1. What is Electronics?

Electronics is the study and use of **electricity to control the flow of electrons** in circuits to make devices work.

- Think of electricity as **water flowing in pipes**.
- Electronics is like **valves, taps, and pumps** that control how water flows.

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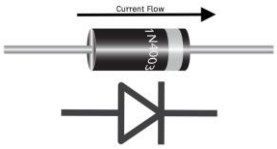
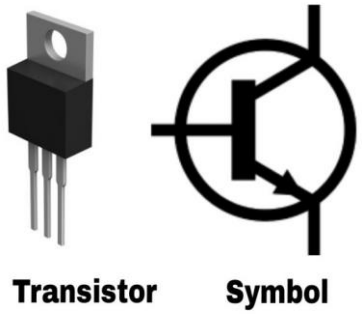
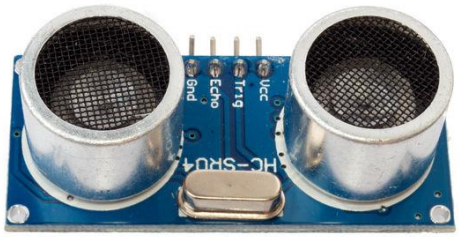
2. Basic Components of Electronics

Component	Symbol	Function	Simple Example
Battery / Power Supply		Provides voltage (energy)	9V battery in a toy car
Resistor		Limits current flow	Makes an LED safe from burning
LED		Emits light when current passes	Indicator light on a device
Capacitor		Stores electrical charge	Helps smooth power supply in phones
Diode		Allows current in one direction	Protects circuits from reverse polarity

Component	Symbol	Function	Simple Example
Transistor		Acts like a switch or amplifier	Turns a small signal into a bigger one
Switch		Turns circuit on/off	Light switch in your room
Sensor		Detects something (light, distance, temp)	HC-SR04 for distance, LDR for light

3. Voltage, Current, and Resistance

1. **Voltage (V)** – Pushes electrons through a circuit.
    - Like water pressure in a pipe.
    - Example: 5V from Arduino can power an LED.
2. **Current (I)** – Flow of electrons (measured in Amperes, A).
    - Like water flowing through the pipe.
    - Example: LED draws 20 mA (0.02 A) to glow.
3. **Resistance (R)** – Limits current flow (measured in Ohms, Ω).
    - Like a narrow section in the pipe slowing water.
    - Example: Using 220 Ω resistor to limit current to LED.

Ohm's Law:

V=I×RV = I \times RV=I×R

- Example: 5V supply, 220 Ω resistor → I = 5 / 220 ≈ 0.023 A (23 mA)