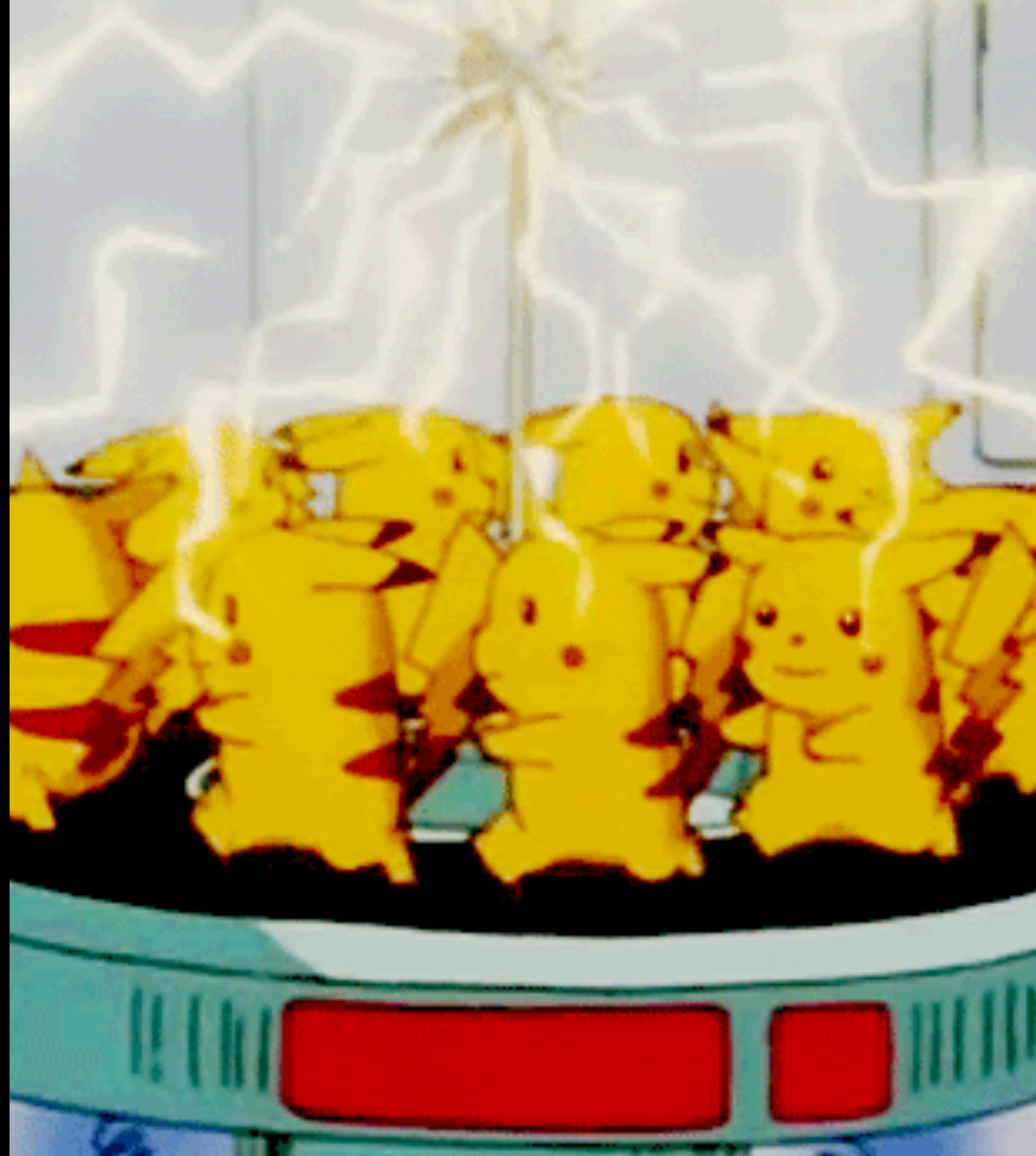
AGENDA

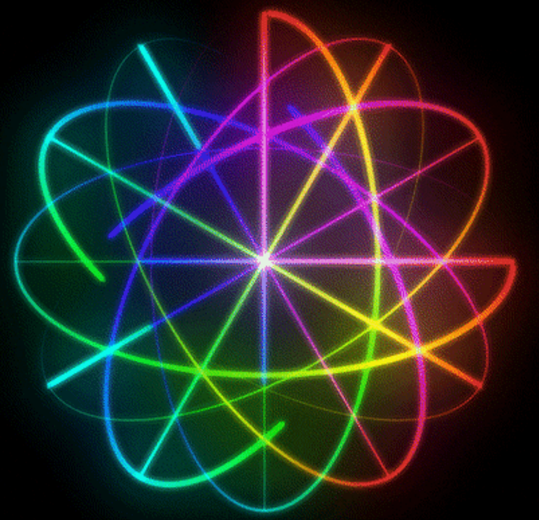
- Introduction
- Basics of electricity
- Electronic components
- Tools



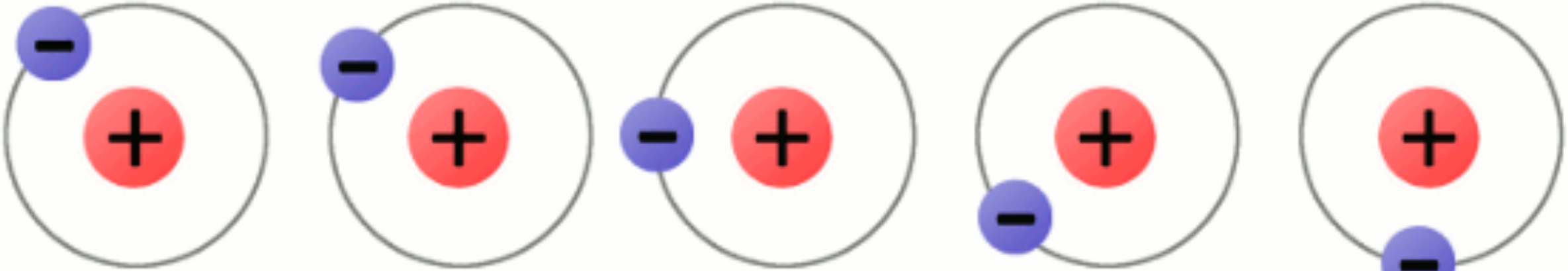
ELECTRICITY

ELECTRICITY

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



ELECTRICITY

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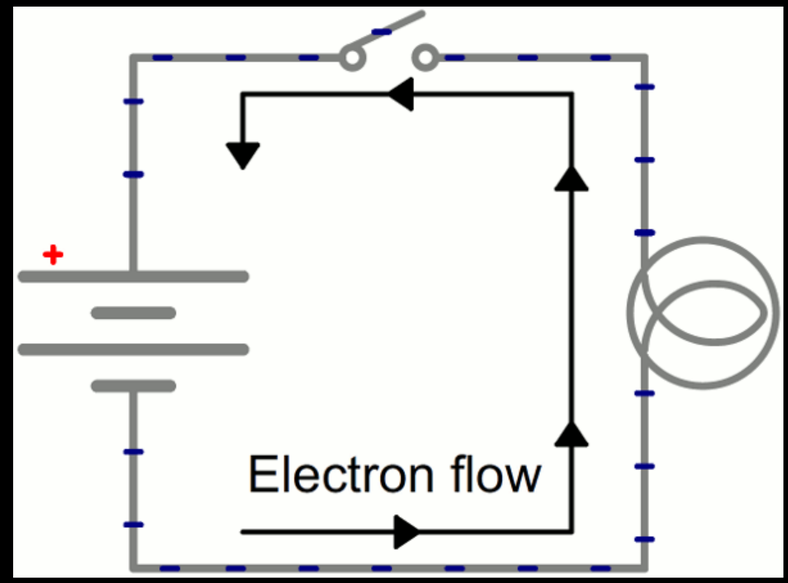
ELECTRICITY

