AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Faculty of Engineering

Lab Report

Experiment # 01

Experiment Title: Familiarization with a microcontroller, the study of blink test using and implementation of a traffic control system using microcontrollers·

Course Title:	MICROPROCESSOR AND EMBEDDED SYSTEMS LAB		
Course Code:	COE3104	**Section:**	A
Semester:	Spring 2022-23	**Degree Program:**	BSc in CSE/BSc in EEE
Course Teacher:	**Md. Ali Noor**		

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	Total Marks	

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Abstract: The open-source Arduino platform is used to build interactive electronics projects. An integrated development environment, or IDE, is a piece of software that runs on your computer and is used to write and upload computer code to the Arduino microcontroller board. Additionally, the Arduino Uno does not require a hardware component (programmer or burner) to upload fresh code to the board. With the Arduino IDE, which uses a simpler form of C++ to develop code, we can quickly and easily load a code into the board.

Objectives:

The objectives of this experiment are to become familiar with the Arduino microcontroller, create a straightforward circuit that uses the delay function to make LED lights blink, and also implement a straightforward traffic control system.

Equipment List:

1) Arduino board
2) Breadboard
3) LED lights (red, yellow, green)
4) Jumper wires

Circuit Diagram:

The Arduino platform is made up of the following components.

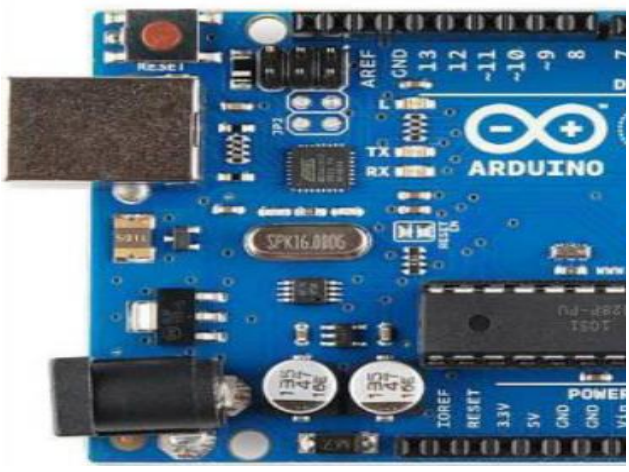

Figure 1: Arduino Uno (R3)

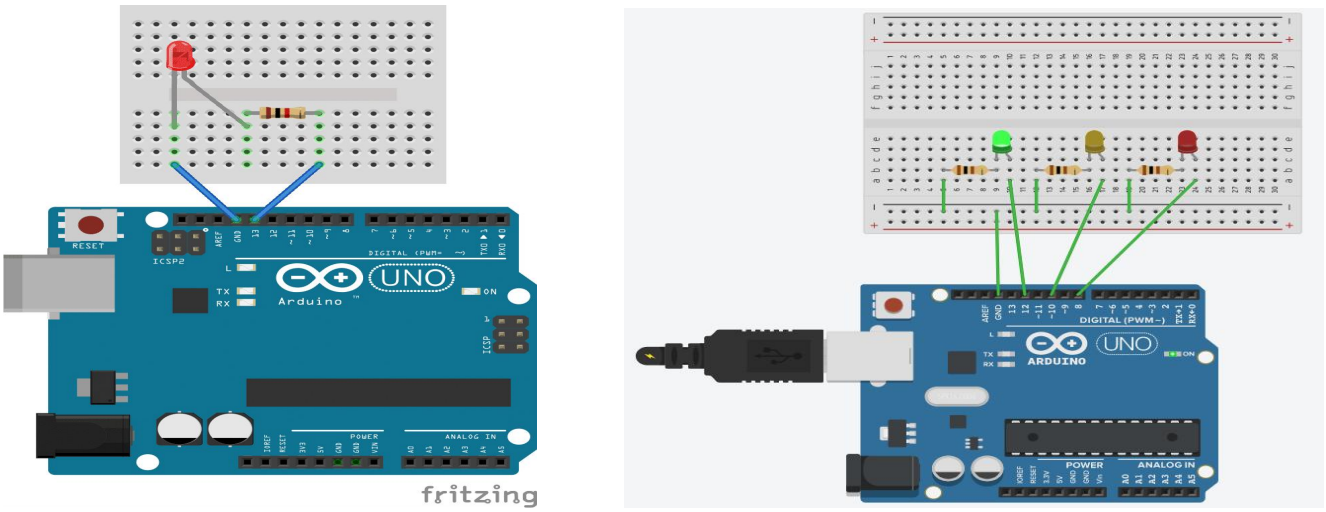

Figure 2: Hardware for the traffic light

Simulation Set-up :

