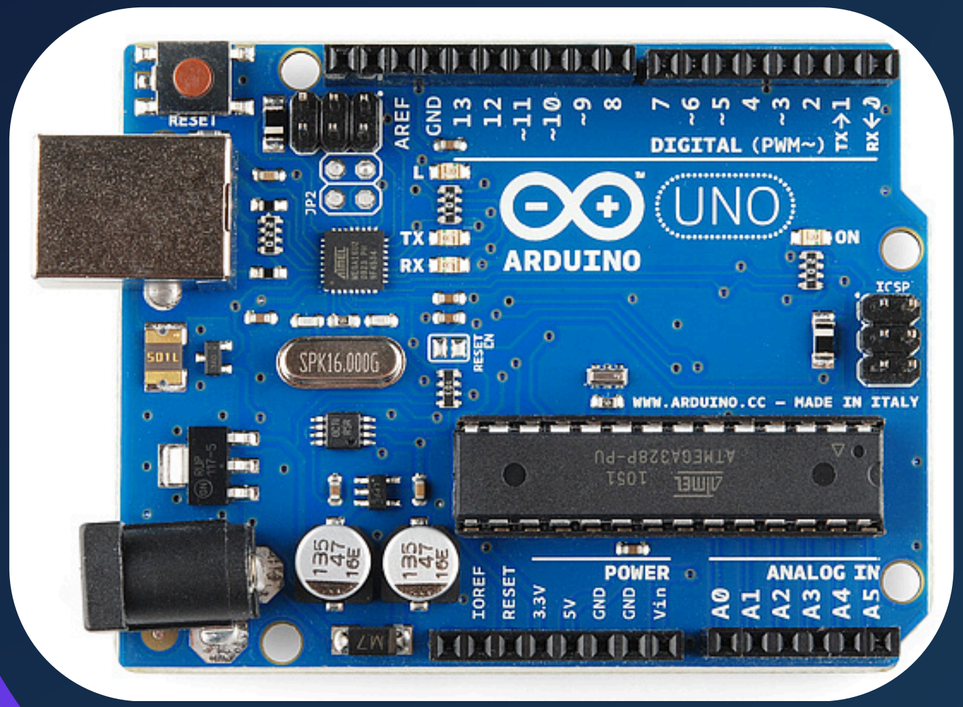
Arduino Experiment 1: Blinking LED



Rose Barakat

WHAT IS TINKER CAD?

A simulation tool to build and test circuits online.

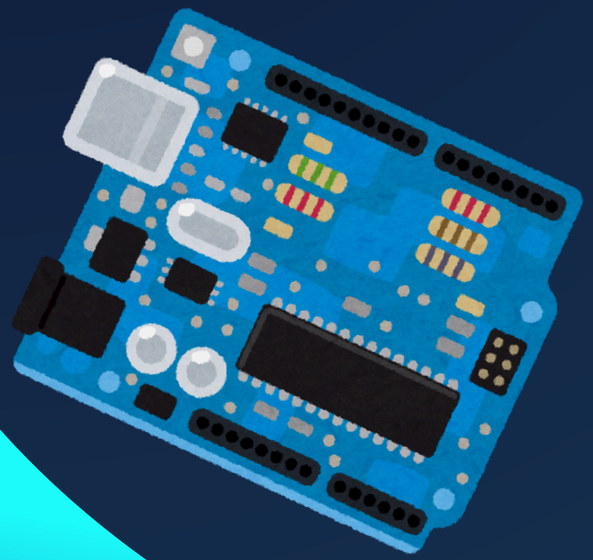
Why Use It?

