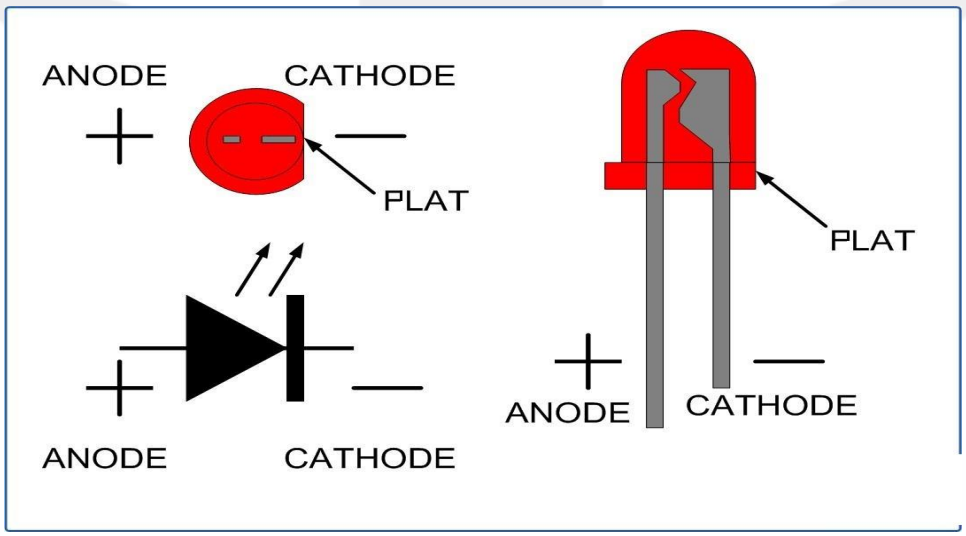
LAUNCH THE PROJECT - 01

External LED Blink

On AYNOP® UNO Launchpad Kit



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1. Overview

This project demonstrates how to control an **external LED** using the Arduino® UNO R4 Minima.

You will learn to:

- Connect and power an external LED.
- Understand the difference between onboard vs. external components
- Toggle an LED ON and OFF using digital output pins.

2. Components Required

- Arduino® UNO R4 Minima board
- USB Type-C data cable
- 1 × LED (any colour)
- 1 × 220 Ω resistor (current limiting)
- Breadboard
- Jumper wires

3. Software Required

- Arduino IDE (v2.3.6 or later recommended)
- No additional libraries required.

  Note:
  We assume the **Arduino UNO R4 Minima board package** is already installed on your machine, as explained in the 00_Getting_Started/00_GettingStarted_Arduino_R4_Minima guide. If it is not installed, please refer to that document and complete the installation before proceeding.

4. Hardware Setup

This section explains how to connect the components for the **External LED Blink** project.
It includes a **Wiring Diagram** and a **Circuit Schematic**.

4.1 Wiring Diagram

The LED **anode (long leg)** is connected to digital pin **D13** through a **220 Ω resistor**, and the **cathode (short leg)** is connected to **GND**.

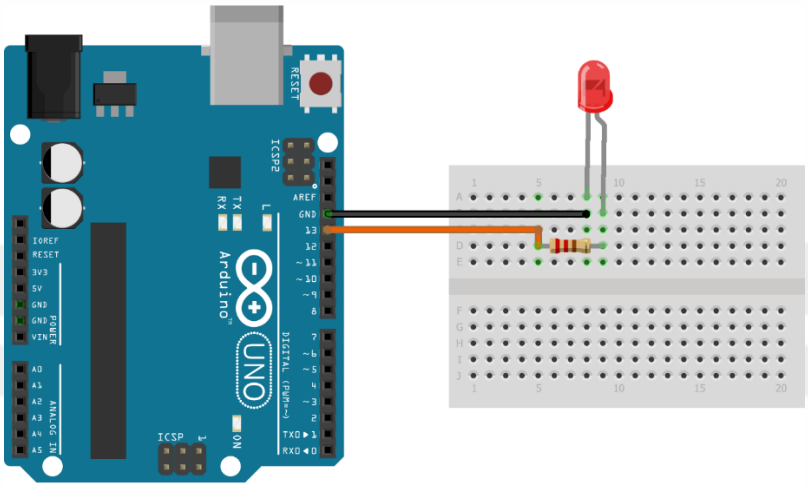

Figure 4.1 – Wiring diagram for External LED Blink project

💡 **Tip:** Always use a resistor on the cathode to limit current through the LED.

4.2 Circuit Schematic

- **R1 = 220 Ω** (current limiting resistor)
- **L1 = LED** (long leg = anode, short leg = cathode)
- Arduino **D13** provides the signal, and **GND** completes the circuit

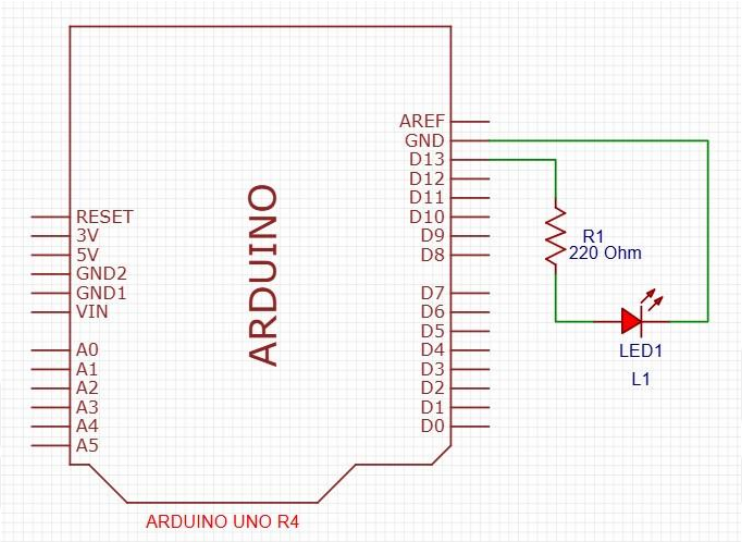

Figure 4.2 – Circuit schematic for External LED Blink project

5. Principle – How It Works

An LED allows current to flow only in one direction.