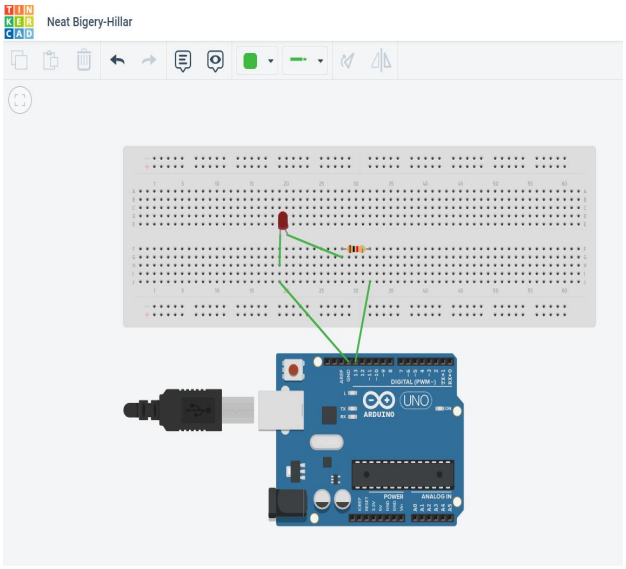

Figure 3: Simulation setup for single light (using tinkercad)

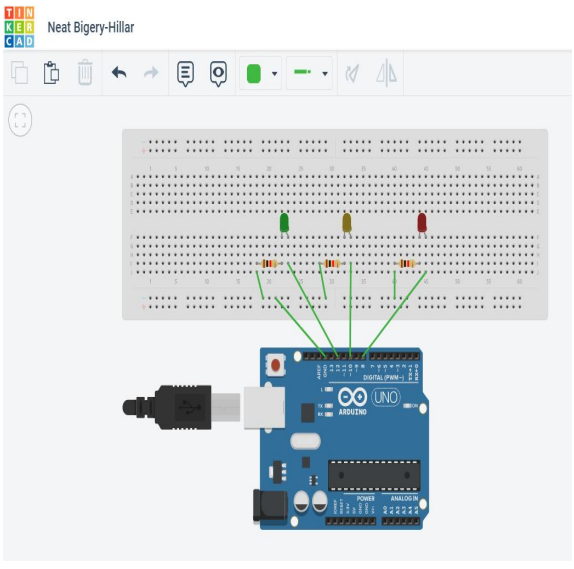

Figure 4: Simulation setup for Traffic Control system: (using tinkercad)

Hardware Set-up:

