

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

`setup ()`

Runs once at
the beginning

`loop ()`

Repeats forever

`digitalWrite ()`

Sets voltage
HIGH or LOW

`delay ()`

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?

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

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

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