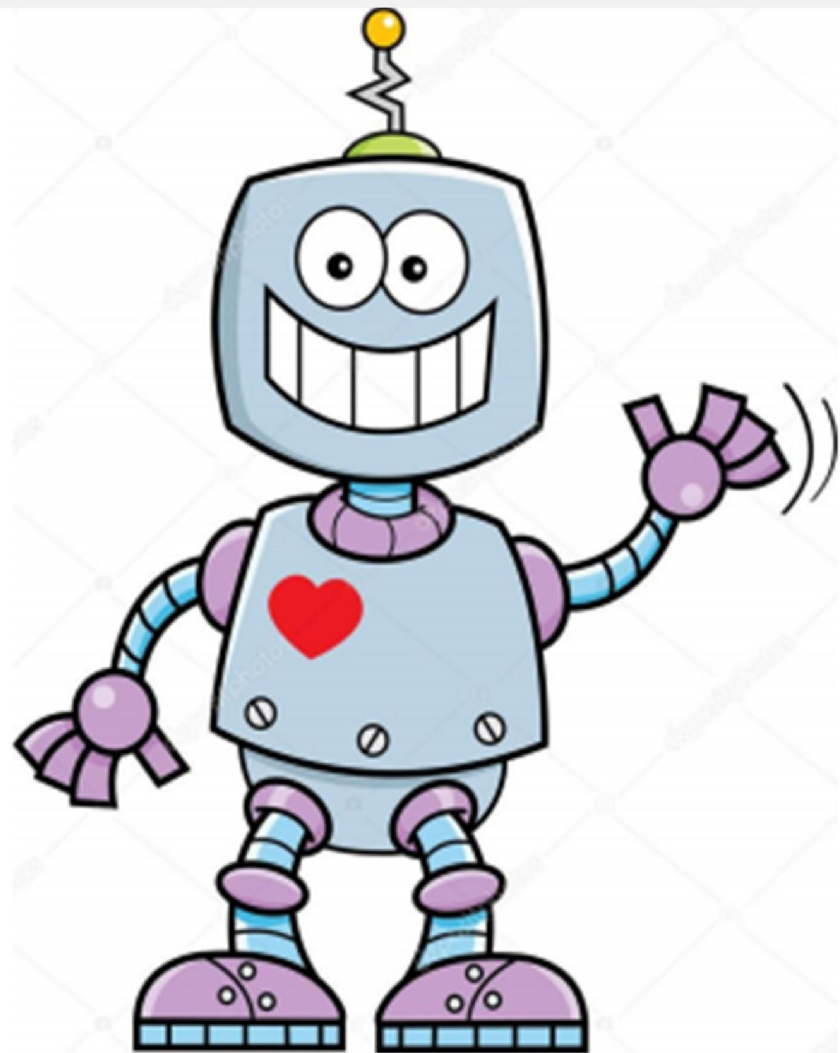


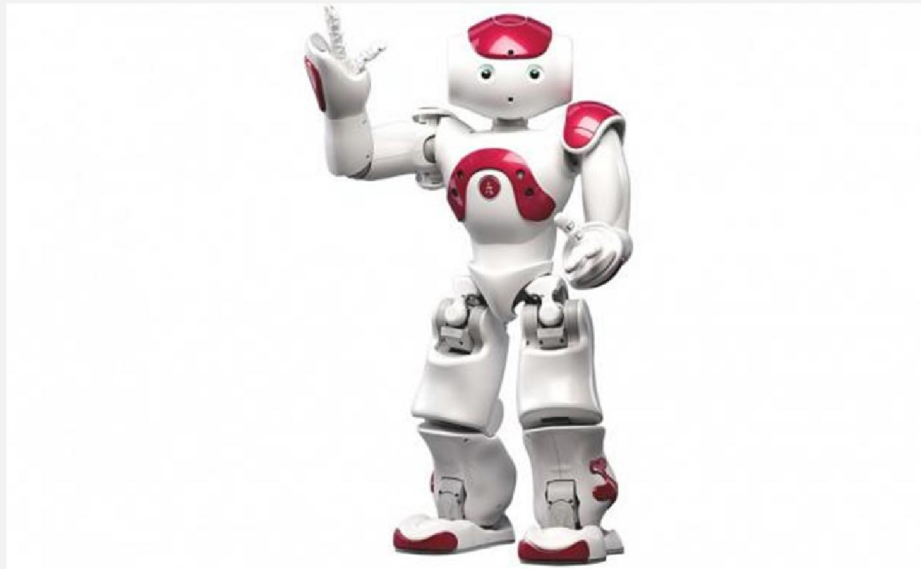
# GESTURE-CONTROLLED ROBOTICS

EEE Association

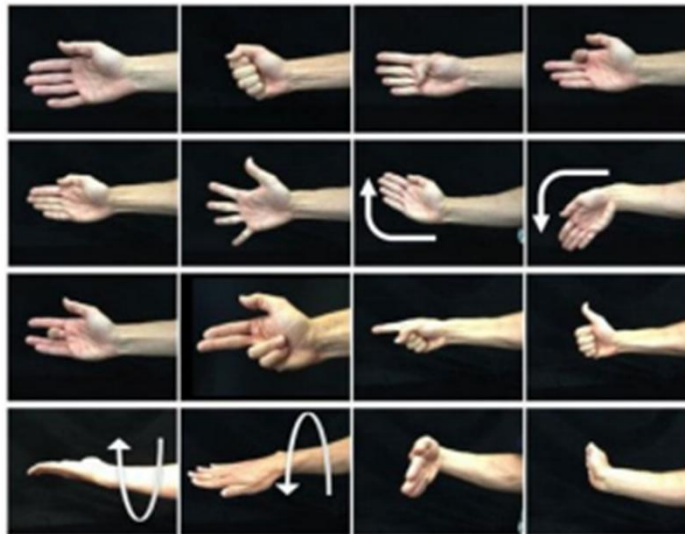
**Robot**

**Sense.Think.Act**

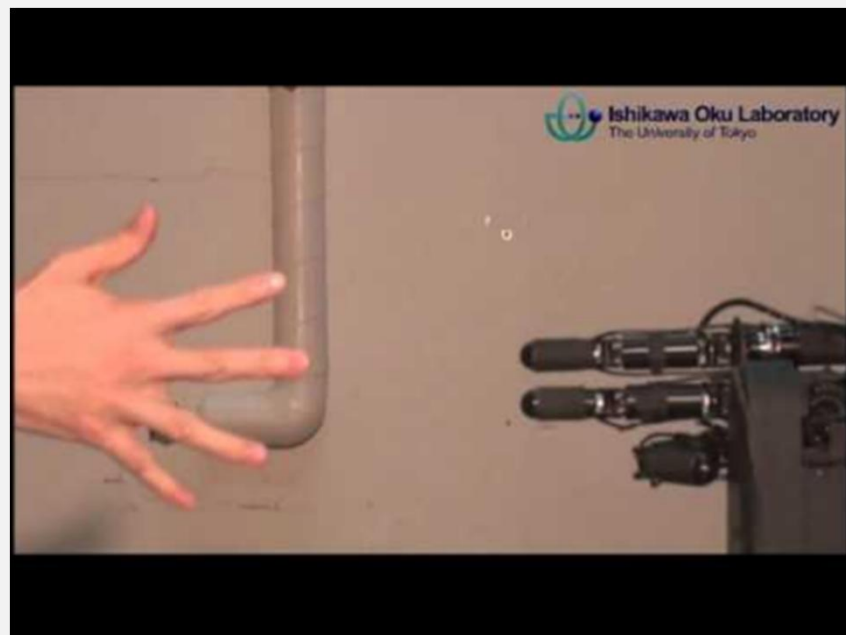




# WHAT ARE GESTURES?



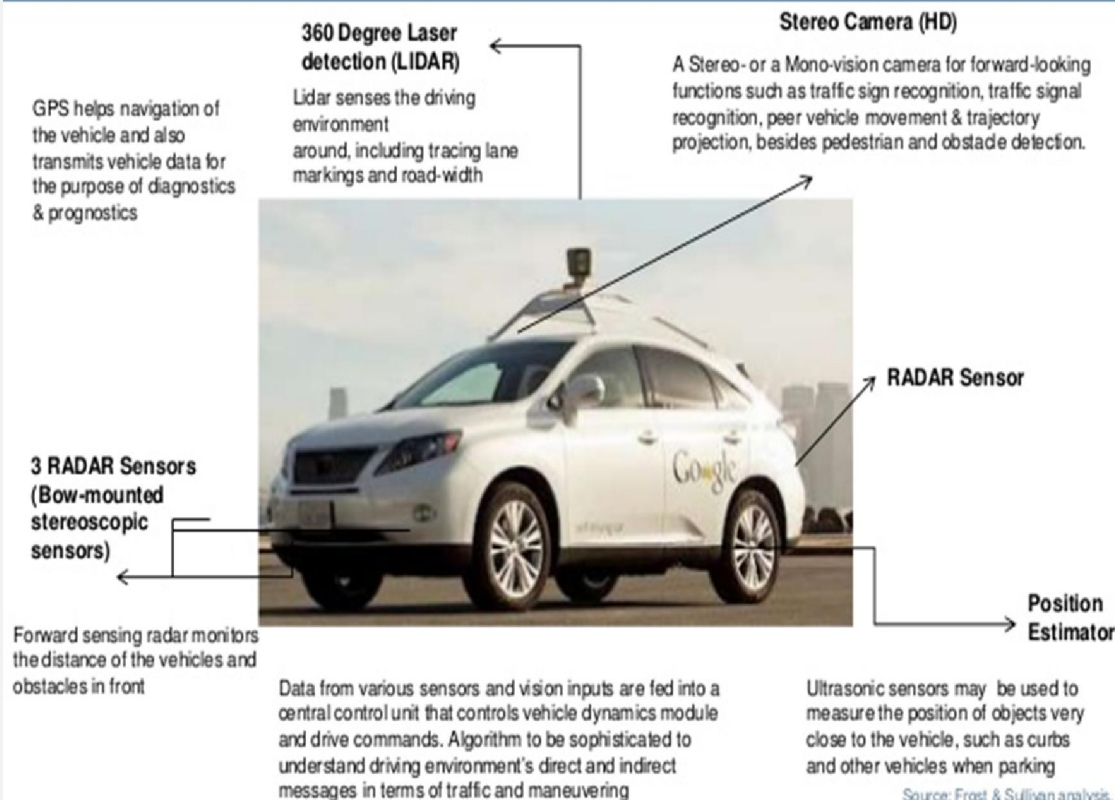
# JANKEN





## Google Car: Sensors and Technologies Used

The Google X automation module employs some of the finest and expensive sensors available today, enabling a transition to ADAS-enabled maps with accuracy of 10cm, a dire need for autonomous driving



Source: Frost & Sullivan analysis.

