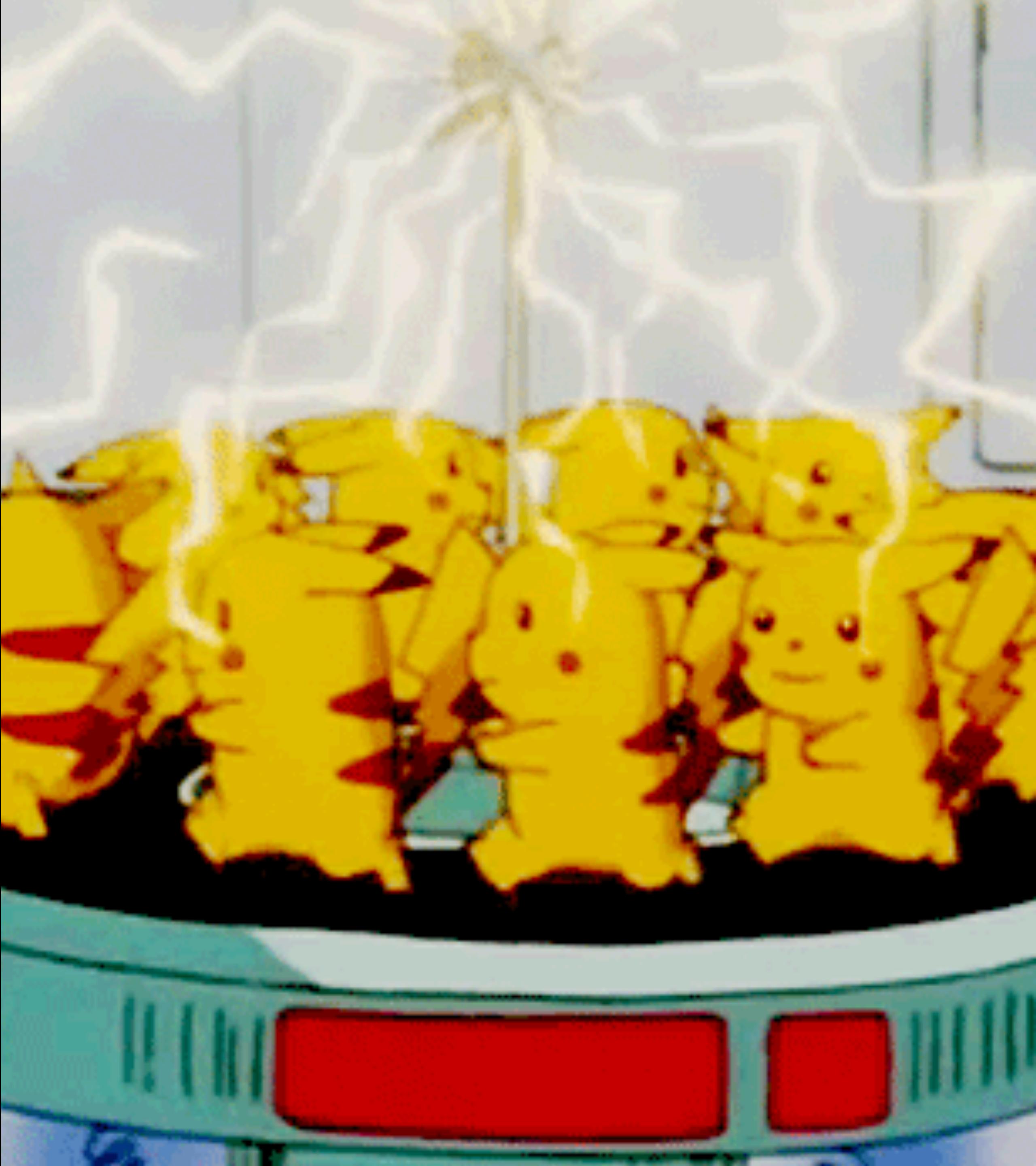


AGENDA

- Introduction
- Basics of electricity
- Electronic components
- Tools

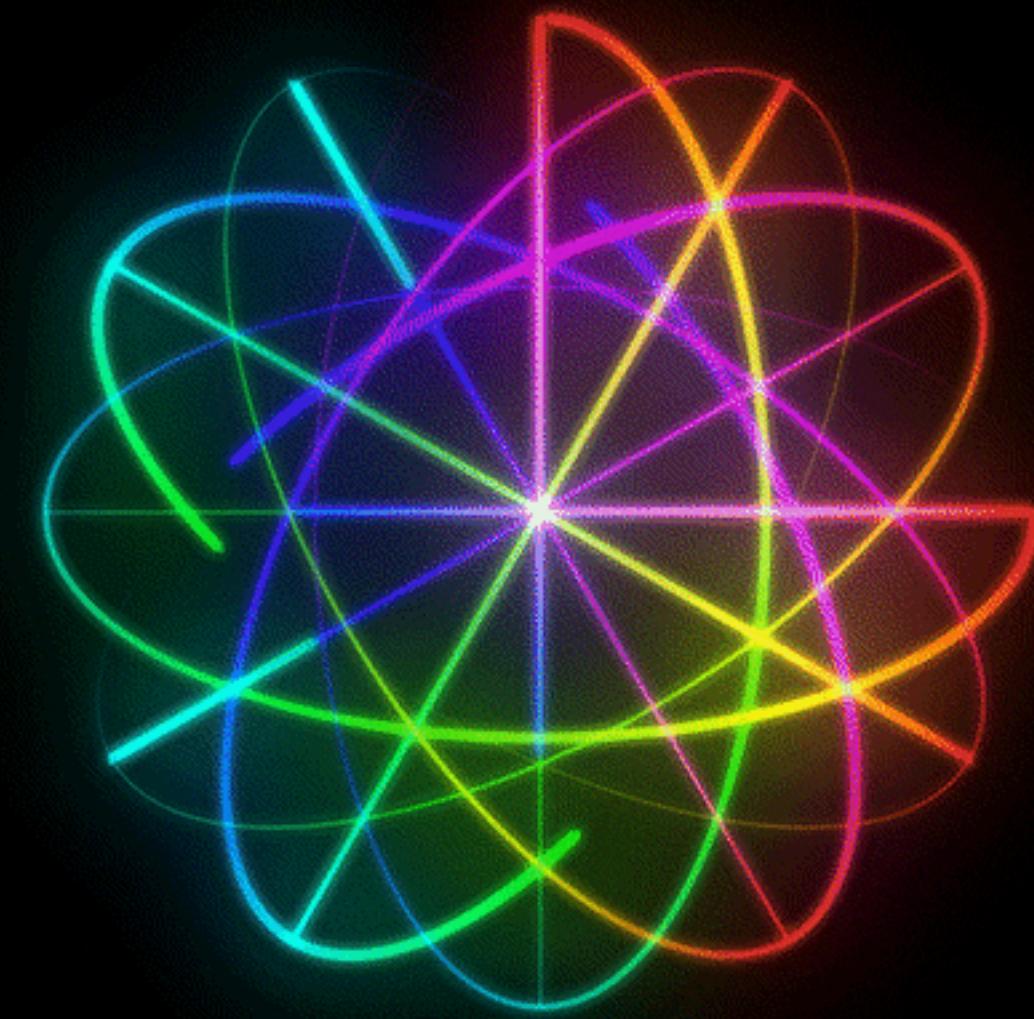


ELECTRICITY

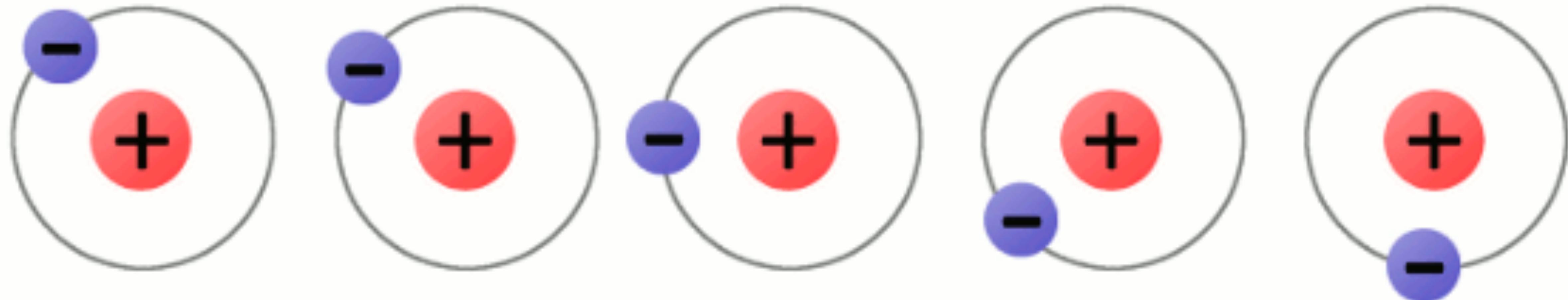


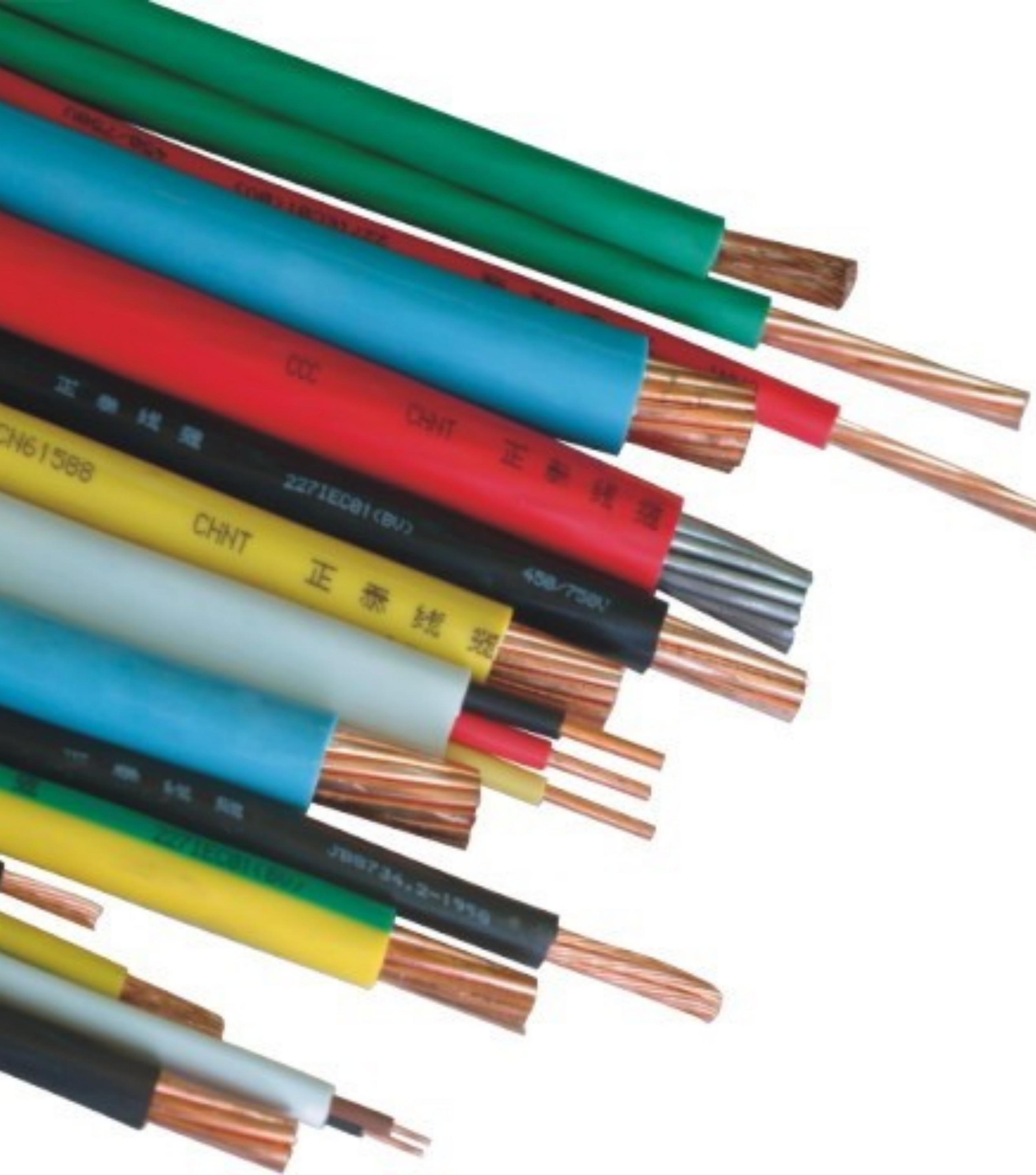
ELECTRICITY

- Unhelpfully defined as “the flow of electric charge”
- A kind of energy
- Beware! Physics takes place here!



ELECTRICITY



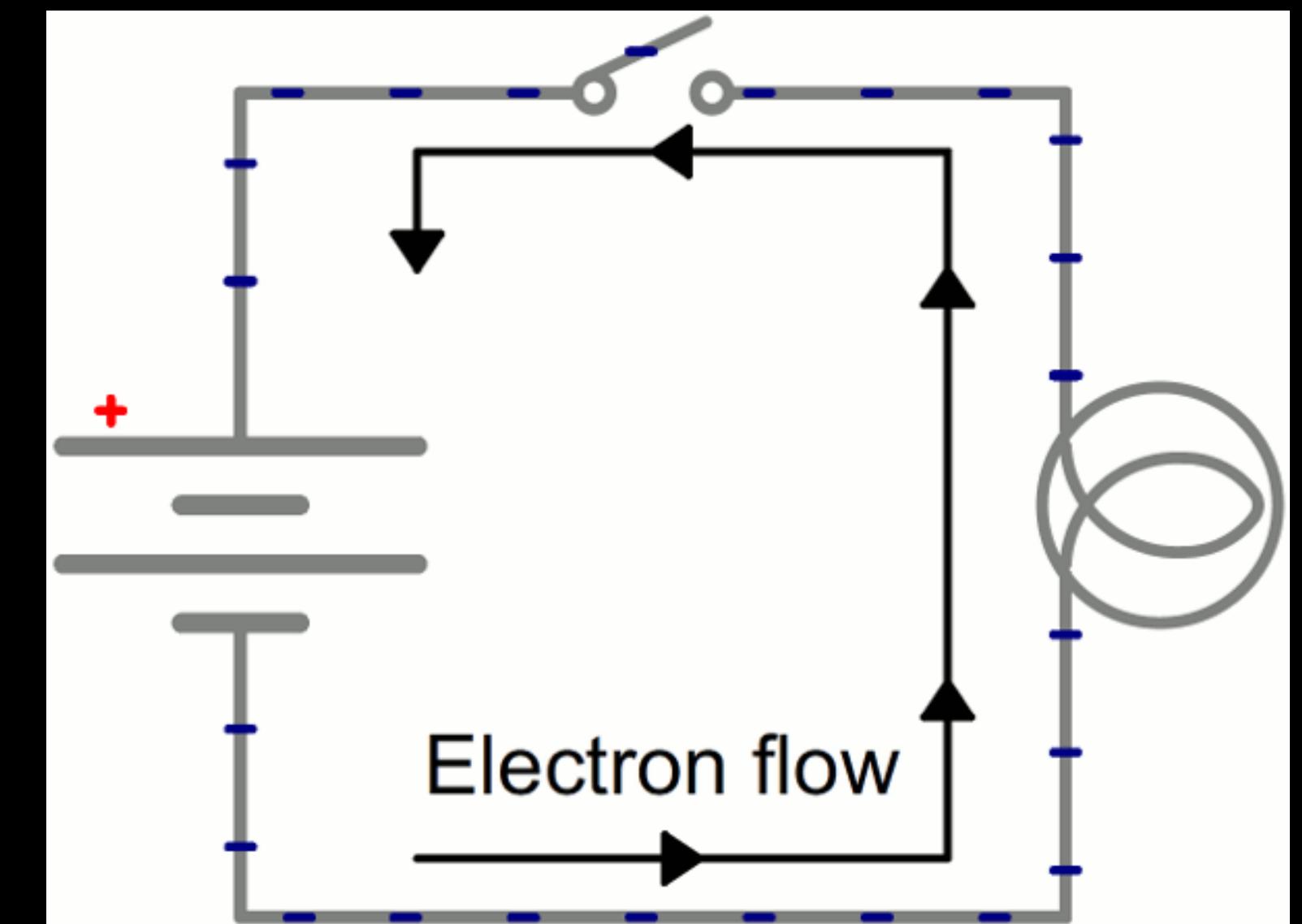


ELECTRICITY

- Electricity can take different forms
