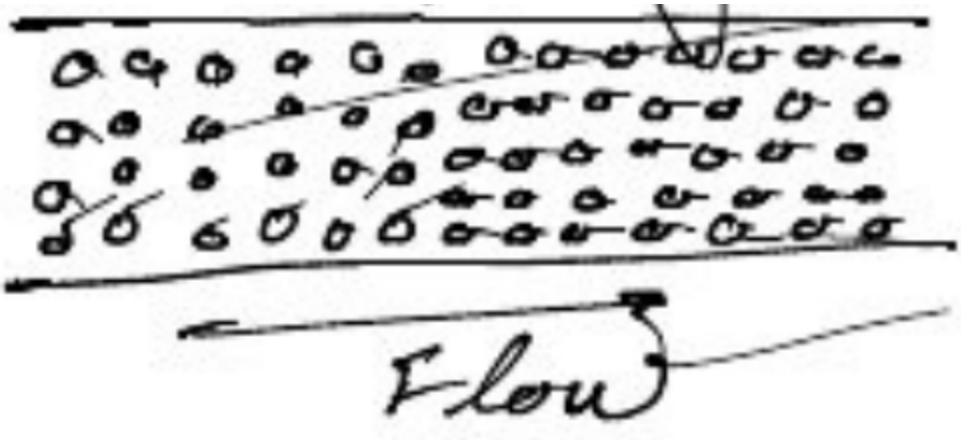
# Lecture 2 - Basic Electronics and Components

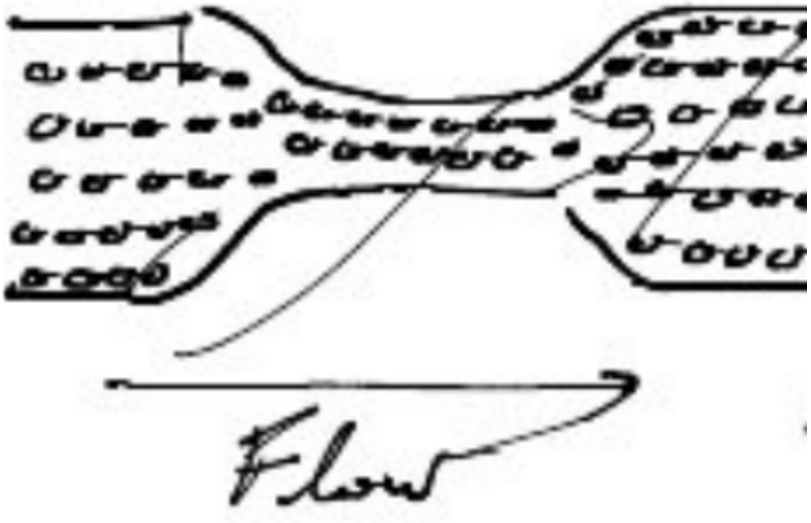
## I. Basic electronics theory: Current, Resistance and Voltage

- Electron:
  - e-
  - “A tiny bit of charge”
- Current:
  - How much charge passes a point per second.



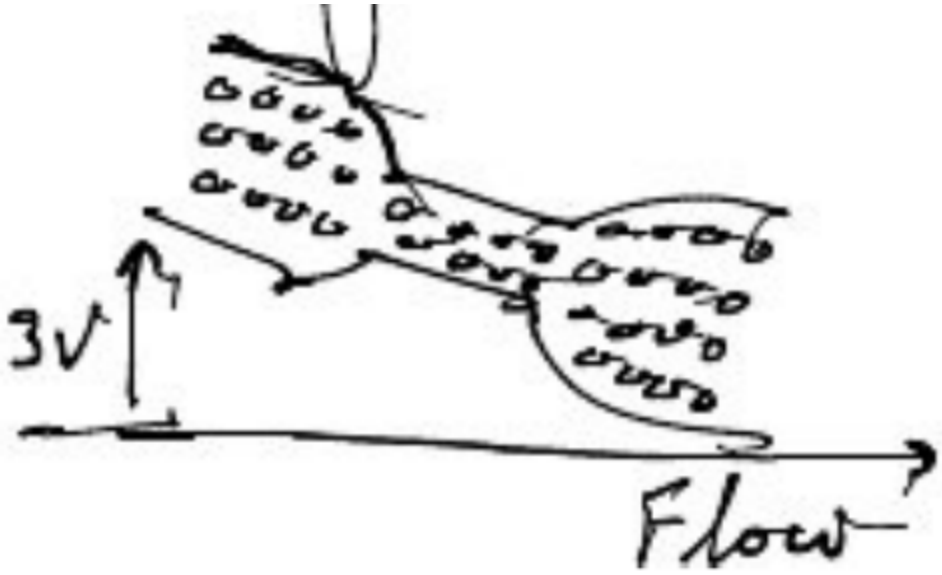

… think of it as a tube full of tiny balls.

