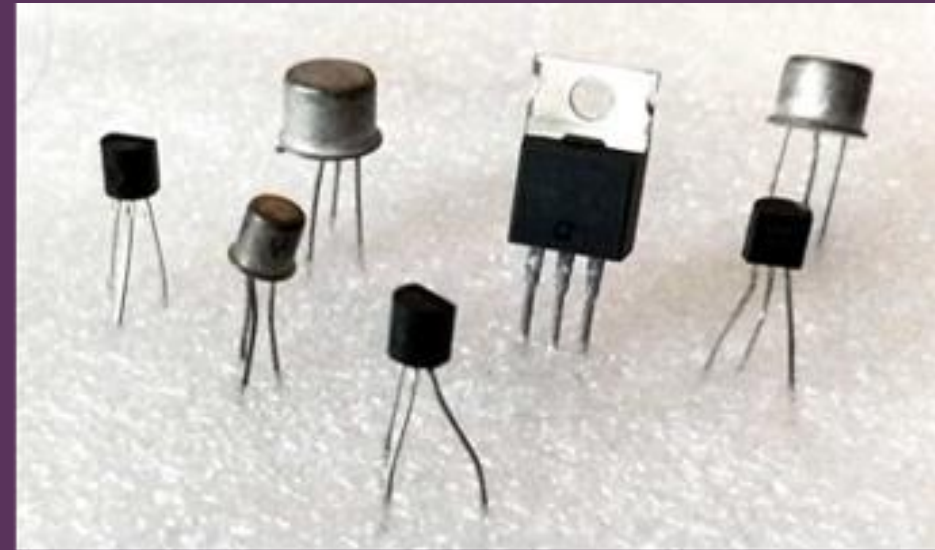
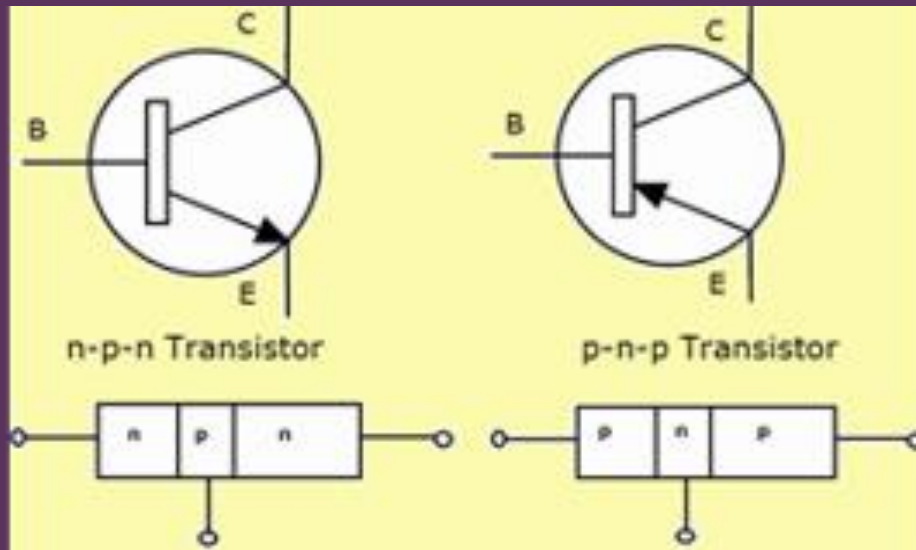
# Uses of Transistors in Real world



- Uses in signal amplifier devices
  - Smart phones
  - Microphone Amplifier
- Transistors are used in building some of the integrated circuits
- Transistors are used in digital and analog circuits as a switch
  - Automated water tank controller

