Lab 1: Intro to STM32 Development Board & STM32CubeIDE

ELEC4601

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Lab Section: A4E

1 Pin Configurations & Circuit

1.1 Part 1

Pins	Configuration
PA5	GPIO_Output

Table 1: Pin Configurations for part 1: Blinking on-board LED

1.2 Part 2

Pins	Configuration
PA5	GPIO_Output
PA10	GPIO_Output

Table 2: Pin Configurations for part 2: Blinking On-board LED & External LED alternatively

1.3 Part 3

Pins	Configuration
PA10	GPIO_Output
PA8	GPIO_Output
PA9	GPIO_Output
PC13	GPIO_Input

Table 3: Pin Configurations for part 3: Sequentially Blinking Three External LEDs in order and then reverse order

Note on part 3 of the lab: In part 3, we were meant to control external LEDs with a switch. Our button was not working for whatever reason; We opted to complete the lab at home and use the on board button at pin PC13.

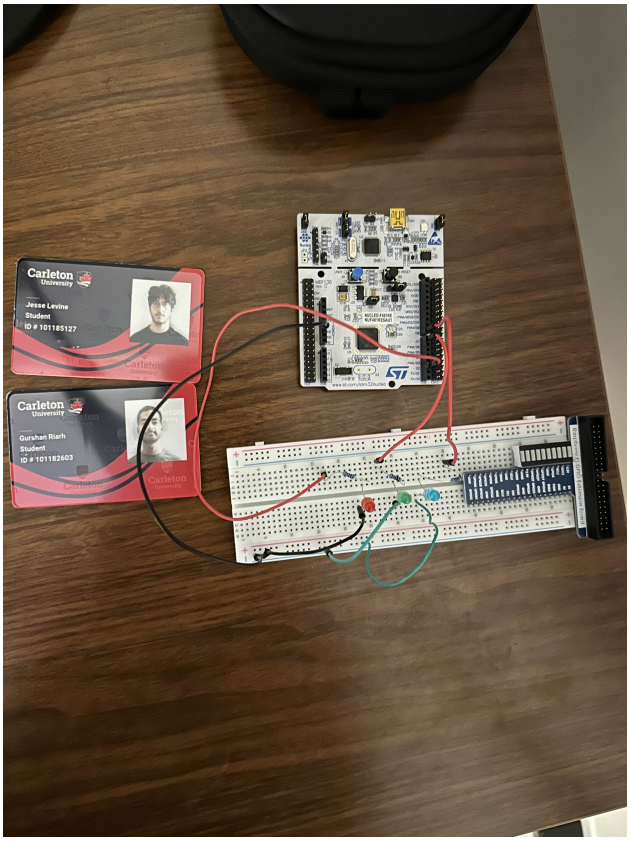

Figure 1: Circuit Prior for Part 3 implementation. Three LEDs are connected to pins PA8, PA9, PA10 respectively and the on-board button at pin PC13 is used.

2 Code

Attached below is the code within the while loop.

```
    while (1)
  {
    /* USER CODE END WHILE */


//Jesse Levine 101185127
//Gurshan Riarh 101182603
 //Part 1
```

```
    HAL_GPIO_TogglePin(GPIOA, GPIO_PIN_5); //Pin PA5 controls the on board LED --> eve
    HAL_Delay(500);

//Part 2
    HAL_GPIO_TogglePin(GPIOA, GPIO_PIN_5);
    HAL_Delay(500);
    HAL_GPIO_TogglePin(GPIOA, GPIO_PIN_10); //External LED connected to pin PA10
    HAL_Delay(500);    // on-board LED and external LED will alternate ON every 500ms

//Part 3 - Sequentially blinking 3 LEDs in order then reverse order

 if(HAL_GPIO_ReadPin(GPIOC,GPIO_PIN_13) == GPIO_PIN_RESET){
   HAL_GPIO_WritePin(GPIOA,GPIO_PIN_10,1);
   HAL_Delay(500);
   HAL_GPIO_WritePin(GPIOA,GPIO_PIN_8,1);
   HAL_Delay(500);
   HAL_GPIO_WritePin(GPIOA,GPIO_PIN_9,1);
  }
  else{
   HAL_GPIO_WritePin(GPIOA,GPIO_PIN_9, 0);
   HAL_Delay(500);
   HAL_GPIO_WritePin(GPIOA,GPIO_PIN_8,0);
   HAL_Delay(500);
   HAL_GPIO_WritePin(GPIOA,GPIO_PIN_10,0);
  }

  HAL_Delay(500);
```

```
    /* USER CODE BEGIN 3 */
  }
```