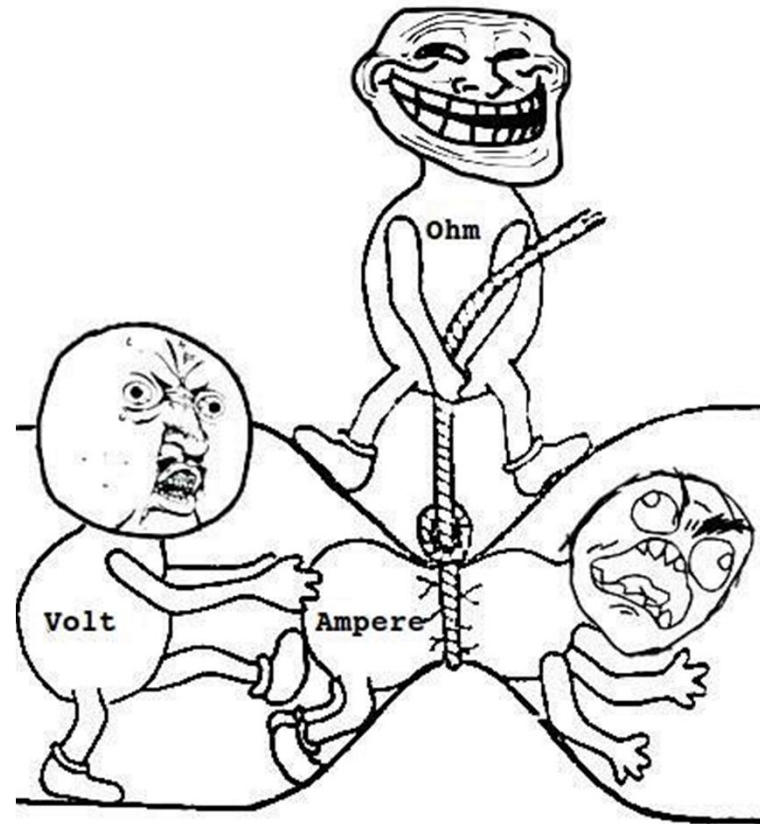
# BASIC ELECTRONIC COMPONENTS

# RESISTANCE

## Ohm's Law

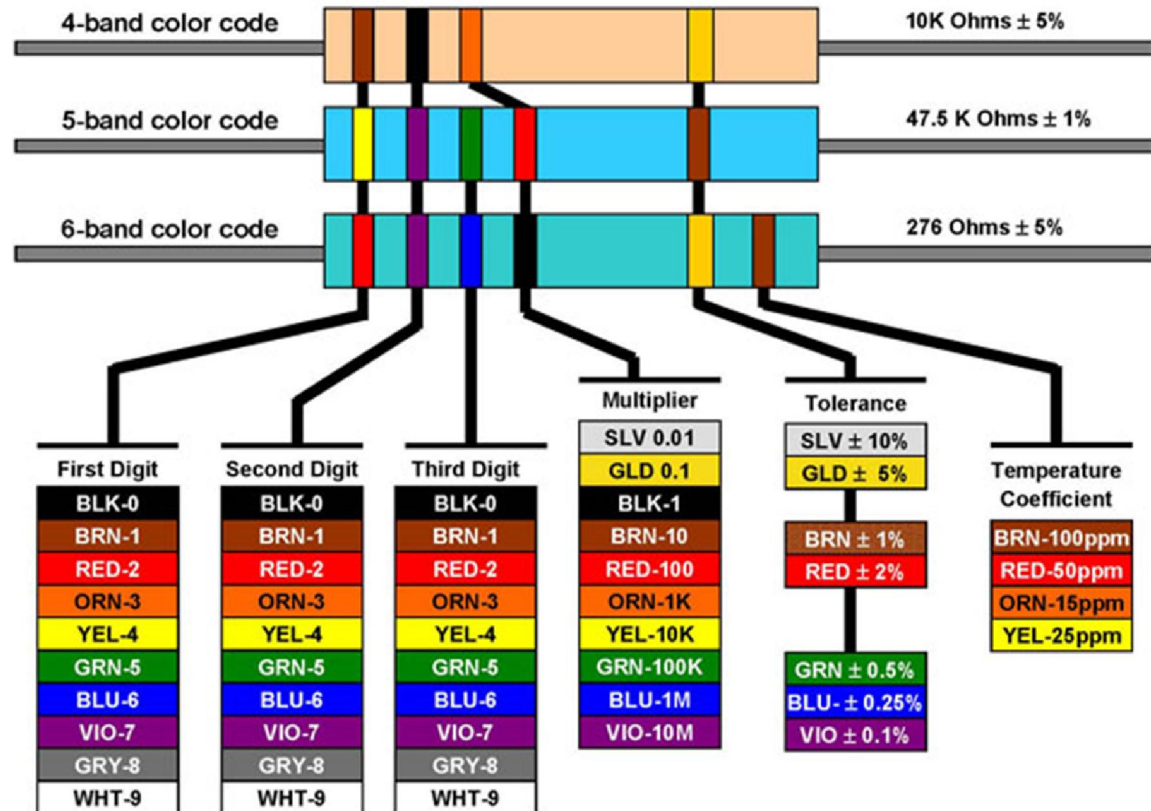
Electrical resistance:

A measure of the difficulty to pass an electric current through that conductor





# Resistor Color Code

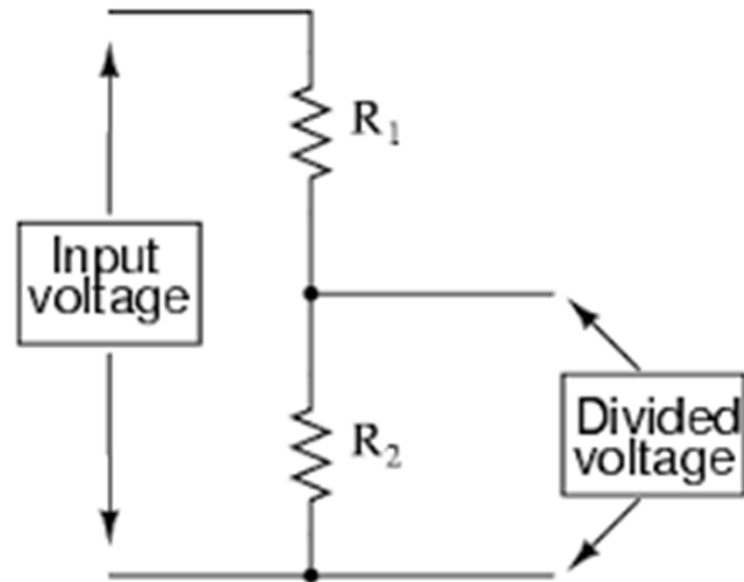


RESISTOR

## SOME USES OF A RESISTOR

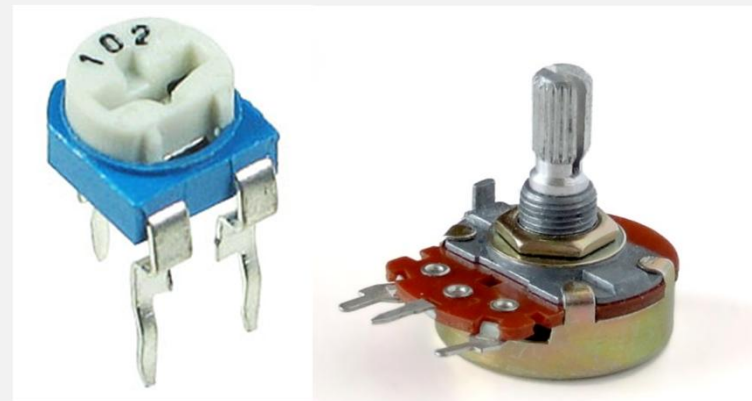
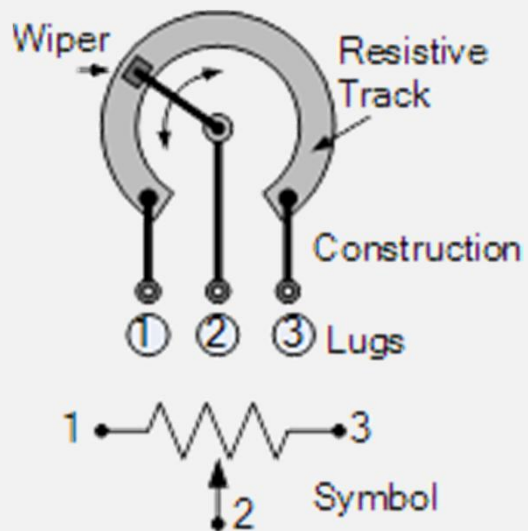
- Limit current in a circuit to protect components
- Potential divider

# POTENTIAL DIVIDER



# POTENTIOMETER

Variable resistor



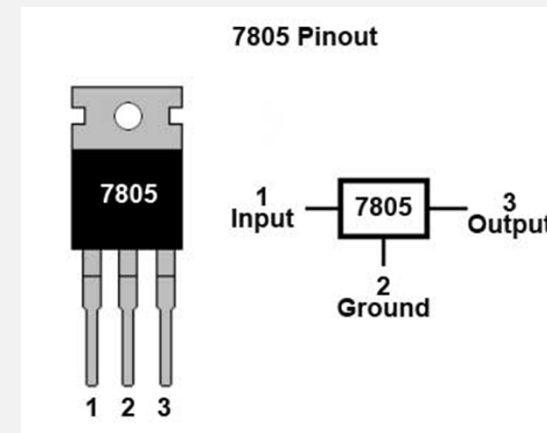
Some types of Pot



What is the difference between rheostat and a potentiometer?

## VOLTAGE REGULATOR – IC 78XX

- xx – Denotes the output voltage
- Made of Zener diodes and transistors



Why are regulators used when potential divider circuit is much simpler?



How would you change the resistance of a resistor without touching it ?