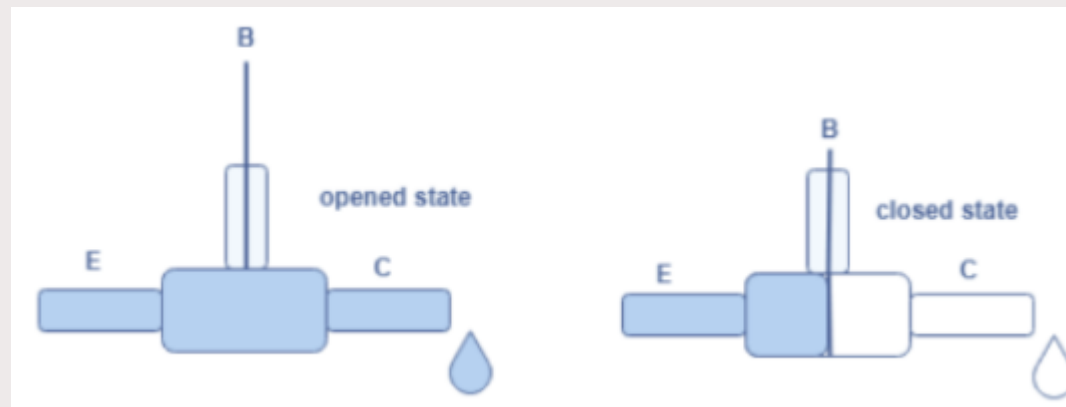
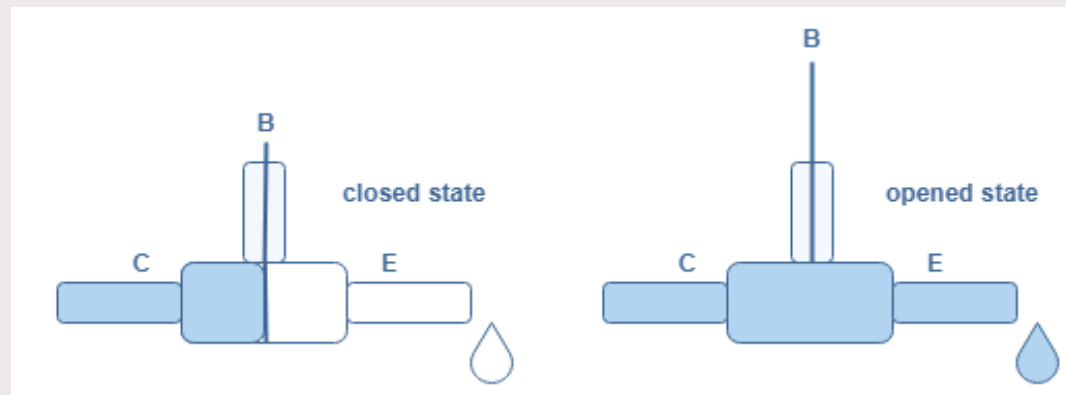
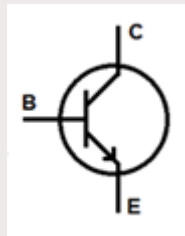
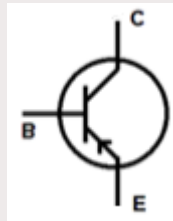
# Transistor

- The transistor is a three-layer semiconductor device consisting of either two n- and one p-type layers of material or two p- and one n-type layers of material.
- The former is called an NPN transistor, while the latter is called a PNP transistor.



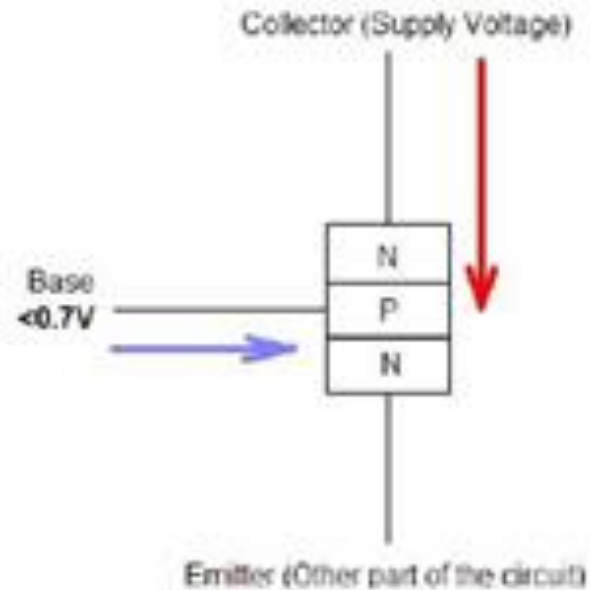
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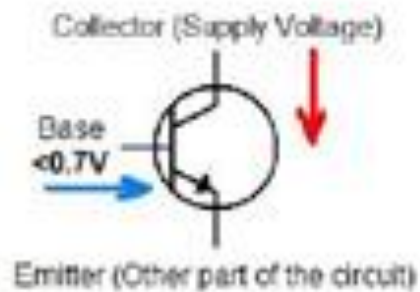


