

# **Introduction to Arduino**

**Thinking Through Circuits**

# Learning Goals

Now we:

- Understand what a **microcontroller** is and what makes Arduino useful
- Grasp the structure of an **Arduino sketch** (`setup()` and `loop()`)
- Learned the difference between **digital** and **analog** signals
- See how **sensors and output** connect through code
- Can begin to imagine **interactive behaviors** as part of artistic expression

**What can  
Arduino do for  
art and design?**

- Bridge between **physical and digital worlds**
- Enable works that **react, move, listen, or shine**
- Expand material practice with **behavior and time**

# What Is Arduino?

**Arduino = Ecosystem**

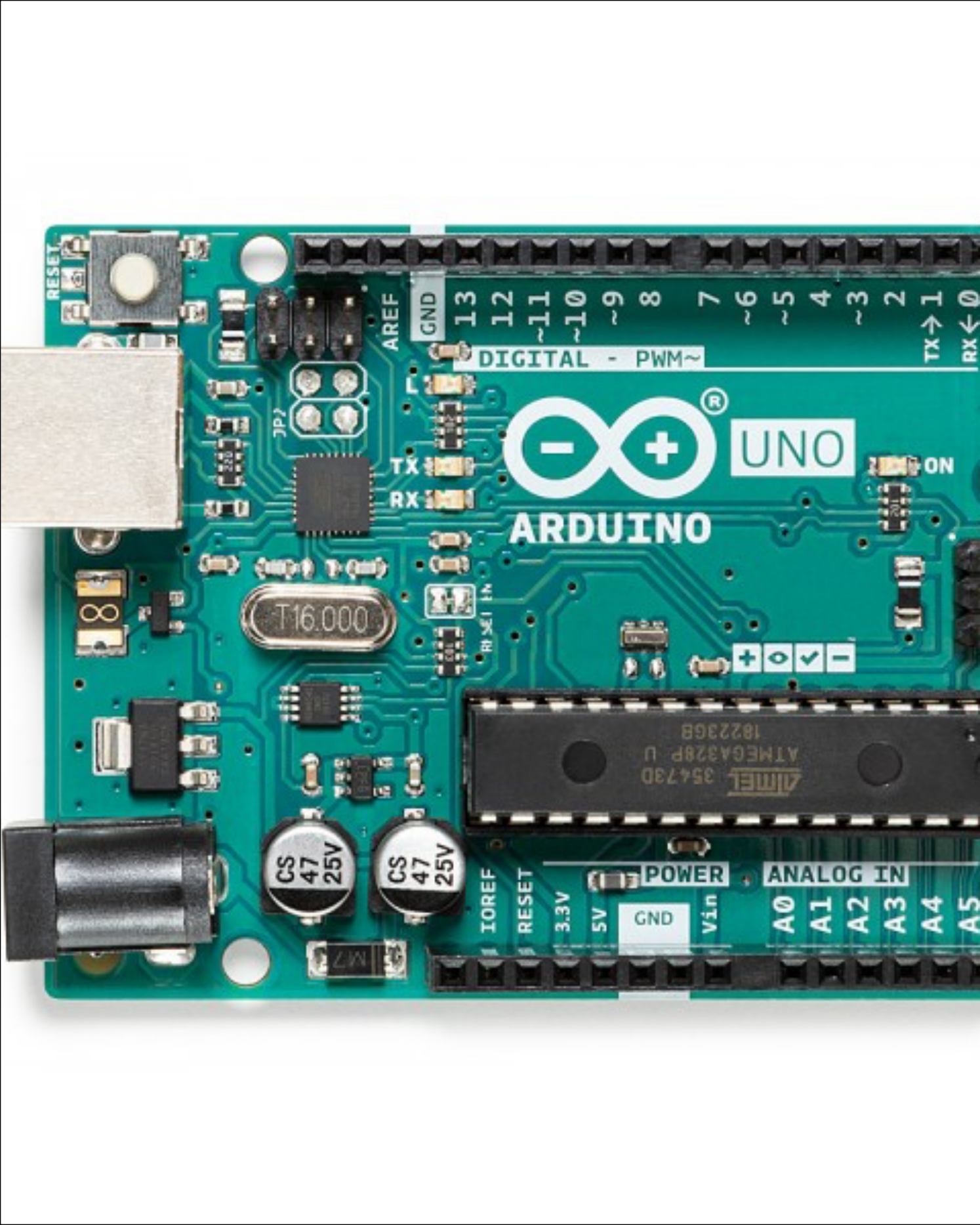
- Hardware (boards)
- Software (IDE)
- Open-source community

**Key idea:** Input → Processing → Output

# **What Is a Microcontroller?**

# A microcontroller is a small computer that:

- Reads **input** (sensors)
- Processes **logic** (code)
- Controls **output** (actuators)



- USB power + communication
- Digital pins (0–13)
- Analog pins (A0–A5)
- Onboard LED (pin 13 / `LED_BUILTIN`)
- Reset button
- Microcontroller chip



- Power via **USB** or **external supply**
- Connect to laptop → small LED lights up
- Ready for communication

```
void setup() {  
    pinMode(LED_BUILTIN, OUTPUT);  
}  
  
void loop() {  
    digitalWrite(LED_BUILTIN, HIGH);  
    delay(1000);  
    digitalWrite(LED_BUILTIN, LOW);  
    delay(1000);  
}
```

# Blink — Code Anatomy

Function	Purpose
<code>setup()</code>	Runs once at the beginning
<code>loop()</code>	Repeats forever
<code>digitalWrite()</code>	Sets voltage HIGH or LOW
<code>delay()</code>	Pauses for a given time (milliseconds)

# Digital vs Analog

## Digital

- Two states: **HIGH / LOW**
- Example: button pressed or not

## Analog

- Continuous range of values
- Example: potentiometer or light sensor

Signal Type	Range	Example
Digital	0 or 1	Button
Analog	0–1023	Potentiometer

# Mapping Input to Output

```
void setup() {  
    pinMode(LED_BUILTIN, OUTPUT);  
}  
  
void loop() {  
    int sensorValue = analogRead(A0);           //  
0..1023  
    int delayTime = map(sensorValue, 0, 1023, 50,  
1000); // 50..1000 ms  
    digitalWrite(LED_BUILTIN, HIGH);  
    delay(delayTime);  
    digitalWrite(LED_BUILTIN, LOW);  
    delay(delayTime);  
}
```

# Reflection

- What can we express with rhythm, timing, or response?
- How does behaviour become a design material?
- How could sound, light, or motion become part of a conversation between a human and an object?



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*“Arduino lets us think through materials  
— not just their form, but their  
behaviour.”*

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# Summary: Core Concepts

Concept	Description	Artistic Relevance
Microcontroller	Small computer on a board	Makes materials behave
Setup/Loop	Structure of temporal logic	Defines rhythm and flow
Digital/Analog	Binary vs continuous	Affects expressive resolution
Input/Output	Sense and respond	Enables interaction
Serial Monitor	Text bridge to computer	Data as creative material

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*“In new media art, Arduino is not a tool  
for technology —  
it’s a medium for expression, behaviour,  
and time.”*

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