No need for physical components, easy debugging

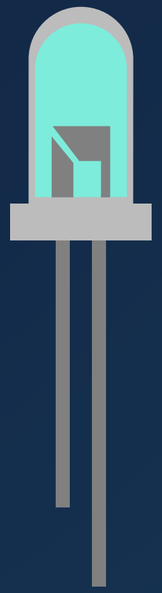
SETTING UP THE CIRCUIT

Components Needed:

1- Arduino

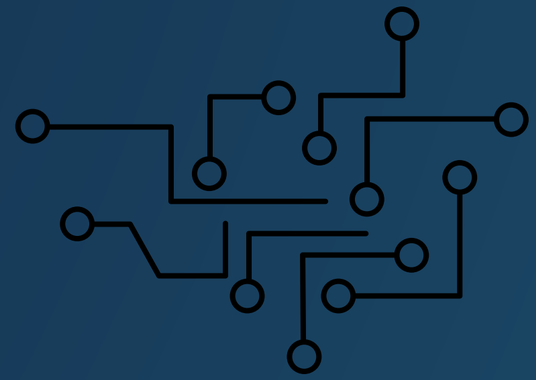


2- LED

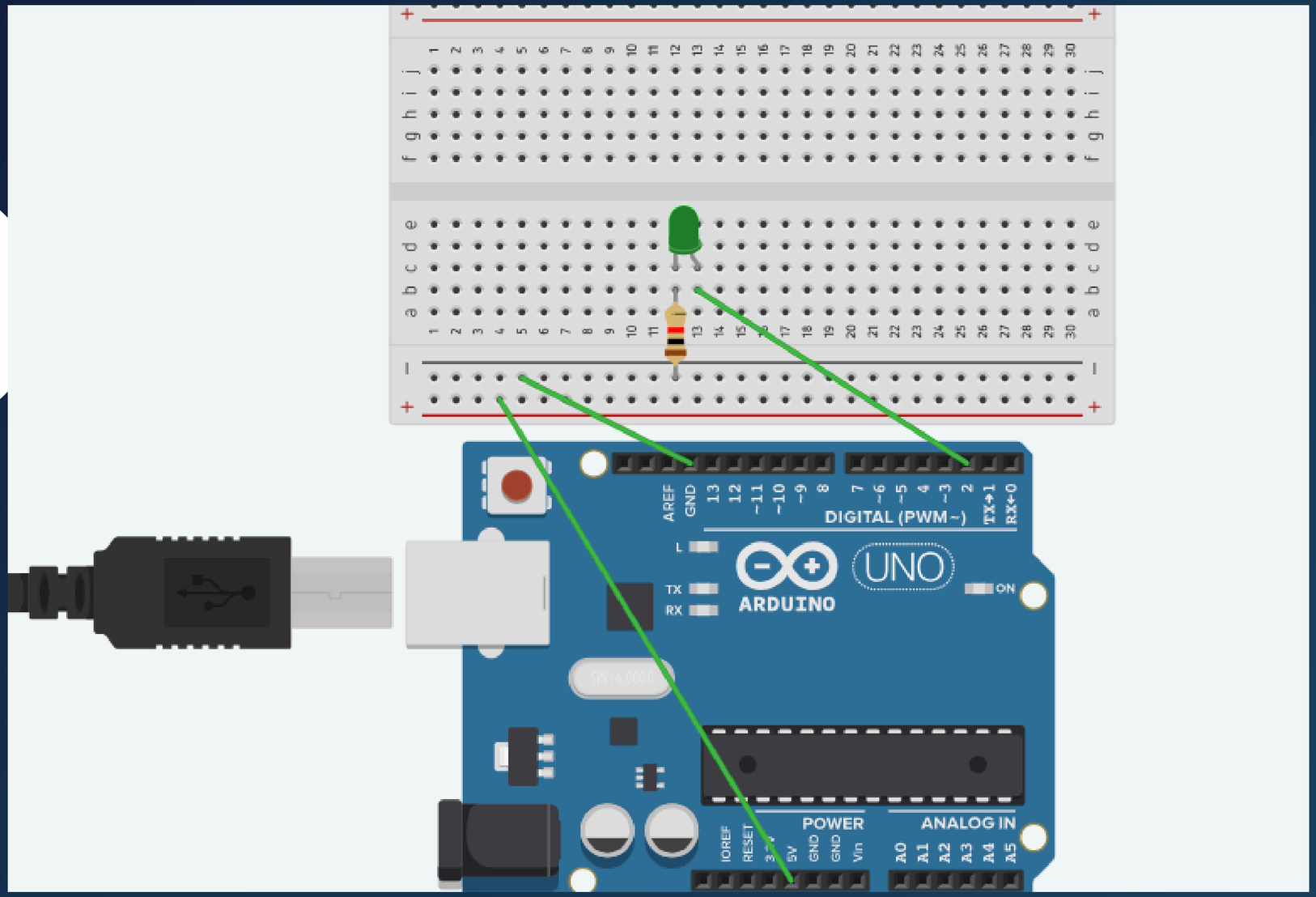


3- Resistor

4- Wires



THE CIRCUIT


DIGITAL (PWM~)
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
L
TX
RX
ON
UNO
ARDUINO
POWER
ANALOG IN
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5

