IGNITE
ACADEMY

Inspire & Grow New Innovation
in Technology & Engineering

Ground Rules

- Growth Mindset
  - Be transformed by the renewing of your mind (Romans 12:2)
  - Take every thought captive and make it obedient to Christ (2 Cor 10:5)
    - Basketball experiment
    - Strength training study
    - SAT score story
  - “Whether you think you can, or can’t, you’re right” – Henry Ford
- Professionalism in the academy
- Be CURIOUS, ask questions!
- Don’t be afraid to make mistakes

Why are we here?

- Isn’t AI just going to do everyone’s job in the future?
  - People thought the same thing about COMPUTERS!
  - Preparing to thrive in an AI driven world
- Many of the world’s biggest technology companies began in very ordinary places — a garage, a dorm room, or even a college apartment. They started with just a few people, very little money, and a big idea.
- Let’s take a look at some of those stories…

Famous Beginnings in Technology

- **Apple (1976 – Garage in California)**
  - Started by **two friends**: Steve Jobs and Steve Wozniak (later joined by a third, Mike Markkula, who helped fund them).
  - Built their first computer, the **Apple I**, in Jobs' parents' garage.
  - **Startup money**: they scraped together about **$1,300** (Jobs sold his van, Woz sold his calculator).
  - Today, Apple is worth **over $2 trillion** — one of the most valuable companies in the world.
- **Google (1998 – College Dorm & Garage)**
  - Started by **two PhD students**: Larry Page and Sergey Brin at Stanford University.
  - Their first servers were built in a dorm room, then moved to a rented garage.
  - **Startup money**: an angel investor (Andy Bechtolsheim) wrote them a check for **$100,000** before they even had a bank account.
  - Today, Google is the backbone of the internet, running search, YouTube, Android, and more.

Famous Beginnings in Technology

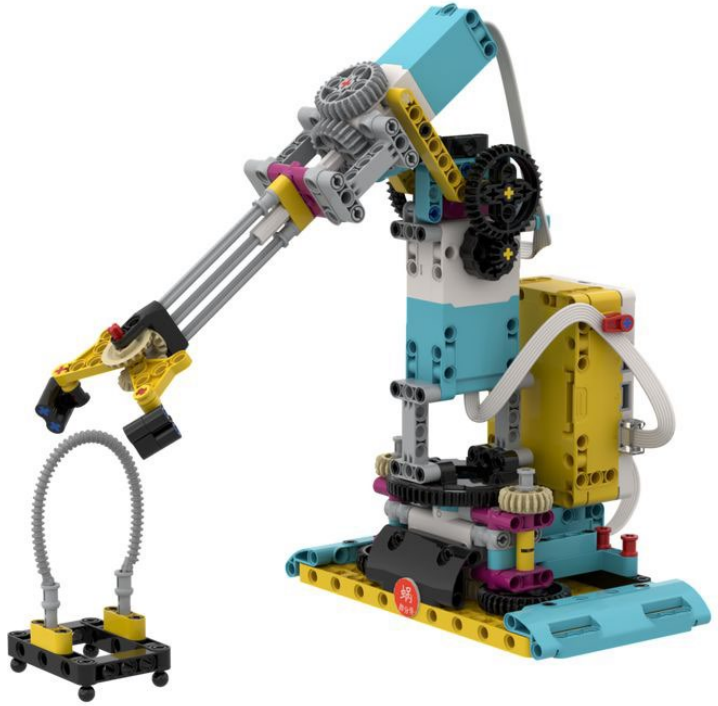
- **Facebook (2004 – College Dorm Room at Harvard)**
  - Started by **one student**, Mark Zuckerberg, with help from friends Eduardo Saverin, Dustin Moskovitz, and Chris Hughes.
  - **Startup money**: only a few **thousand dollars** to host the first servers.
  - Grew quickly across universities, then the world.
  - Today, Facebook (now Meta) has billions of users and owns Instagram and WhatsApp.
- **Takeaway**
  - These world-changing companies **started small**: just a couple people, little money, and a lot of creativity.
  - They didn't wait for perfect conditions — they built with what they had.
  - **Big ideas can grow from garages, dorms, or even a single laptop.**

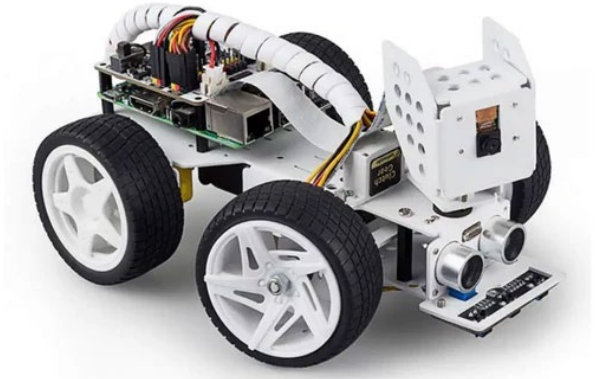
Technology Helps Everyone

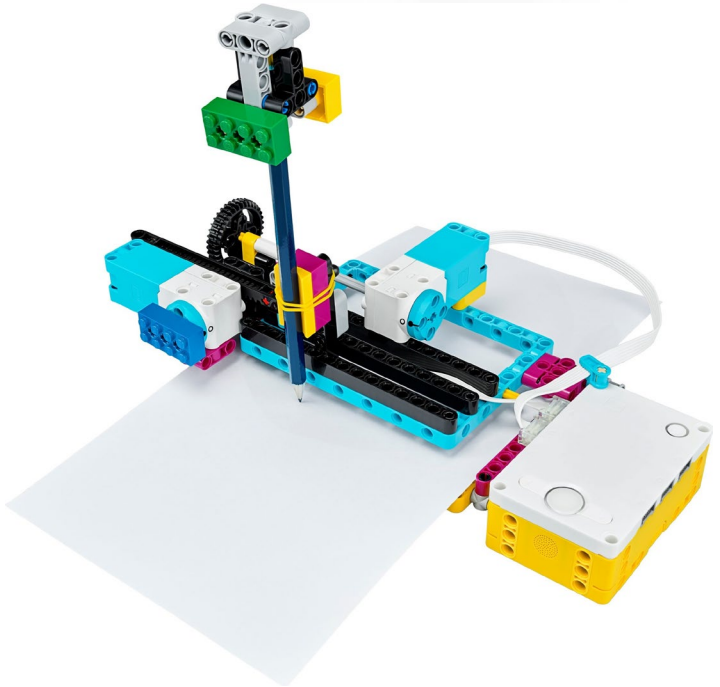
- Do you have to be an engineer or in tech to make use of AI driven world? – No!
- **For skilled professionals**
  - Technology makes everyday work faster and more efficient — smarter scheduling, instant invoicing, easy parts ordering, and digital guides.
  - Plumbers who use these tools can do more jobs in a day and serve customers better.
  - You can use AI to do things faster, automate routine tasks, and improve quality
  - Those who *don't* adopt technology risk being left behind.
- **For Homeschool Moms (or teachers)**
  - Technology can handle lesson planning, grading, scheduling, and even suggest new activities.
  - It saves time on routine tasks so moms can focus on teaching and encouraging their kids.
  - Families that use technology can access opportunities and resources others miss.
- **The Big Takeaway**
  - Technology isn't just for tech companies — it helps **any job, any person**.
  - The future belongs to people who **learn how to use technology creatively and wisely**.