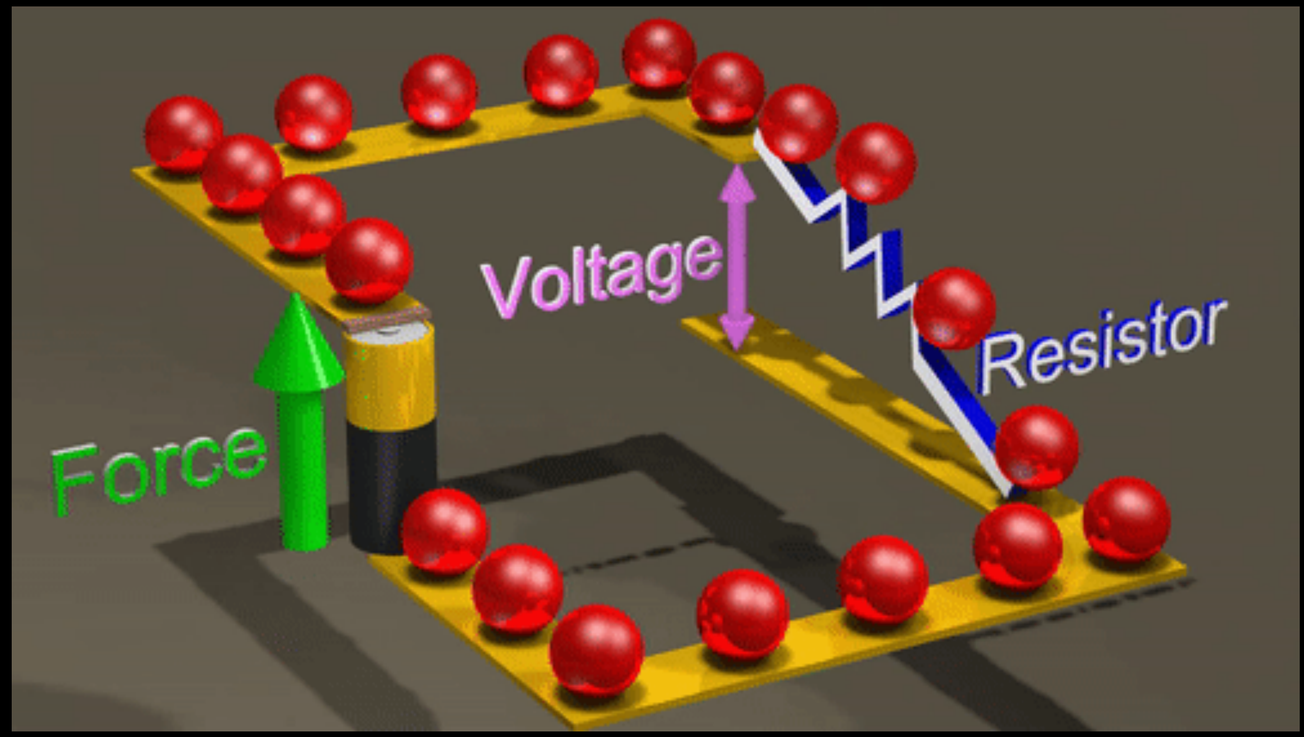
- Electricity can take different forms
  - Static electricity is dangerous to cats and generates lightning
  - Current electricity is the stuff that makes our machines bleep and bloop