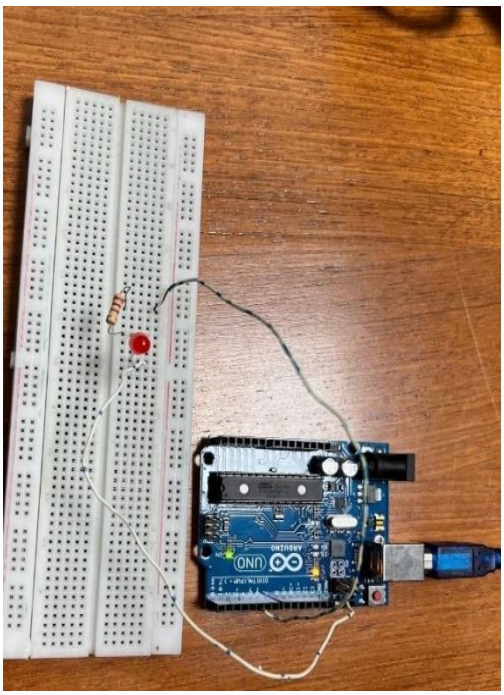

Figure 5: Hardware Set-up for single light

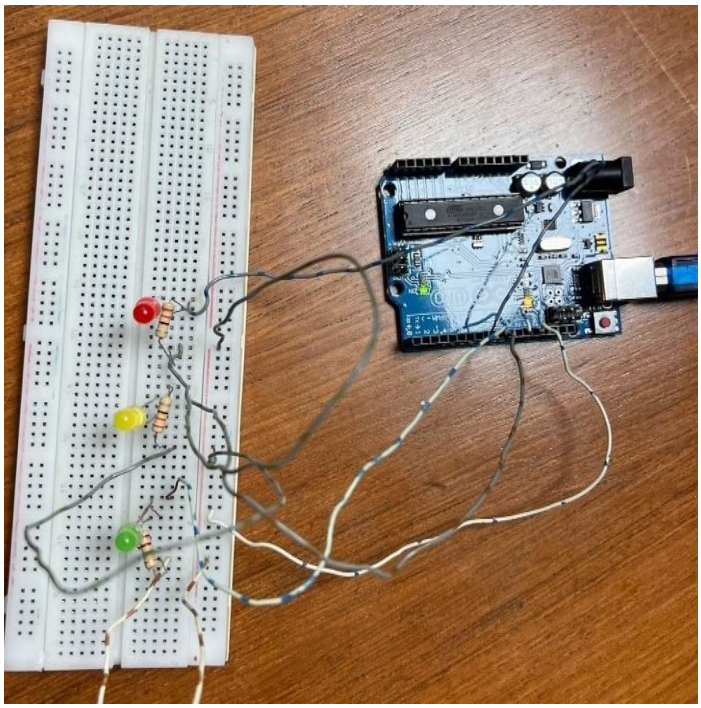

Figure 6: Hardware Set-up for Traffic Control system

Experimental Result:

In Single LED (Red) :

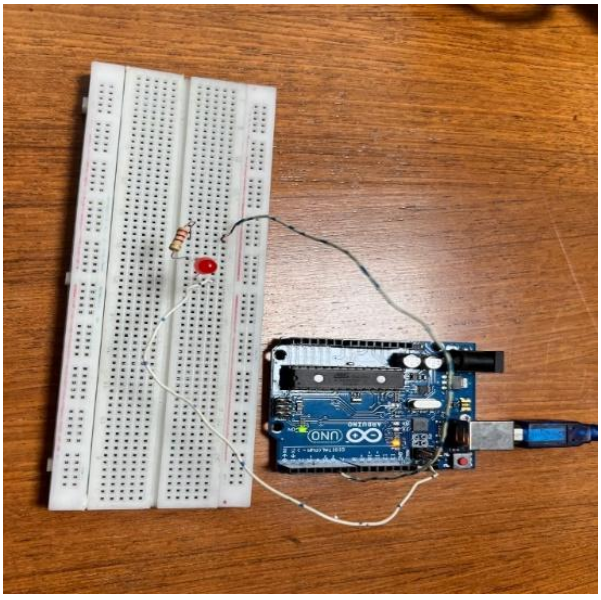

Figure 7.1: Red LED off

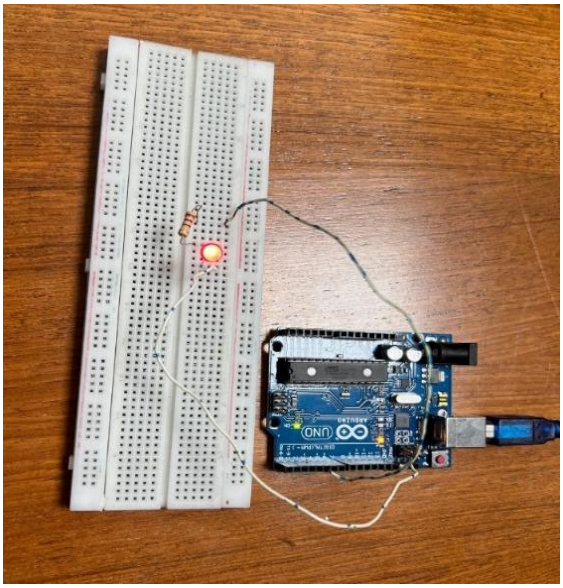

Figure 7.2: Red LED on

In Multiple LED (Traffic Control system):