What are we going to do?

- Some COOL STUFF!





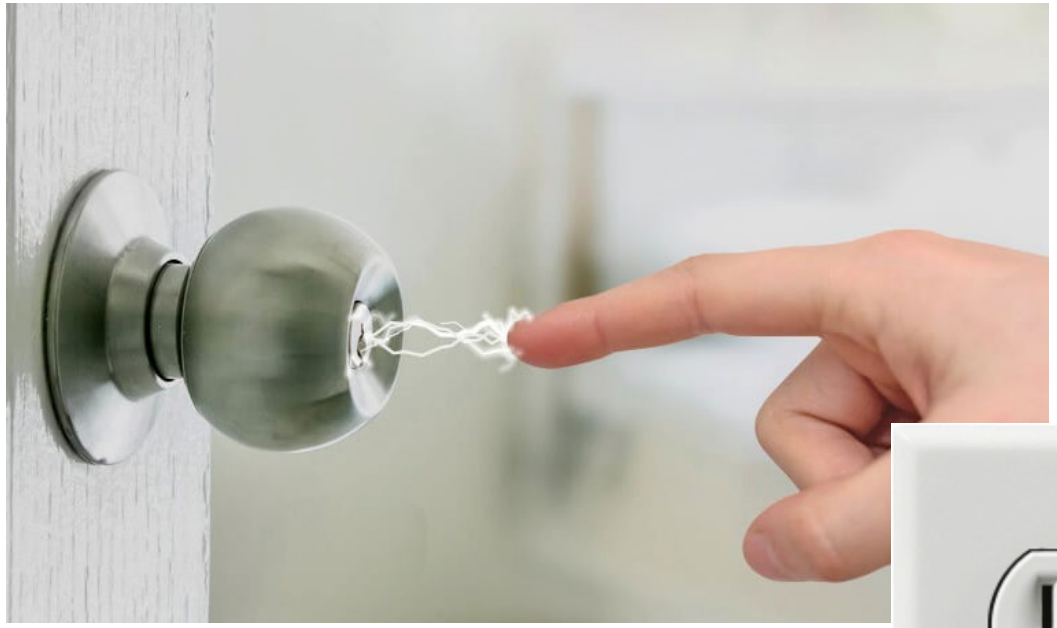


What we'll be learning

- **Electronics Basics (Review)**
  - Circuits, resistors, LEDs, and sensors.
- **How Computers Work**
  - What's inside a computer and how the parts talk to each other.
  - Binary code: the 1s and 0s that run everything.
  - Why timing and communication are so important.
- **Coding**
  - Learning how to "talk" to computers in their language.
  - Writing code to control things, solve problems, and make fun projects.
- **Robotics**
  - How machines can sense, move, and react.
  - Building and programming robots to do tasks.
- **3D Modeling and Printing**
- **Artificial Intelligence (AI)**
  - How computers can learn patterns and make decisions.
  - Real-world examples: self-driving cars, voice assistants, image recognition.
- **Innovation & Entrepreneurship**
  - How ideas grow into inventions.
  - Learning from the stories of people who started small and built big.

Review: Electricity and Circuits

What Is Electricity?



Moving ELECTRONS!!!

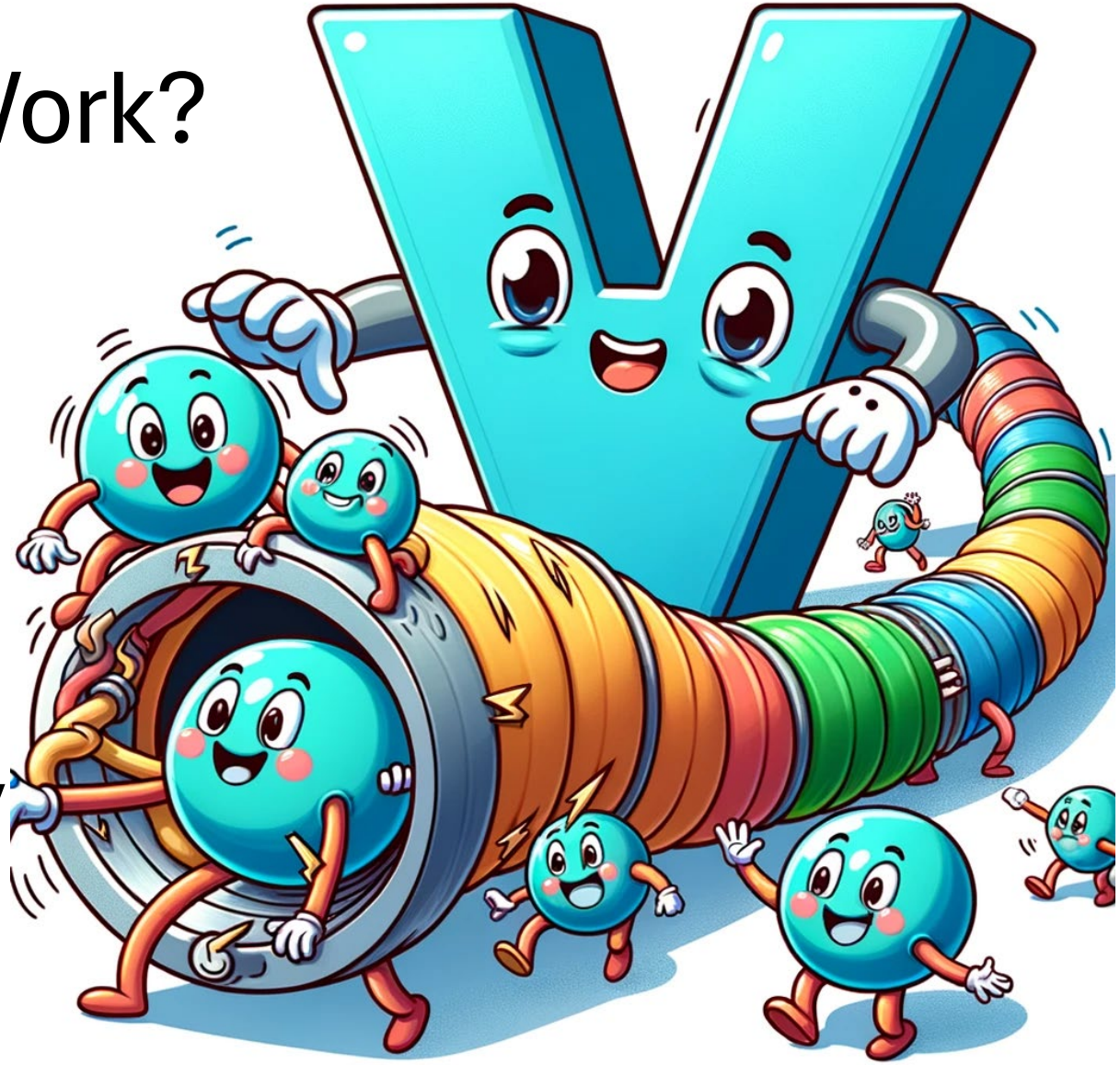
How Does Electricity Work?

- Electricity is kind of like water!