 - Static electricity is dangerous to cats and generates lightning
 - Current electricity is the stuff that makes our machines bleep and bloop

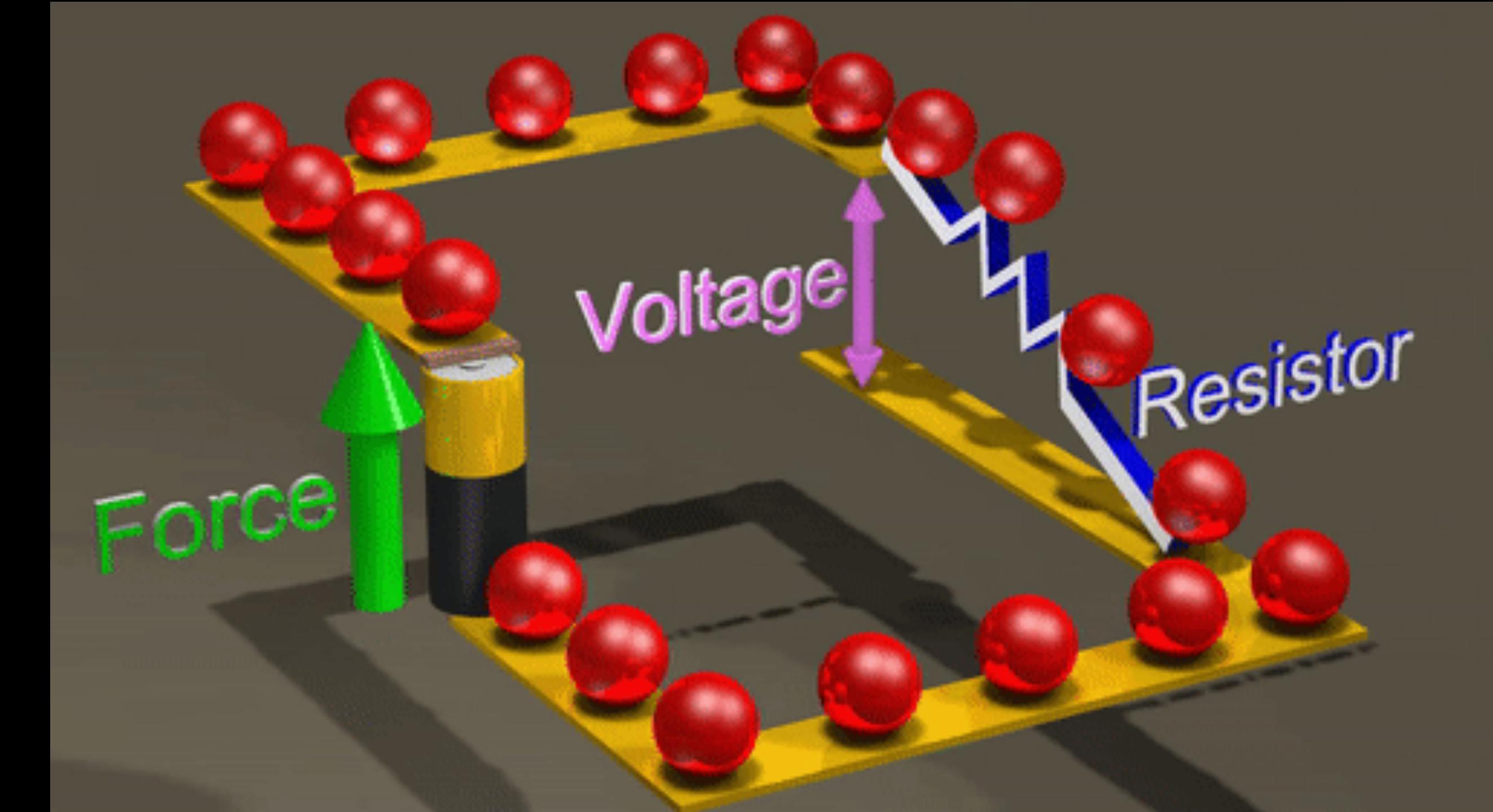
ELECTRICITY

- Circuits are the way in which we can wrangle electrons to do our bidding.
- They are closed loops
- They have a load (something to use up the EE)
- They have a power source



TERMS FOR ELECTRICITY

- Voltage - electrical force measured in Volts
- Current - amount of electricity measured in Amperage
- Resistance - reduces electrical flow measured in Ohms



