

Ex. No: 1
01.07.24

UNDERSTANDING THE FUNCTIONALITIES OF THE ARDUINO UNO BOARD

Aim:

1.1- To program an Arduino UNO to blink an LED, introducing basic Arduino programming and hardware interfacing.

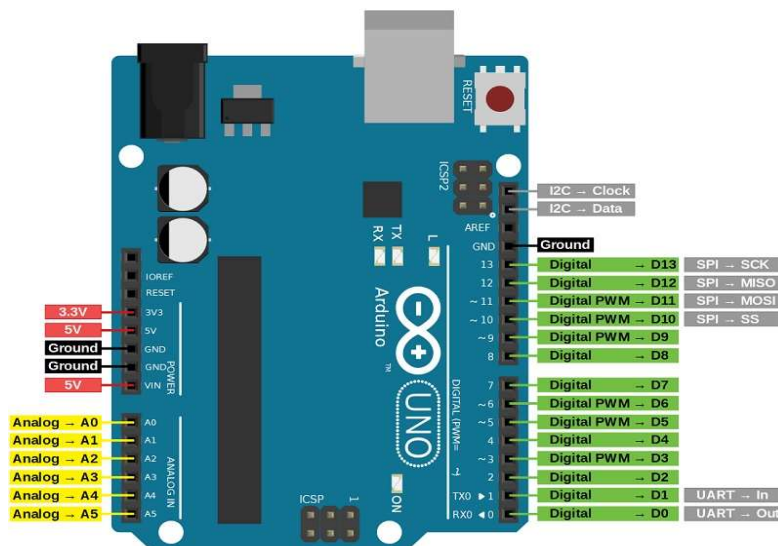
1.2- To sequentially blink three LEDs using an Arduino UNO, demonstrating timing functions and multiple output control.

1.3- To blink three LEDs simultaneously with an Arduino UNO, illustrating parallel processing and concurrent output control.

Components used:

- * 1 X Arduino UNO Board with its Power Cable
- * 1 X Breadboard
- * 3 X LEDs
- * 4 X Jumper Wires (Male to Male)

Pin diagram of Arduino UNO:



PIN Diagram of Arduino UNO board

About Arduino UNO:

1. **Atmega328P Microcontroller:** The Arduino UNO is powered by the Atmega328P microcontroller, which combines a rich instruction set with 32 general-purpose working registers, enabling efficient high-level programming and low-level control.

2. **Integrated Development Environment (IDE):** The Arduino IDE supports C/C++ programming and simplifies the process of writing, compiling, and uploading code, making it accessible for beginners while powerful enough for advanced users.

3. **Open-Source Ecosystem:** Arduino UNO is part of a vast open-source community, providing extensive libraries, shields, and documentation, fostering innovation and collaboration among developers worldwide.

4. **Versatile Input/Output Pins:** The board features 14 digital I/O pins (6 of which provide PWM output) and 6 analog input pins, offering flexibility in interfacing with a wide range of sensors, actuators, and other hardware components.

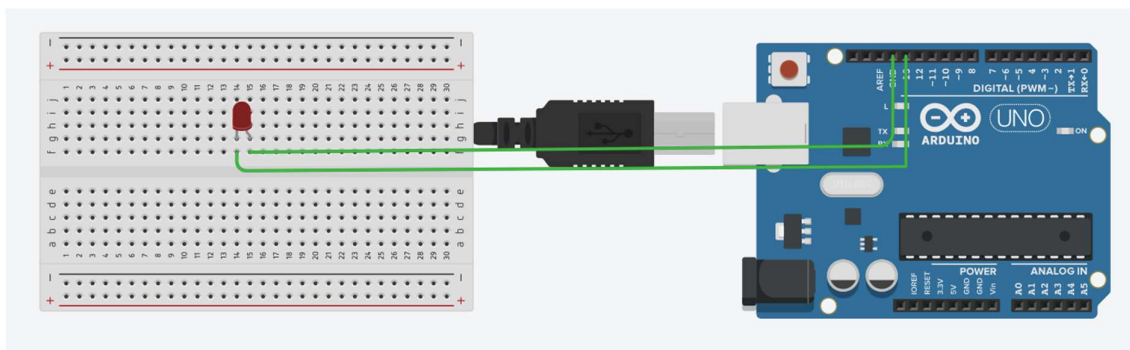
5. **USB-to-Serial Converter:** The onboard ATmega16U2 (or 8U2 on older models) chip serves as a USB-to-serial converter, enabling easy communication with the host computer and facilitating firmware updates.