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

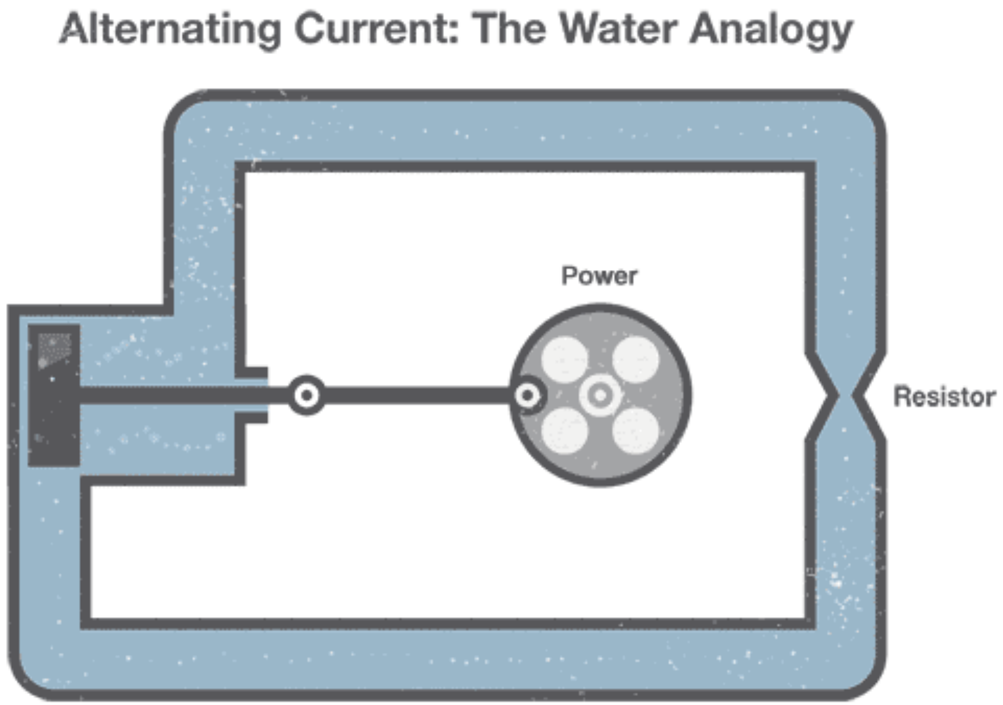
$$V = I * R$$

HTTPS://LEARN.SPARKFUN.COM/TUTORIALS/VOLTAGE-CURRENT-RESISTANCE-AND-OHMS-LAW

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



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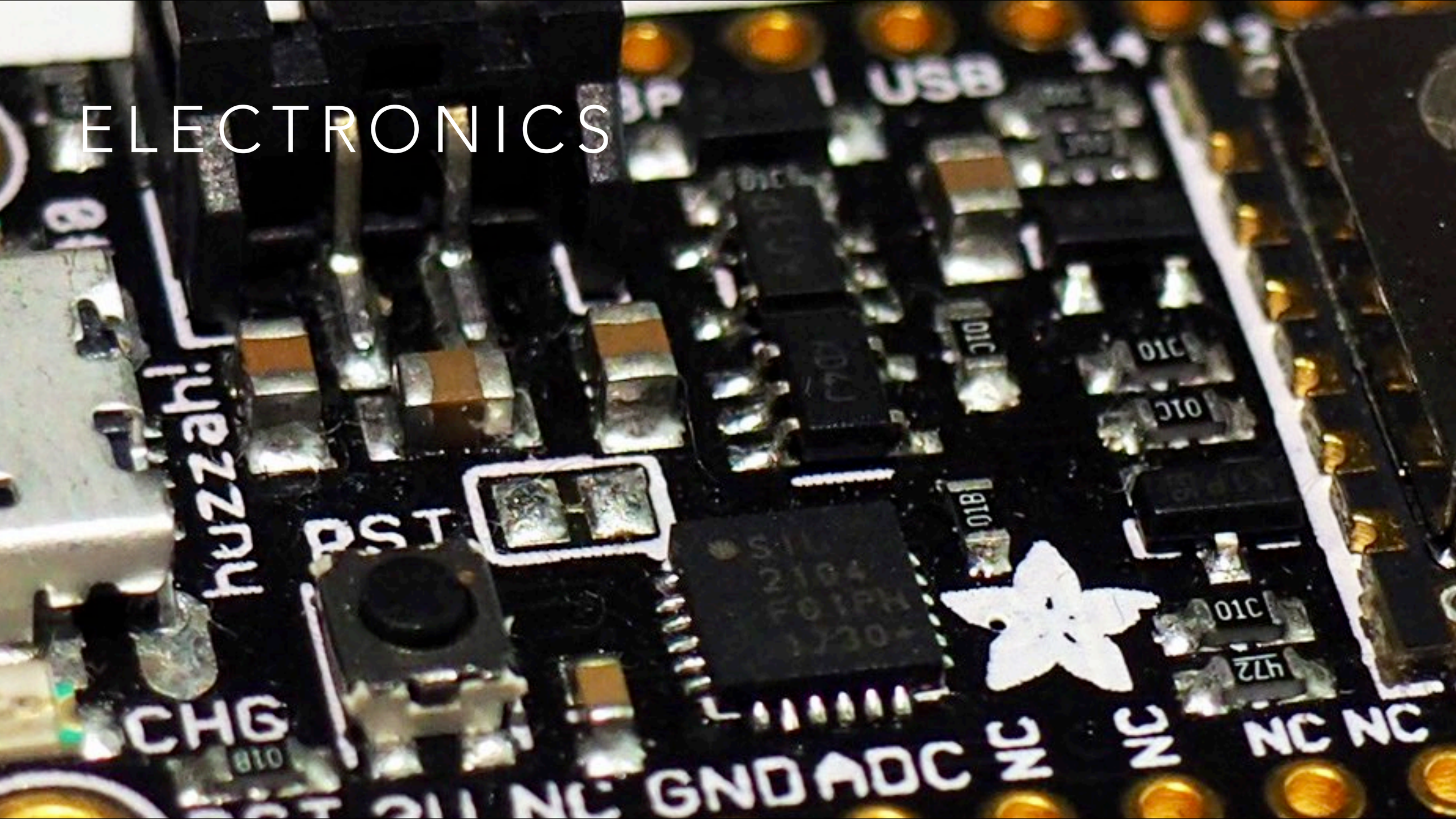
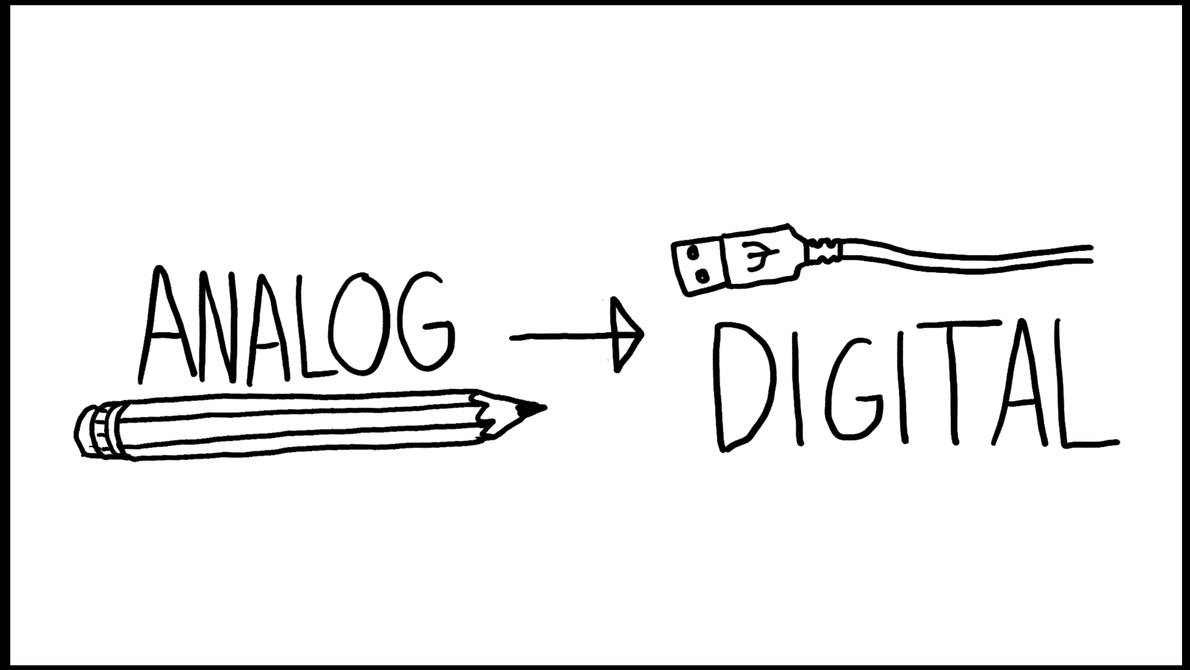
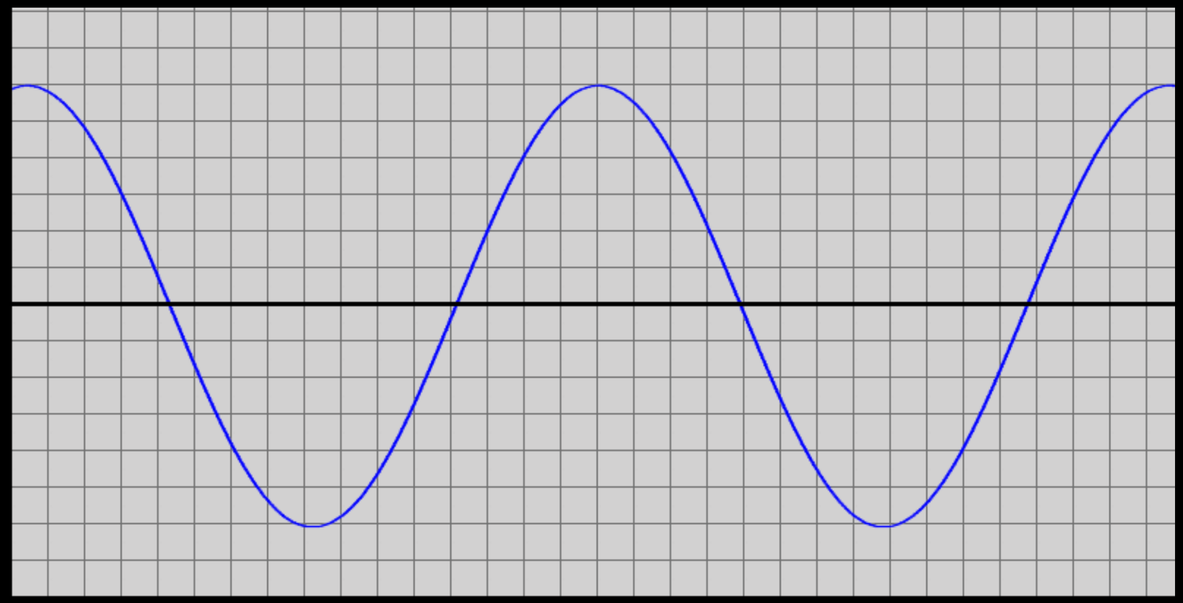
ELECTRONICS