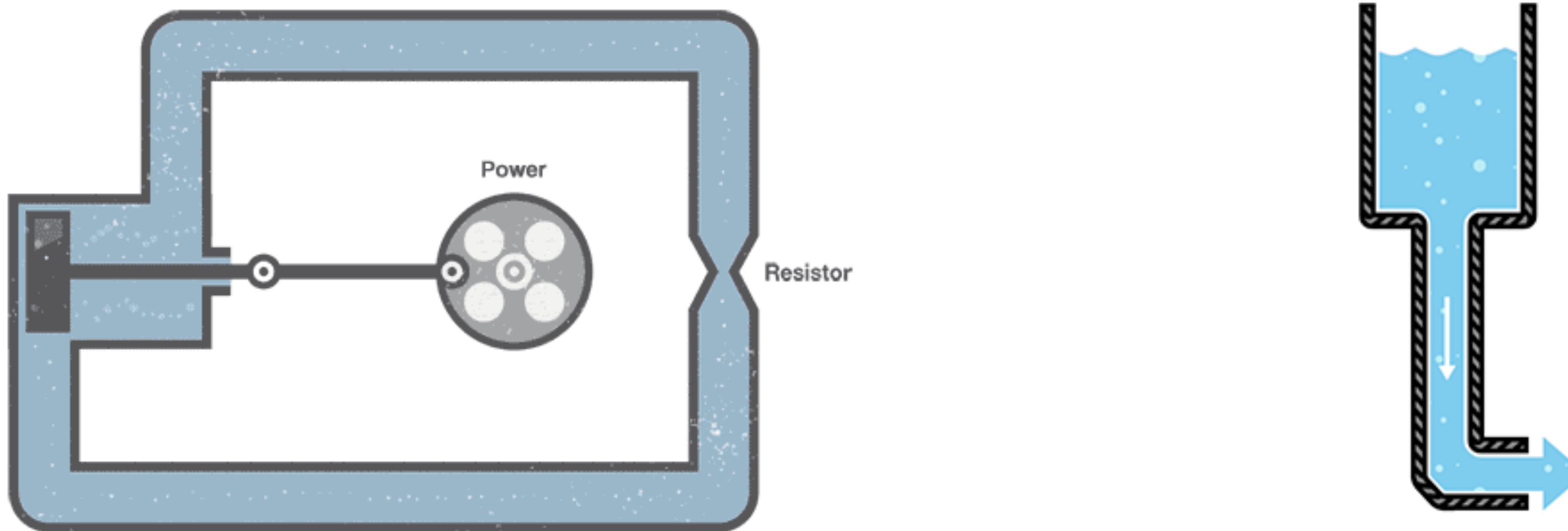
$$V = I * R$$

SOME THINGS TO REMEMBER ABOUT CIRCUITS

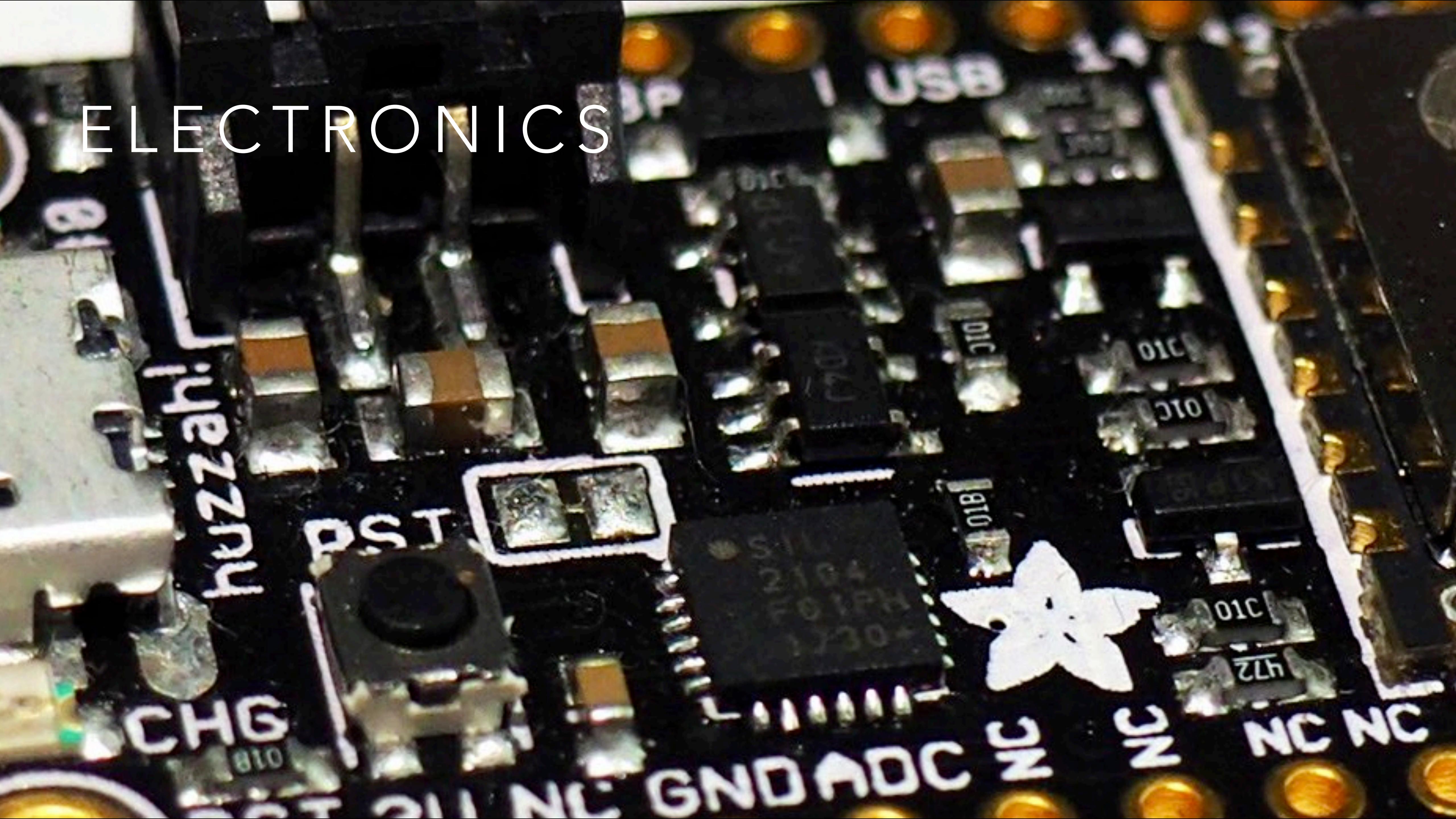
- Electricity will always follow the path of least resistance
- All voltage gets used up in a circuit
- Electrical energy will flow from a point of higher potential energy to a point of lower potential energy
- Additional notes on circuits - <https://learn.sparkfun.com/tutorials/what-is-a-circuit>

ALTERNATING CURRENT VS DIRECT CURRENT

Alternating Current: The Water Analogy

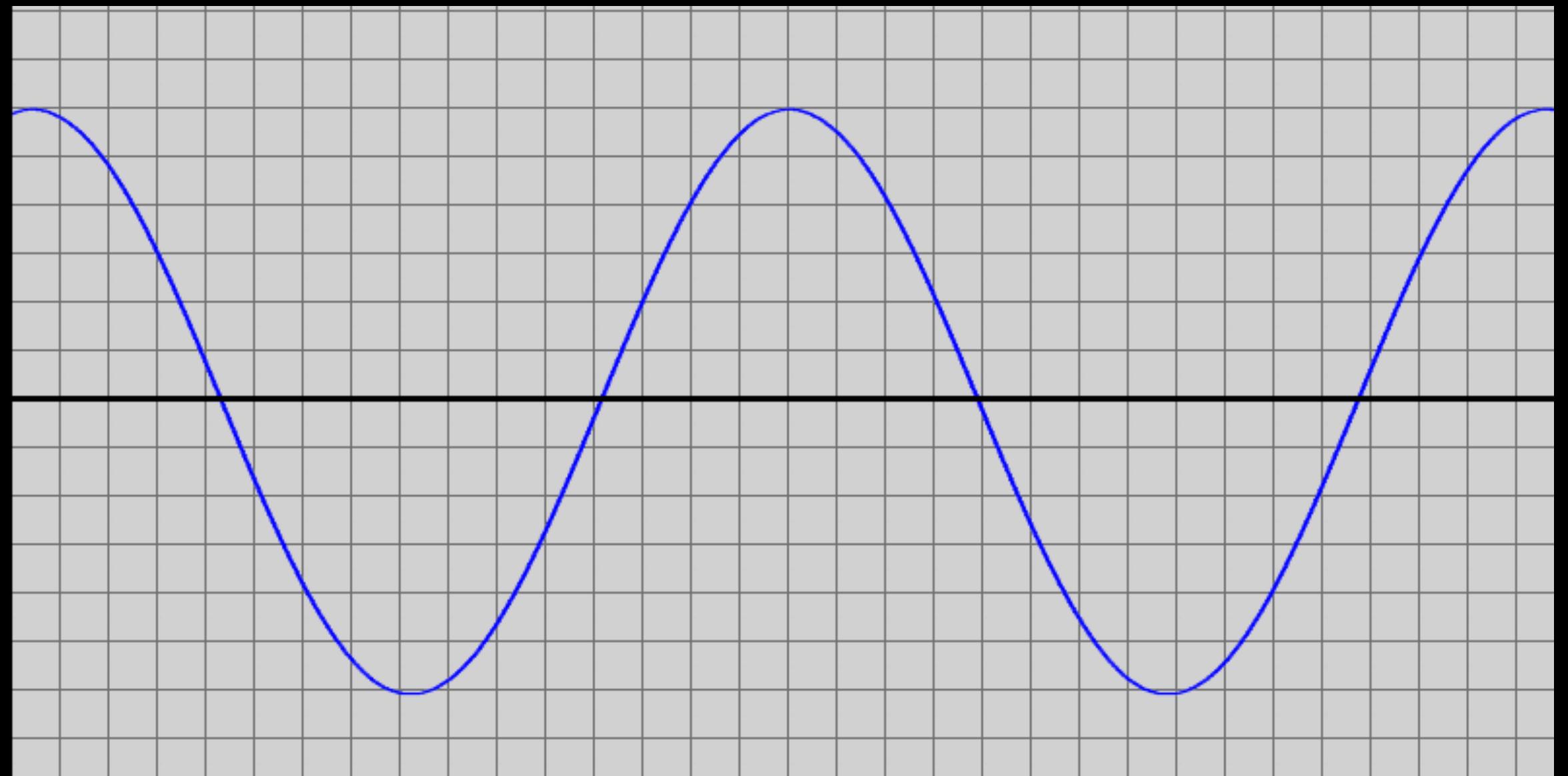
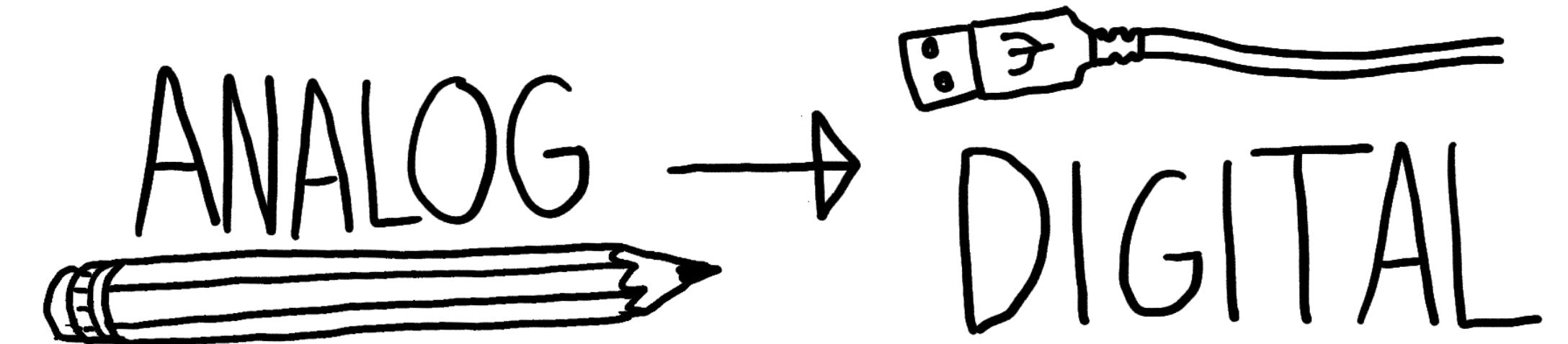