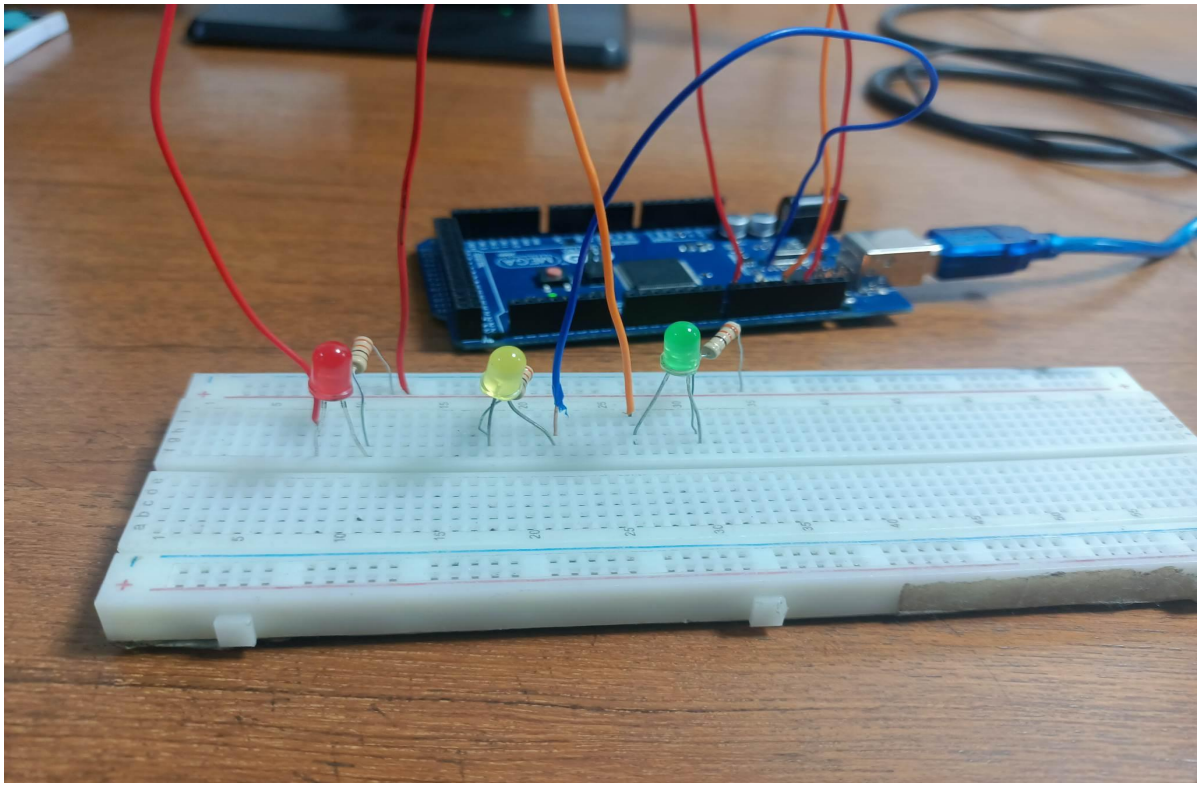

Figure 8.1: All LEDs off

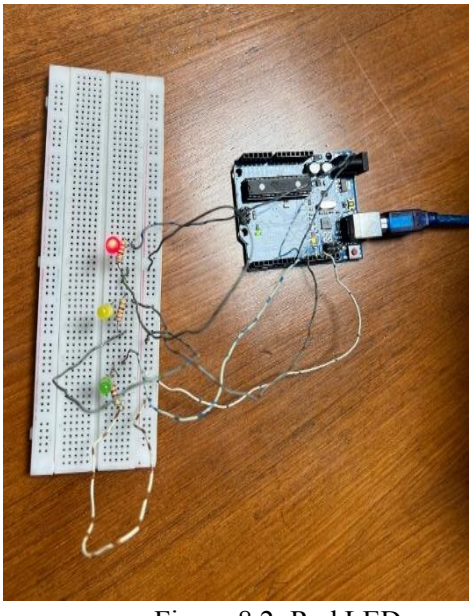

Figure 8.2: Red LED on

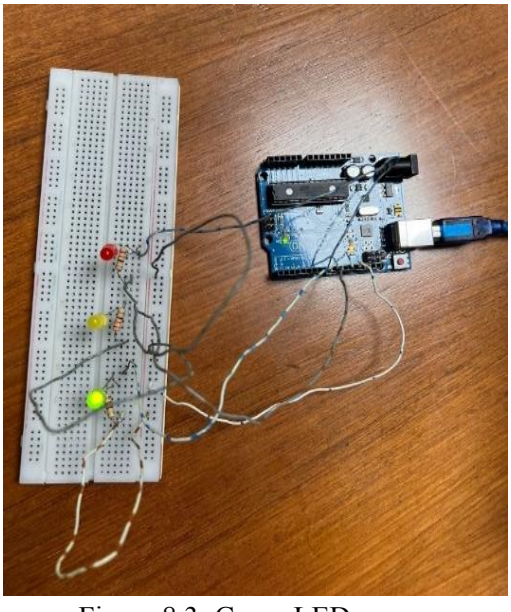

Figure 8.3: Green LED on

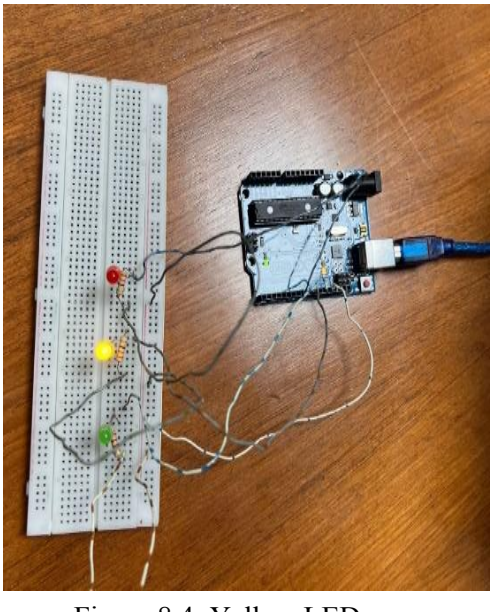