# Transistor

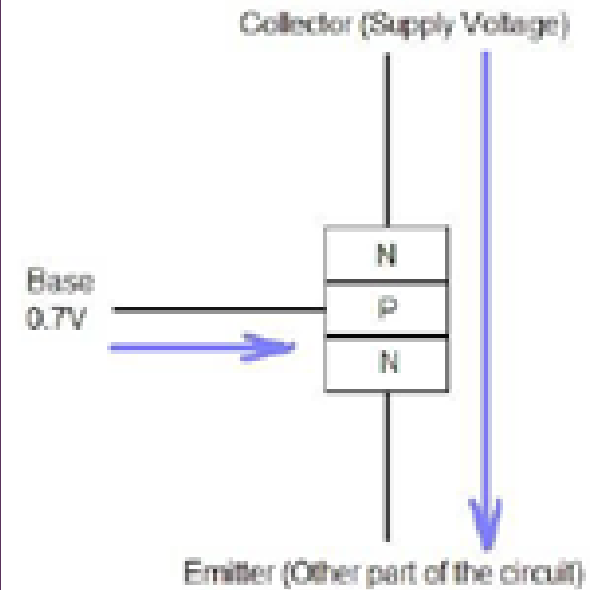
**Transistor Not Turned On**



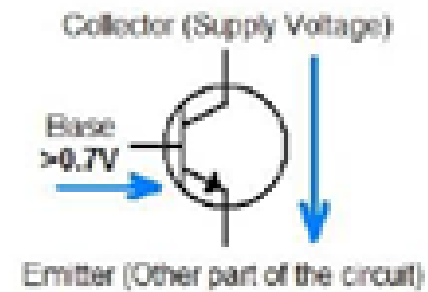
**NPN Symbol**



**Transistor Turned On**

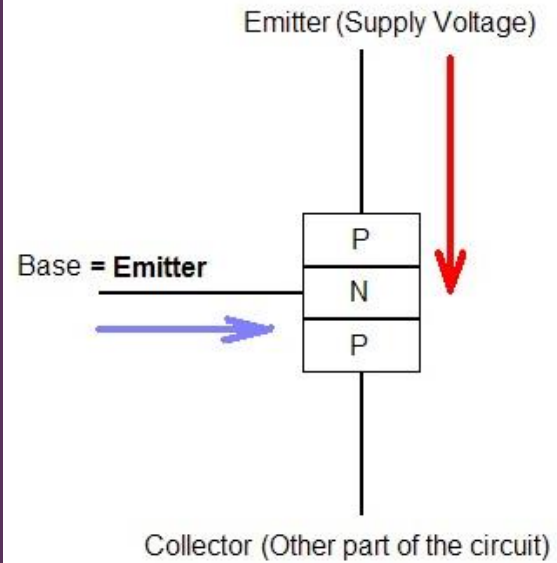