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



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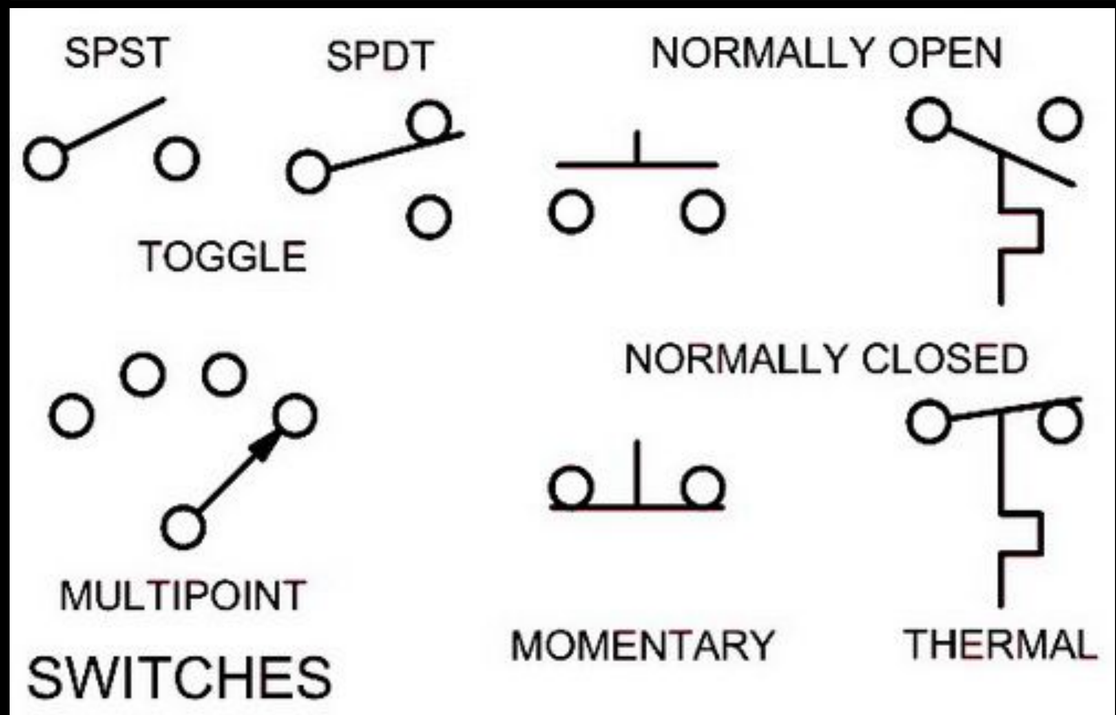
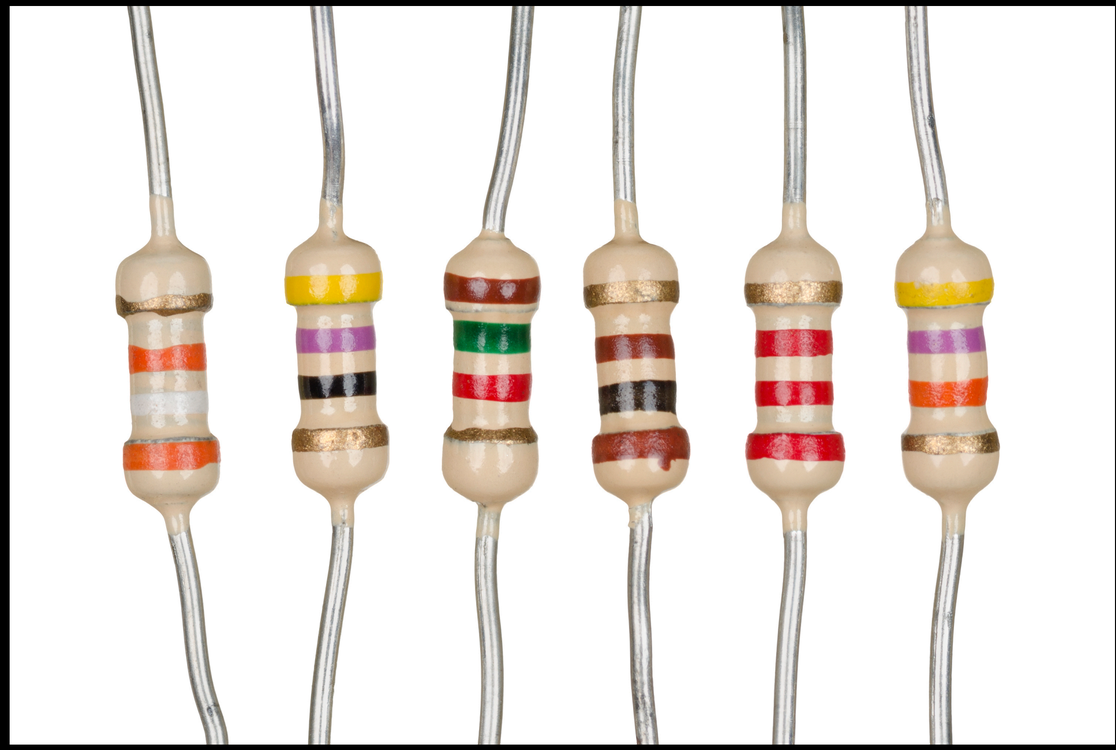
SWITCHES!

