WRIGHT STATE UNIVERSITY

LAB-1

LED BLINKING

CEG 7360 Embedded Systems

LAB 1

LED BLINKING

Objective:

The main aim of lab-1 is to illustrate and comprehend the functionality of the Nucleo-F411RE microcontroller board by implementing and executing blinking of led program with a delay.

Components required:

Hardware : NUCLEO-F411RE Board , USB Cable.
Software : STM32CUBEIDE

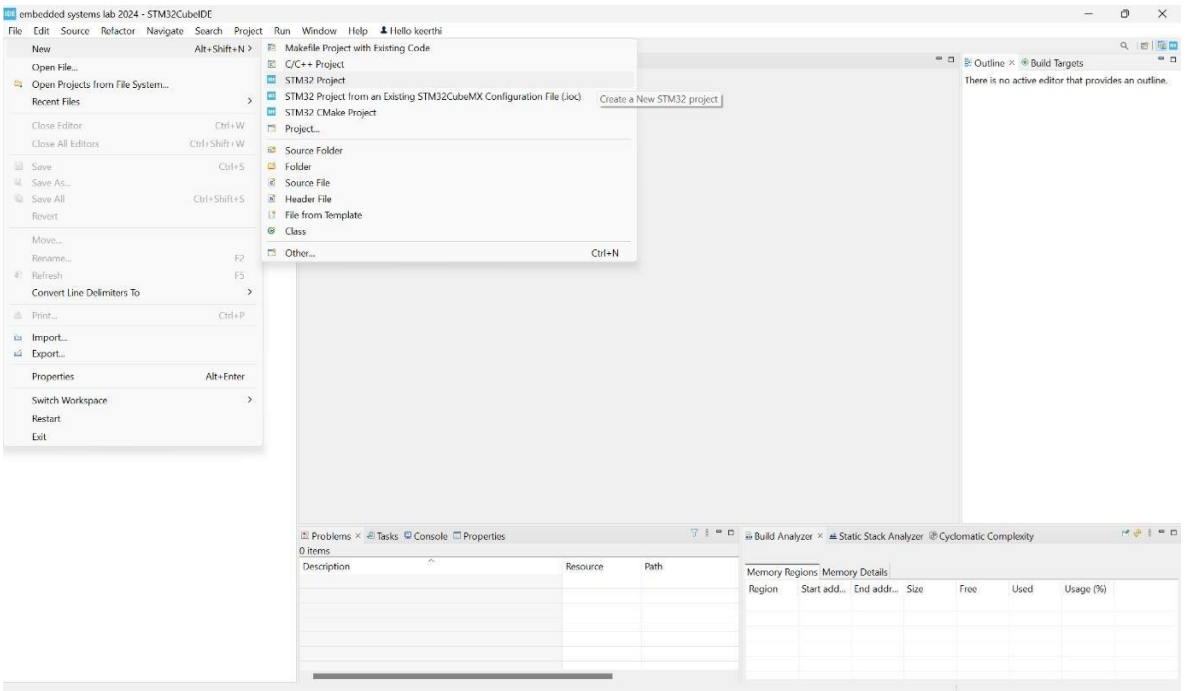
1. Project Setup Procedure (Description of the steps followed to set up the project)

Step 1 : I have downloaded STM32cudeIDE from the following link

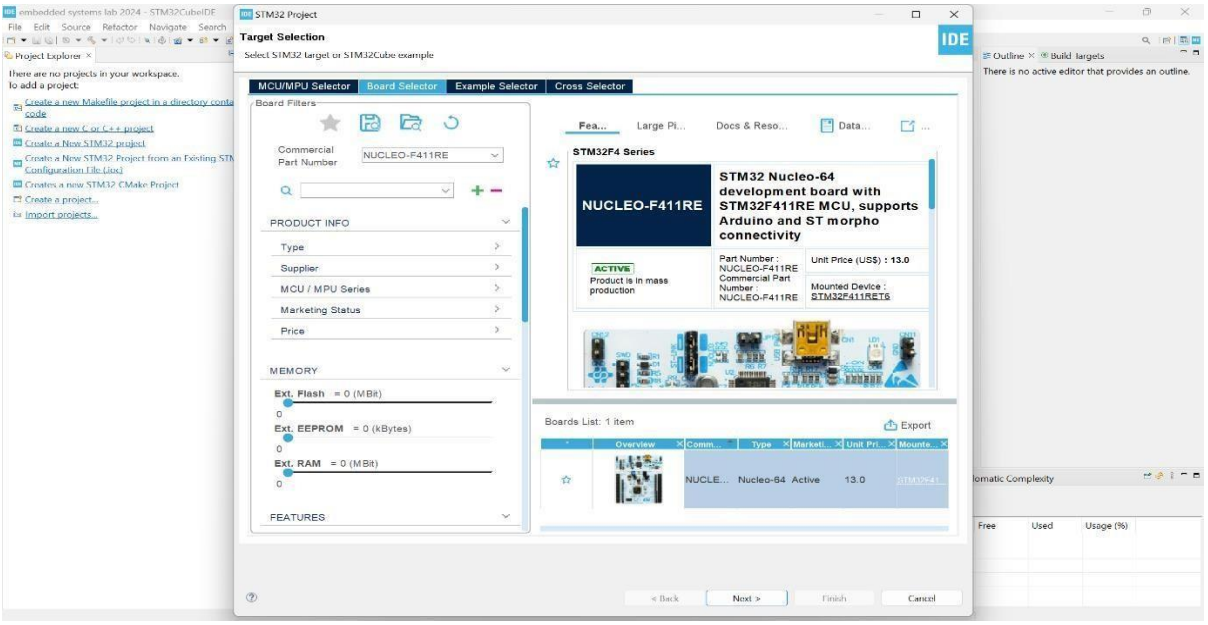
https://www.st.com/en/development-tools/stm32cubeide.html#get-software.

