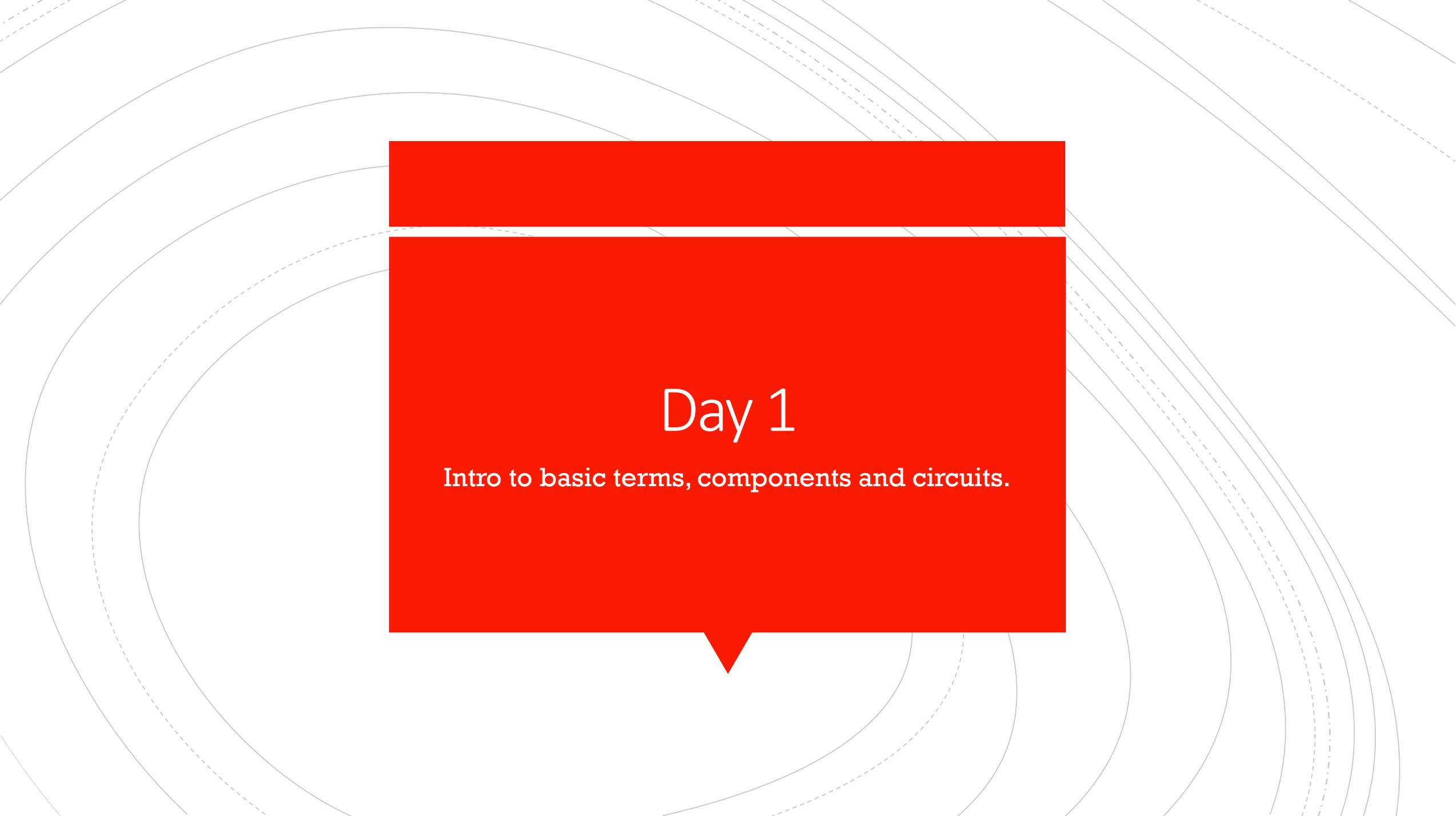


# Electronics Basics Workshop

23, 24, 25 November 2020

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# Day 1

**Intro to basic terms, components and circuits.**

Eleshop staff



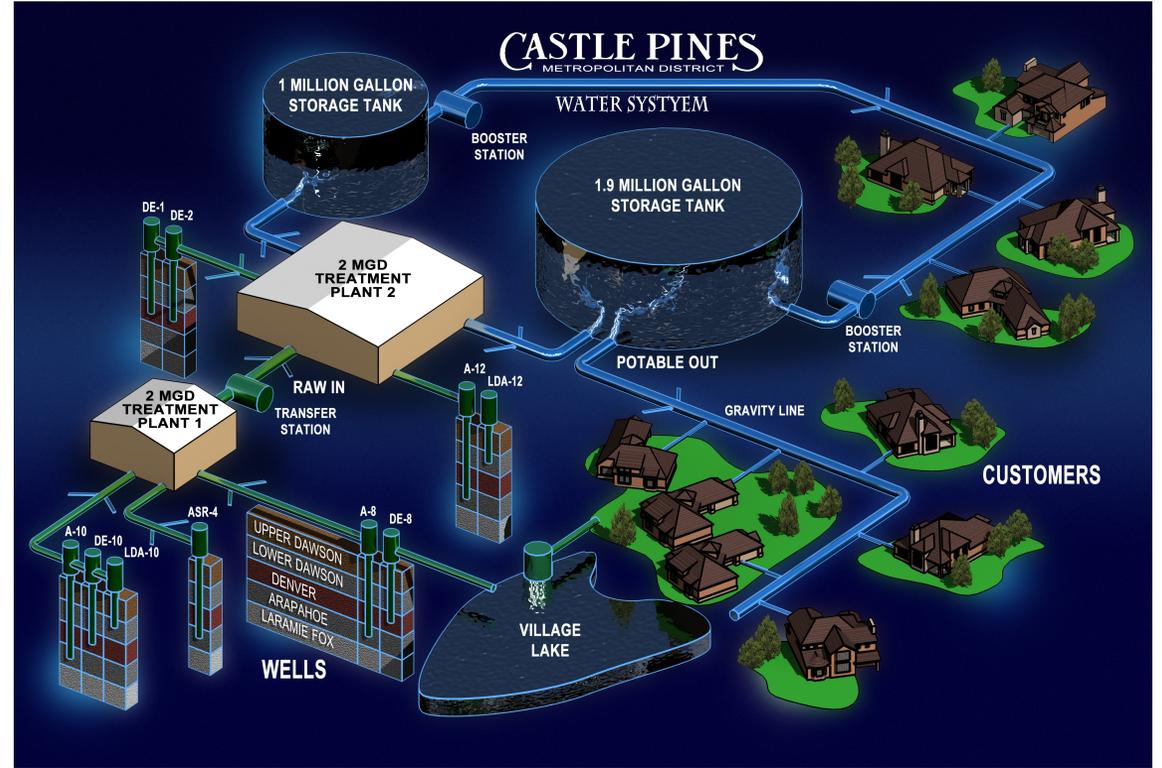
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# What is Electronics?

- **Electronics** comprises the physics, engineering, technology and applications that deal with the emission, flow and control of electrons in vacuum and matter.
- Electronics deals with electrical circuits that involve active electrical components, associated passive electrical components, and interconnection technologies.
- Designing a system for electrons to flow through different paths, to get what we want.



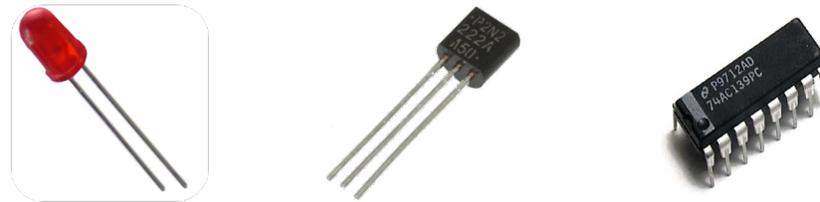
# Basic components

An electronic component is any basic discrete device or physical entity in an electronic system used to affect electrons or their associated fields.

## PASSIVE COMPONENTS



## ACTIVE COMPONENTS



## ELECTROMECHANIC



Voltage ( V ),  
Current ( I ),  
Resistance ( R )

- **Voltage** : Voltage, electric potential difference, electric pressure or electric tension is the difference in electric potential between two points. The difference in electric potential between two points in a static electric field is defined as the work needed per unit of charge to move a test charge between the two points.

OR voltage is the pressure from an electrical circuit's power source that pushes charged electrons (current) through a conducting loop, enabling them to do work such as illuminating a light.

- **Current** : An electric current is a flow of electric charge. In electric circuits this charge is often carried by moving electrons in a wire. It can also be carried by ions in an electrolyte.

OR a flow of electrical charge carriers.