How Does Electricity Work?

- Electricity has both Voltage and Current!

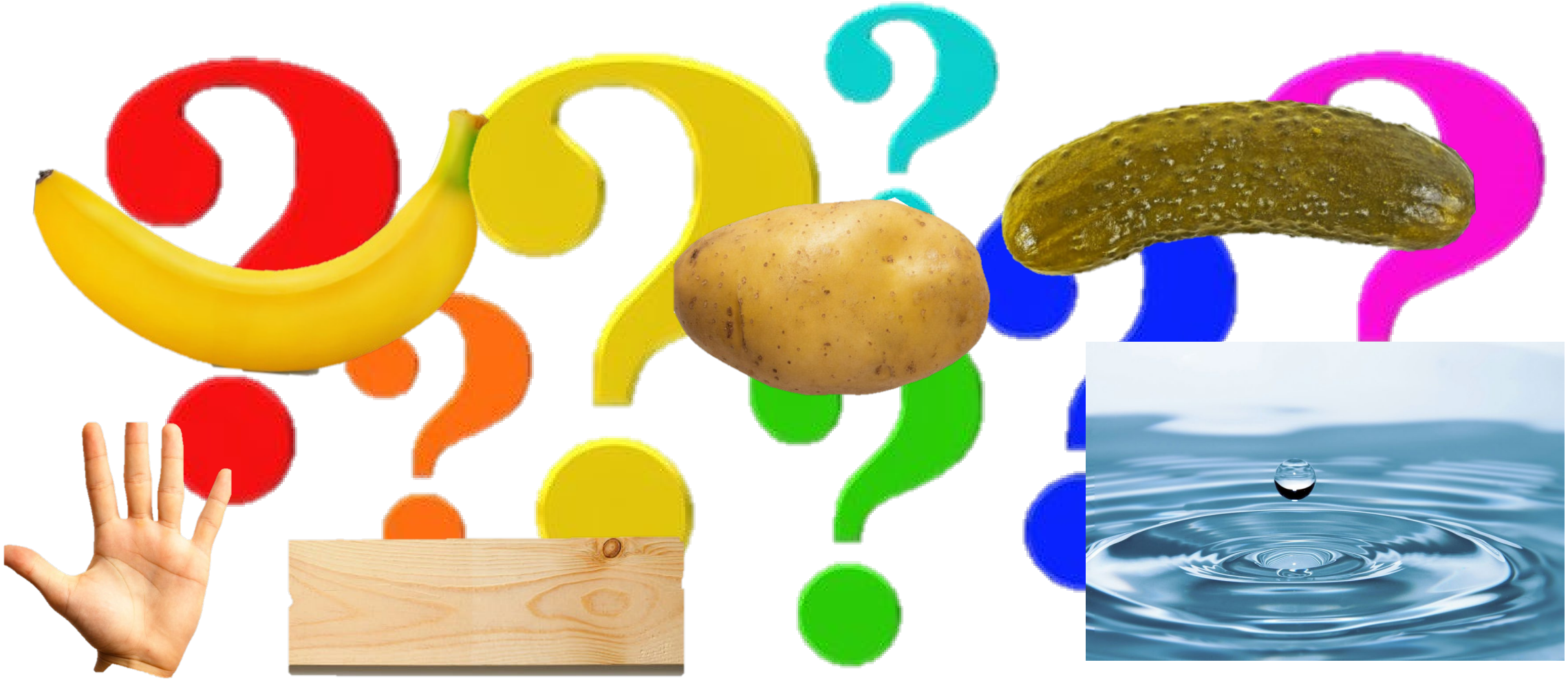
- Voltage is like water pressure
  - More voltage means the electrons get PUSHED harder!
- Current is how fast and how many electrons are moving
  - Current in electricity is the same as current when water flows, like the current in a river



Safety With Electricity

- We need to be careful with electricity
- It does so many good things, but can also be **VERY DANGEROUS**
- **NEVER** play with electrical outlets
- If you ever see a broken wire, or power line **DO NOT TOUCH IT** or go near it
- **DO NOT TRY** any of the experiments we do without an adult!

What Will Electricity Flow In?



Conductors and Insulators

- Conductor
  - Something that electricity flows through REALLY easily
- Insulator
  - Something that electricity doesn't flow through well at all
- Sorta Conductor
  (Actually called SEMI Conductor)
  - Something that electricity flows through really well, but only in under certain conditions

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Conductors

- METALS!!!
  - Silver,

Copper

Gold

Aluminum

Steel

Iron

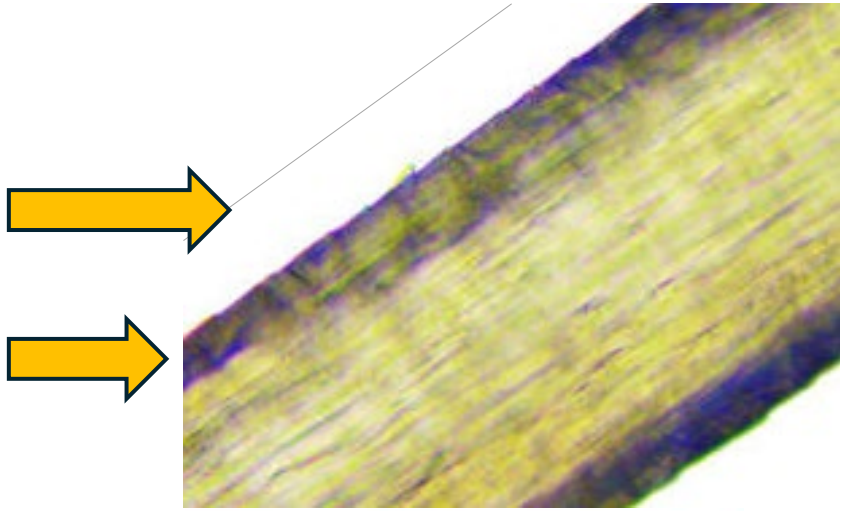
- GRAPHITE!

Insulators

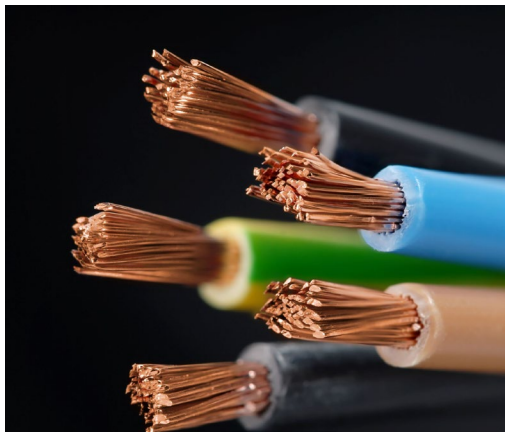
- Most everything else (Kind of)!
  - Glass, Plastics, Rubber, Wood, Paper, Cotton, Diamond, Quartz, Wax, Air, Oil, **Pure Water**
- The Best Ones:
  - Plastic, Rubber, Glass

Conductors With Insulators – make wires safer!