CODE PART


```
void setup()
{
  pinMode(2, OUTPUT);
}

void loop()
{
   digitalWrite(2, HIGH);
   delay(1000); // Wait for 1000 millisecond(s)
   digitalWrite(2, LOW);
   delay(1000); // Wait for 1000 millisecond(s)
}
```

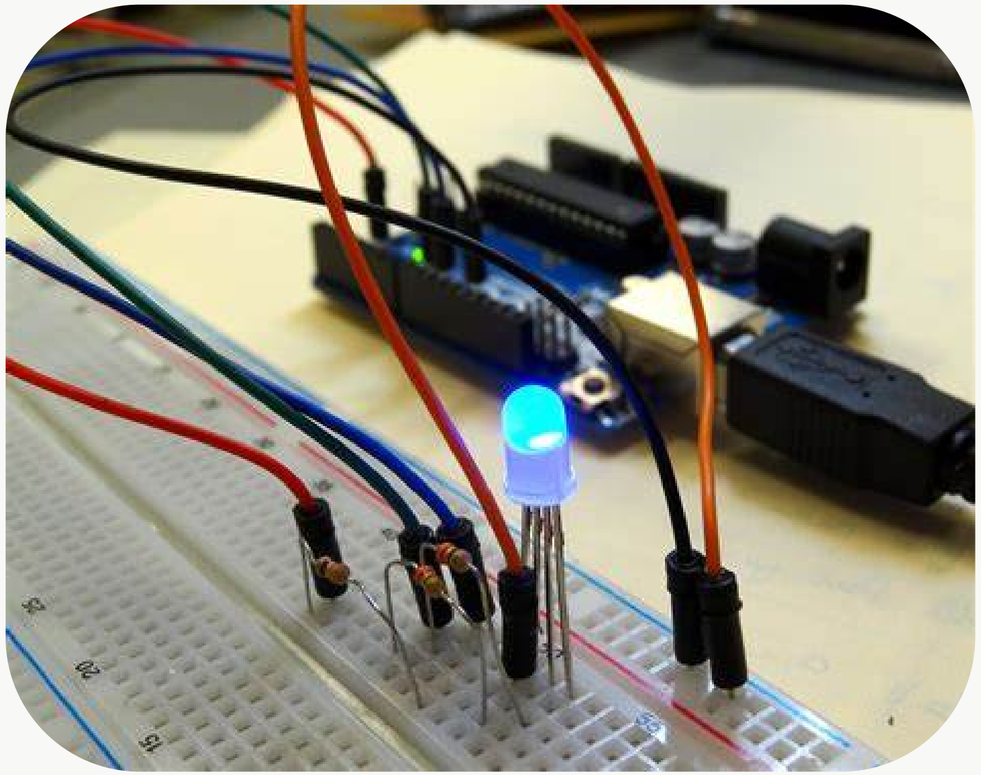
Explanation

void setup() {} → Runs once, setting pin modes
void loop() {} → Repeats, controlling the LED
digitalWrite(Pin_Number, HIGH); → Turns LED on
delay(1000); → Waits for 1 second
digitalWrite(Pin_Number, LOW); → Turns LED off
delay(1000); → Waits again