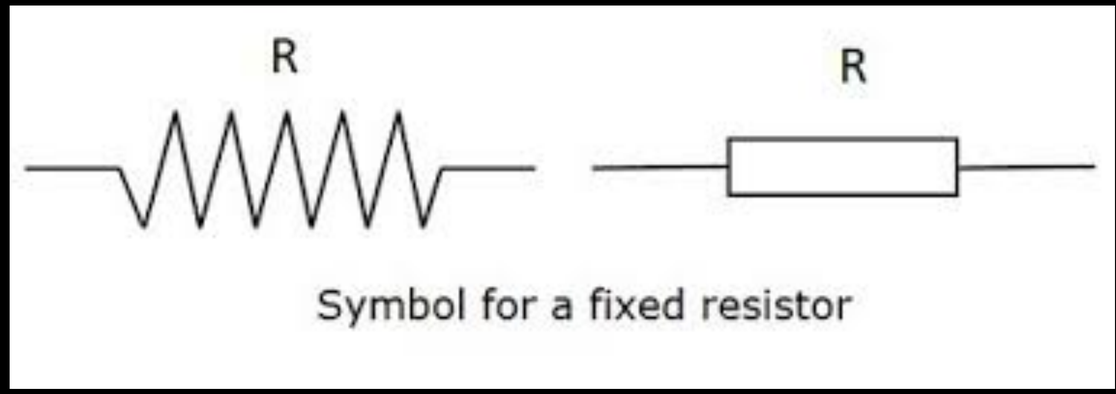
- Interrupt the flow of electrical energy - they break a circuit's continuity
- There are as many kinds of switches in the world as there are stars in the sky
- Additional links on switches : https://idmnyu.github.io/BlinkingBeeping/switches.html and https://itp.nyu.edu/classes/dat-fall2018/resources/blindness-low-vision-preparation-for-ccvip-trip



RESISTORS



- Resist the flow of electrical energy



Symbol for a fixed resistor

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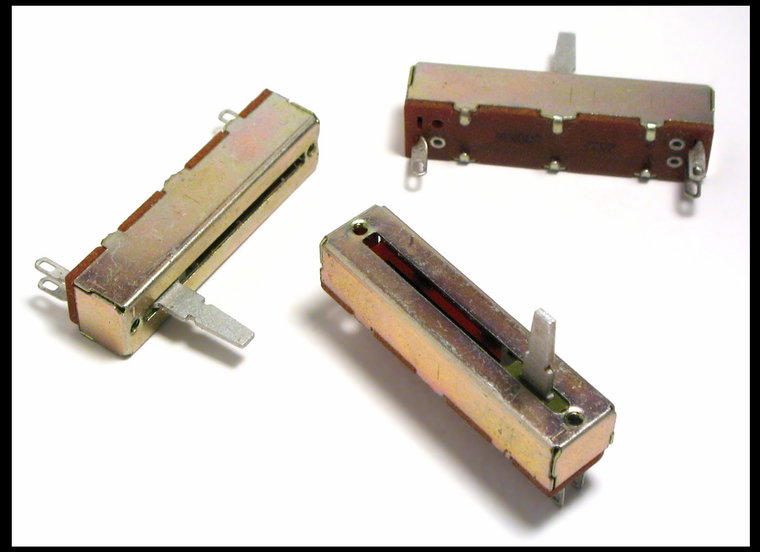
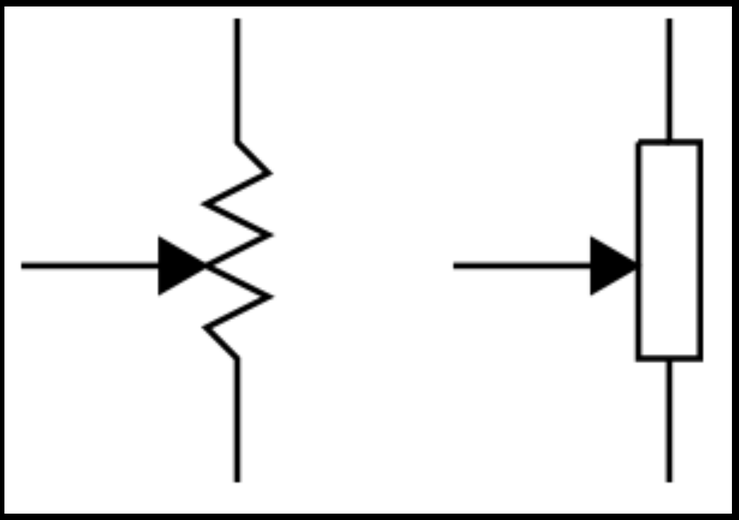
VARIABLE RESISTORS

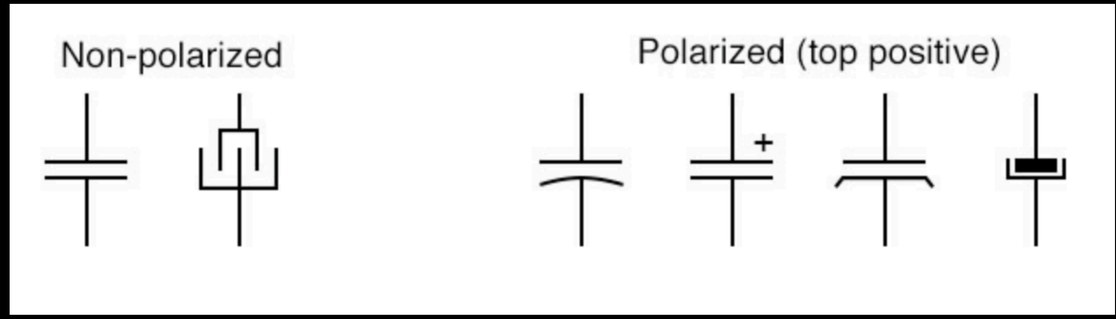


- Change the amount of resistance - knobs sliders and many sensors fall into these categories