**NPN Symbol**

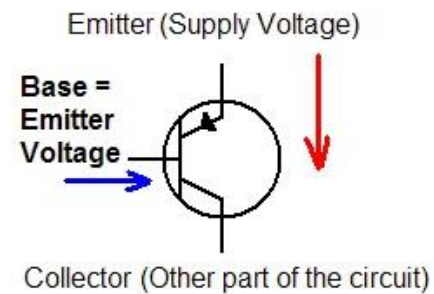


# Transistor

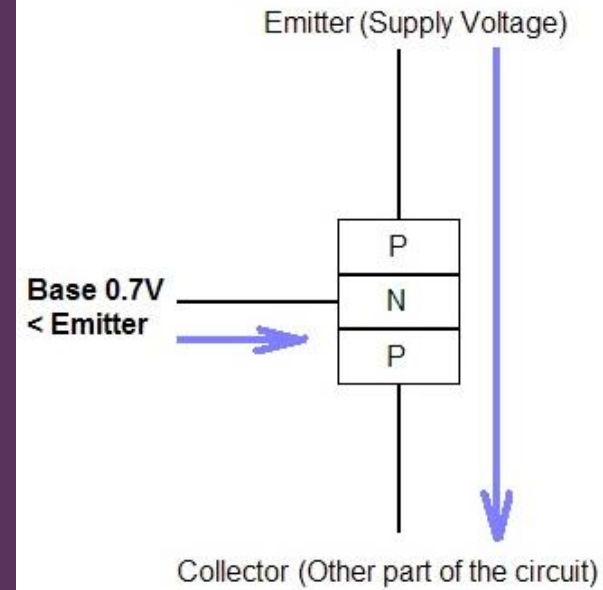
**Transistor Not Turned On**



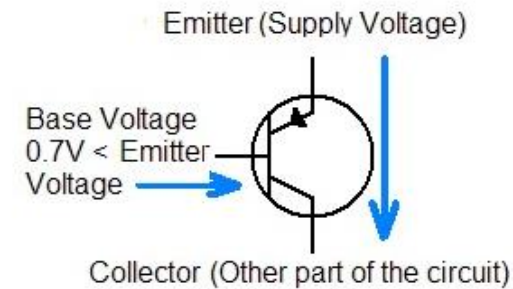
**PNP Symbol**



**Transistor Turned On**