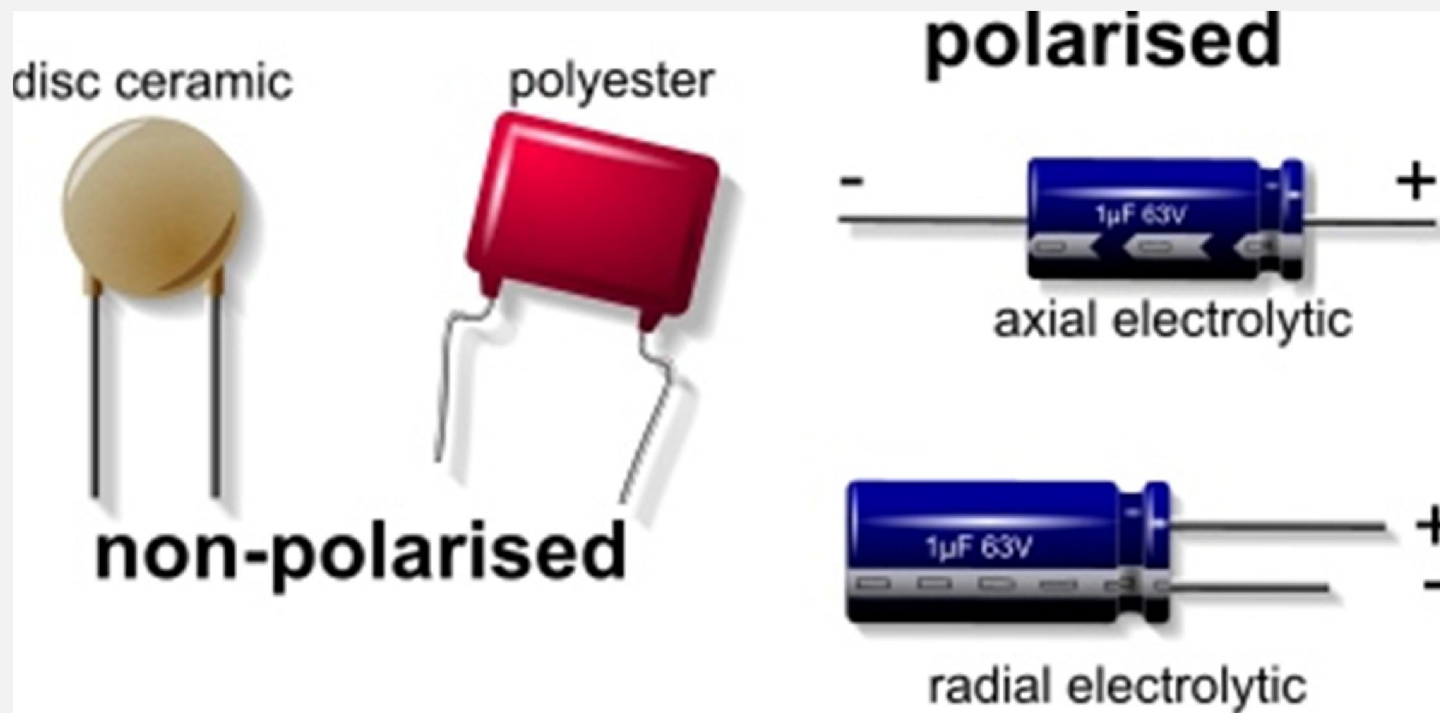
## LIGHT DEPENDENT RESISTOR

- Composed of Cadmium Sulphide
- Increase in light intensity results in increase in concentration of charge carriers, which in turn increases the conductivity and decreases the resistance