- Resistance:

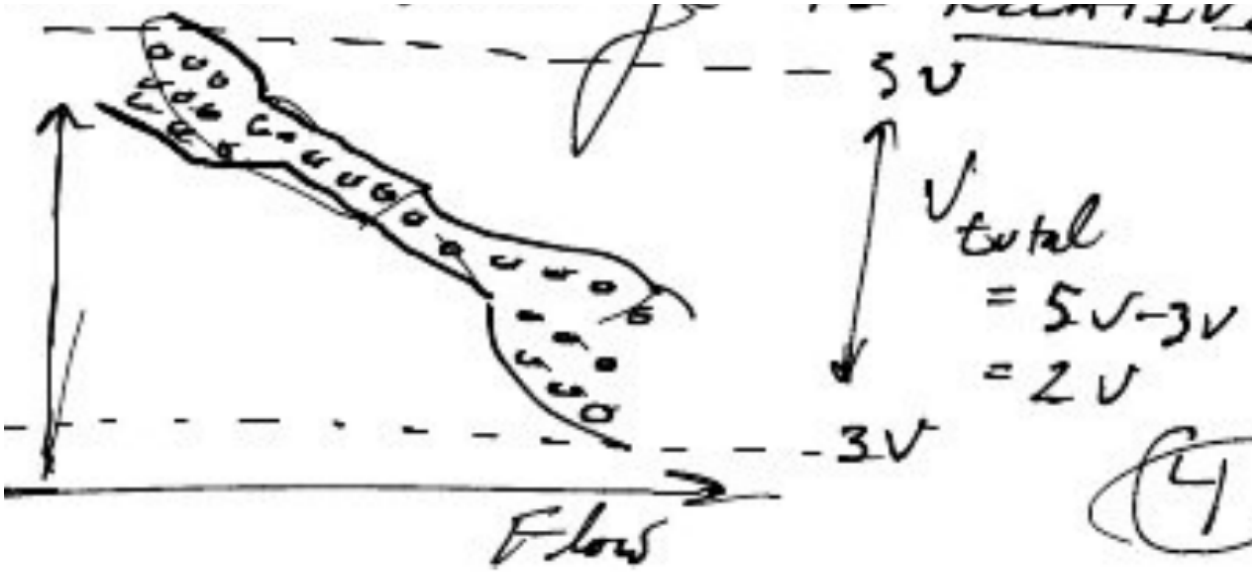



A limitation to the amount of charge that can pass through a point.

- Voltage:
  - Electrical potential difference between two points in a circuit…




However… voltage is relative!



**II. Ohm's Law**

- Relationship between current, voltage and resistance.
- V = IR
    - Where "V" is voltage
    - "I" is current
    - "R" is resistance

**III. Electronic Component Identification Guide**

- Resistors:
    - Symbol:

    - Reduces current flow
    - Keeps stuff from blowing up (among other things)
    - Most common component.

- Capacitors:
    - Symbol:

    - Stores up charge and releases it quickly over time
    - Does not produce charge!
    - Good for "smoothing" signals
    - Stabilizes voltage and power flow.

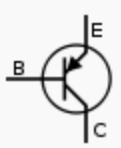
- Diode:
    - Symbol:


- Only allows electrons to flow one way
- Prevents "slosh-back" that can damage components "up stream".

- LEDs:
    - Symbol:


    - A type of diode that produces light when electricity passes through.

- Transistor:
    - Symbol:




    - Very important!
    - Switches that use small currents to control big currents
    - Video: https://www.youtube.com/watch?v=IcrBqCFLHIY
    - Acts as an on / off switch
        - Binary!
        - Can perform logical operations!
- I.C.
    - Integrated circuit
    - An electronic circuit formed on semiconducting material

Chips, processors, timers, gates … arduino!