**PNP Symbol**

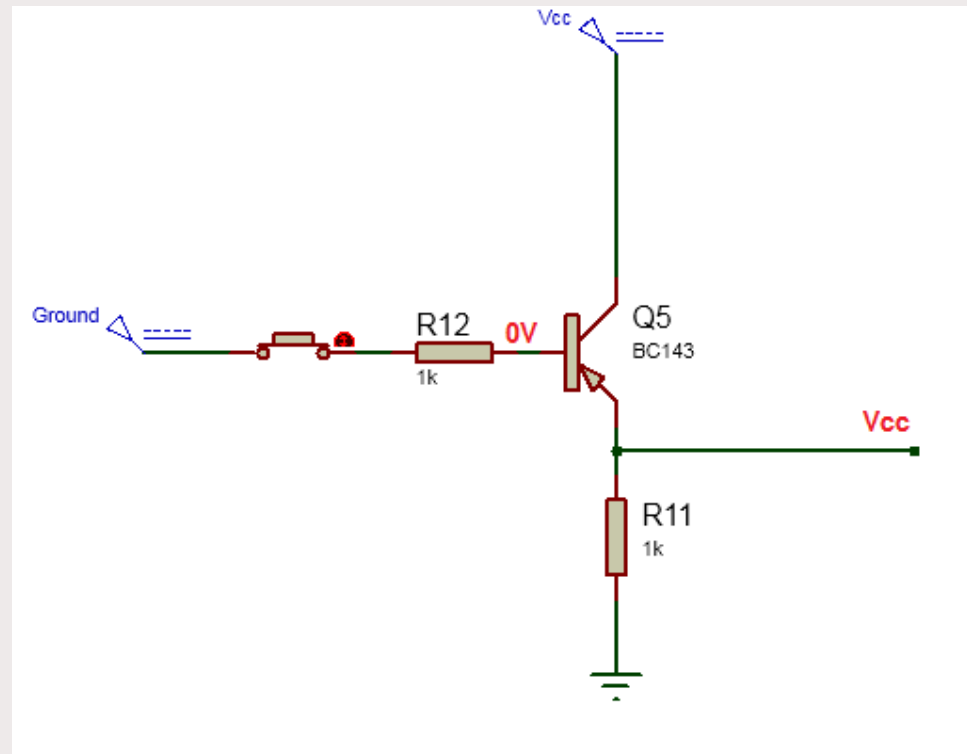




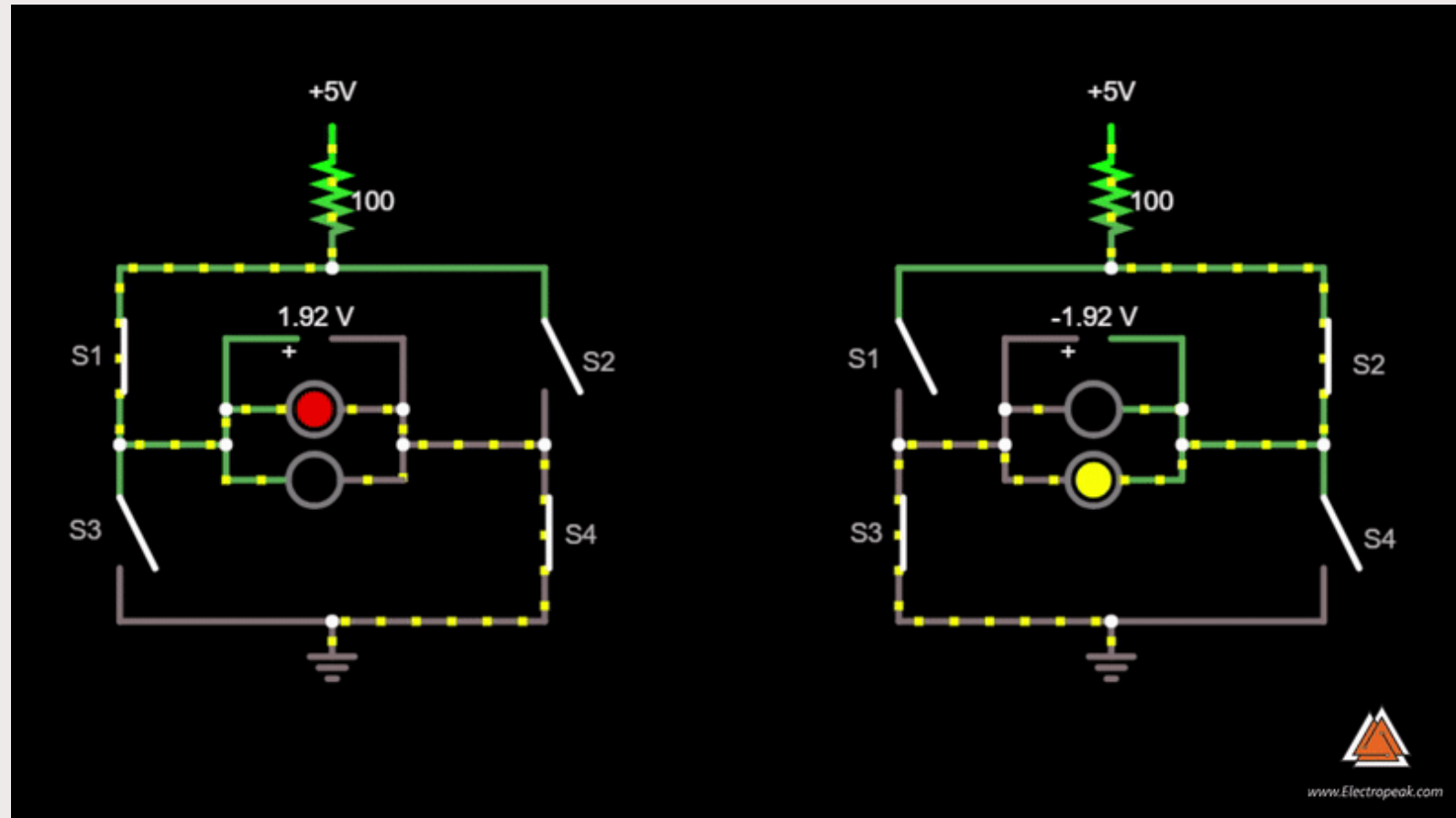
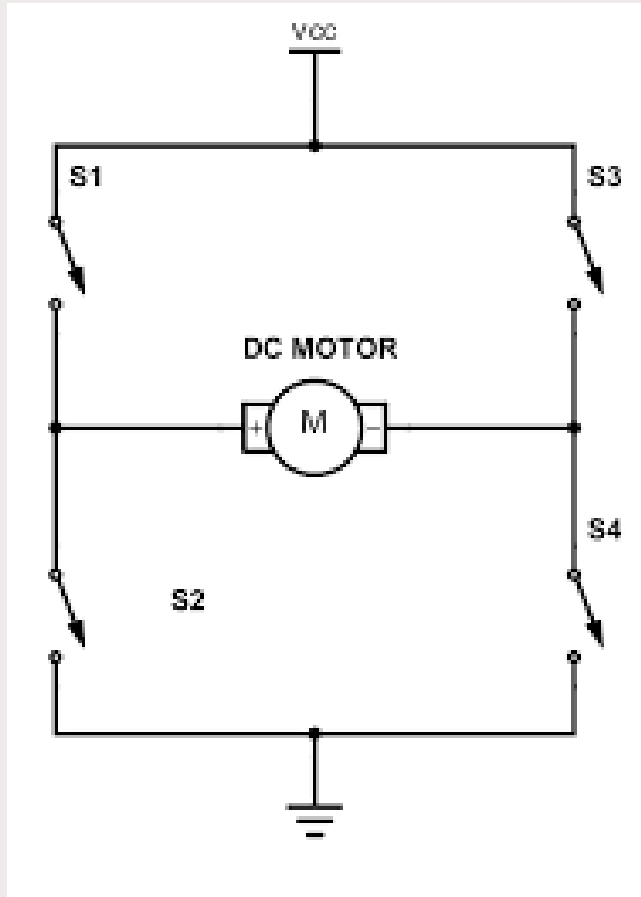
# Transistor as switch

The other important use for the transistor is as a switch.