- **Anode (long leg)** connects to the positive signal.
- **Cathode (short leg)** connects to ground.

The Arduino UNO R4 Minima outputs a **HIGH (5V)** signal on pin D13 to turn the LED ON, and a **LOW (0V)** signal to turn it OFF.
The **220 Ω resistor** limits current to protect the LED.

6. Procedure – Steps to Run

1. **Build the Circuit**
   a. Assemble the circuit as shown in the **Wiring Diagram (Figure 4.1)**.

2. **Connect the Board**
   a. Use a USB Type-C data cable to connect your UNO R4 Minima to your computer.

3. **Open the Project Code**
   a. Simply **double-click** the file *01_Led_Blink_External.ino* in the project folder, and it will open directly in the Arduino IDE (if installed).

4. **Confirm Board Selection**
   a. The IDE usually auto-detects the UNO R4 Minima if the package is installed.
   b. If not installed, refer to the *00_Getting_Started/00_GettingStarted_Arduino_R4_Minima* document to install the necessary board package.
   c. Verify that *Arduino UNO R4 Minima* is selected in the IDE's board selector (top toolbar).

5. **Upload the Code**
   a. Click the **Upload** button (arrow icon) in the top-left corner of the IDE.
   b. Wait until the console displays "**Done uploading**.".

6. **Observe the LED**
   a. The external LED connected to pin D13 will blink ON and OFF at 1-second intervals.

7. **(Optional) Experiment**
   a. In the code, locate the #define **BLINK_INTERVAL_MS** macro near the top.
   b. Change its value (e.g., between 250 ms and 2000 ms) to adjust the blink speed.
   c. Upload the code again to see the resulting effect.

7. Expected Output

Once the code is uploaded successfully:

- The LED will blink ON (lit) for 1 second → OFF (dark) for 1 second → repeat continuously.
- The cycle will continue until the board is powered off or reset**.**

8. Code

The source code for this project is included in the downloaded folder:

📂 *uno-launchpad-kit/01_Basic_Projects/01_Led_Blink_External/01_Led_Blink_External.ino*

👉 **Tip:**

- To open the project, simply **double-click the .ino file**. If the Arduino IDE is installed, it will launch automatically and load the code.
- If you **haven't installed the Arduino IDE yet**, please refer to:
  📂 uno-launchpad-kit/00_Getting_Started/00_GettingStarted_Arduino_R4_Minima
  to **download and install it**

8.1 Function References

- setup() – runs once when the board is powered on or reset.
- loop() – runs continuously after setup() finishes.
- pinMode(pin, mode) – configures a pin as either **INPUT** or **OUTPUT**.
- digitalWrite(pin, value) – writes a digital value (**HIGH** or **LOW**) to a pin.
- delay(ms) – pauses the program for the specified number of milliseconds.

📚 **Arduino Reference:**

- setup()
- loop()
- pinMode()
- digitalWrite()
- delay()

📚 **For more details and advanced usage, visit:**

🔗 Arduino Language Reference — The official guide for all Arduino functions.

9. Troubleshooting Tips

- **LED not blinking?**
  - Check polarity: the **anode (long leg)** must connect to pin D13 (via resistor), and the **cathode (short leg)** must go to GND.
  - Ensure the resistor is in series with the LED, not parallel.

- **LED always ON or always OFF?**
  - Double-check your wiring against the **Wiring Diagram (Figure 4.1)**.
  - Make sure you are using pin **D13**, not another pin.

- **Upload error in Arduino IDE?**
  - Verify that the correct board (**Arduino UNO R4 Minima**) is selected in the IDE.
  - Check that the correct **COM port** is chosen.

- **Board not detected?**
  - Ensure you are using a **data-capable USB Type-C cable** (some cables only provide charging).
  - Try reconnecting the cable or using a different USB port.

- **Board not listed in Arduino IDE?**
  - If you don't see **Arduino UNO R4 Minima** in the board selector, the **board package is not installed**.
  - To fix this, follow the installation steps in:
    uno-launchpad-kit/00_Getting_Started/00_GettingStarted_Arduino_R4_Minima

Tip: If nothing works, press the **RESET** button on the UNO R4 Minima and try uploading the code again.

10. License

11. Support & Feedback

We value your feedback and are happy to assist with any questions, troubleshooting, or suggestions you may have.

Email: *support@aynop.com*

When sending an email, please include your kit name (AYNOP® UNO Launchpad Kit) and, if applicable, the project name in the subject line. This will help our team respond faster and more accurately. We aim to respond to all queries within 2–3 business days. Your feedback helps us improve our products and create even better learning experiences for all Arduino beginners.