

# Lesson 1: Introduction to Conductive Ink

## What is it?

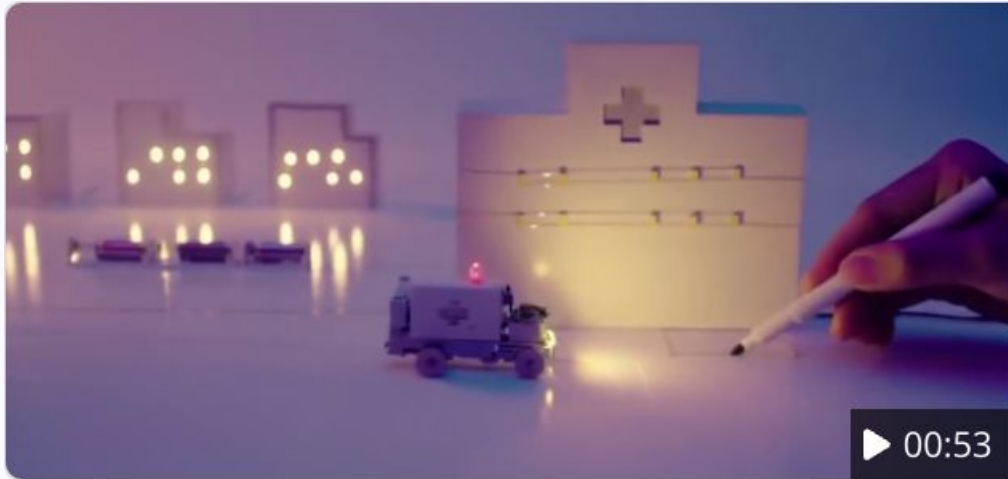
Conductive ink is a special ink that conducts electricity.

## How is it used?

It can be used in electronics and art projects.

## Lesson Overview

We'll explore its properties and applications.



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### **Pen that draws electricity - The AgIC Circuit Marker pen uses conduct...**

The AgIC Circuit Marker pen uses conductive ink that allows working electrical circuits to be drawn on pieces of paper. Available on Amazon for only \$15!...

 00:53

# Understanding Electrical Conductivity

Conductivity refers to a material's ability to allow the flow of electrical current. Just like water flows through pipes, electricity flows through conductive materials.

## Electronic Circuit

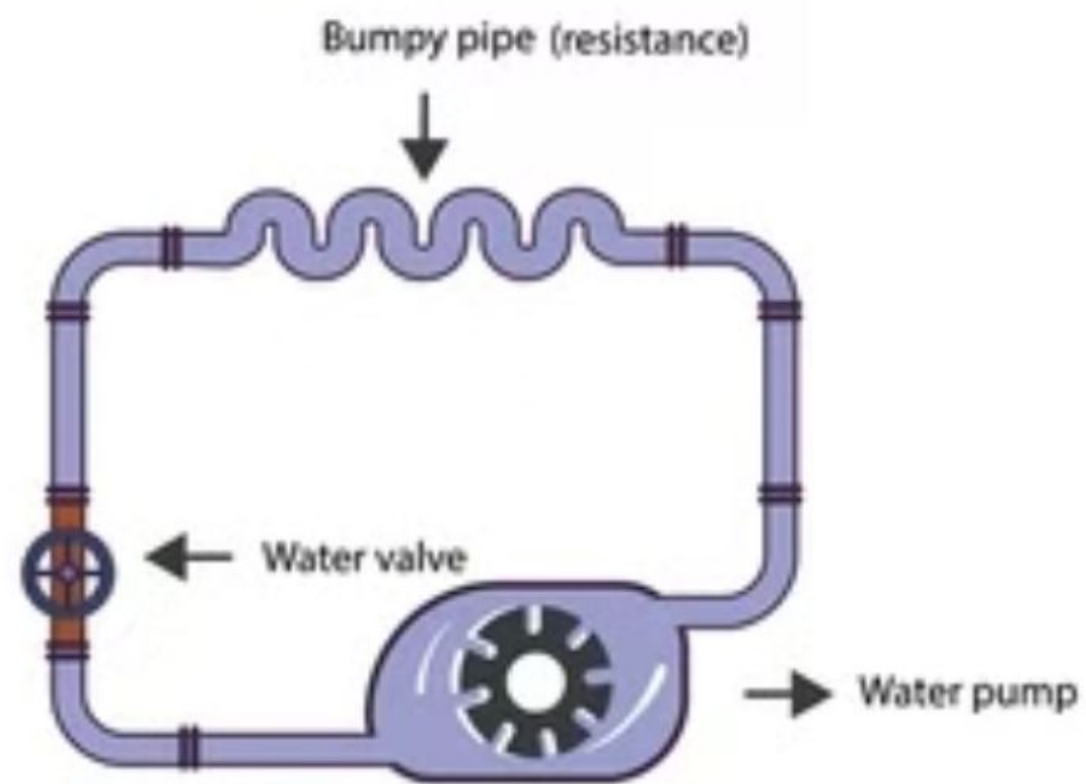
- Electricity flows through conductive wires
- Electrons move from negative to positive
- Resistance restricts electrical flow
- Voltage acts as electrical pressure