REALLY SMALL WIRE



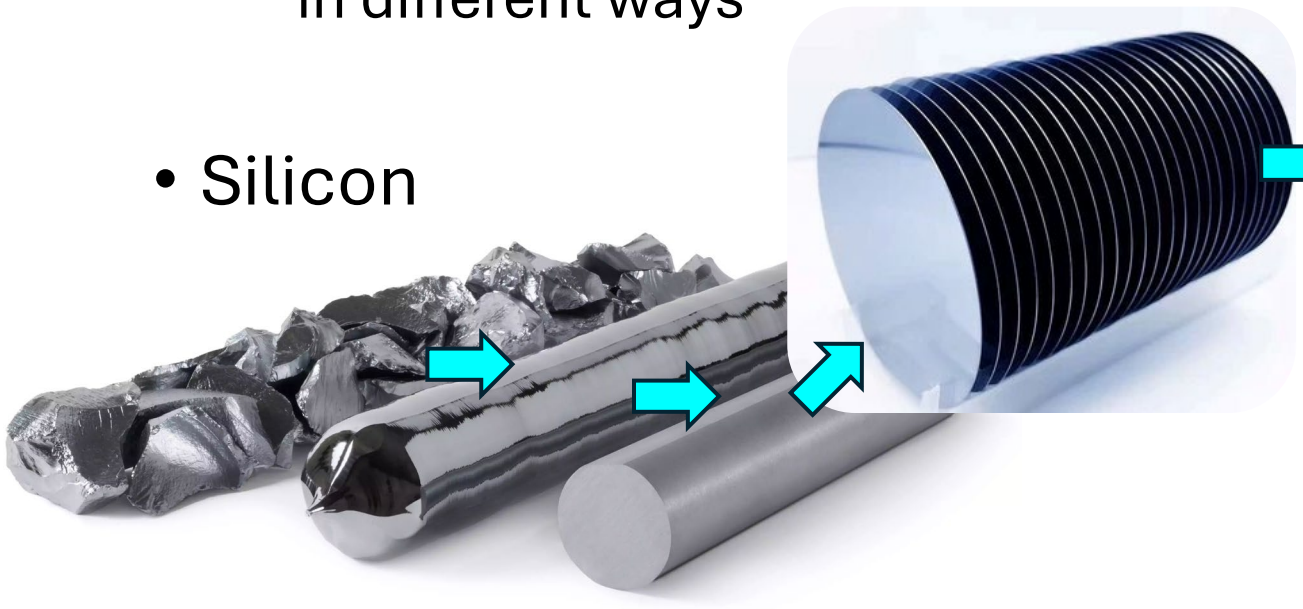
Human hair zoomed WAAY in

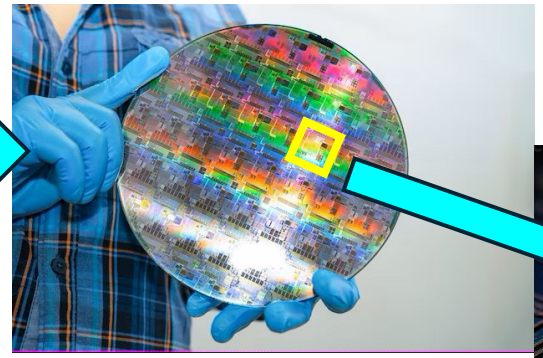


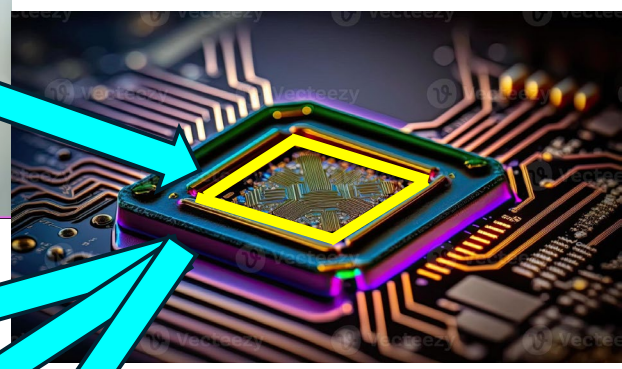
Sorta Conductor
(Semi)

- Kind of like the water we tested
  - It isn't a conductor until you add different things into it, and apply voltages in different ways

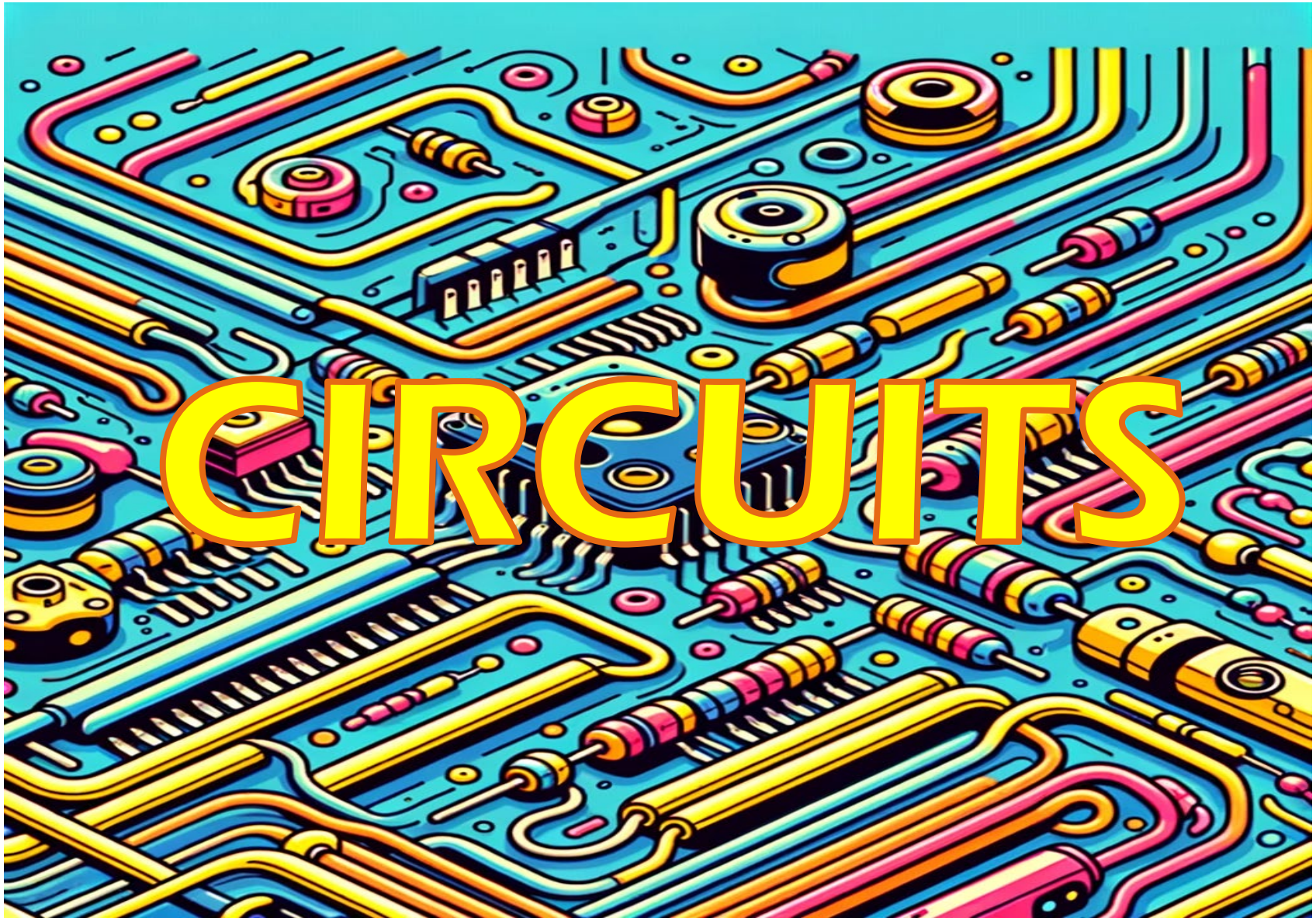
- Silicon







CIRCUITS!!!