Figure 8.4: Yellow LED on

Simulation Result :

In Single LED (Red) :

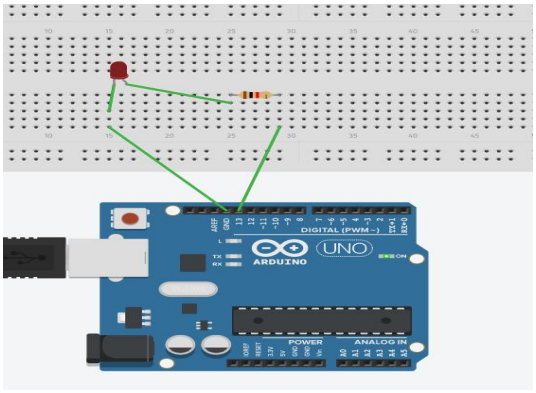

Figure 9.1: Red LED off

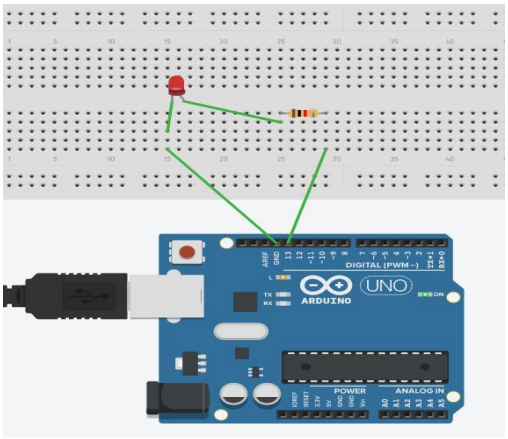

Figure 9.2: Red LED on

In Multiple LED (Traffic Control system):