6. **Standard Form Factor:** The Arduino UNO's standardized physical layout allows for compatibility with a variety of shields and accessories, which can be stacked to extend its functionality without complex wiring.

7. **Robust Power Options:** It can be powered via USB connection or an external power supply, with an onboard regulator ensuring stable operation across a range of voltages, enhancing its usability in diverse environments.

8. **Bootloader:** The pre-installed bootloader simplifies the process of programming the microcontroller via USB, eliminating the need for an external programmer and making it user-friendly for rapid prototyping and development.

Circuit Diagram of Experiment 1.1:



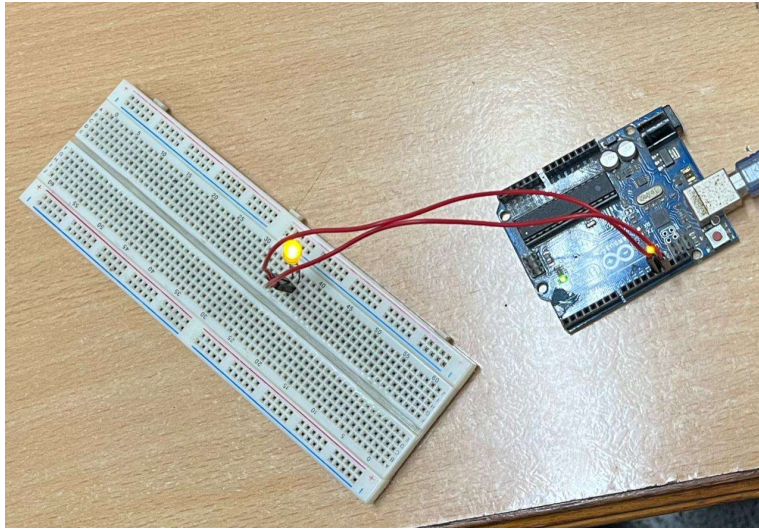
Circuit Diagram – Connection of one LED

Code – 1.1:

```
// 1.1
int pin1 = 13;
int delayT = 1000;
void setup(){
  pinMode(pin1,OUTPUT);
}
void loop(){
  digitalWrite(pin1,HIGH);
  delay(delayT);
  digitalWrite(pin1,LOW);
  delay(delayT);
}
```

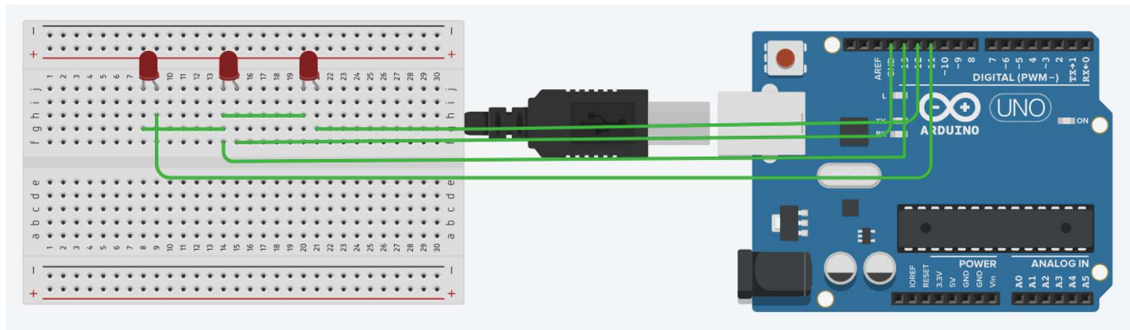
Code for a single LED to blink

Output – 1.1:



Output image showing the blinking of one LED

Circuit Diagram of Experiment 1.2:



Circuit Diagram – Connection of three LED's

Code – 1.2:

```
// 1.2
int pin1 = 13;
int pin2 = 12;
int pin3 = 11;
int delayT = 1000;
void setup(){
    pinMode(pin1,OUTPUT);
    pinMode(pin2,OUTPUT);
    pinMode(pin3,OUTPUT);
}
void loop(){
    digitalWrite(pin1,HIGH);
    delay(delayT);
    digitalWrite(pin1,LOW);
    delay(delayT);

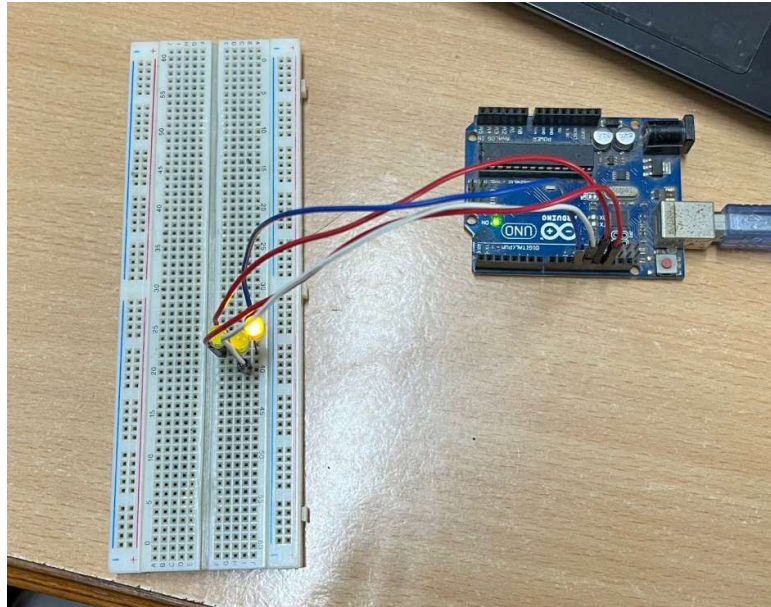
    digitalWrite(pin1,HIGH);
    delay(delayT);
    digitalWrite(pin1,LOW);
    delay(delayT);

    digitalWrite(pin1,HIGH);
    delay(delayT);
    digitalWrite(pin1,LOW);
    delay(delayT);
}
```

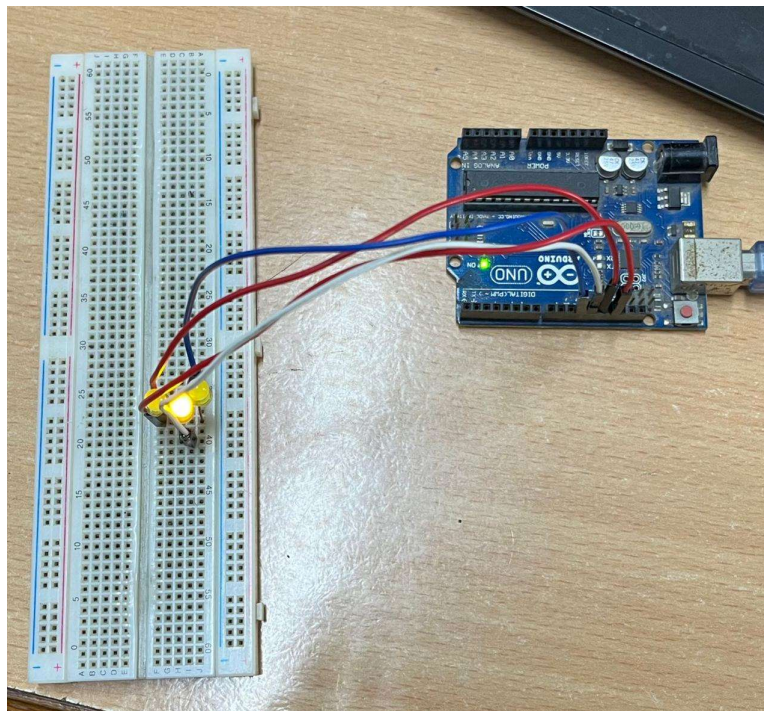
Code for three LED's to blink serially

Output – 1.2:

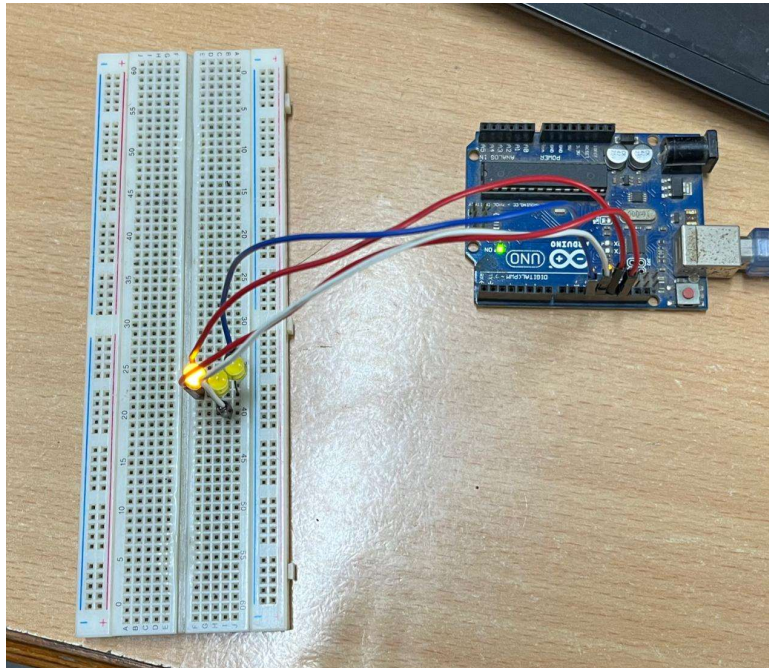
Output of three LED's blinking serially



Output showing the first LED blinking

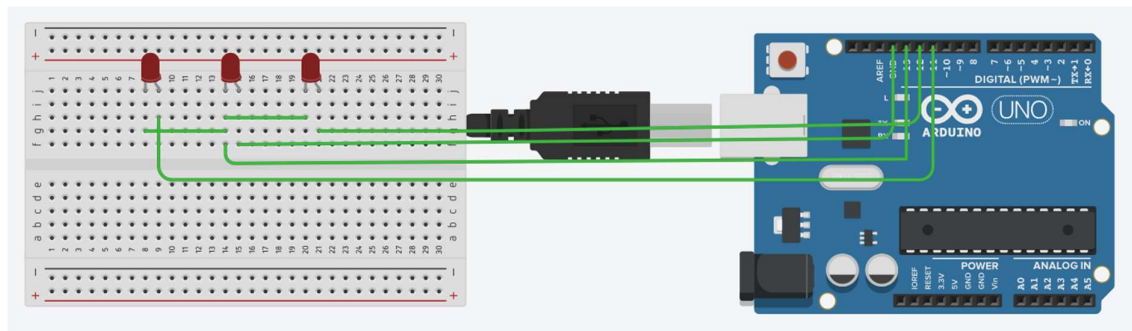


Output showing the second LED blinking



Output showing the third LED blinking

Circuit Diagram of Experiment 1.3:



Circuit Diagram – Connection of three LED's

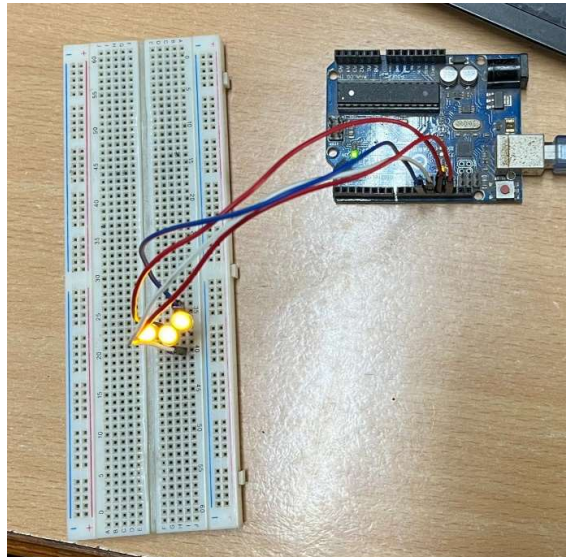
Code – 1.3:

```
// 1.3
int pin1 = 13;
int pin2 = 12;
int pin3 = 11;
int delayT = 500;
void setup() {
  pinMode(pin1, OUTPUT);
  pinMode(pin2, OUTPUT);
  pinMode(pin3, OUTPUT);
}
void loop() {
  digitalWrite(pin1, HIGH);
  digitalWrite(pin2, HIGH);
  digitalWrite(pin3, HIGH);
  delay(delayT);

  digitalWrite(pin1, LOW);
  digitalWrite(pin2, LOW);
  digitalWrite(pin3, LOW);
  delay(delayT);
}
```

Code for three LED's to blink parallely

Output – 1.3:



Output showing three LED's blinking parallely

Result:

The given experiments were executed successfully.