- **Resistance** : Electrical resistance of an object is a measure of its opposition to the flow of electric current.

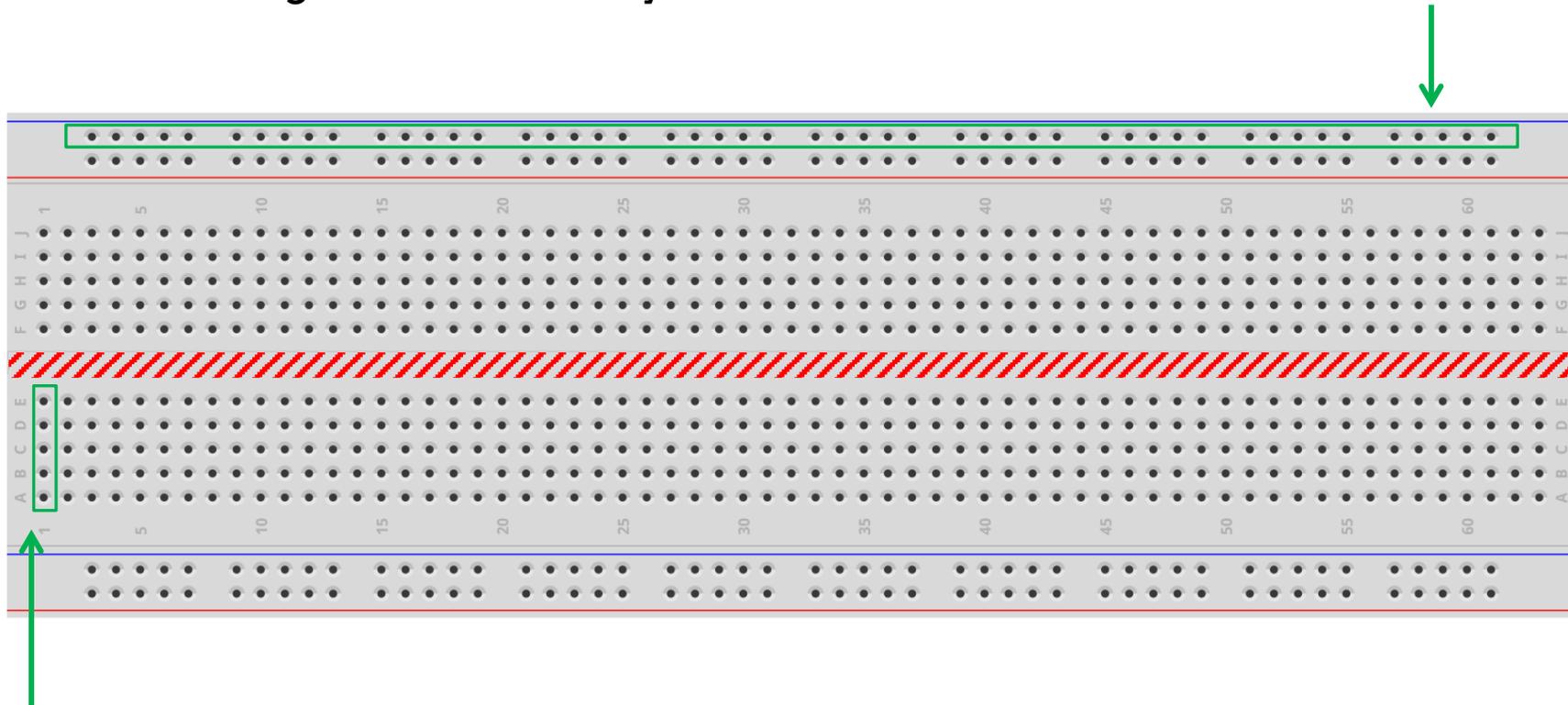
$$V = I * R$$

$$P = U * I \quad M \quad U = R * I$$

$$V \text{ or } U = I * R$$
$$P = U * I$$

- To prevent overloading a pin or a component with excessive current you need to use a resistor
- Example: Using an LED – Calculating the required resistor size
  - Operation voltage for LED: 5V
  - Recommended current 23mA
- $U = R * I \rightarrow R = \frac{U}{I} = \frac{5V}{0,023A} \approx 220\Omega$

Terminals with blue and red lines are called power busses and are connected together horizontally.