Step 2 : For installation I have followed the steps mentioned in the file provided in Pilot .

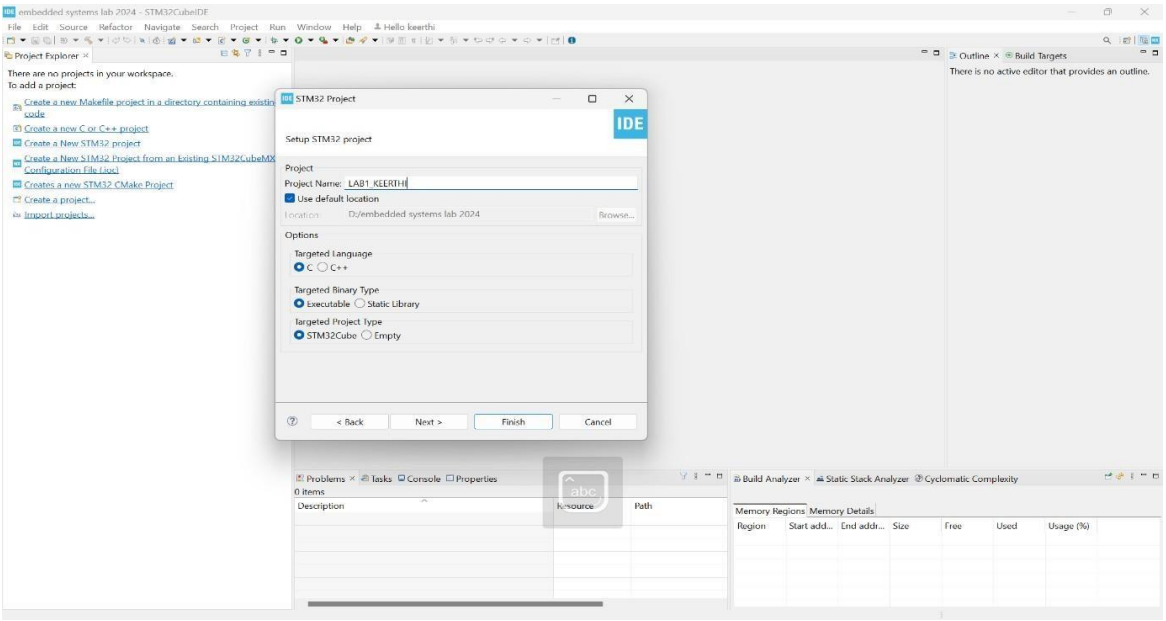
I began by creating a new file. File -> New -> STM32 Project -> press 'Enter'.



Step 3: After that, I chose the board ‘Nucleo-F411RE’.