3 Challenges

Despite the seemingly simple nature of the lab, there were many challenges.

For part 2, while the circuit and code were correct, the implementation simply did not work. All the pins were correctly set, and seemingly nothing was wrong. We switched STM boards and reset each pin and suddenly the implementation worked.

For part 3, our button did not work. Both TAs and the lab tech could not figure out what the problem was. In the end my lab partner and I bought a board and completed the lab at home.

4 Potential Applications

A large point of this lab was to introduce us students to embedded systems development. Because embedded systems are excellent at performing specific tasks efficiently there are many potential applications.

Notably within automotive systems, consumer electronics, medical devices or even industrial automation (or even a combination of all of these).

Embedded Systems can be used for essential functions like engine control, or ABS breaking systems. Smartphones, modern "smart" tvs and new home automation devices like the Alexa utilize embedded systems. In the medical field, devices like pacemakers and diagnostic depend embedded systems for real-time monitoring and control. Likewise, just like in medical devices, in industrial automation, precise control is solved with embedded systems.

5 Compiler

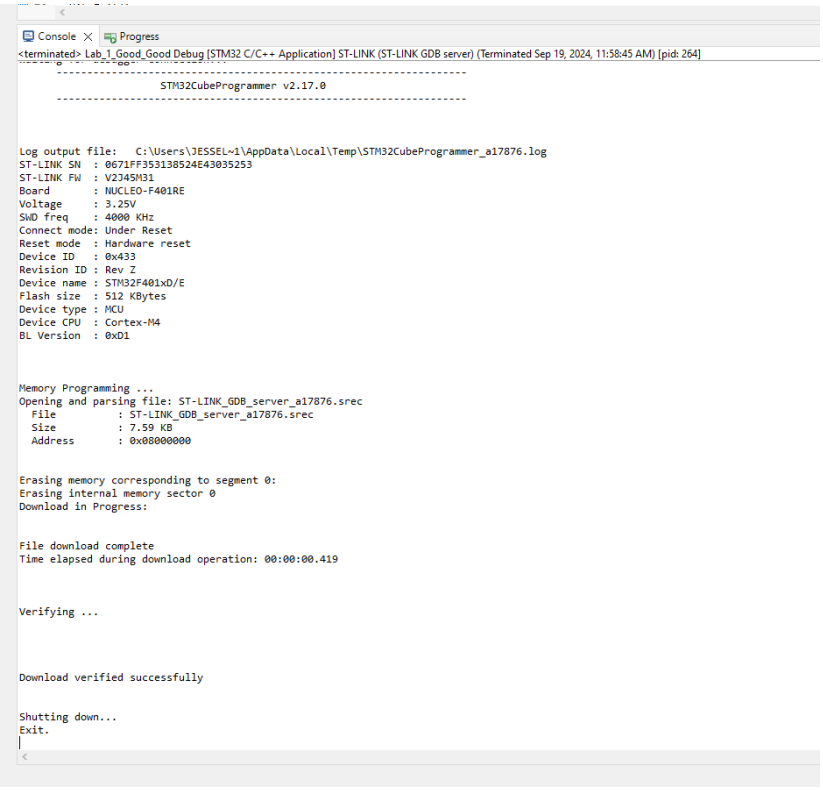

Figure 2: Compiler Screenshot