CAPACITORS

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



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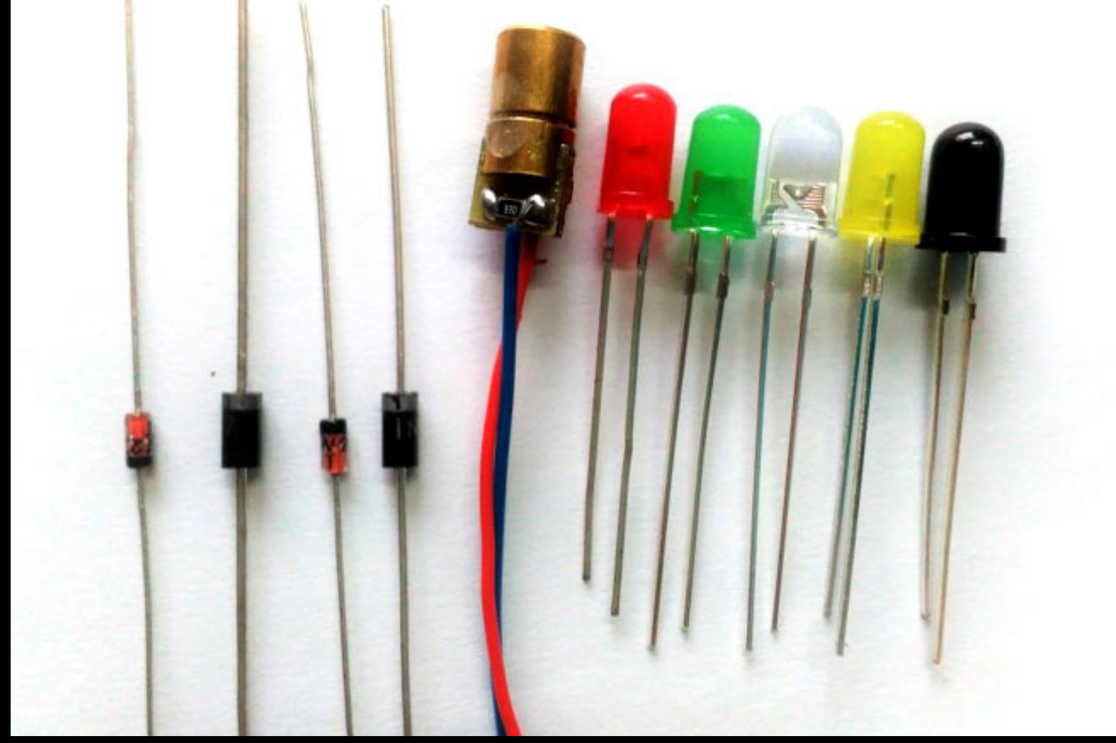
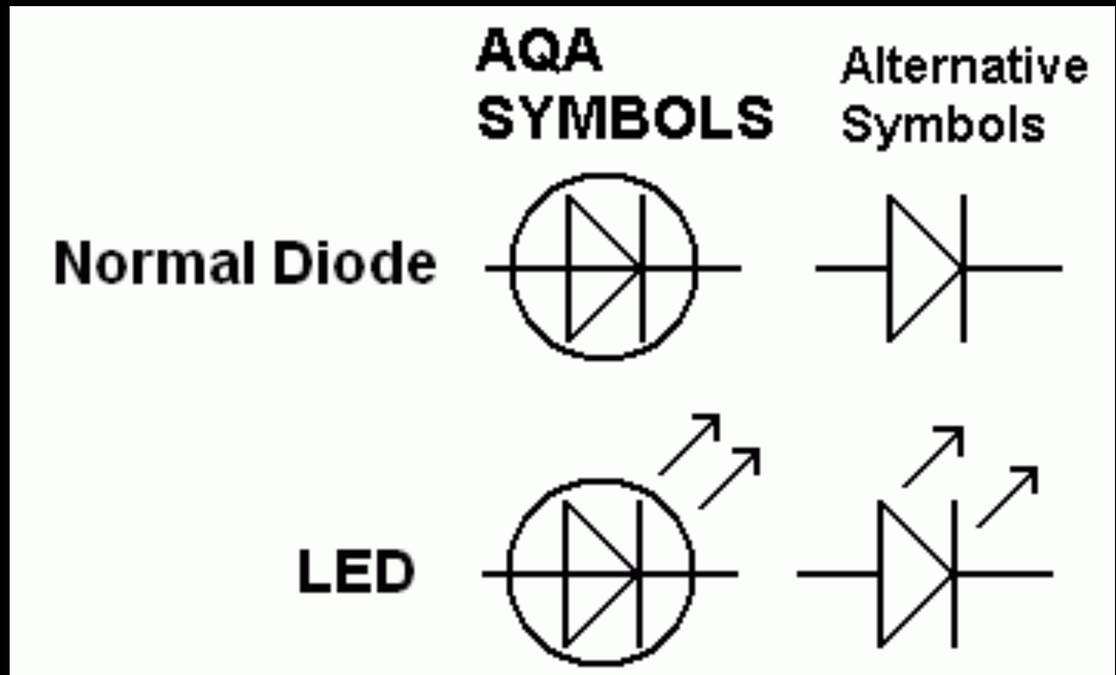
DIODES

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





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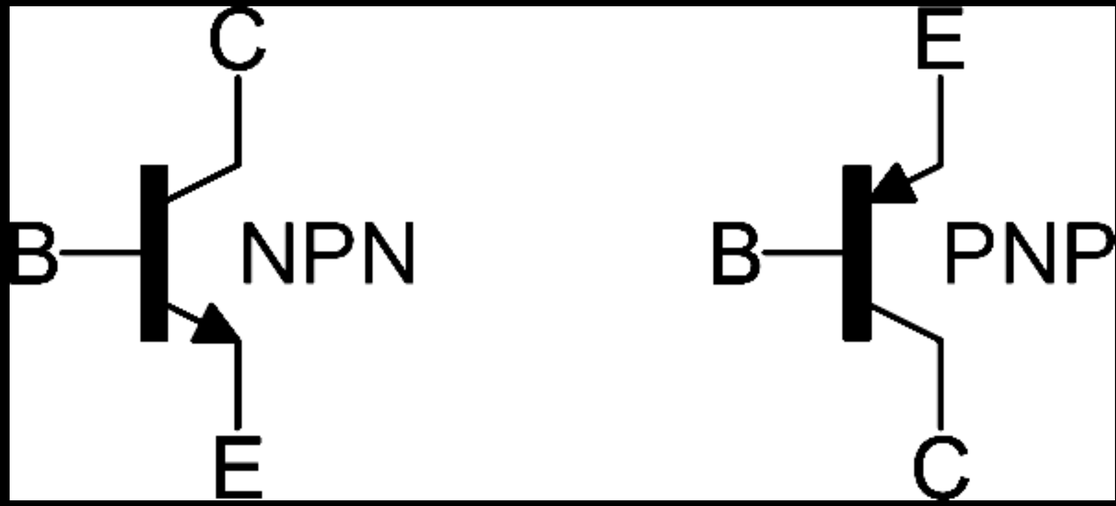
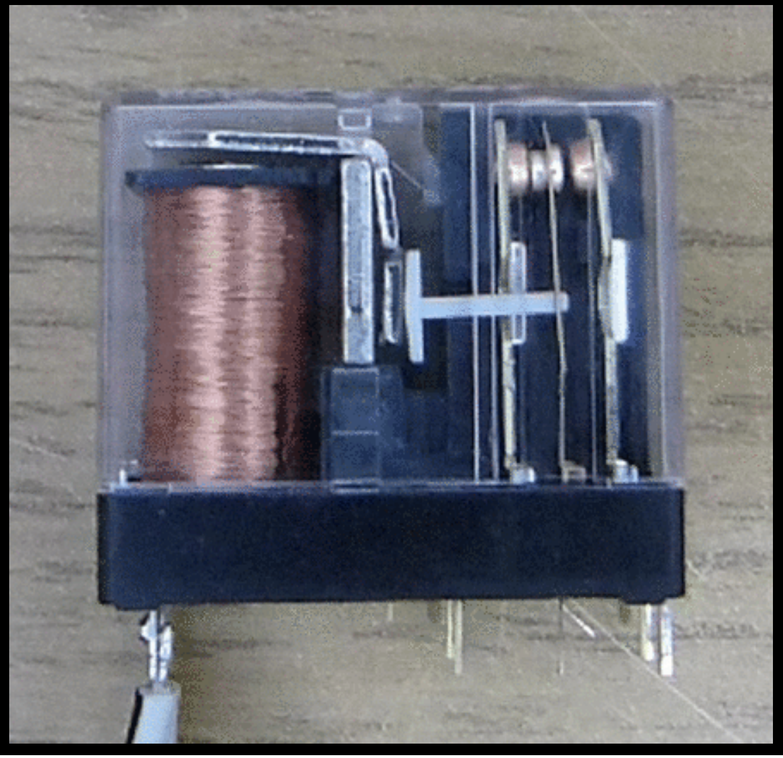
TRANSISTORS