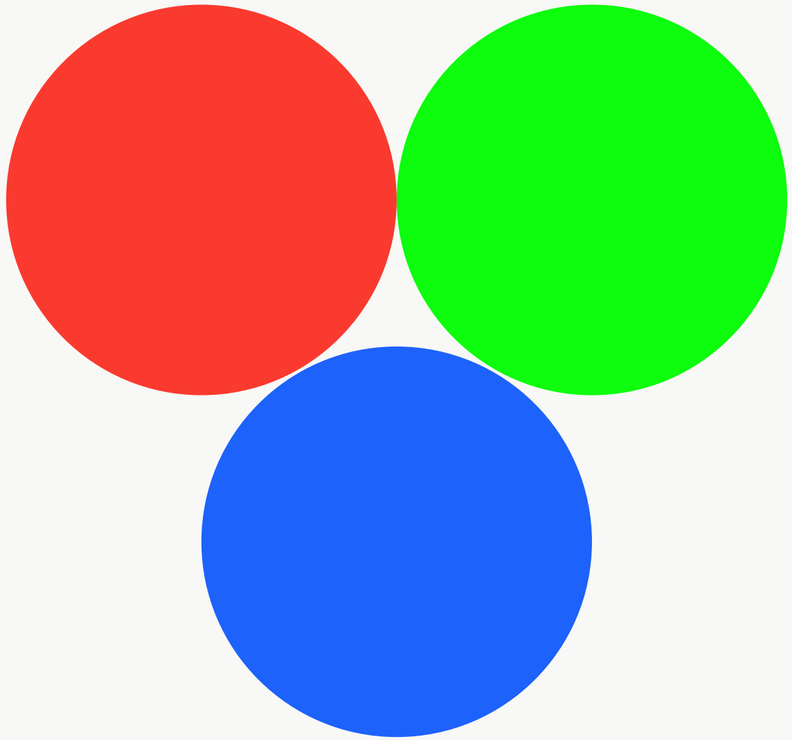
CODING CHALLENGE

Modify the delay time to make the LED blink faster/slower.

Arduino Experiment 2: RGB LED



WHAT IS RGB?



These three colors combine to create other colors by adjusting their intensity.

- Red: R
- Green: G
- Blue: B

"WHAT IS AN RGB LED?"

