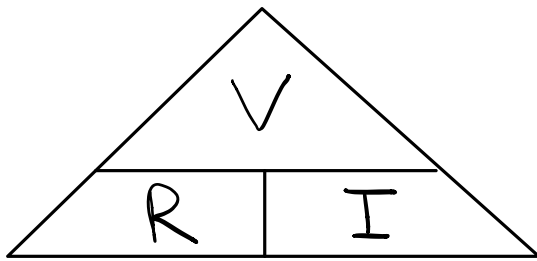# Mechatronics / Electrical Signals

- DC (= direct current) motors are more complex and less efficient than AC (= alternate current) motors
  ↳ - DC easier to manipulate / easier math
    - integration is easier / cheaper (e.g. batteries produce DC current)

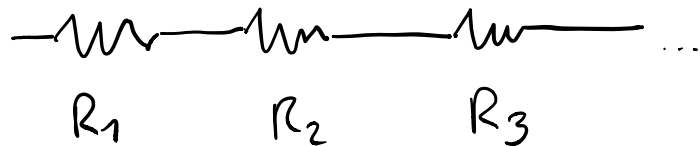- Circuit analysis: usually voltage is given → calculate current
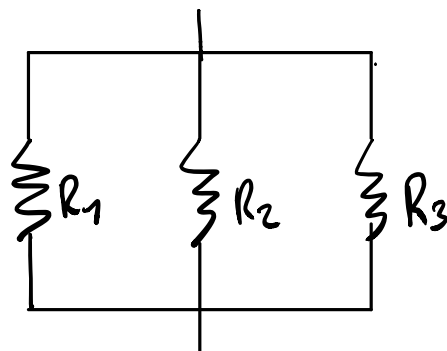
$$V = R \cdot I$$
$$R = V / I$$
$$I = V / R$$

OHM's LAW

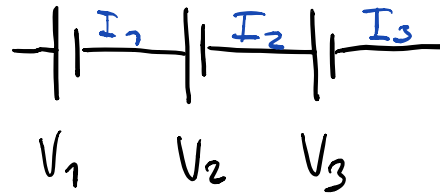Resistors in series: $R_T = R_1 + R_2 + R_3 \ldots$

$R_1 \qquad R_2 \qquad R_3$

Resistors in parallel: $\dfrac{1}{R_T} = \dfrac{1}{R_1} + \dfrac{1}{R_2} + \dfrac{1}{R_3}$

$R_1 \qquad R_2 \qquad R_3$

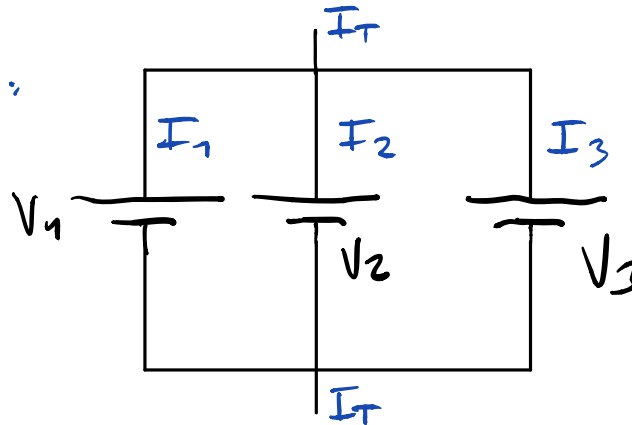Voltages in series: $V_T = V_1 + V_2 + V_3 \ldots$

Current in series:

$I_T = I_1 = I_2 = I_3$

Voltages in parallel: $V_T = V_1 = V_2 = V_3$

Current in parallel:

$I_T = I_1 + I_2 + I_3$

Kirchoff's Laws:
- algebraic sum of currents meeting at one point is zero
- direct sum of voltages in closed loop is zero

When analyzing complex networks, choose direction of current
→ voltage rise is positive, voltage drop is negative