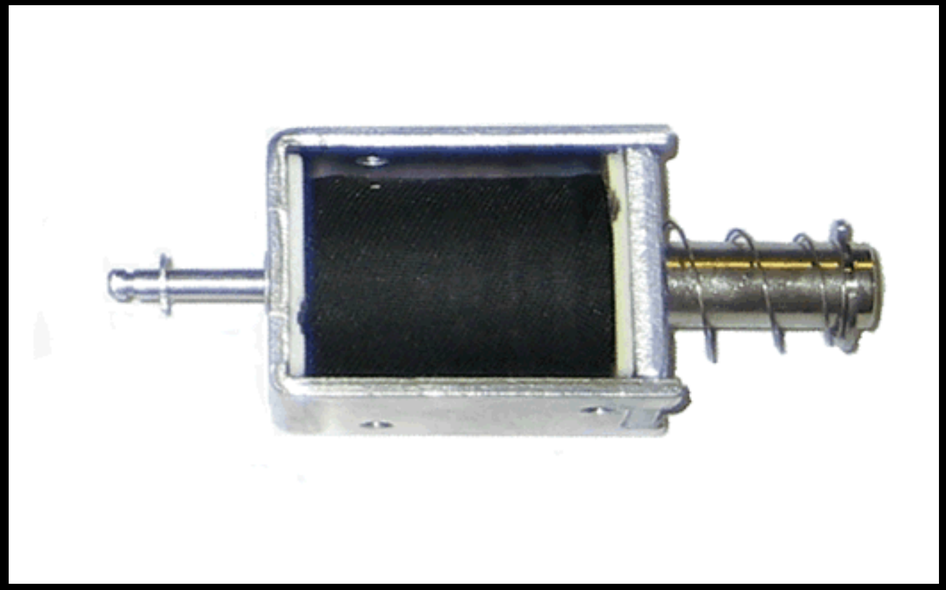
- Frequently used as solid state switches to control high power / high current loads (motors, LEDs, relays, etc)
- Alos used to build logic gates - the basic building block of digital electronics



ELECTROMAGNETIC COMPONENTS

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





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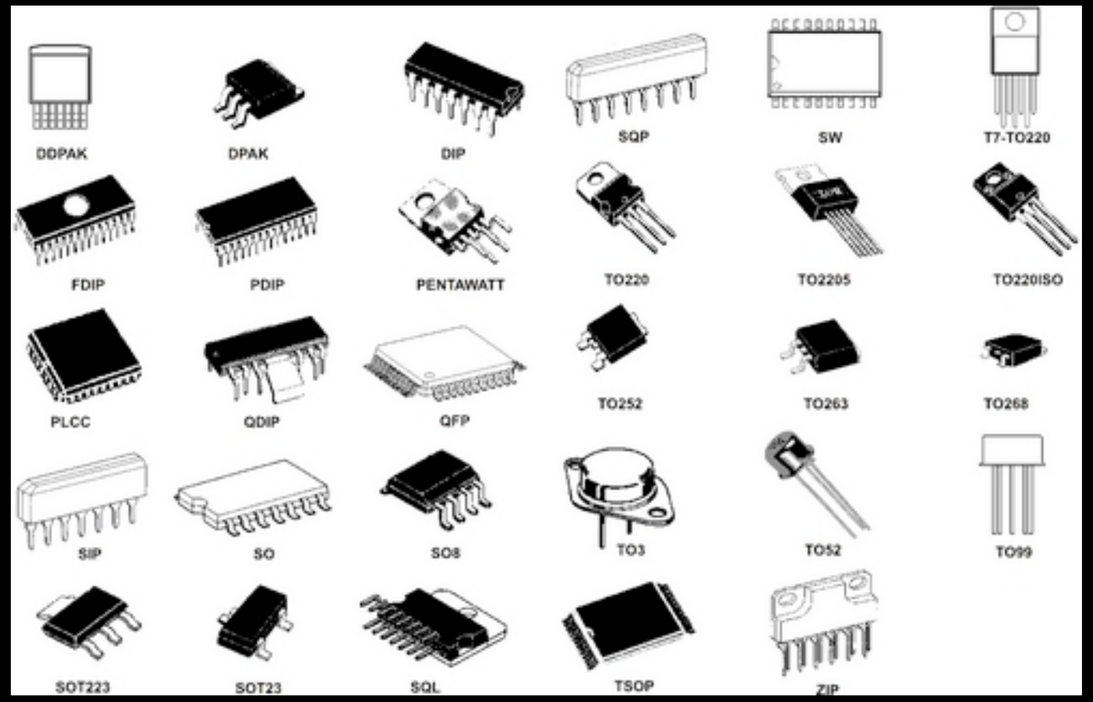
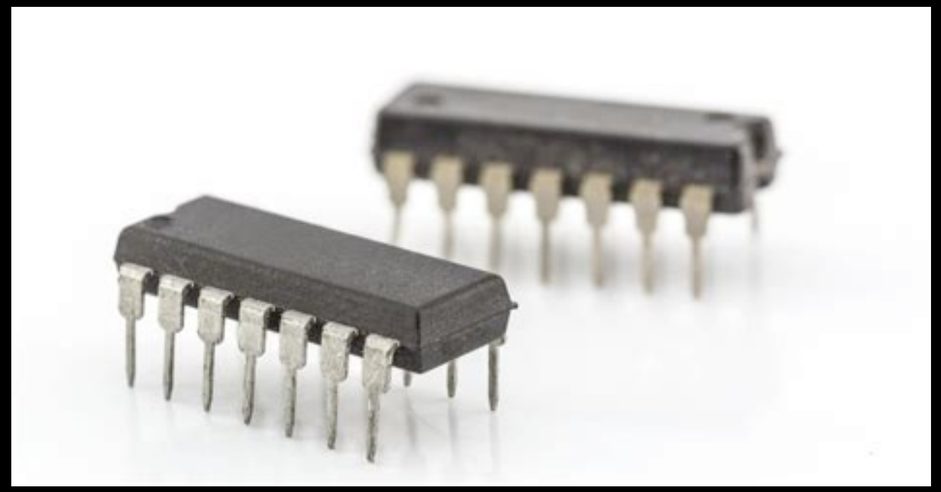
INTEGRATED CIRCUITS (IC)