RGB LEDs are special lights that can emit different colors by adjusting the brightness of each individual LED (red, green, blue).

- Example: "By turning on all three LEDs (R, G, and B) at different intensities, we can create millions of colors."

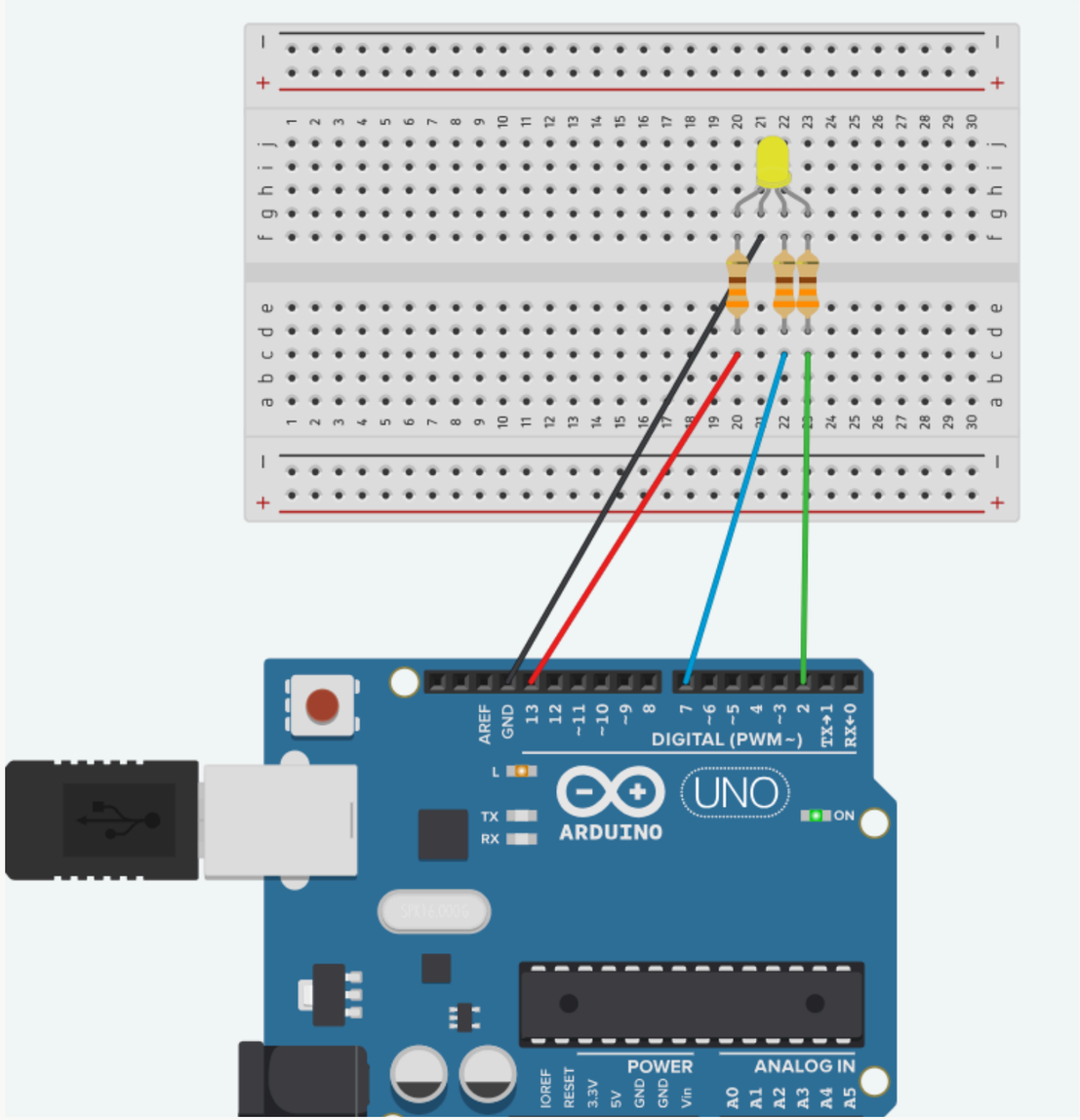
HOW RGB LEDS WORK WITH ARDUINO"