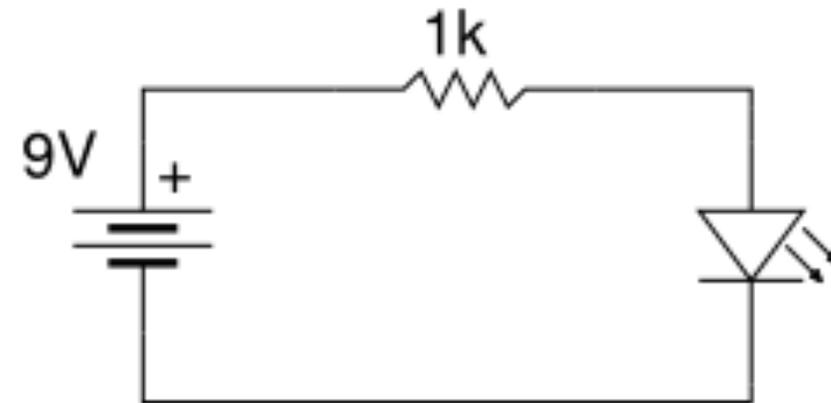
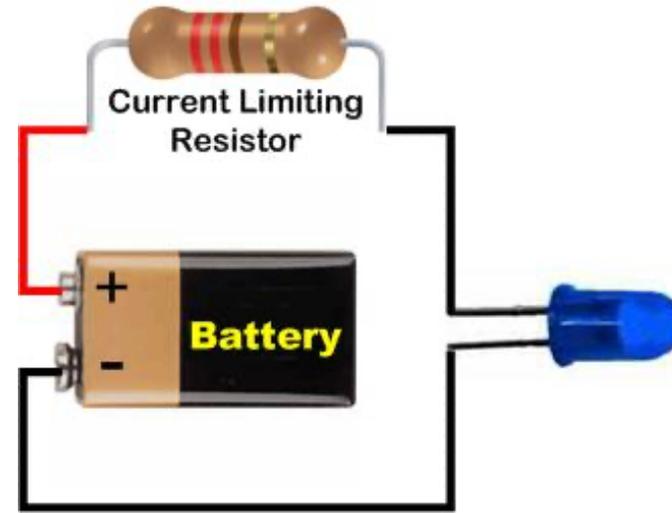


Terminals in the middle are connected together vertically. The gap in the middle separates the two sides.