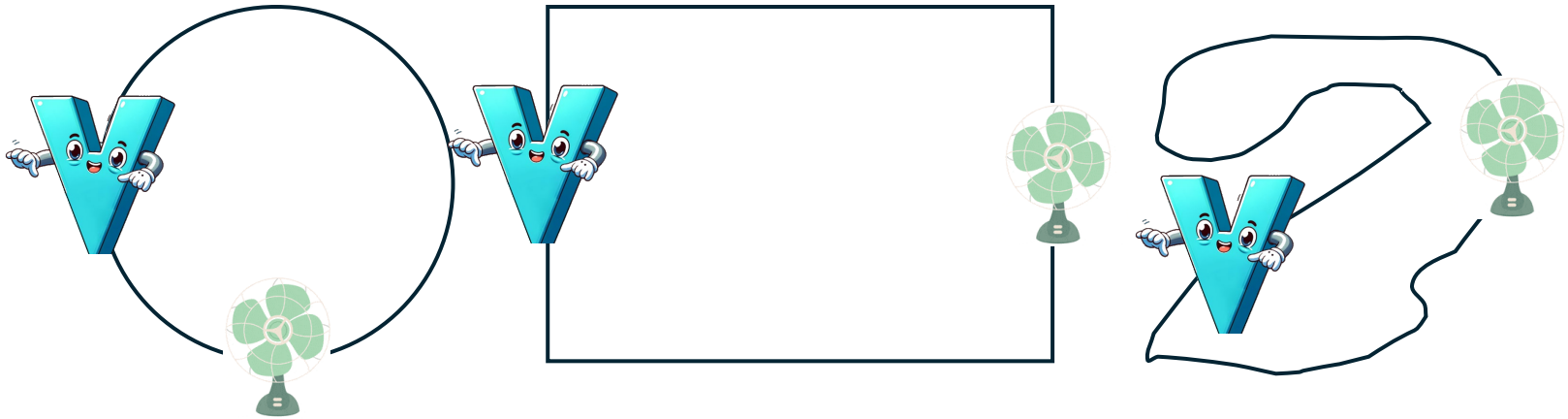
What is a Circuit?

- A CIRCUIT is a path that electricity (moving electrons) take to move around!
  - Much of the path is usually some kind of conductor

- Remember when we pretended to be electrons? What was the shape of the path that we went around in?

What is a Circuit?

- A CIRCUIT is a path that electricity (moving electrons) take to move around!
- Remember when we pretended to be electrons? What was the shape of the path that we went around in?
  - As the electrons go around the “circuit”, they give some of their energy to make the work happen!

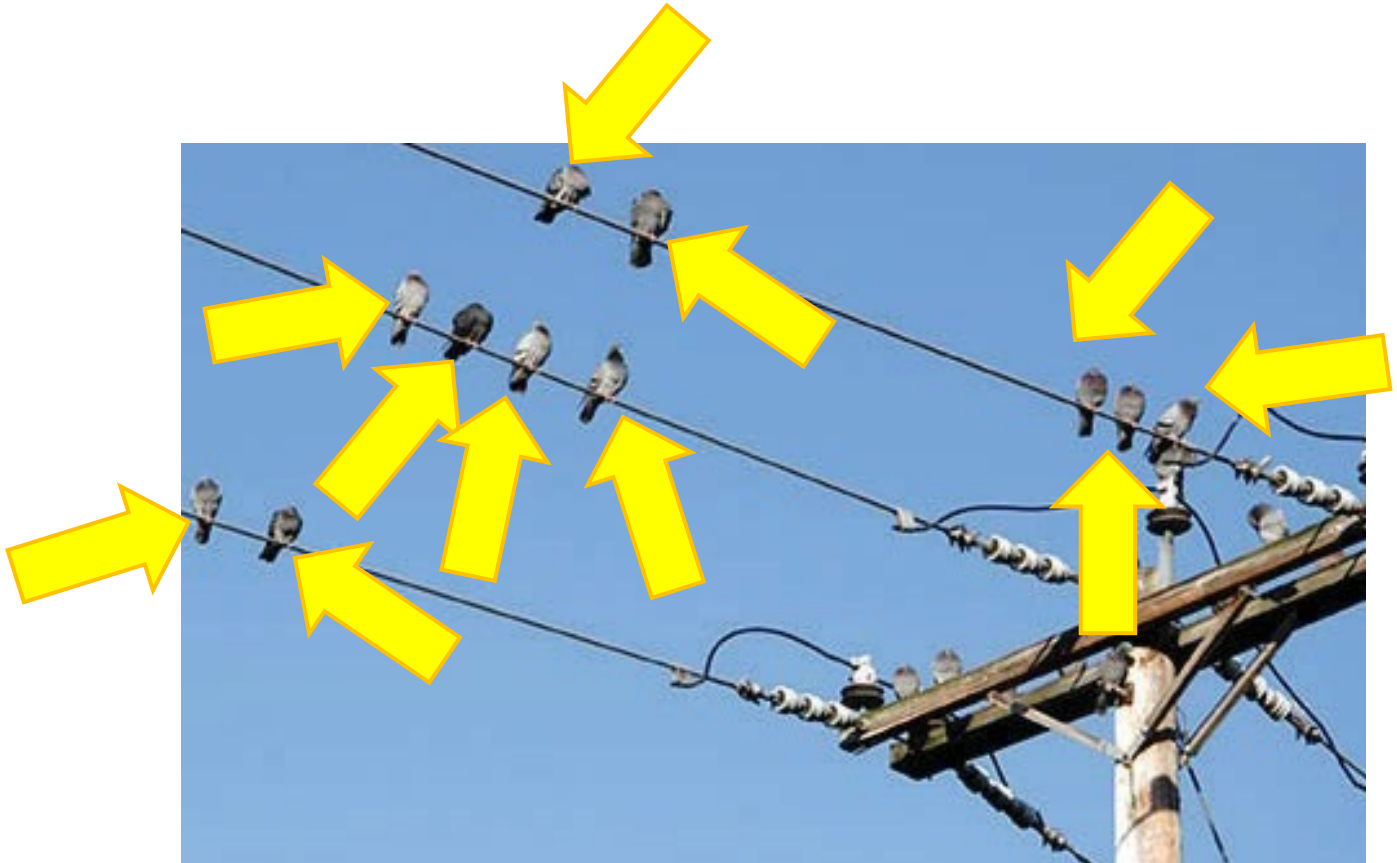


What is a Circuit?