RGB LEDs have 4 pins:

Common Cathode (Ground), Red Pin, Green Pin and Blue Pin

- **"Each pin can be controlled by the Arduino to adjust the brightness of the color."**

THE CIRCUIT



CODE PART

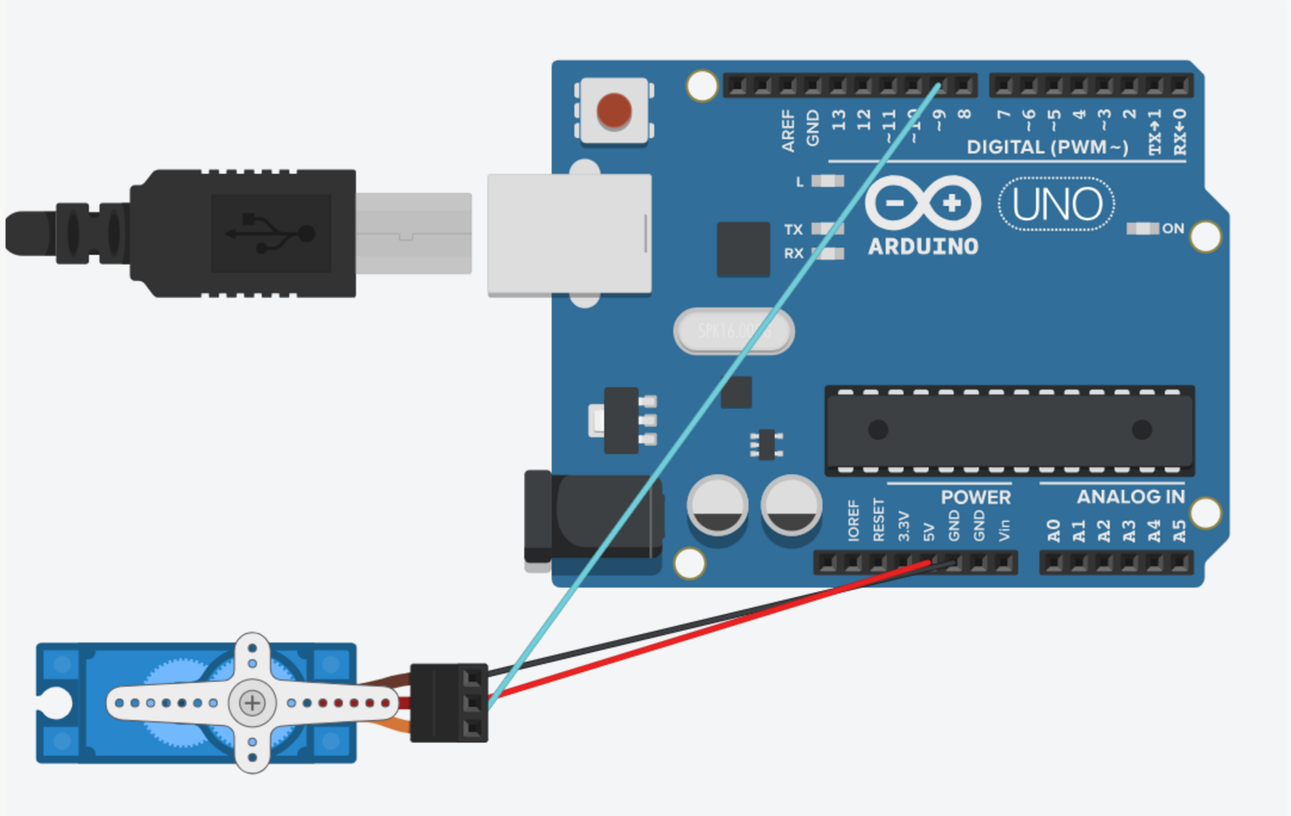
```
void setup()
{
  pinMode(2, OUTPUT);
  pinMode(7, OUTPUT);
  pinMode(13, OUTPUT);
}
```

```
void loop()
{
  analogWrite(2,255);
  analogWrite(7,0);
  analogWrite(13,255);
  delay(1000);

  analogWrite(2, 0);
  analogWrite(7, 255);
  analogWrite(13, 0);
  delay(1000);

  analogWrite(2, 0);
  analogWrite(7, 0);
  analogWrite(13, 255);
  delay(1000);
}
```

Arduino Experiment 3: Servo motor



WHAT IS SERVO MOTOR?

- **A servo motor is a small, powerful motor . It is commonly used in robotics, automation systems, and remote-controlled devices.**

MATERIALS NEEDED:

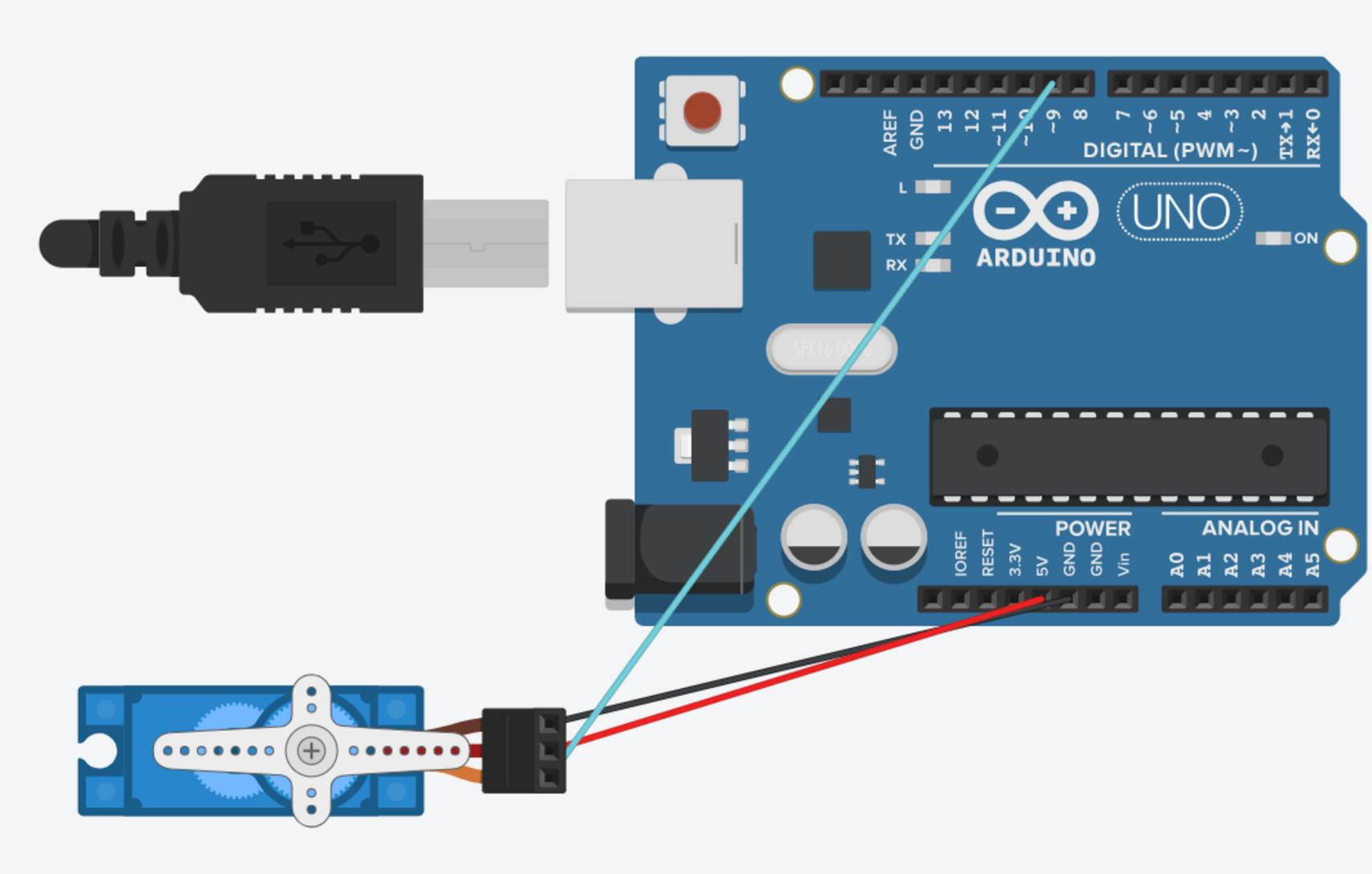
- Arduino board (e.g., Arduino Uno)
- Servo motor
- Jumper wires
- Breadboard (optional)

HOW SERVO MOTOR WORKS WITH ARDUINO"

A servo motor has three pins:

- **Power (VCC): Connect this to the 5V pin of the Arduino.**
- **Ground (GND): Connect this to the ground (GND) on the Arduino.**
- **Control (Signal): This connects to one of the pins on the Arduino (e.g., pin 9, pin 10).**

THE CIRCUIT


AREF
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DIGITAL (PWM~)
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ANALOG IN
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RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5