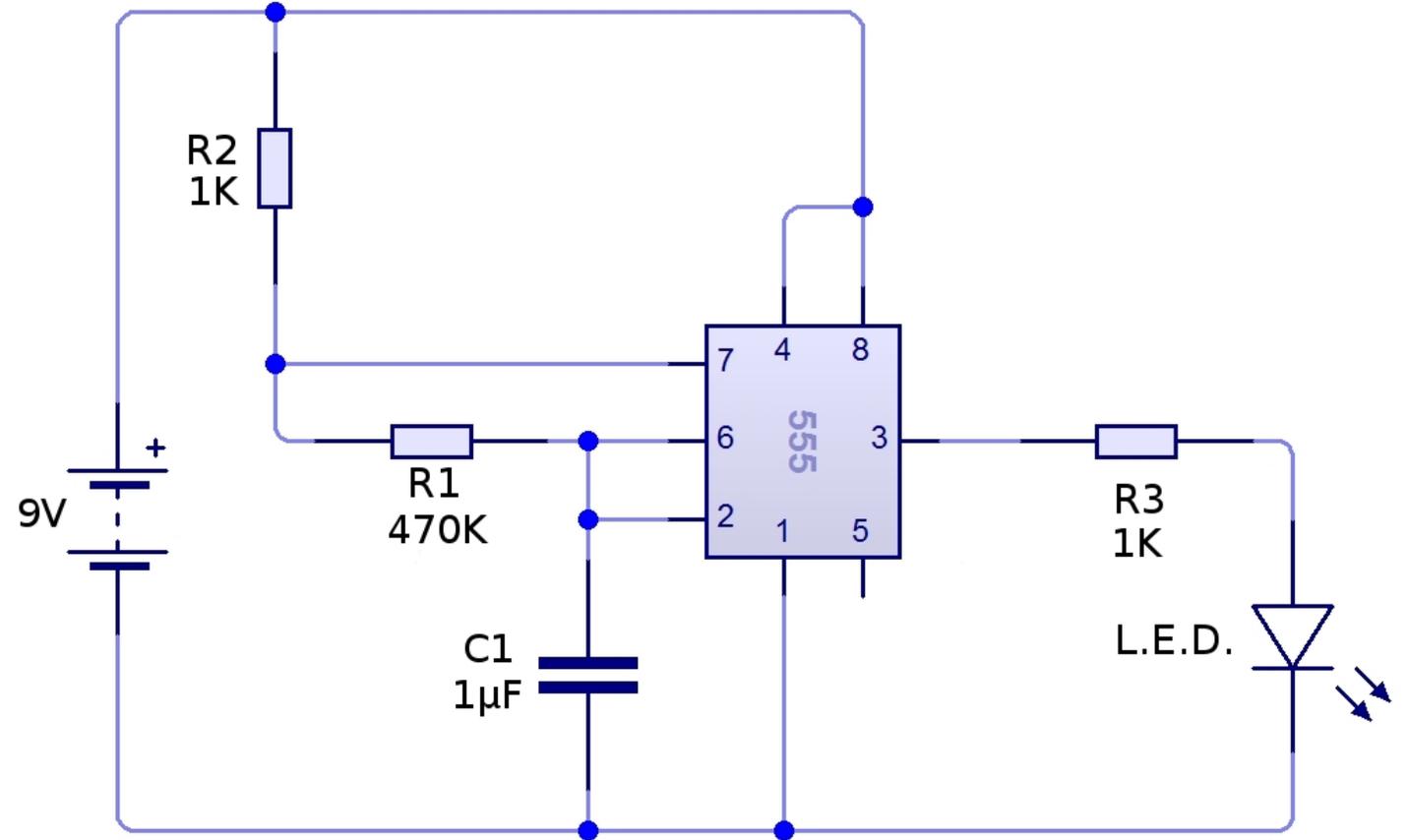


Let's light it up !