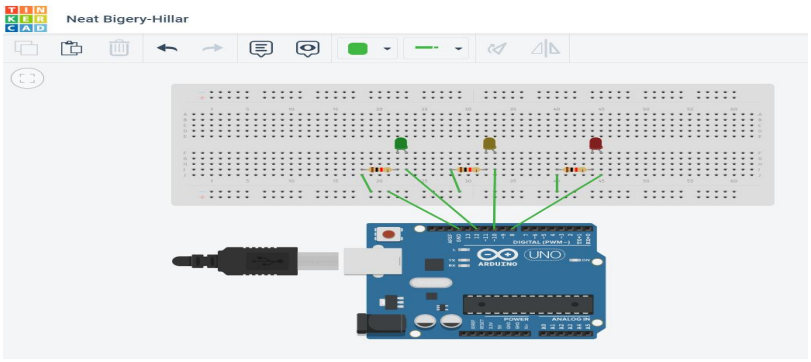

Figure 10.1: All LEDs off

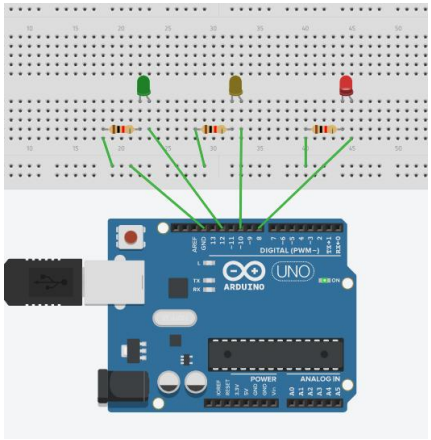

Figure 10.2: Red LED on

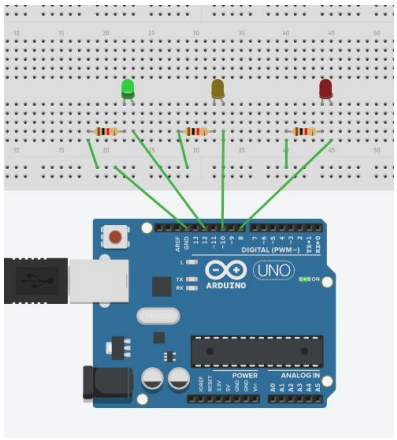

Figure 10.3: Green LED on

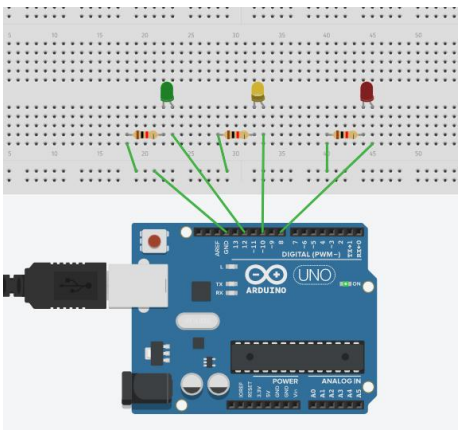

Figure 10.4: Yellow LED on

Code Analysis:

In Single LED (Red)

```
void setup() {
  // pin connections for the LED light
pinMode(13,OUTPUT);
}

void loop() {
  // turning on voltage at output 8(for red LED)
digitalWrite(13,HIGH);
delay(1000);      //  LED is on for 1 seconds
digitalWrite(13,LOW);
delay(1000);      //  LED is off for 1 seconds
}
```

In Multiple LED (Traffic Control system):

```
void setup() {
  // pin connections for the LED lights

pinMode(8,OUTPUT);
pinMode(10,OUTPUT);
pinMode(12,OUTPUT);
}

void loop() {
  // turning on voltage at output 8(for red LED)

digitalWrite(8,HIGH);
delay(3000);      // red LED is on
// turning on voltage at output 8(for red LED)

digitalWrite(10,HIGH);
delay(1000);    // yellow LED is on

//for turning off red and yellow and turning on green

digitalWrite(8,LOW);
digitalWrite(10,LOW);
digitalWrite(12,HIGH);
delay(3000);
digitalWrite(12,LOW);     //green is off for blinking next

//to make green on and off 3 times

delay(500);
digitalWrite(12,HIGH);
delay(500);
digitalWrite(12,LOW);

delay(500);
digitalWrite(12,HIGH);
delay(500);
digitalWrite(12,LOW);
```

```
delay(500);
digitalWrite(12,HIGH);
delay(500);
digitalWrite(12,LOW);

//to turn yellow on once

digitalWrite(10,HIGH);
delay(1000);
digitalWrite(10,LOW);
}
```

Discussion and Conclusion:

To get acquainted with these technologies, we conducted experiments using an Arduino microcontroller with a single light and several lights. In the beginning, we used Arduino UNO to create a traffic management system and implement the LED blink. Later, we completed the precise implementation using the online simulation tool Tinkercad. After developing the delay functions and finishing the essential coding processes, we discovered how Arduino worked and its fundamental coding structure.

References:

1) https://www.arduino.cc/.
2) https://www.coursera.org/learn/arduino/lecture/ei4ni/1-10-first-glance-at-a-program
3) Jeremy Blum; Exploring Arduino: Tools and Techniques for Engineering Wizardry