## Water Pipe System

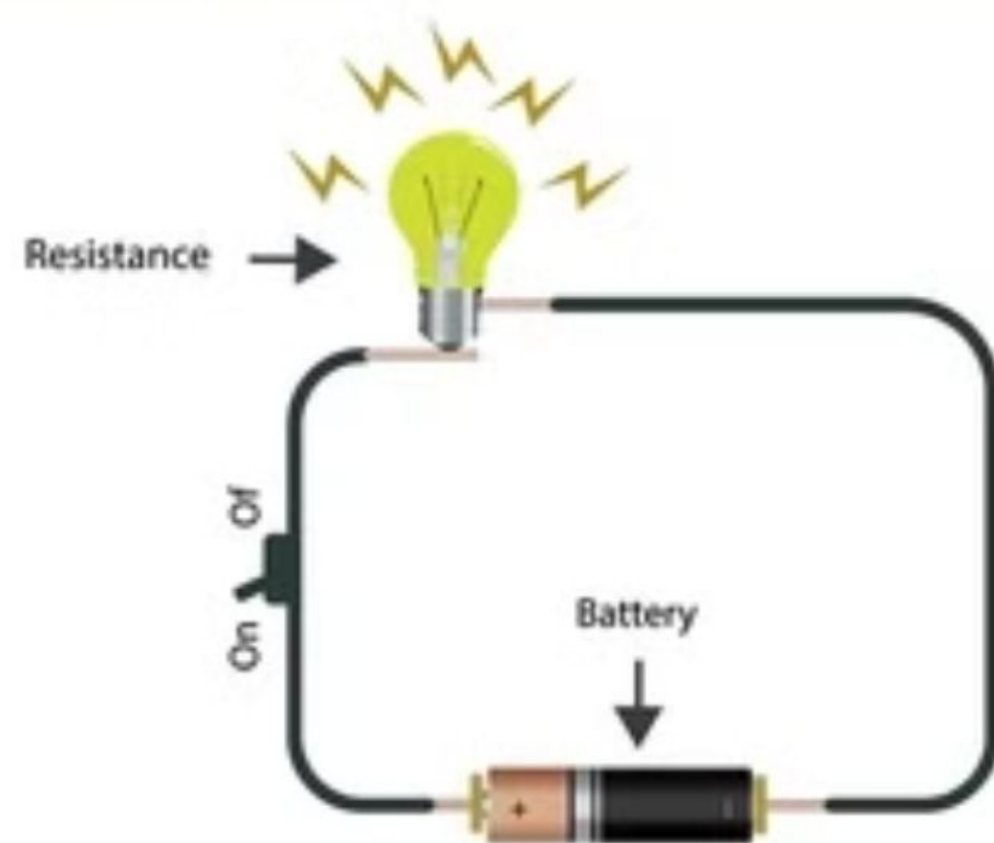
- Water flows through pipes
- Water molecules move from high to low pressure
- Narrow pipes restrict water flow
- Water pressure pushes water forward

When we draw with conductive ink, we're essentially creating flexible "pipes" for electricity to flow through. This allows us to design creative circuits without traditional rigid wiring.


## SIMPLE WATER SYSTEM



## SIMPLE ELECTRIC CIRCUIT





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### **The pen that draws electricity**

The AgIC Circuit Marker pen uses conductive ink that allows working electrical circuits to be drawn on pieces of paper. Japanese venture AgIC developed. We test...

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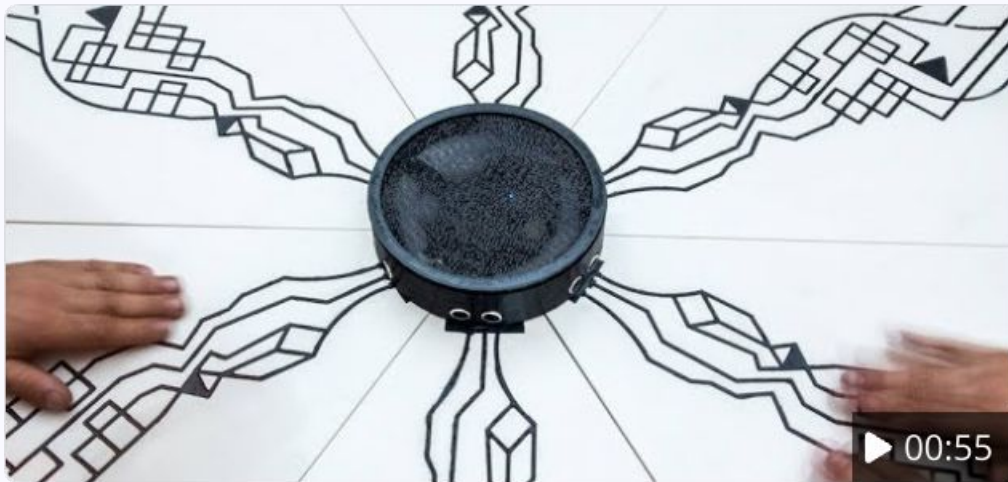
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### **Electric Paint Lamp Kit**

Find out more about the Electric Paint Lamp Kit here:

<https://www.bareconductive.com/collections/electric-paint-lamp-kit> Transform any...