ELECTRONICS



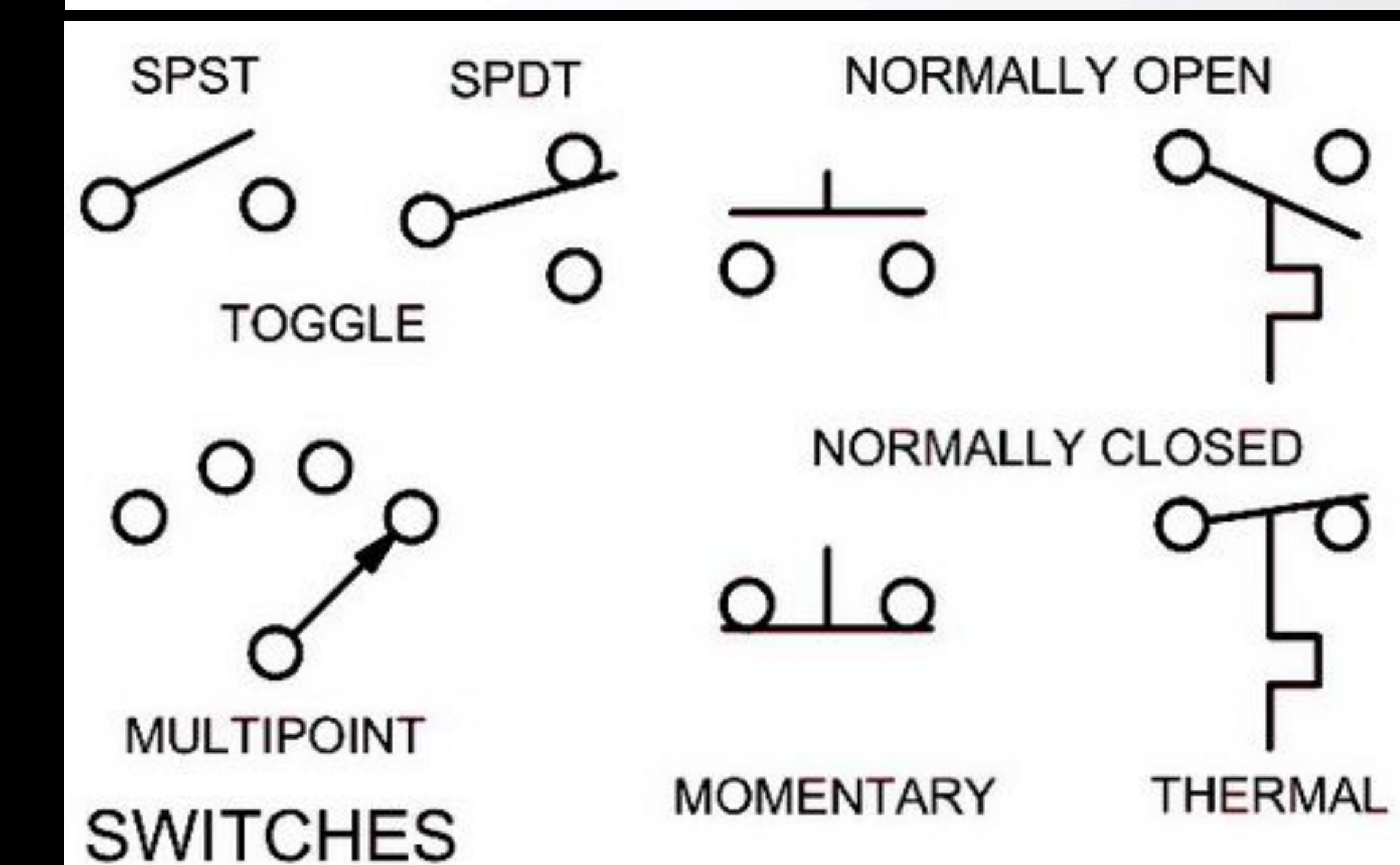
ANALOG VS DIGITAL

- Electronics can be analog and they can be digital
- It's possible to swap out one for the other, but it requires some forethought



SWITCHES!

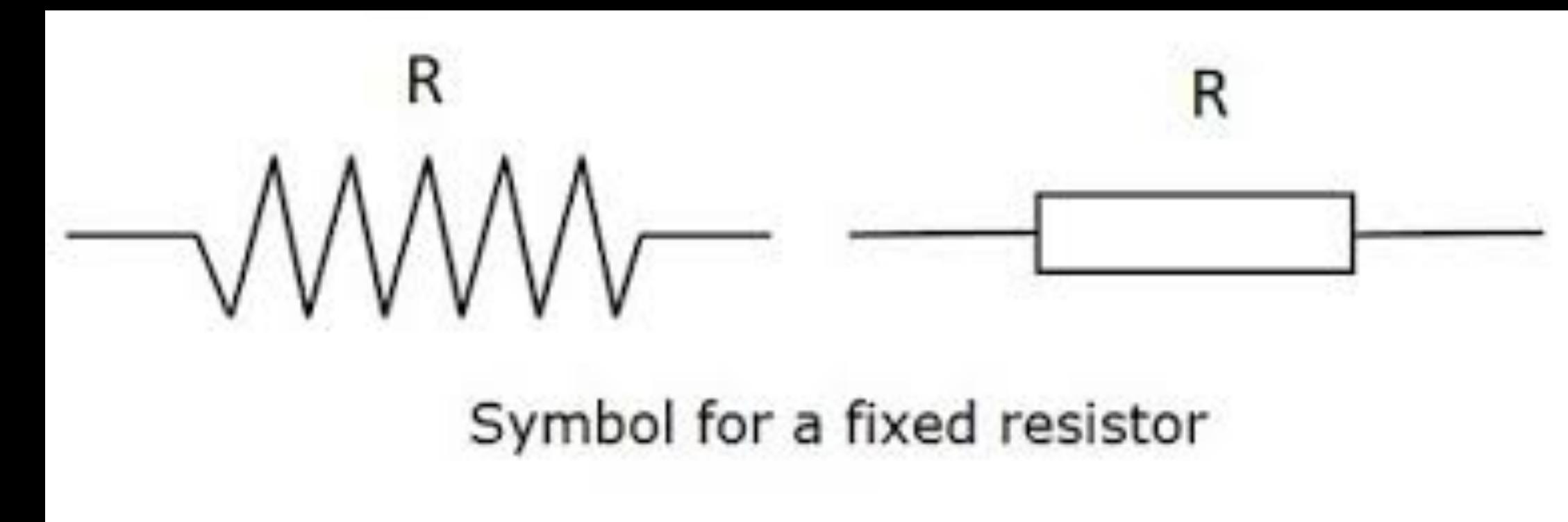
- Interrupt the flow of electrical energy - they break a circuit's continuity
- There are as many kinds of switches in the world as there are stars in the sky
- Additional links on switches : <https://idmnyu.github.io/BlinkingBeeping/switches.html> and <https://itp.nyu.edu/classes/dat-fall2018/resources/blindness-low-vision-preparation-for-ccvip-trip>