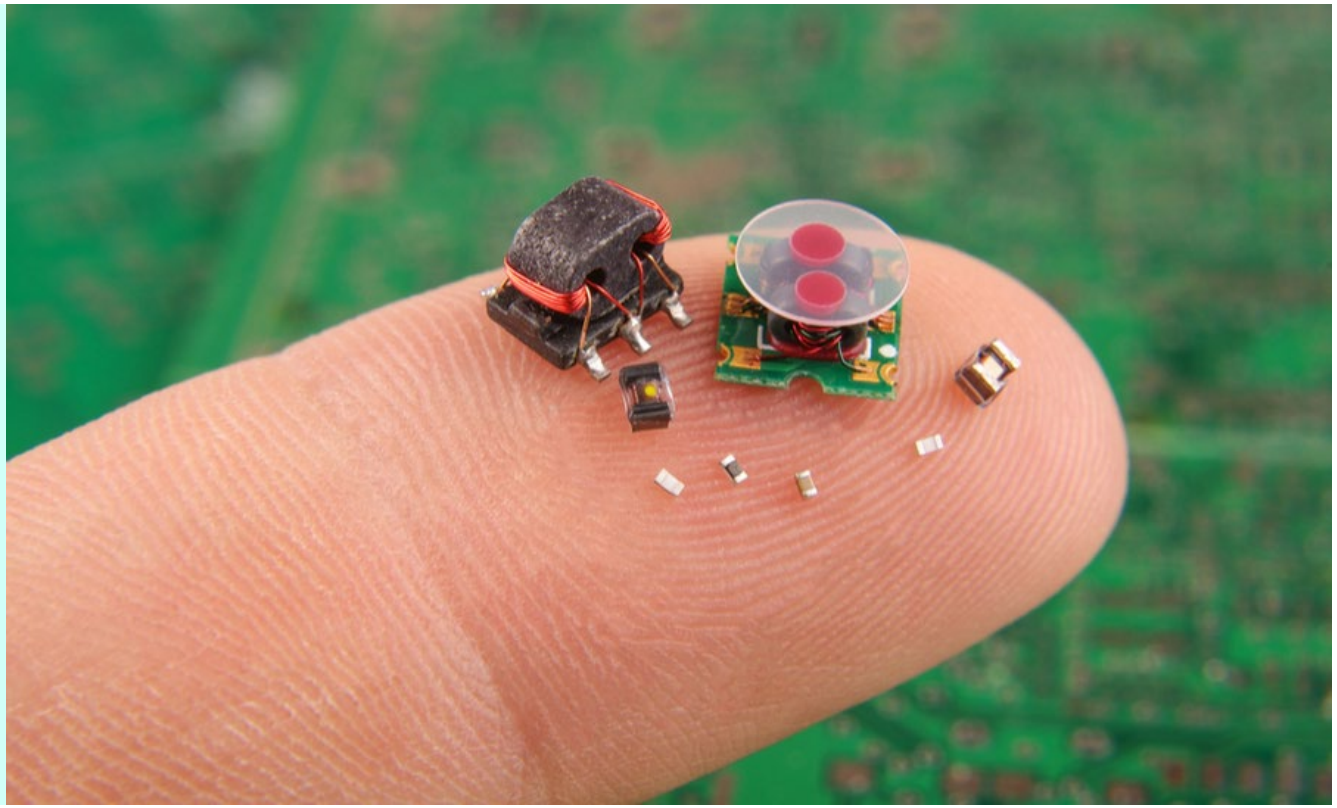
- But, what if the circuit is BROKEN ?

What is a Circuit?

- What about THESE DUDES???

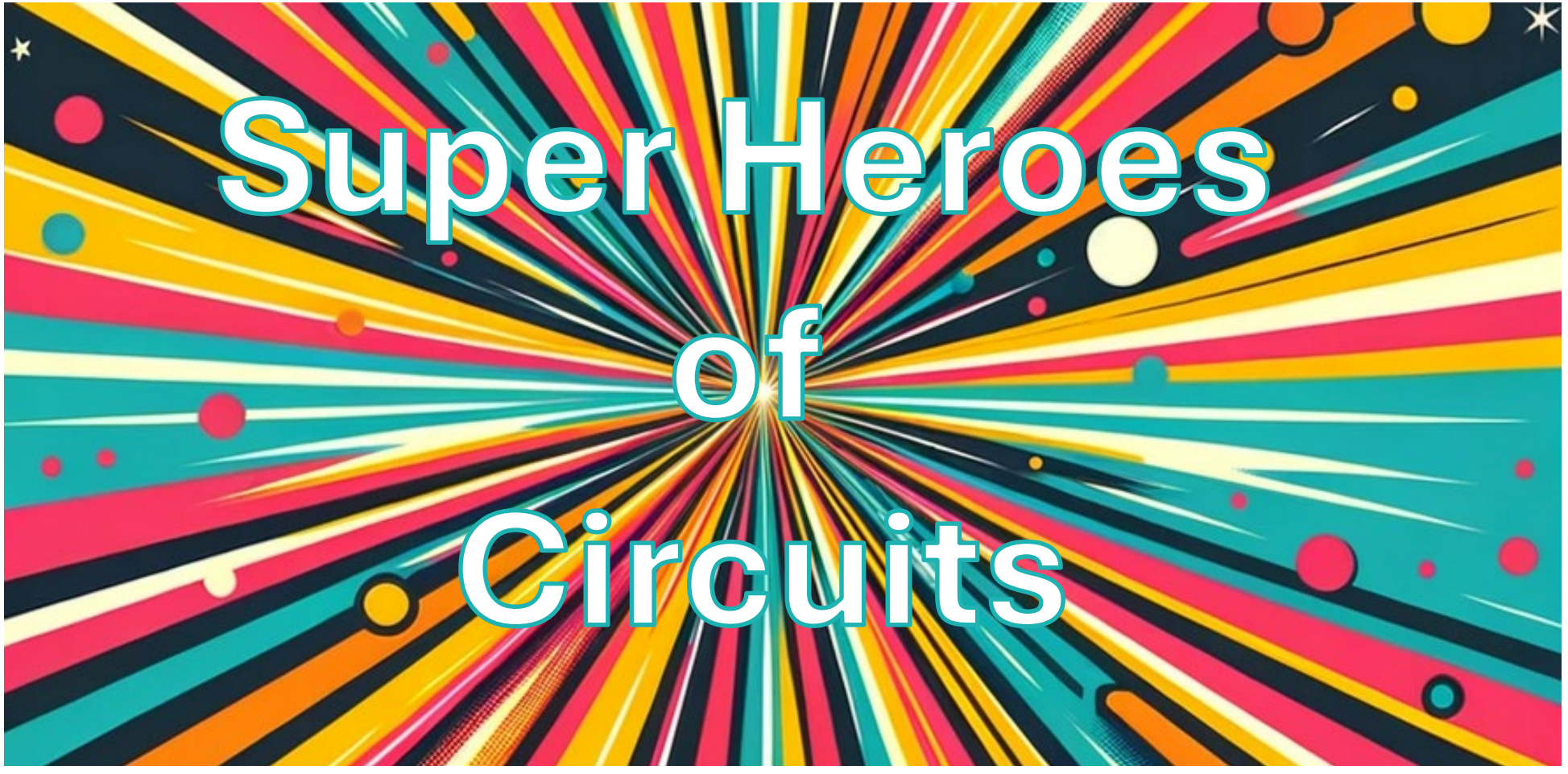


Circuits come in all sorts of sizes and do all sorts of things



What do we make circuits out of!?