# Circuit diagrams

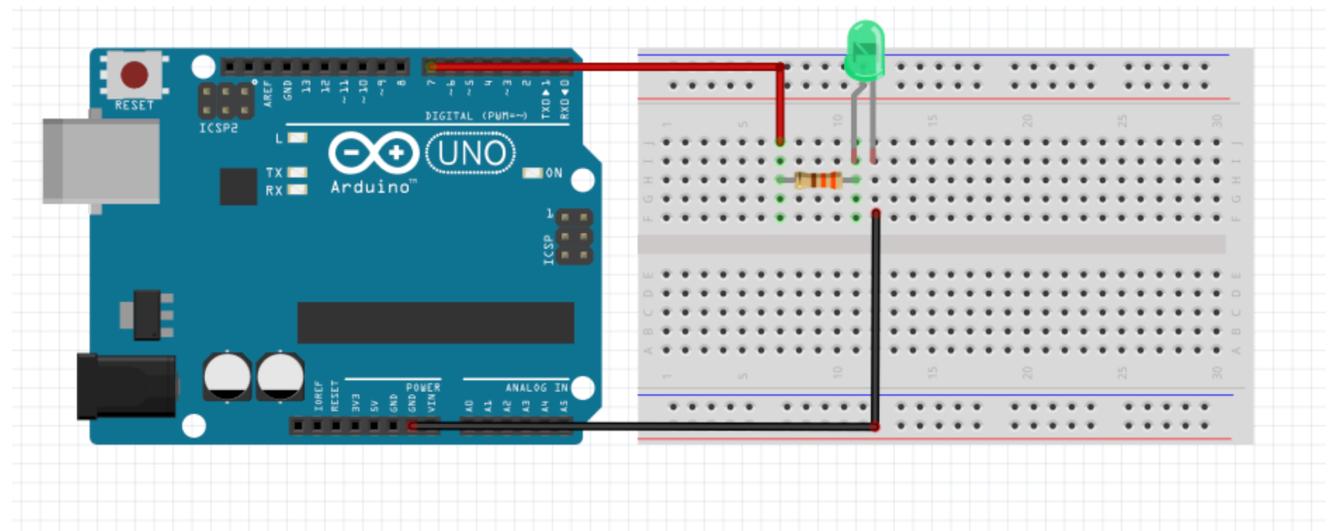


Blink



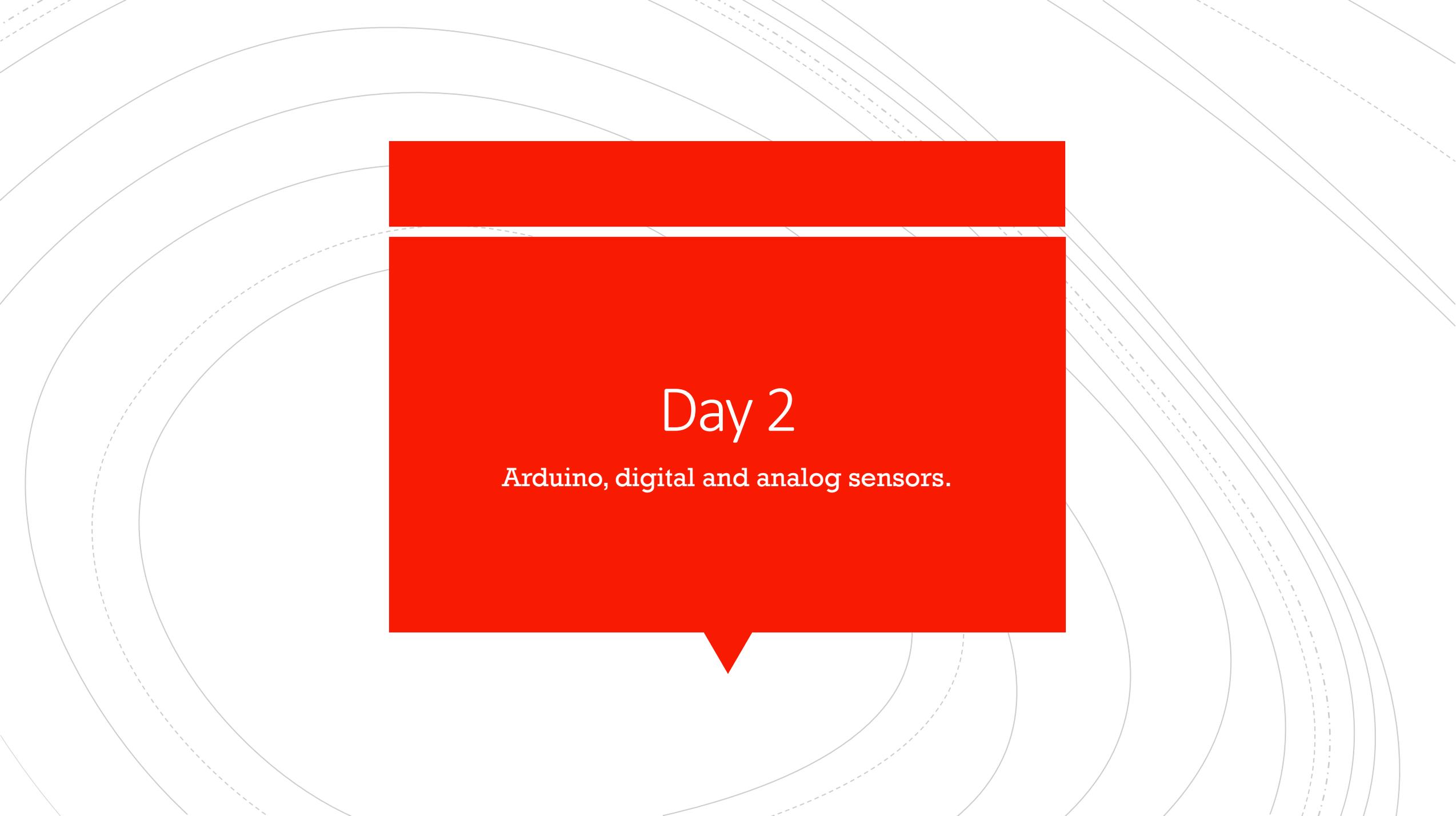
Once done with this, replace R1 with a potentiometer (middle+any one side leg only) for changing blink timing.

# Blink on Arduino



Download Arduino IDE

Examples -> Basic -> Blink (Digital output)