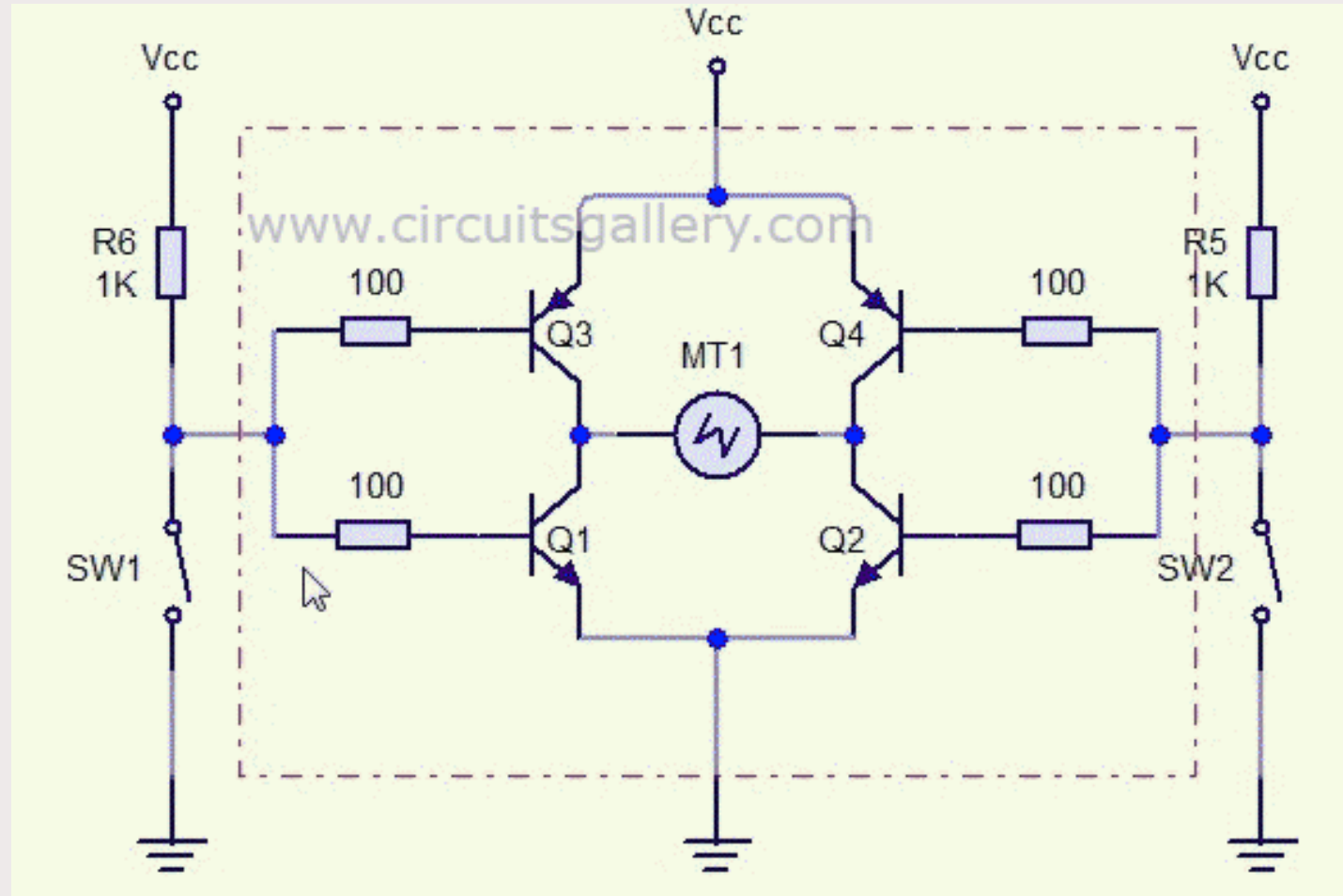
Below Figure illustrates the basic operation of a Transistor as a switching device



# Transistor as H Bridge



# Transistor as H Bridge



# Transistor as switch - Application

## Light-Operated Switch