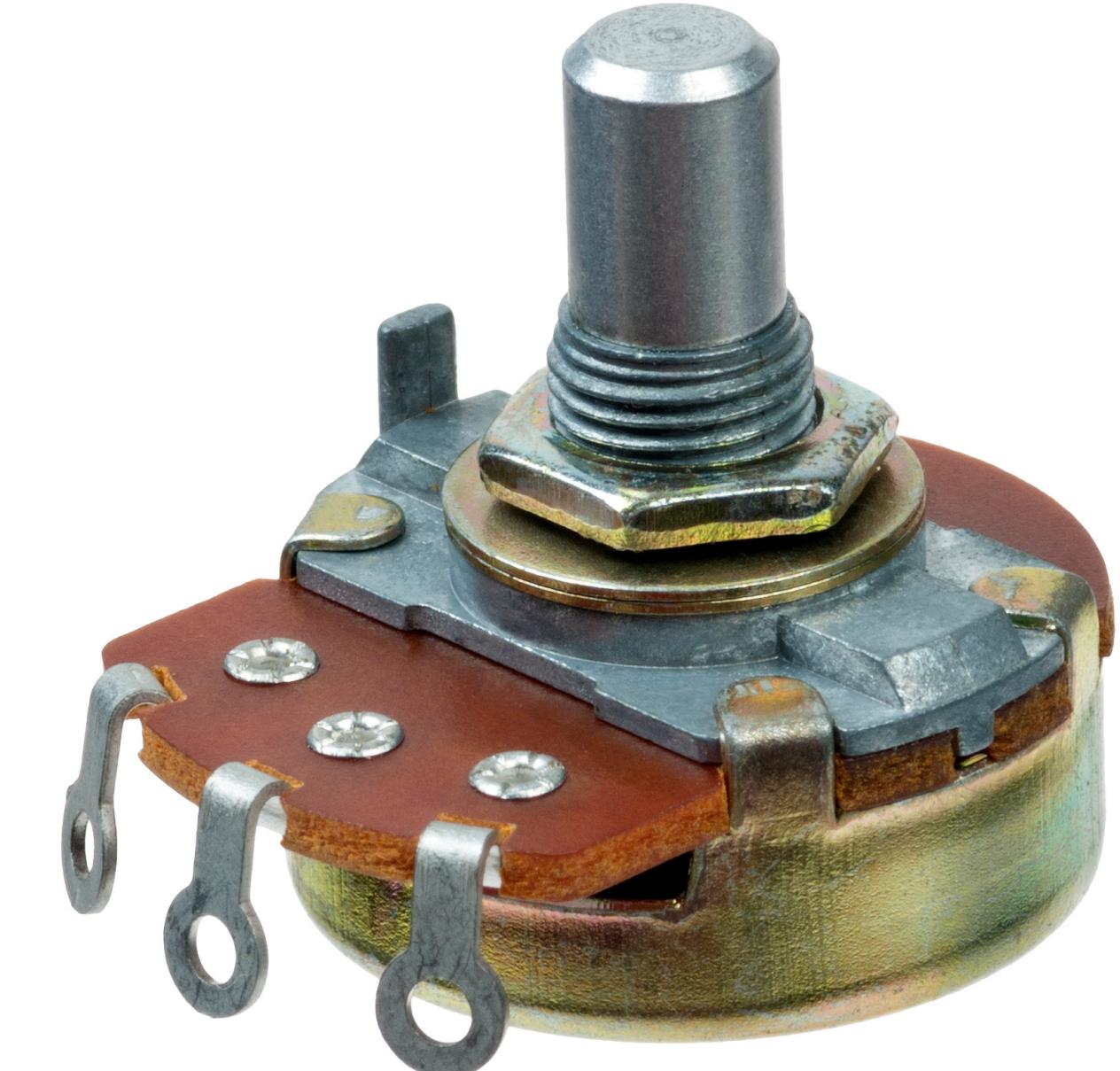
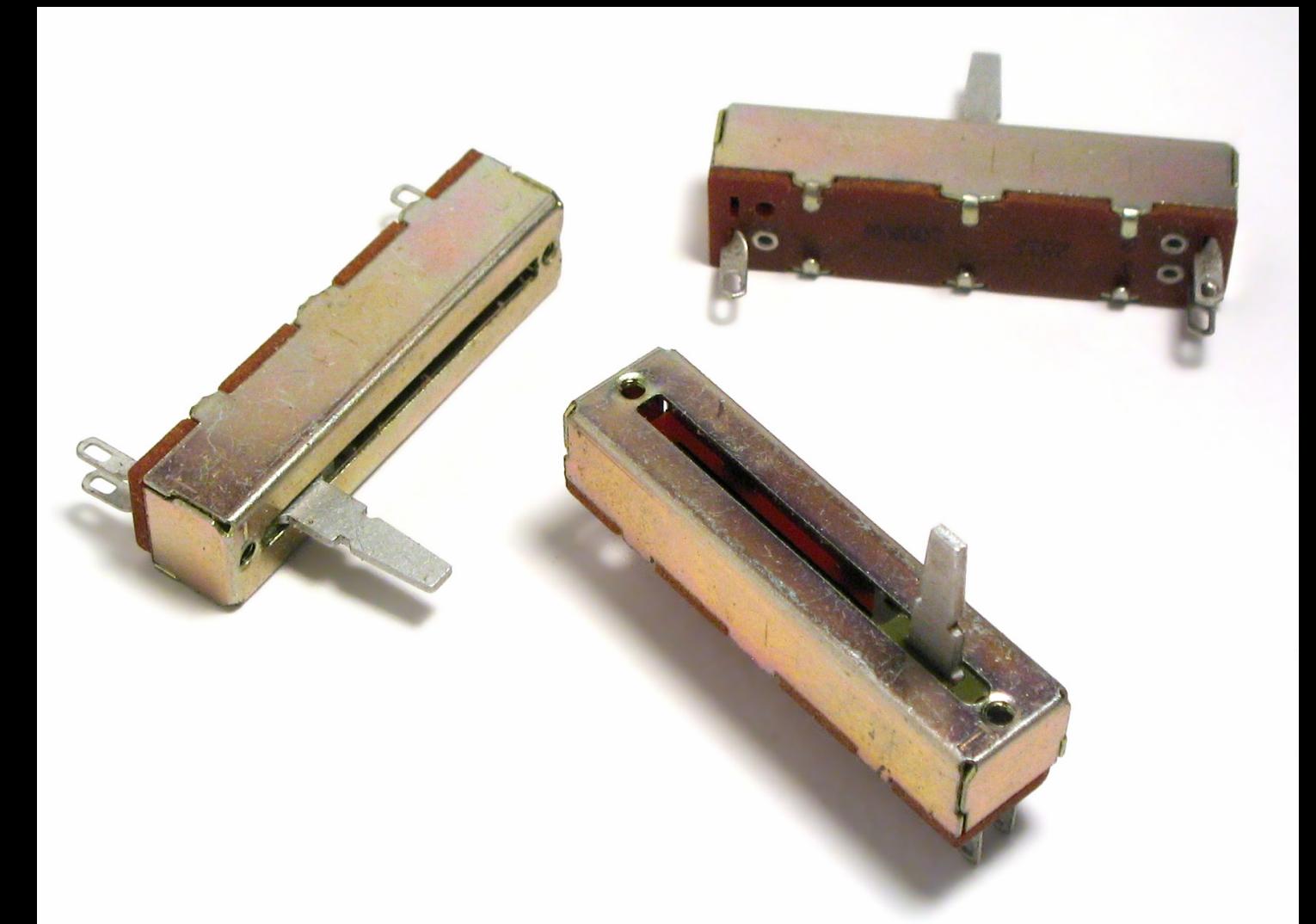
RESISTORS



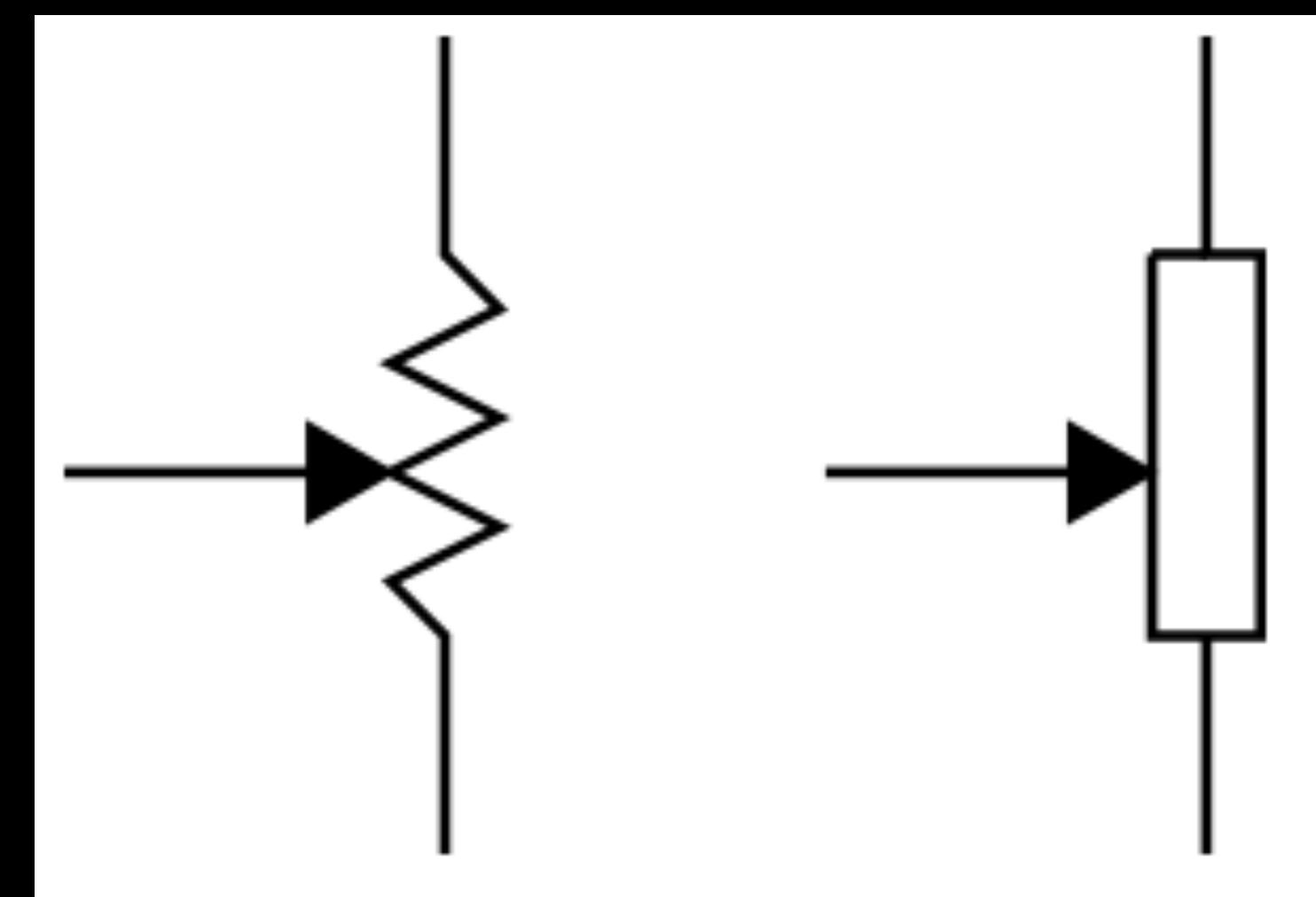
- Resist the flow of electrical energy



VARIABLE RESISTORS

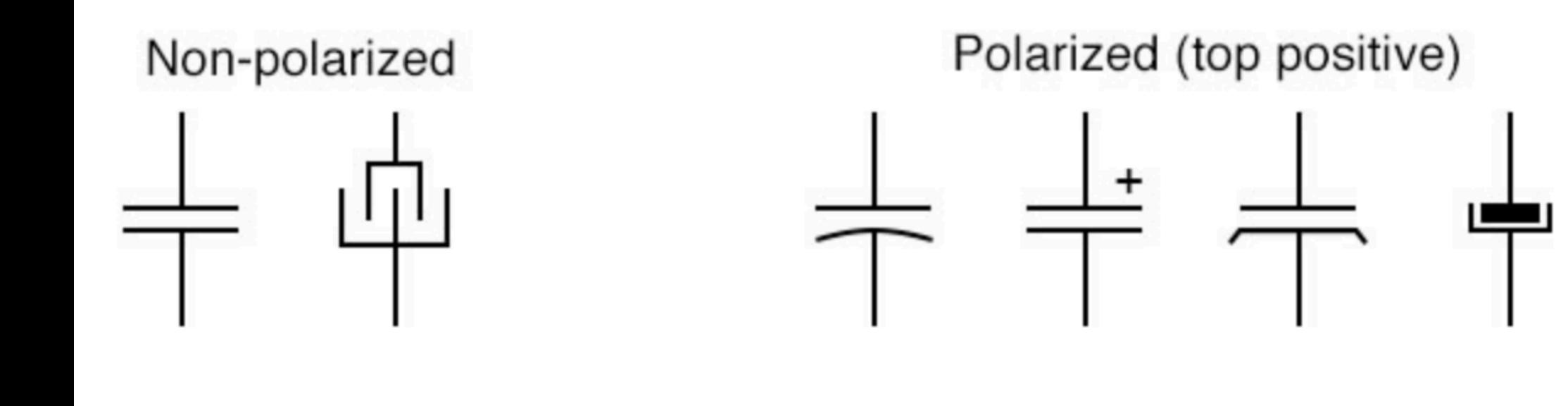


- Change the amount of resistance - knobs sliders and many sensors fall into these categories