- Conductors, Insulators, and….



Super Heroes of Circuits

CAPACITOR

The Energy Storer

- **Superhero Powers:** Capacitor has the ability to store electrical energy and release it at just the right moment, providing power boosts to the circuit whenever needed.
- **Weaknesses:** Once he's out of stored energy, Capacitor needs time to recharge before he can unleash his power again. He's also sensitive to too much voltage, which can overwhelm and damage him.
- **Special Abilities:** Quick Charge – Capacitor can quickly gather energy from the circuit, ready to release it in powerful bursts whenever necessary.
- **Favorite Teammates:** Resistor, to help manage the flow of electricity, and Battery, to provide him with a constant source of energy to store.

RESISTOR

The Reliable Teammate

- **Superhero Powers:** Resistor has the incredible ability to slow the flow of electrical current, ensuring that it remains safe and manageable for all his fellow components. He can stand firm against the flow, slowing down even the mightiest of electrical surges.
- **Weaknesses:** Resistor can get overwhelmed if the power is too much, leading to him heating up. Too much heat, and he might burn out, losing his abilities.
- **Special Abilities:** Heat Resistance – Resistor can absorb a lot of energy before giving out, making him a sturdy and reliable ally.
- **Favorite Teammates:** Capacitor and Inductor – together, they balance and direct the energy flow in any circuit, making sure everything runs smoothly and safely.

INDUCTOR

The Magnetic Warrior

- **Superhero Powers:** Inductor uses his power of magnetism to fight against **changes** in electrical current. He can create magnetic fields and voltages that help control and shape the flow of electricity.
- **Weaknesses:** Inductor struggles when things start to happen too fast, where his power to resist changes becomes less effective.
- **Special Abilities:** Energy Field – Inductor can create a magnetic shield and voltages that helps protect other components from sudden changes in current. When magnets are nearby, Inductor can also help *make* electricity!
- **Favorite Teammates:** Capacitor, with whom he forms an unbeatable team that can tackle many electrical challenges!

SEMI-CONDUCTOR

The Shape Shifter

- **Superhero Powers:** Semiconductor can change his conductivity in response to different conditions, acting as an insulator at times and a conductor at others, making him incredibly versatile.
- **Weaknesses:** His power is dependent on some things like temperature and other parts of his environment, which can limit his effectiveness.
- **Special Abilities:** Adaptability – Semiconductor can adjust his properties to fit the needs of the circuit, making him a crucial ally in any electronic device.
- **Favorite Teammates:** His sidekick Diode and others, who rely on Semiconductor's unique abilities to control the direction and flow of current.


The Sidekicks

DIODE

One Way Street

- **Superhero Powers:** A sidekick of Semi-Conductor, Diode has the amazing ability to allow electrical current to flow in **only one direction**, protecting the circuit from harm and ensuring everything runs smoothly. **Some DIODES can also produce light**!
- **Weaknesses:** If the current tries to flow backward, Diode blocks it, but too much pressure (voltage) can damage him, preventing any electrons from flowing at all.
- **Special Abilities:** Rectification – Diode can convert current that is going back and forth (alternating) into a steady stream, meaning you can find him working in many devices you plug into the wall.
- **Favorite Teammates:** Semiconductor, for his adaptability, and Battery, who supplies the steady stream of electrons Diode guides.

BATTERY

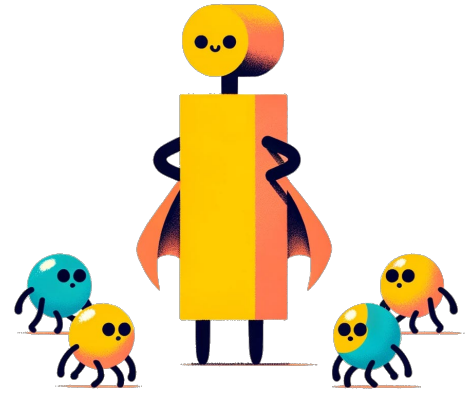
The Powerhouse

- **Superhero Powers:** Battery possesses the extraordinary ability to convert chemical energy into electrical energy, providing the voltage and power that brings the circuit to life.
- **Weaknesses:** Battery has a limited amount of energy, and once it’s gone, he needs to be recharged or replaced to keep the circuit alive.
- **Special Abilities:** Strength – Battery can last for an extended period before needing a recharge, making him a reliable source of power.
- **Favorite Teammates:** Everyone loves Battery, but he works especially well with Capacitor, who can store and release his energy as needed, and Resistor, who helps manage the flow of his power.

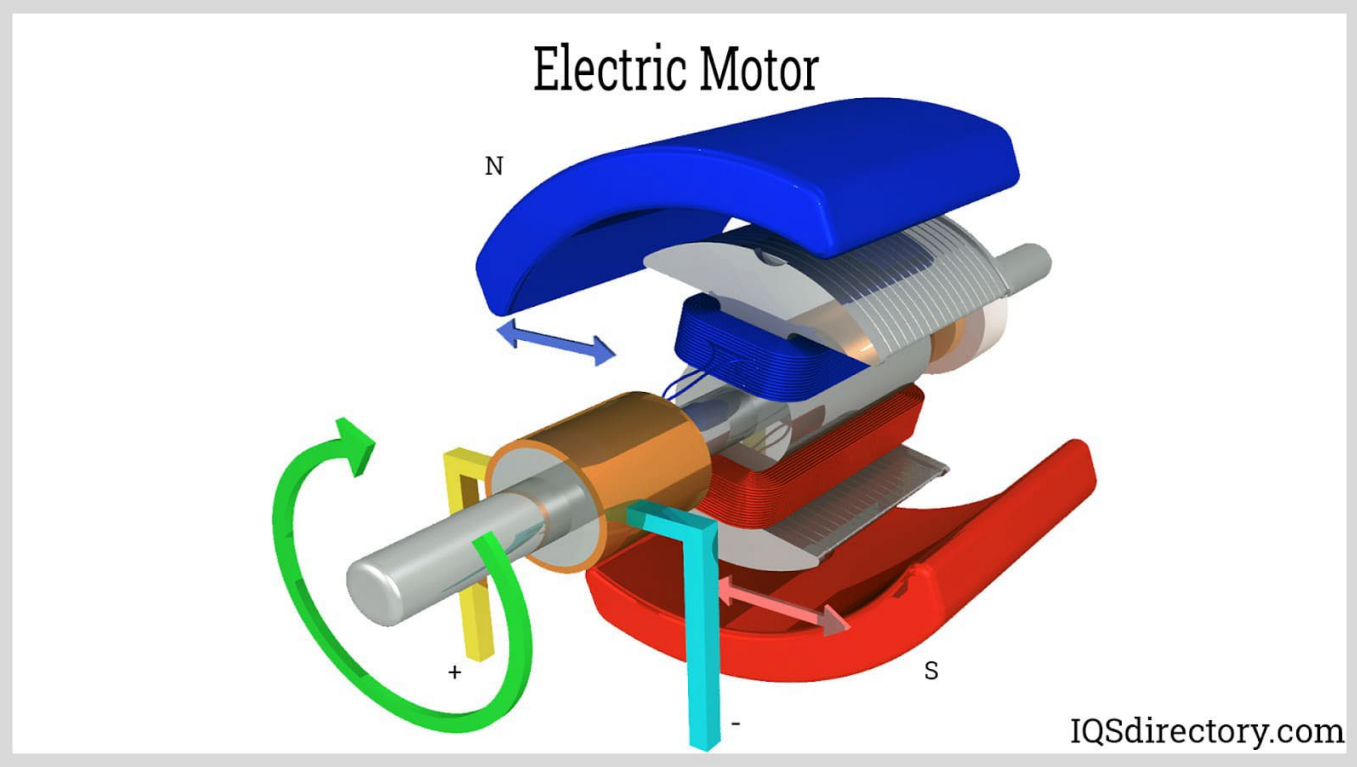
There is another, super hero in town!!!