CODE PART

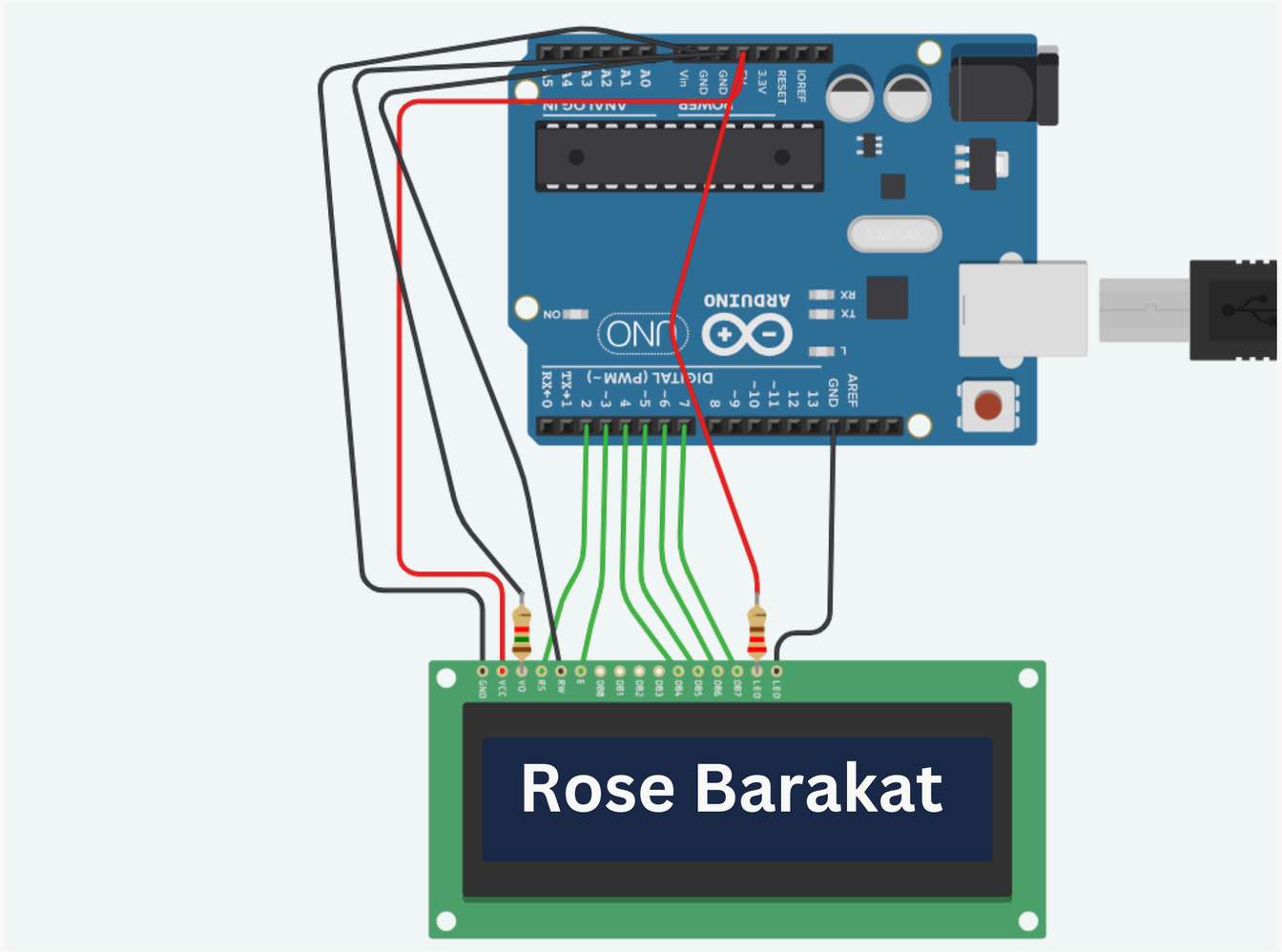
```
void setup()


{
  servo.attach(9);
}
```

```
void loop()
{
  servo.write(180);
  delay(1000);
 }
```

you need to include <servo.h> library.

Arduino Experiment 4: LCD



WHAT IS AN LCD?

- **LCD = Liquid Crystal Display.**
- **Shows letters, numbers, or pictures using tiny crystals**
- **Common in clocks, calculators, and phones**

MATERIALS NEEDED:

- Arduino Uno board
- 16x2 LCD display
- Jumper wires
- Breadboard
- resistors

EXPLAIN THE CODE

```
#include <LiquidCrystal.h>
LiquidCrystal LCD(2,3,4,5,6,7);
String NAME="Rose";
void setup()
{
  LCD.begin(16,2);
}
void loop()
{
 LCD.setCursor(1,0);
 LCD.print(NAME);
}
```

This line includes a special library that helps the Arduino talk to an LCD screen. Think of it like downloading an app so the Arduino can "understand" how to use the screen.

This line tells the Arduino which pins are connected to the LCD screen.

You're creating a text variable called NAME.
It stores the word "Rose" so you can easily print it later on the screen.

This is the setup function — it runs once when the Arduino turns on.
LCD.begin(16,2); means: "Start the LCD screen with 16 columns and 2 rows.

This is the loop — it runs again and again forever.
LCD.setCursor(1,0); tells the LCD: "Start writing on row 0 (top), column 1 (second character position)."
LCD.print(NAME); writes "Rose" on the screen.