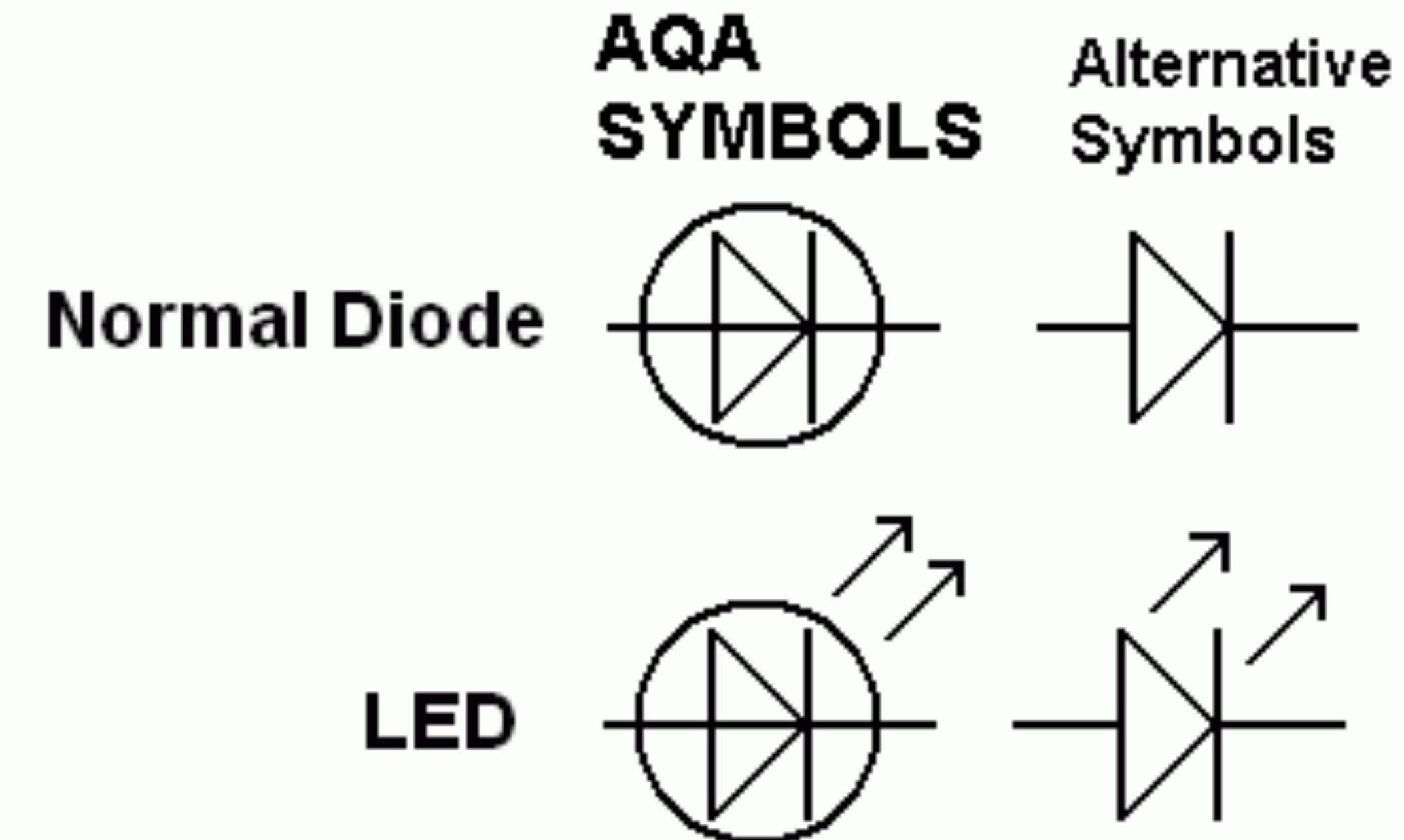
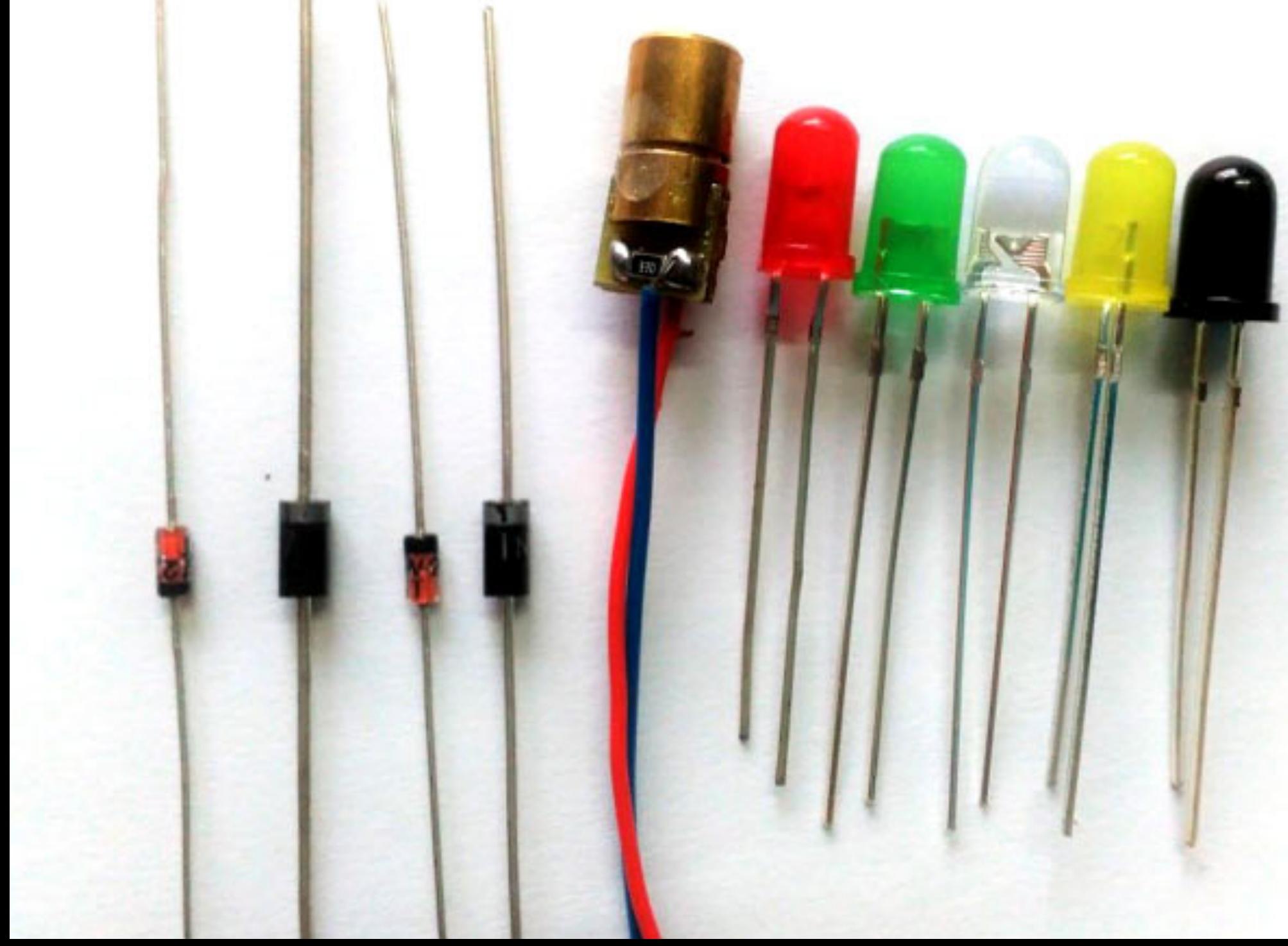
CAPACITORS

- Store and discharge electrical energy
 - like a tiny rechargeable battery
- Some are polarized, others are not



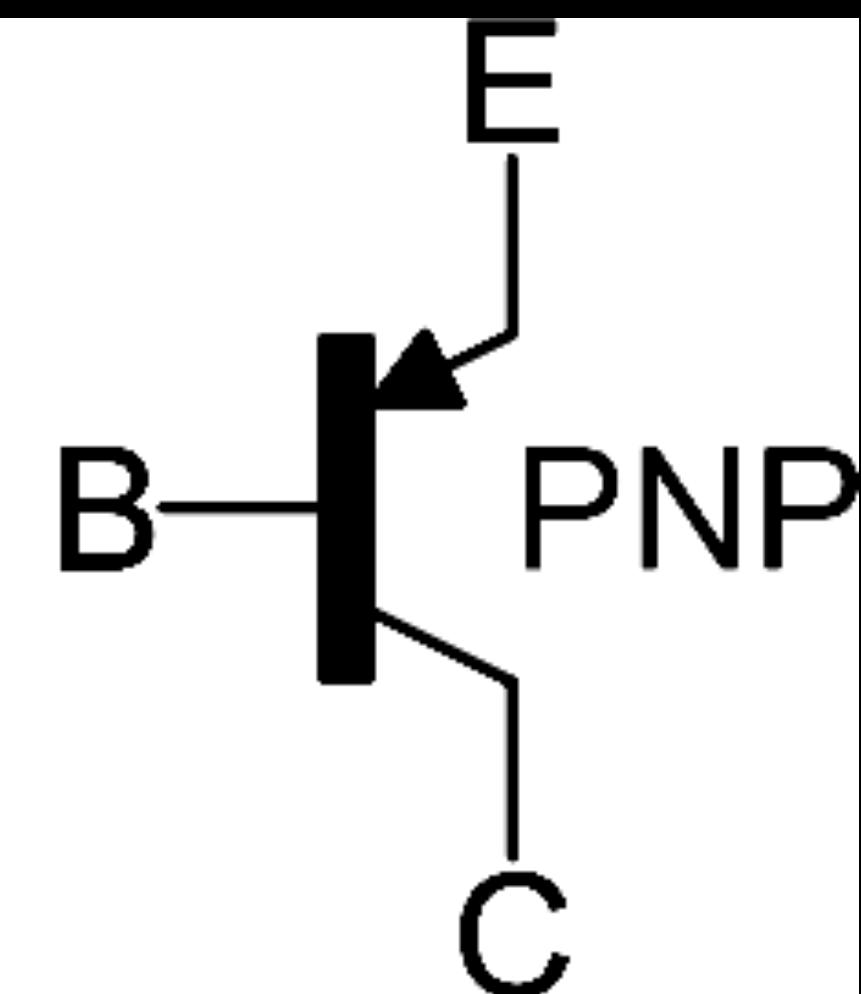
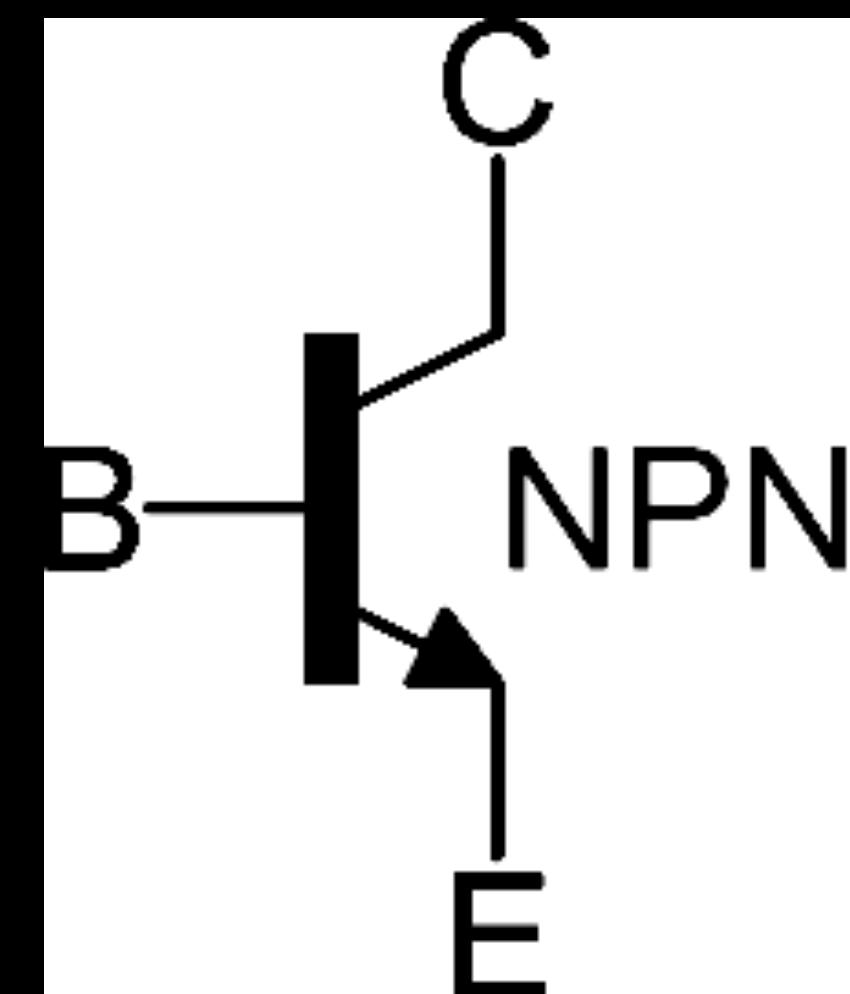
DIODES

