

# Applied Case Studies in Machine Learning and Deep Learning in Key Areas II

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Course Coordinator

V  
R  
I

- Voltage
- Resistance
- Current

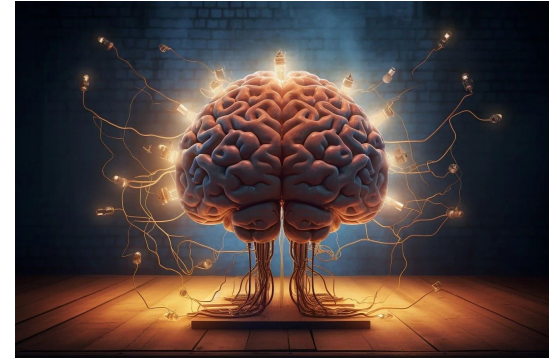
What are they in simple words ?

# Current

Definition Rate of flow of charge  
Amount of charge per unit time that crosses one point

$$I = \Delta Q / \Delta t$$

Unit: ampere (A)

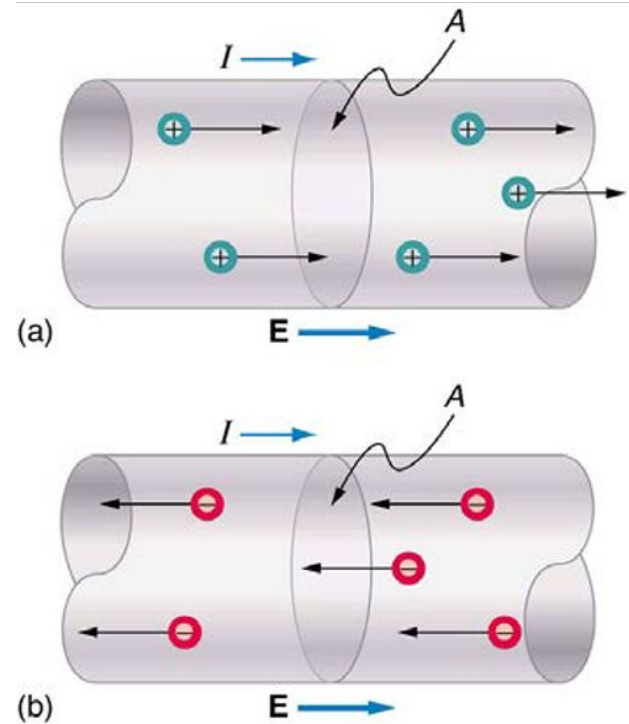


# Current

Electrons are the charge that flows through

Historically thought positive charges move

Conventional current imaginary flow of positive charges  
Flows from positive terminal and into negative terminal  
Real current flows the opposite way

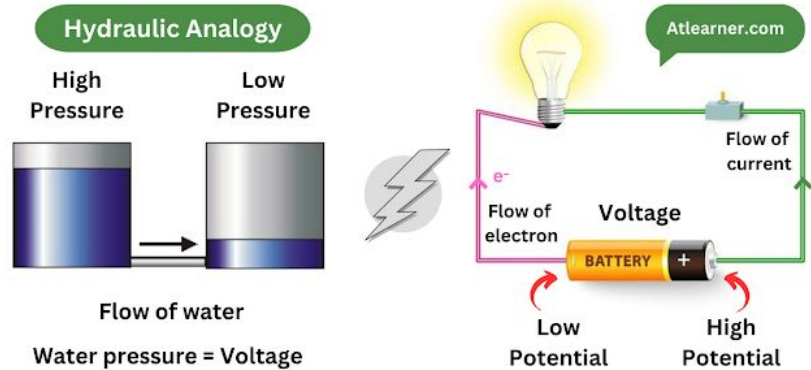


# Voltage

In simple words : Voltage describes the “pressure” that pushes electricity

Voltage is the difference in electric potential between two points.

Unit: V (volts)



# Ohm Laws

$$V = RI$$

## Electrical Power

Electric power is the rate of transfer of electrical energy within a circuit

$$P = V I$$

It is measured in Watts

# Resistance - Capacitance - Inductance

Every material , even our body, has a certain R, C and I

**Resistance:** is a measure of the opposition to current flow in an electrical circuit.

Unit :  $\Omega$  (ohms)

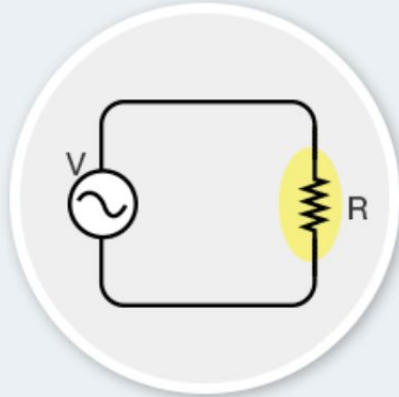
**Capacitance :** is the capability of a material object or device to store electric charge.

Unit : Farad

**Inductance :** the tendency of an electrical conductor to oppose a change in the electric current flowing through it.

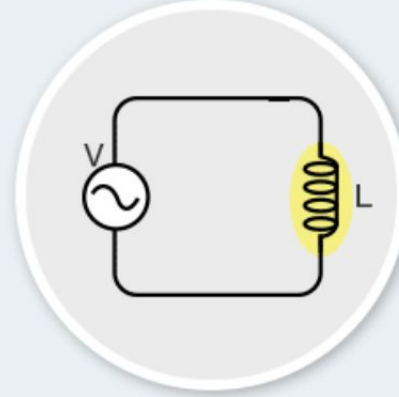
Unit : (Henry)

# Difference Between Impedance and Resistance



## RESISTANCE

Resistance is essentially friction against the motion of electrons. When alternating current goes through a resistance, a voltage drop is produced that is in-phase with the current.



## IMPEDANCE

Impedance is a comprehensive expression of any and all forms of opposition to electron flow, including both resistance and reactance. It is present in all circuits, and in all components.



# The human body is full of electricity

Electricity is required for the nervous system to send signals throughout the body and to the brain, making it possible for us to move, think and feel.