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### **Build Your Own Interactive Sound Table with Electric Pai...**

Find out more about Electric Paint here:

<https://www.bareconductive.com/collections/electric-paint> TACTO is an interactive...





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### **Interactive media wall (touch sensor, conductive ink, projection map...**

[PLAYDODO] Music Playing Wall : Projection Mapping, Conductive Ink, Interacitve Art  
Music Playing Wall, a fun Interactive touch wall painted with instruments recognize...



# Understanding Resistors in Electronic Circuits

Resistors are fundamental electronic components that limit or restrict the flow of electrical current in a circuit. They provide precise amounts of resistance measured in ohms ( $\Omega$ ).

## Resistors in Electronic Circuits

Resistors work by converting electrical energy into heat, thereby reducing current flow.

- Low resistance (e.g.,  $10\Omega$ ) allows more current to flow
- High resistance (e.g.,  $10,000\Omega$ ) significantly restricts current
- Resistors protect sensitive components from excessive current
- They're used to divide voltage and create specific circuit behaviors


Just as we use different pipe sizes to control water flow in specific parts of a plumbing system, we use different resistor values to control electrical current in different parts of a circuit.

## Water Pipe System Analogy

The water pipe system provides an excellent way to understand how resistors function:

- Wide pipes (low resistance) allow water to flow easily
- Narrow pipes (high resistance) restrict water flow
- Water pressure (voltage) pushes against the restriction
- Flow rate (current) decreases as pipe narrowness increases

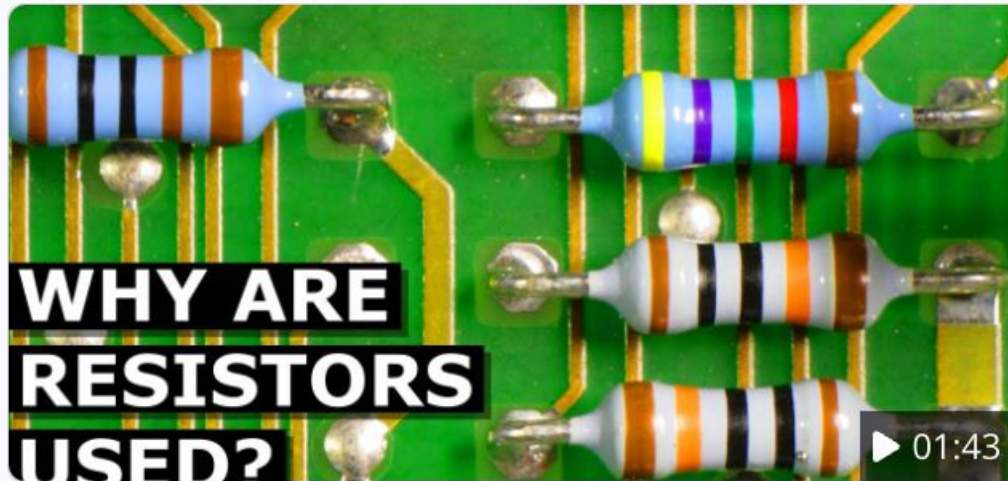



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### How Resistor Work - Unravel the Mysteries of How Resistors Work!

In this video, we're going to learn about how resistors work! We'll explore the different types of resistors, how resistors work in circuits, and how to calculate...



 YouTube



### Why Resistors Are Used In circuits

In this video, we're going to answer the question: Why are resistors used? 👉 👉 👉

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# Why Resistors Are Critical for Our Inkstrument

For our conductive ink musical instrument project, resistors play several essential roles:



## Component Protection

Resistors protect our Arduino microcontroller and other sensitive electronic components from receiving excessive current that could damage them.



## Sound Modulation

By creating voltage dividers with different resistor values, we can generate various tones and control pitch in our Inkstrument, allowing for more expressive musical capabilities.



## Touch Sensitivity

When used with conductive ink, resistors help calibrate the sensitivity of the capacitive sensors, ensuring reliable detection of finger touches and gestures on our instrument's surface.

# Material list

The following components are required to build our interactive musical instrument:

## Core Electronics

- Arduino Uno R3 microcontroller board
- TouchKeyUSB capacitive touch sensor module
- VS1053 module with SD card
- Small speaker with audio jack output
- USB cable

## Conductive Materials

- Conductive Ink
- Copper tape
- Assorted resistors (10k $\Omega$ , 1k $\Omega$ , and 220 $\Omega$ )
- Clip wires