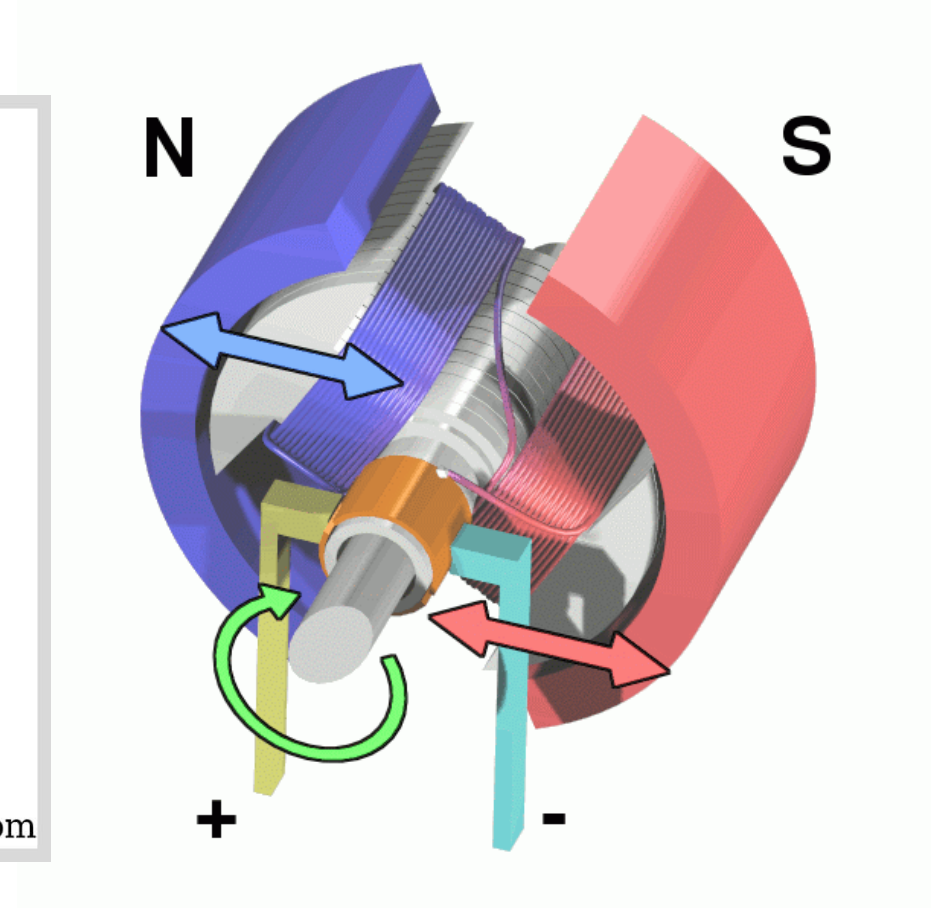
Magnet-o

- **Superhero Powers:** Magnet-o can create electricity when he moves near wires, AND can pull many different kinds of metal toward himself. He can also push away or pull toward other magnets.
- **Weaknesses:** When things aren't moving, Magnet-o doesn't have much ability to affect the flow of electricity
- **Special Abilities:** Making electricity flow in wires that are moving nearby. But, electricity moving through wires also helps strengthen magnet-o!
- **Favorite Teammates:** Inductor who works very closely with magnet-o to shape how electricity is flowing.



Using magnetism and electricity is how an electric motor works!!



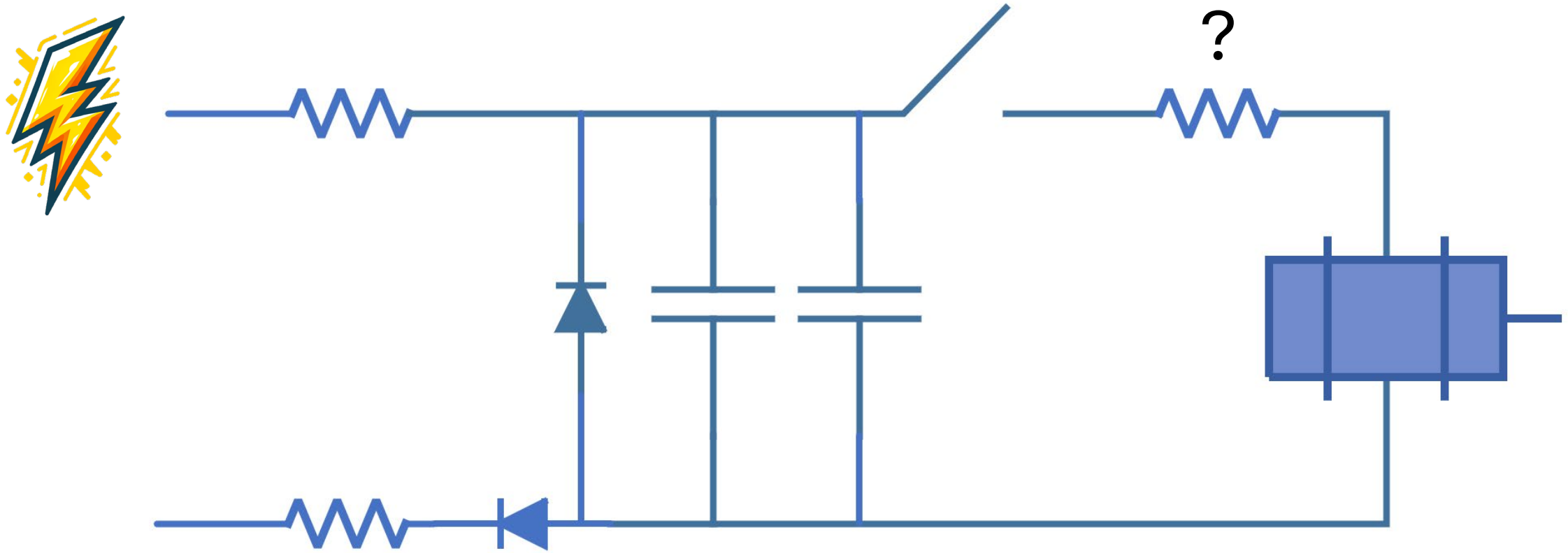


Its GO TIME

- Lets team up with some other super heroes of circuits to build a CAPACITOR POWERED DRAGSTER!

The Car Circuit

- WHAT ARE THESE SYMBOLS???



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