Title: Blinking an LED Using STM32 Bluepill (Arduino Framework)

Introduction:

In this lab, I implemented a simple LED blinking circuit using the BluepillF103C8 microcontroller, which is based on the STM32F103C8T6 chip.The purpose was to understand GPIO control, code deployment using PlatformIO, and simulate the behavior in both real and virtual environments.

Circuit Diagram and Description:

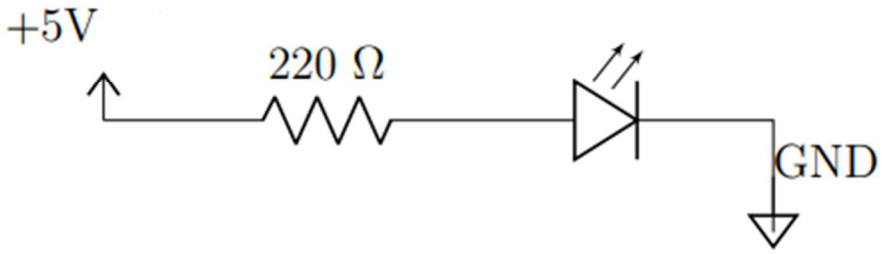


Figure 1: Simple LED Circuit Diagram

Connections:

Bluepill Pin	Component	Description
PC13	LED (+)	PWM Output to LED
GND	LED (-)	Ground connection
2200Ω Resistor	In series with LED	Limits current to protect LED

Diagram Description:
- One leg of the LED (longer) is connected to PC13.
- The shorter leg goes through a 220Ω resistor to GND.
- An external +3.3V supply or USB powers the Bluepill.

Procedure(Virtual part,Hardware setup is explained above):

1. Opened PlatformIO in VSCode.
2. Created a new project:
   - Board: Bluepill F103C8

- Framework: Arduino

3. In platformio.ini, ensure the following settings:

```
[env:bluepill_f103c8]
platform = ststm32
board = bluepill_f103c8
framework = arduino
upload_protocol = stlink
```

4. Written the following code inside src/main.cpp

5. Build and Uploaded the code on Board.

Code:

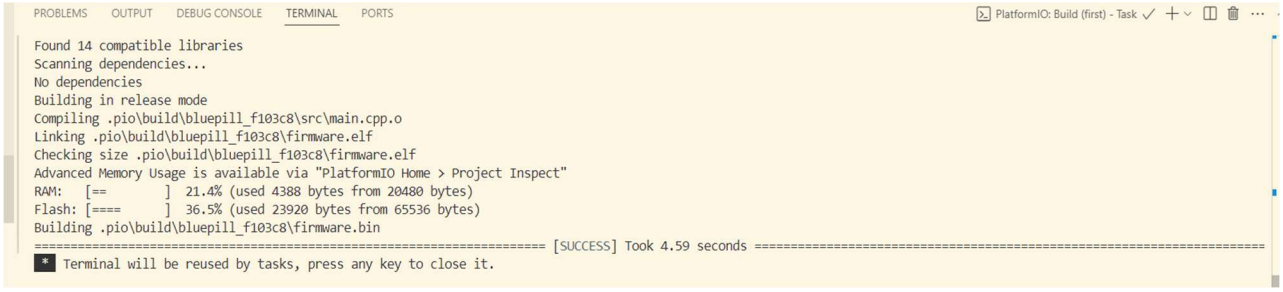
Turning on LED :

```
#include <Arduino.h>

const int LED=PC13; // Define LED for pin PC13

void setup(){

  pinMode (LED, OUTPUT);   // Set the LED pin as an output

  digitalWrite(LED, HIGH);  // Set the LED pin high  }

void loop(){

  // We are not doing anything in the loop!  }
```

Blinking LED:

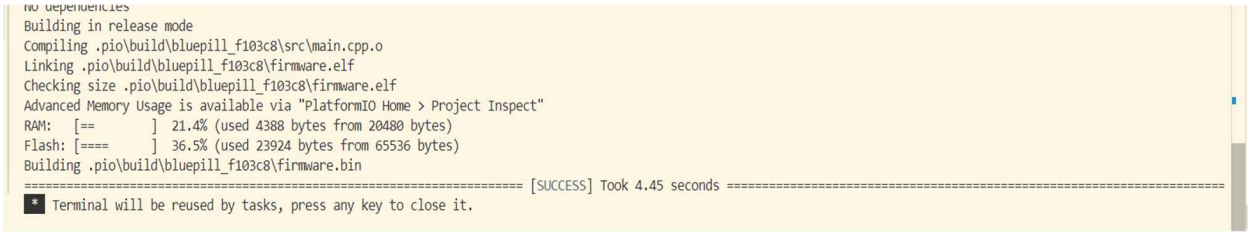
```
#include <Arduino.h>

const int LED=PC13; // Define LED for pin PC13

void setup() {
```

```
  pinMode (LED, OUTPUT);  // Set the LED pin as an output  }
void loop() {
  digitalWrite(LED, HIGH);
  delay(1000); // Time in milliseconds
  digitalWrite(LED, LOW);
  delay(1000);  }
```



LED with changing blink rate:

```
#include <Arduino.h>
const int LED=PC13; // Define LED for pin PC13
void setup(){
  pinMode (LED, OUTPUT);
  // Set the LED pin as an output }
void loop() {
  for (int i=100; i<=1000; i=i+100) {
     digitalWrite(LED, HIGH);
     delay(i);
     digitalWrite(LED, LOW);
     delay(i);
     }
}
```



Discussion:

Through this lab, I learned how to:

- control LED brightness.
- Set up and build STM32 code using PlatformIO.
- Interface hardware (LEDs) with GPIO pins.
- Work with alternative frameworks (Arduino for STM32).

-I became familiar with functions like pinMode,digitalWrite and delay.

The hardware behaviour matched expectations.Both real and virtual implementations confirmed correct logic and execution.