- Polarized components that insure electricity flows in one direction
- LEDs are types of diodes that convert electrical energy to light (Light Emitting Diode)



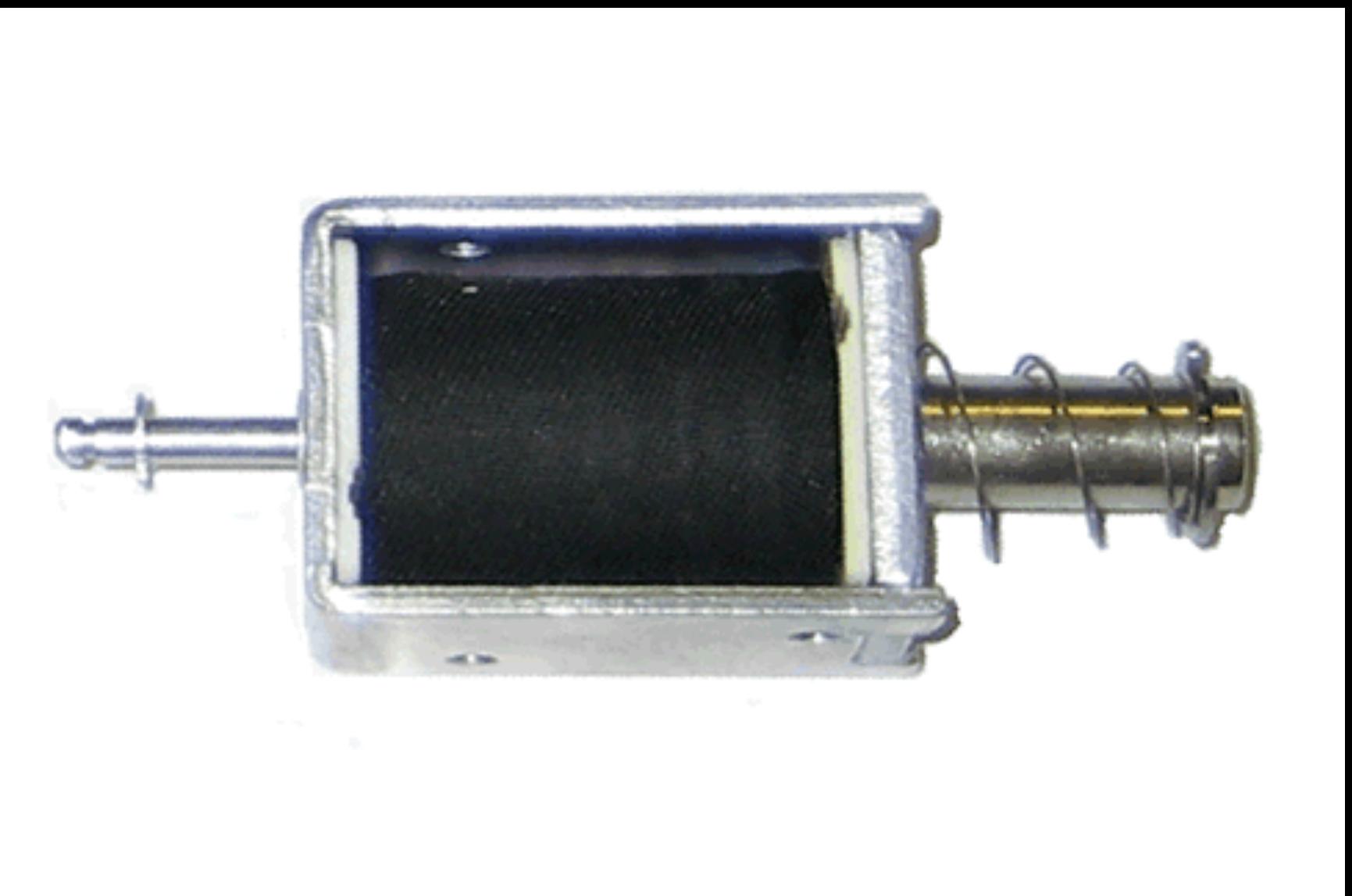
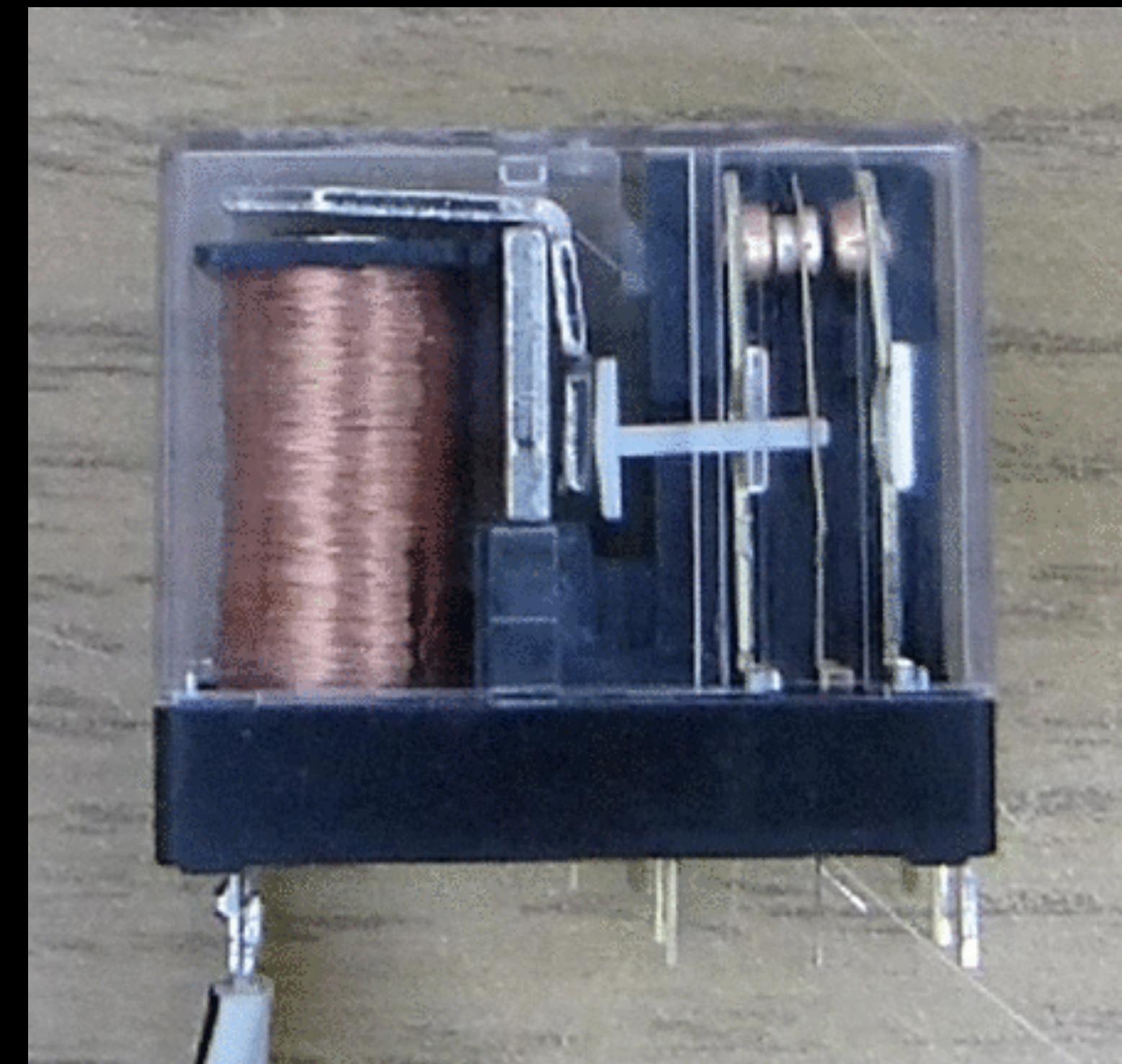
TRANSISTORS

- Frequently used as solid state switches to control high power / high current loads (motors, LEDs, relays, etc)
- Also used to build logic gates - the basic building block of digital electronics

