Inbyggd elektronik 2018-03-19 #1

GOAL: Understand Voltage (V), Current (I), Resistance (R) and Power (P)

Voltage (Spänning)

- Matter has a property called charge (Q) SI unit coulomb [C]
- Electrons has negative charge, protons has positive charge
- Two particles of the same charge repel each other, and particles of opposite charge attract each other.
- The force between charges is given by Coulomb's law

$F \propto \frac{Q_1 Q_2}{r^2}$ where r is the distance between two charges.

- Electric field is defined to extend from every charge and a charge (q) experience $F = qE$ that is the same as the force calculated from Coulomb's law.

To move a positive charge against the electric field requires energy and the charge increases its potential energy.

The electric potential at some point is defined by the potential energy a unit charge has aquired by moving from a reference zero potential energy.

The electric potential at a point (a) is $V = \frac{PE_a}{q}$ [J/C] Unit of energy is Joules [J]

NOW!! - The difference in electric potential between two points is called Voltage (V)

Current (I): Any flow of charge is an electric current.

In a wire the current is equal to the charge that passes a cross-section per unit time.

$I = \frac{dQ}{dt}$ [C/s] is called ampere [A]

Resistance (R): Matter restricts the flow of charge when a voltage is applied.

Ohm experimentally found that $I \propto V$

Ohm's law $\boxed{V = RI}$ Unit of R is $\left[\frac{V}{A}\right]$ called [Ω]