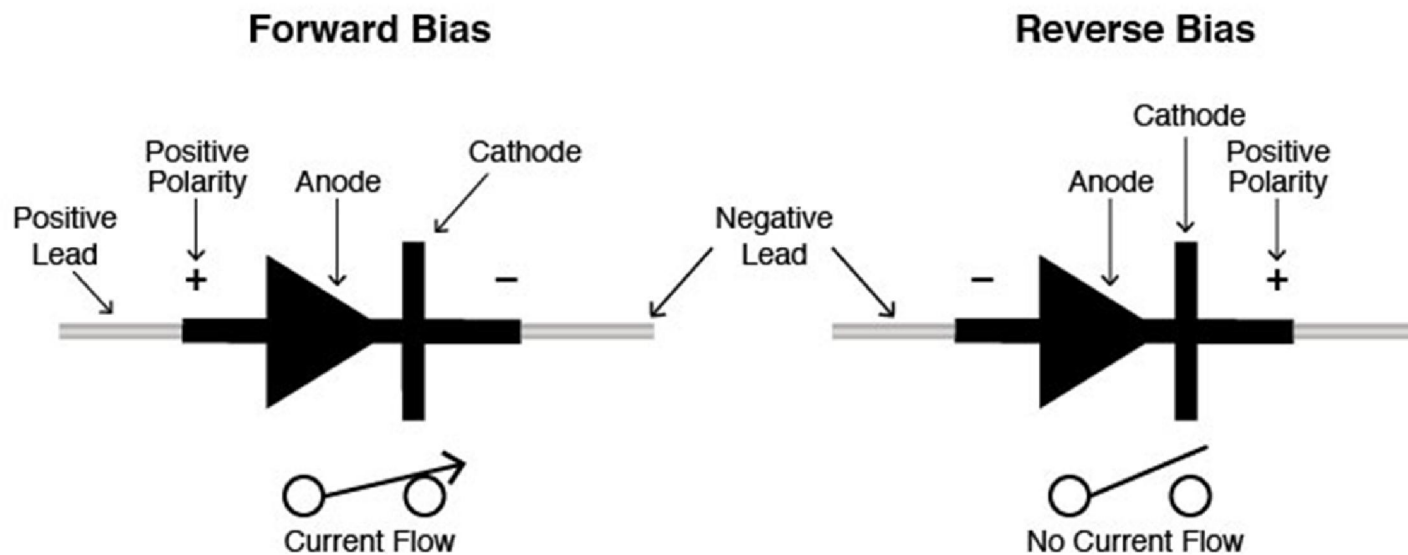
# CAPACITOR

Used to store electric charge

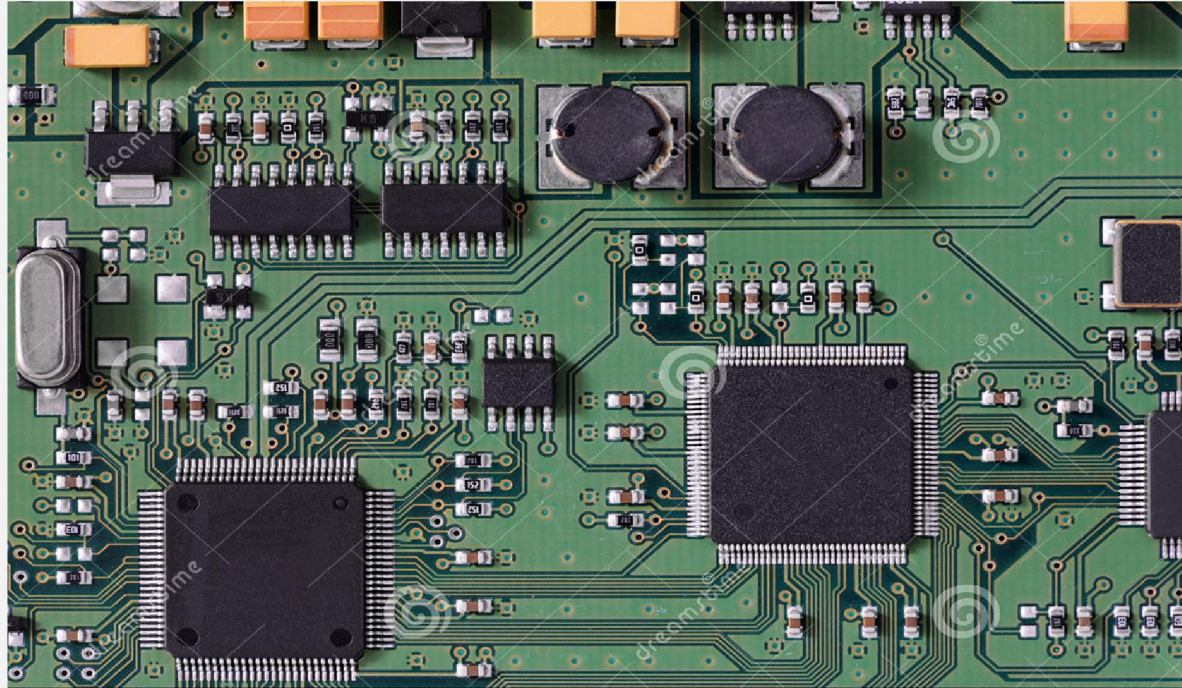


# DIODE

Conducts current primarily in one direction



# Integrated Circuits



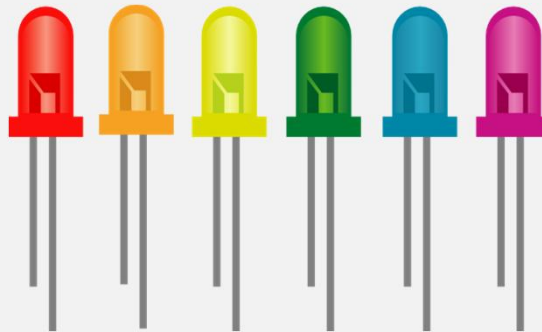
Have you heard of Moore's law?



## SOME SPECIAL DIODES

## LIGHT EMITTING DIODE (LED)

- Emits a specific wavelength of light depending upon the type of semiconductor material.
- Used for indication/debugging in circuits.
- Identification: Cut at the cathode / Flat Portion



## IR LED

Emits light in the infrared range of the electromagnetic radiation spectrum



How would you check if an IR LED is working?

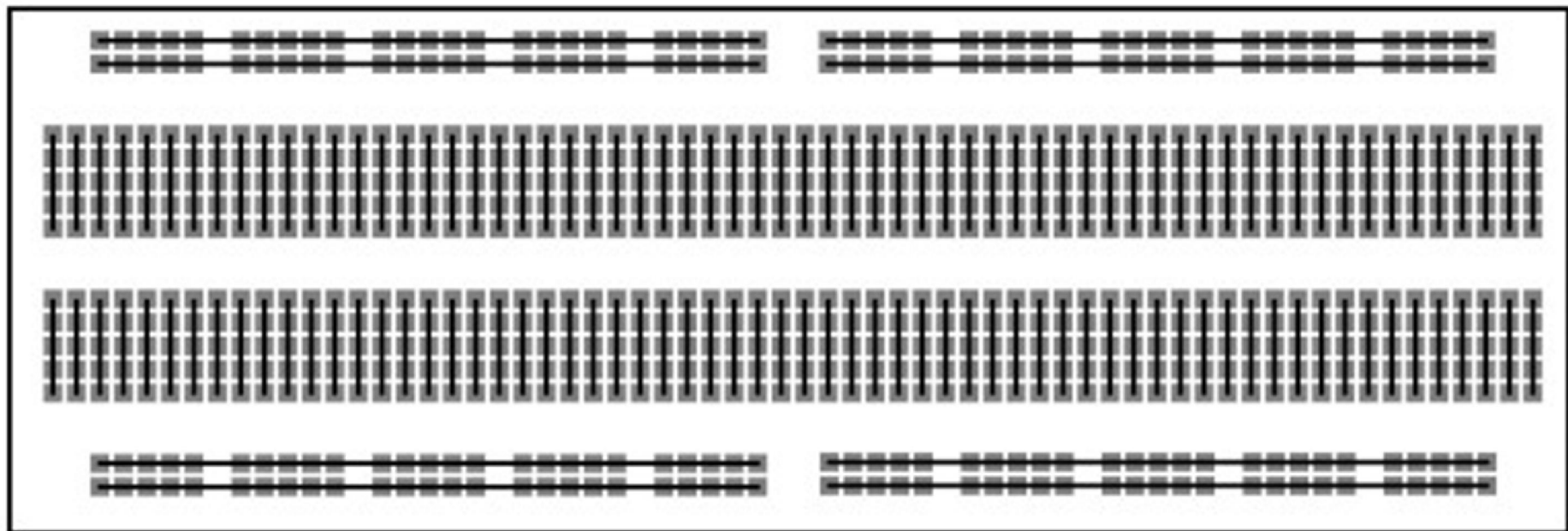
# PHOTODIODE

- Disadvantage of LDR – More sensitive to ambient light.
- Connected in reverse-bias configuration.
- Most sensitive to IR.