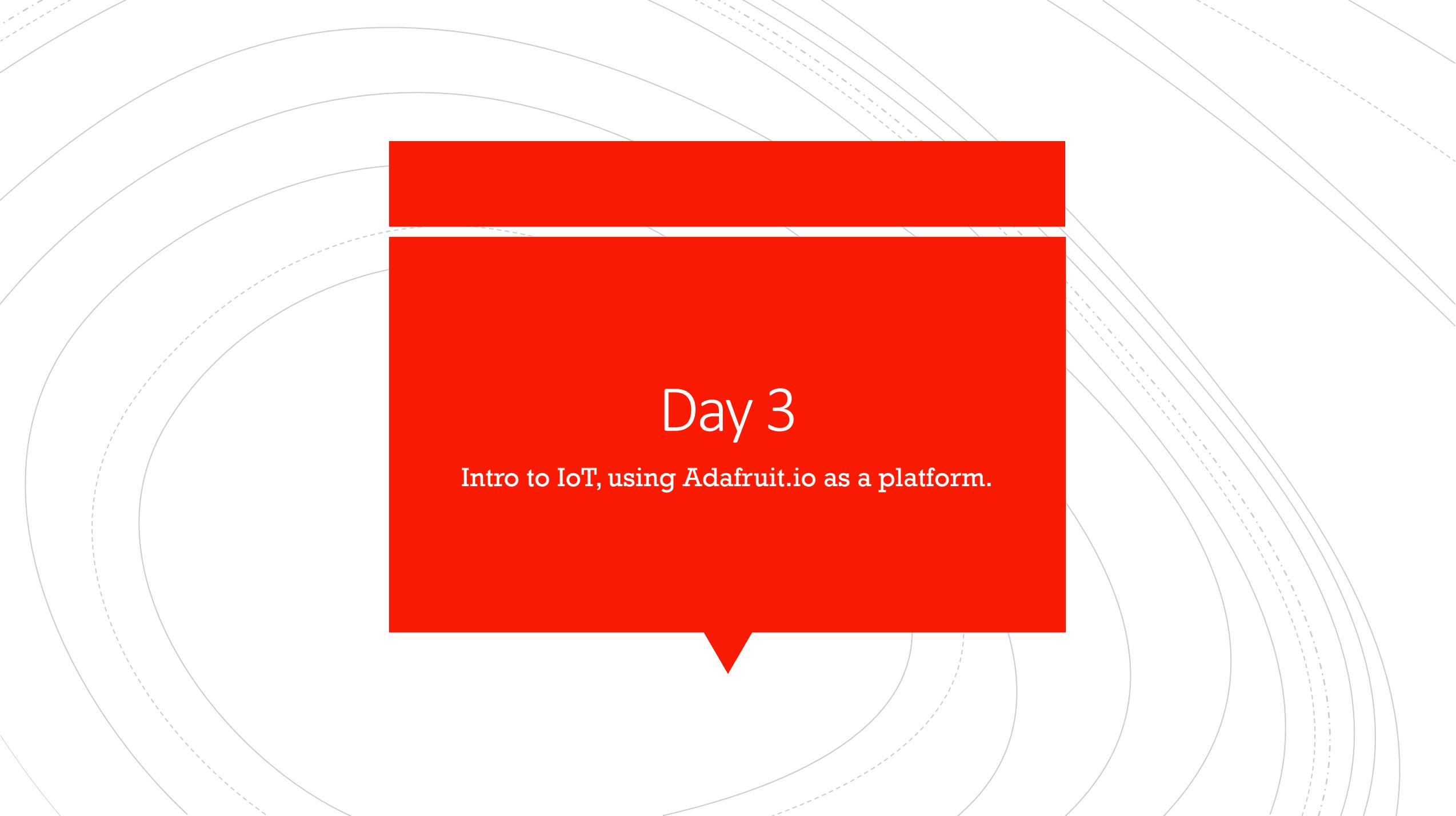
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# Day 2

Arduino, digital and analog sensors.

## Sketches we did

- Using a potentiometer (analog in, serial monitor)
- Controlling led blink with potentiometer (device with input and output, mapping )
- Using Light Dependant Resistor (LDR) to dim a LED (pwm, analog out, using analog sensors with potential divide)
- Using a switch (digital in)
- Using an ultrasonic sensor (finding codes online).
- Using DHT22 temp and humidity sensor (Installing custom libraries)
- Make adafruit.io account and go through the feeds and dashboard videos at home

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# Day 3

Intro to IoT, using [Adafruit.io](https://adafruit.io) as a platform.

## Sketches we did

- What is IoT? Servers and querying. Diff providers, thingspeak, custom mqtt, temboo, adafruit.io etc.
- Using adafruit.io server, basics, api keys, feeds and dashboard.
- Installing custom boards. Adafruit Huzzah 32 in this case
- Working in pairs (or 3) to build an IoT system to trigger a led to turn on and off remotely. One person codes the sending side and others the receiving.
- Connect the DHT sensor to the interwebs. Display data in a meaningful way on the dashboard.