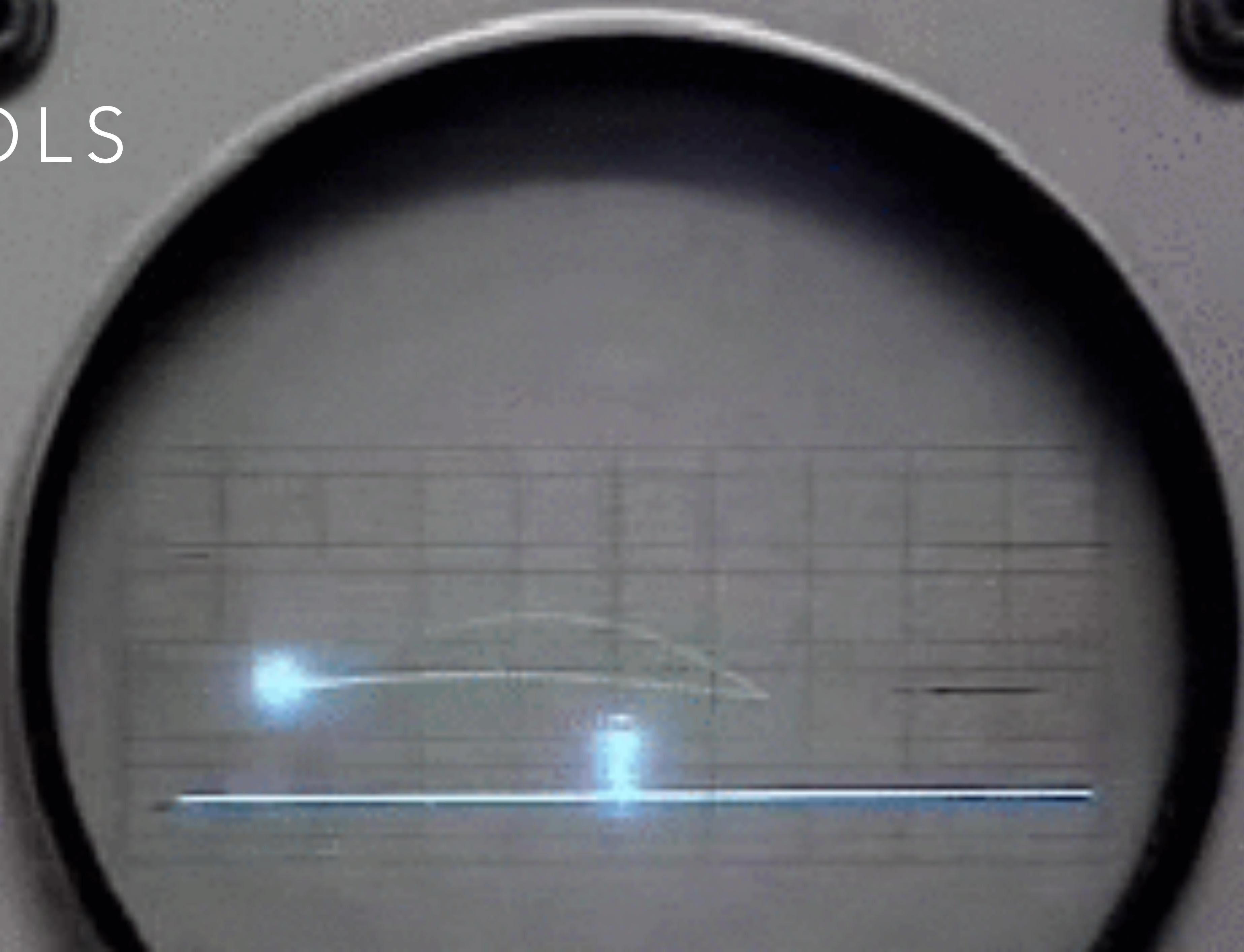


ELECTROMAGNETIC COMPONENTS

- Relays are electromagnetic switches
- Solenoids use magnets to change position
- Motors are electromagnetic as well



TOOLS



HAND TOOLS



Wire strippers



Wire cutters



Needle nose pliers

SOLDERING TOOLS



Iron & Stand

Solder

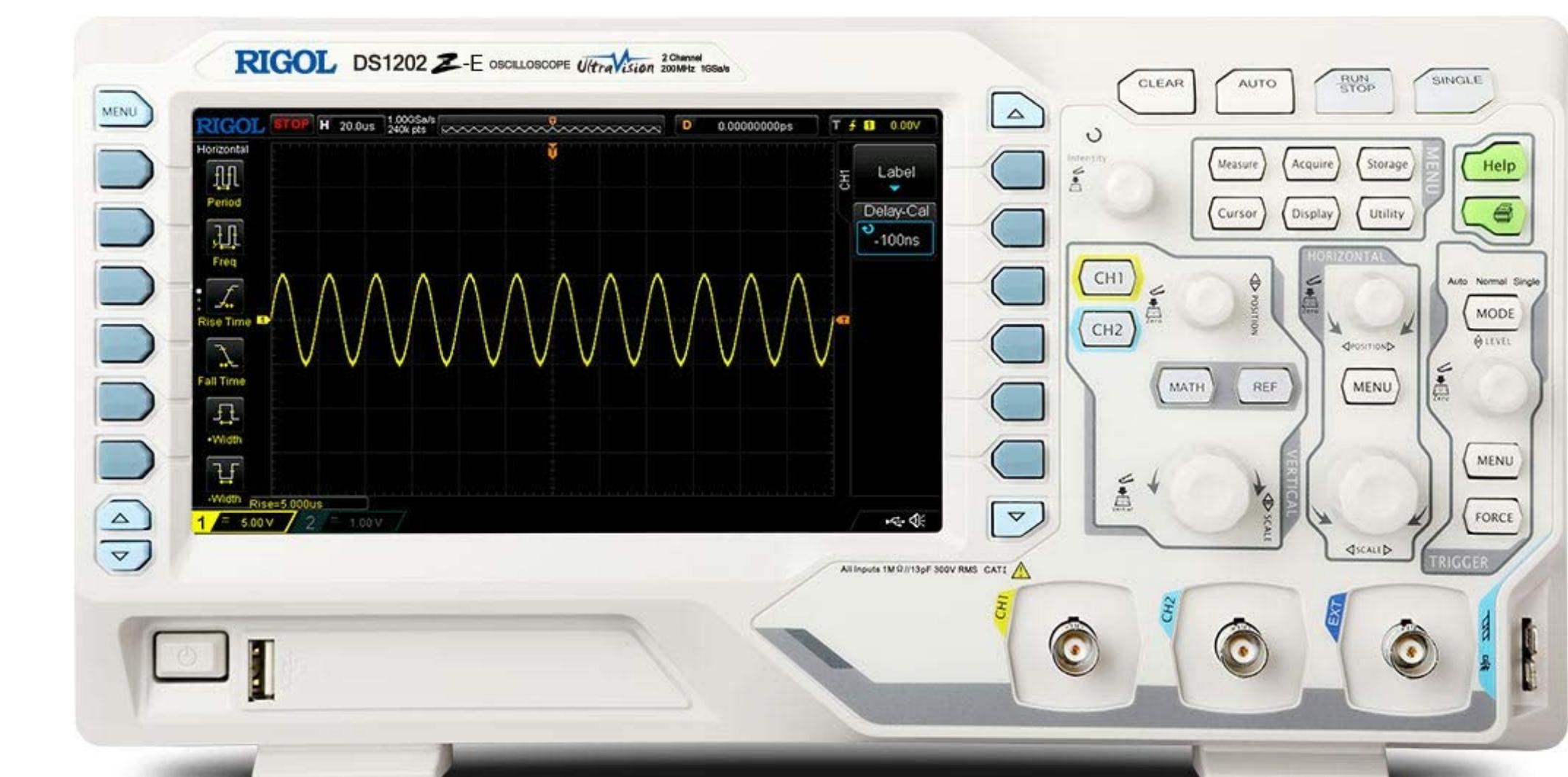
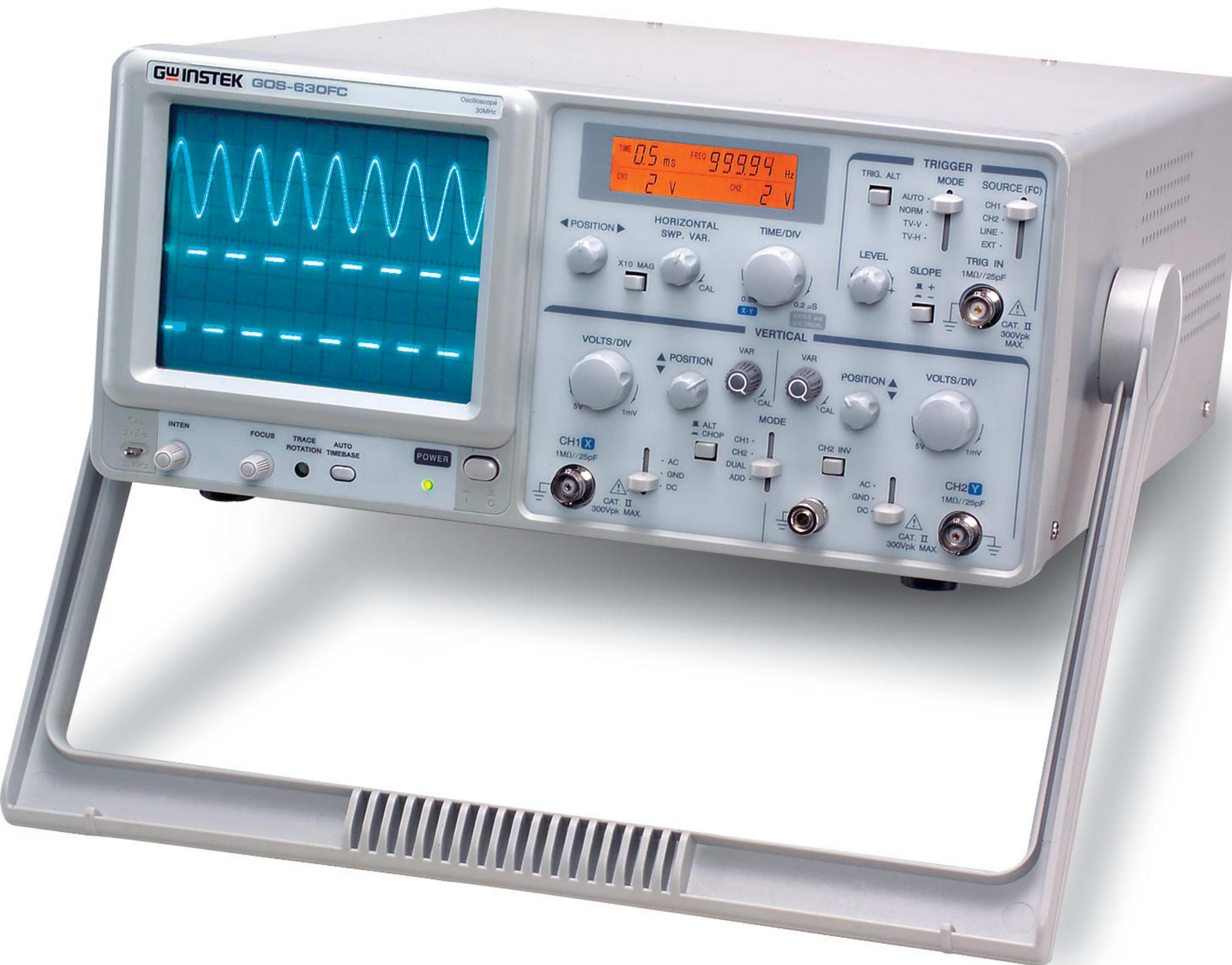


Helping/Third
hands

MULTIMETER



OSCILLOSCOPES



[HTTPS://LEARN.SPARKFUN.COM/TUTORIALS/HOW-TO-USE-AN-OSCILLOSCOPE](https://learn.sparkfun.com/tutorials/how-to-use-an-oscilloscope)