- Collections of other electronic components
- Incredibly small and thin copper connections across the ‘die’
- Come in a variety of packages (we’re going to use DIP). They all have unique functions





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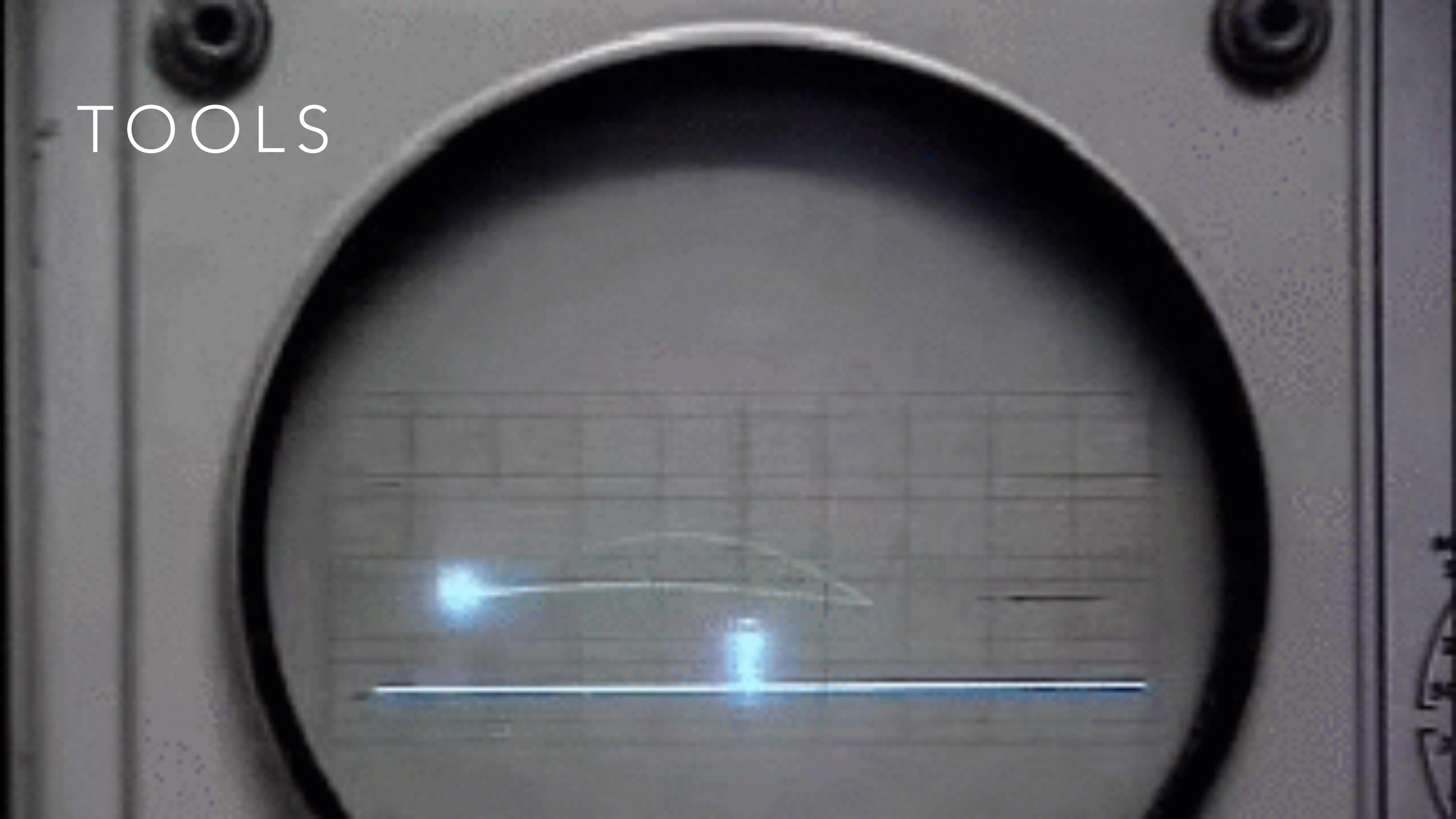
TOOLS



HAND TOOLS

Wire strippers

Wire cutters

Needle nose pliers

SOLDERING TOOLS

Iron & Stand

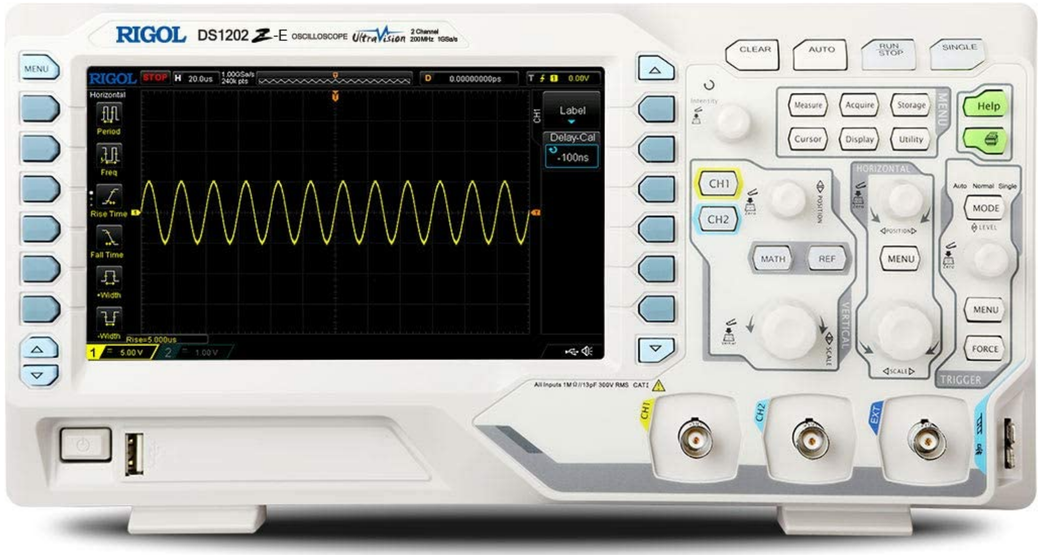
Helping/Third hands

Solder

MULTIMETER

HTTPS://LEARN.ADAFRUIT.COM/MULTIMETERS/OVERVIEW

OSCILLOSCOPES



HTTPS://LEARN.SPARKFUN.COM/TUTORIALS/HOW-TO-USE-AN-OSCILLOSCOPE