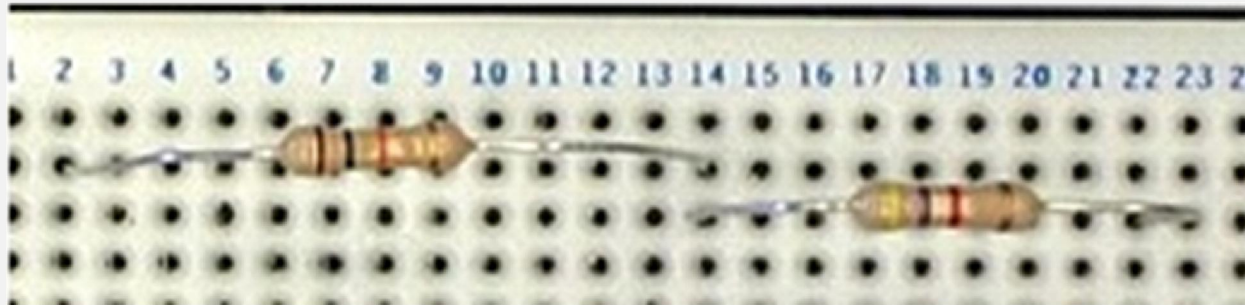
# BREADBOARD

A solderless device used for prototyping circuits

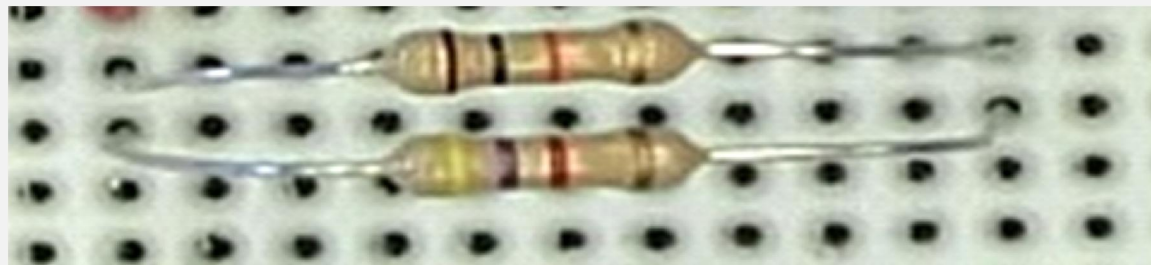


Internal connections of a breadboard

## SERIES AND PARALLEL CONNECTION

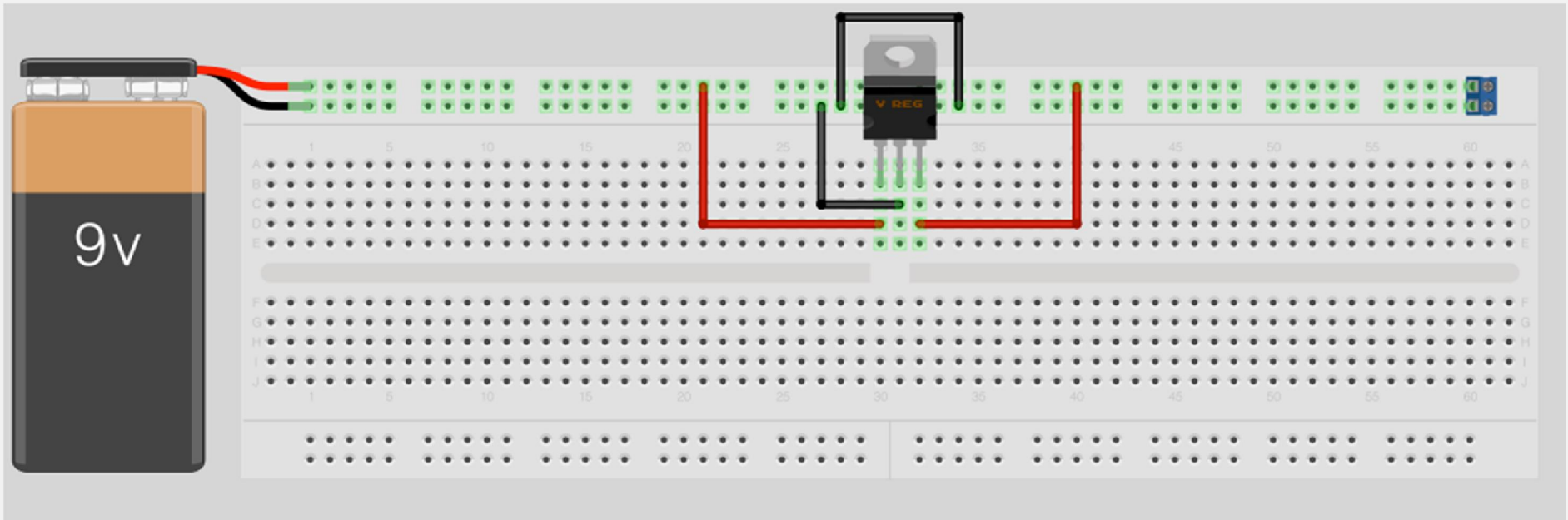


Series connection in breadboard



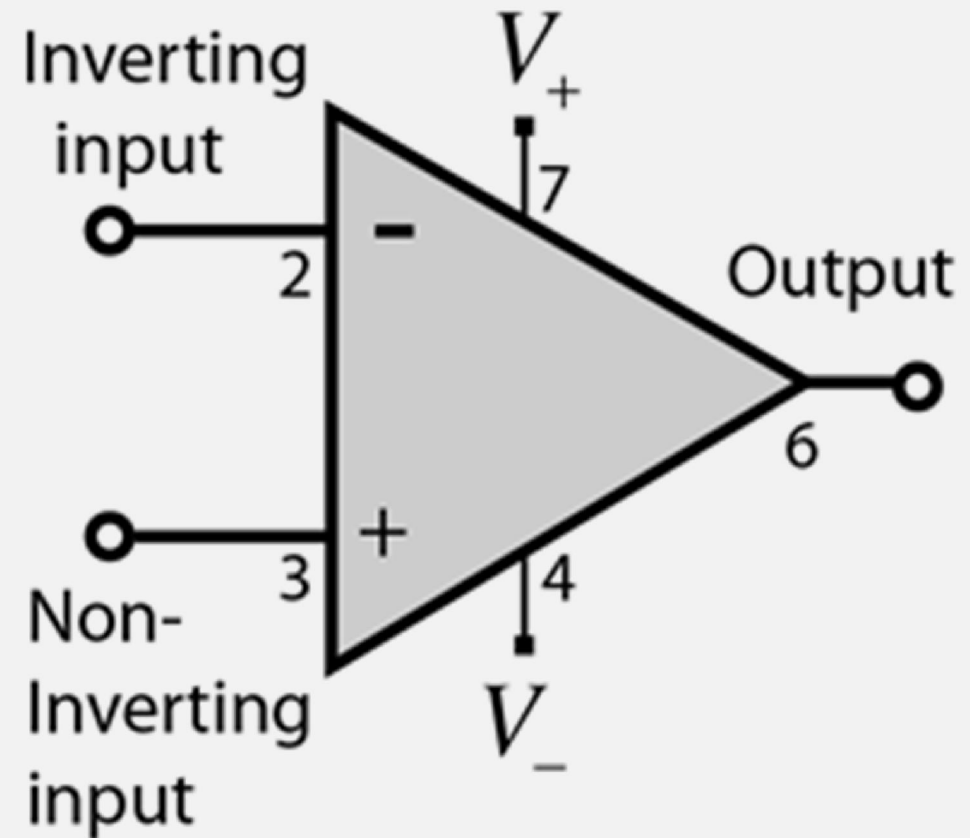
Parallel connection in breadboard

## VOLTAGE REGULATOR CONNECTION IN A BREADBOARD



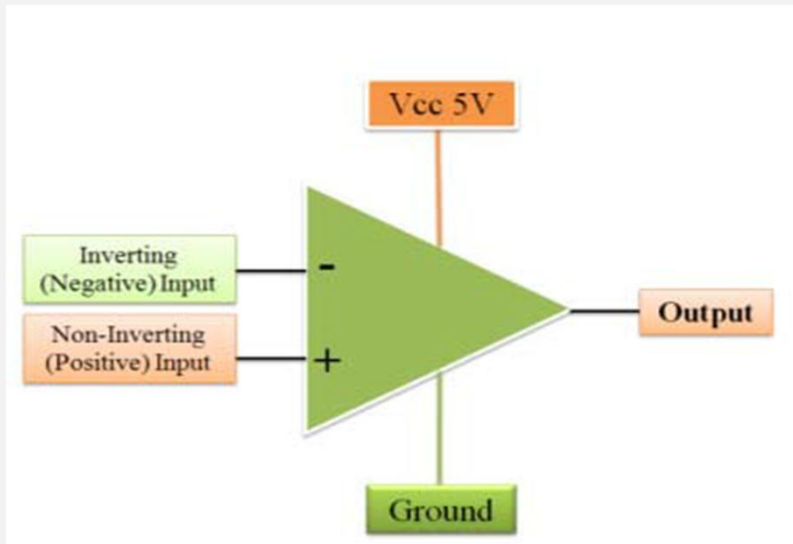
## OPERATIONAL AMPLIFIERS

- High gain amplifiers
- Used to perform operations on voltage signals like addition, subtraction, multiplication



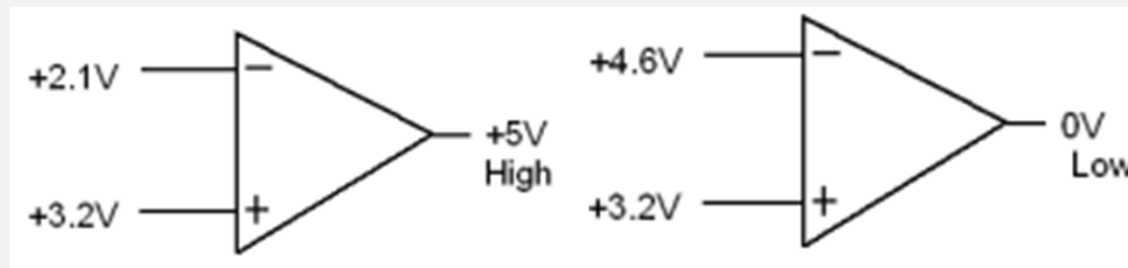
# OP AMP AS COMPARATOR

Compares the magnitudes of two voltage inputs and determines which is the largest of the two.

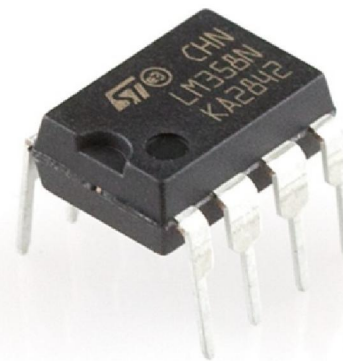
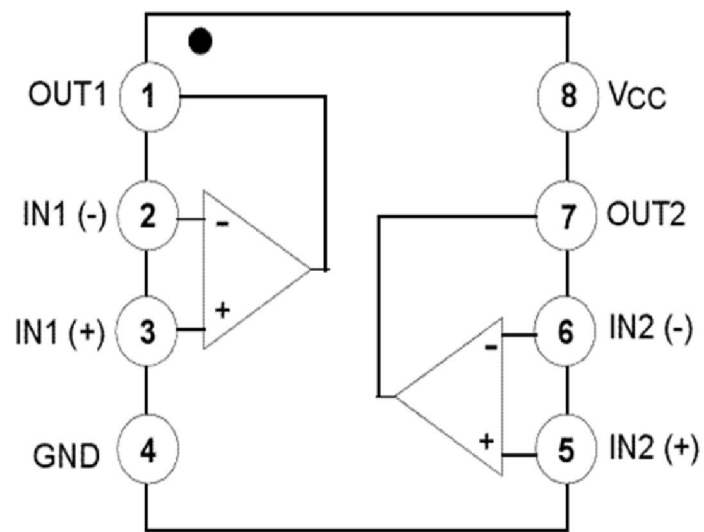


- If  $V_+ > V_-$  then  $V_o = V_{cc}$   
(Digital High 1 output)
- If  $V_+ < V_-$  then  $V_o = 0$   
(Digital Low 0 output)

Eg.



## LM358 – DUAL COMPARATOR



# TODAY'S TASK

Construct an IR Module!

# CIRCUIT DIAGRAM