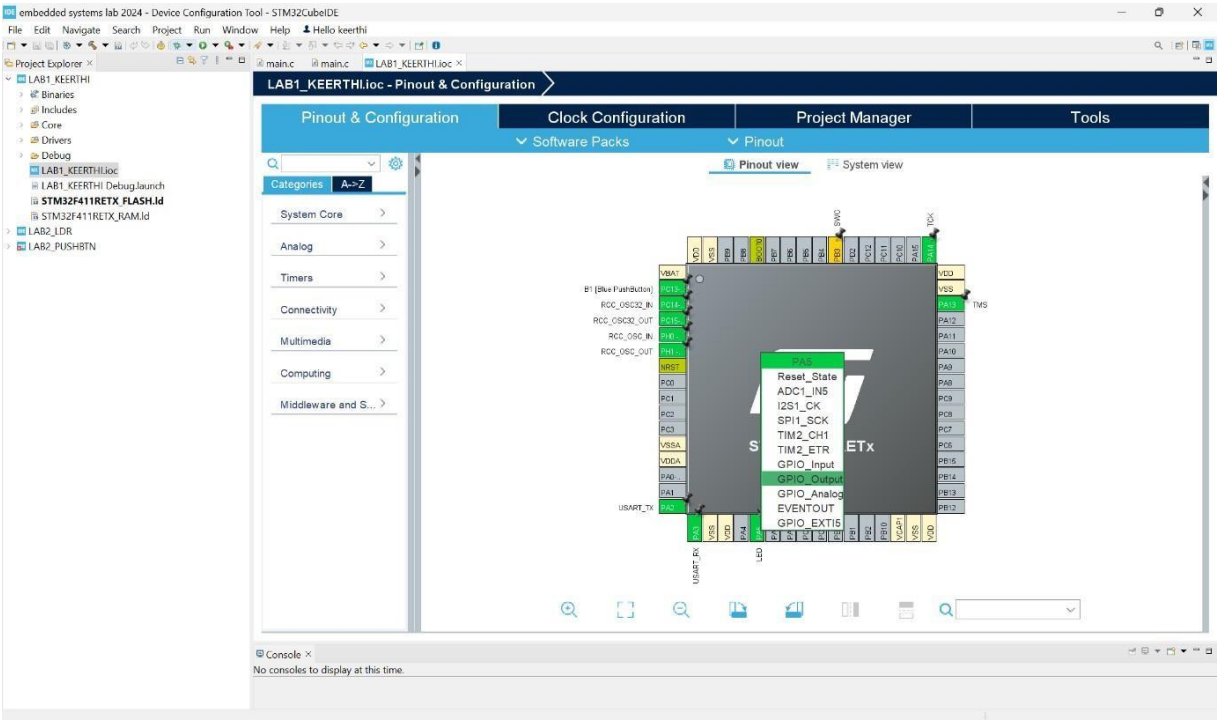


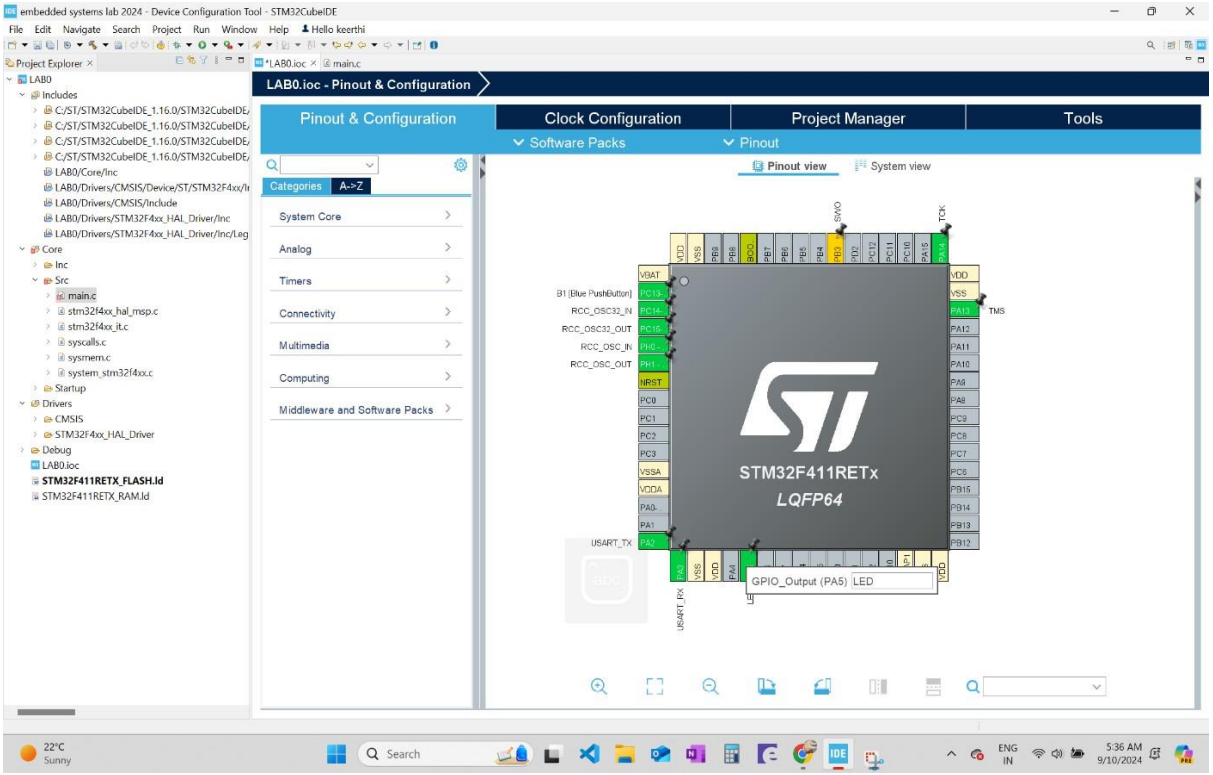
Step 4: Then I have given ‘LAB1_KEERTHI’ as project name.



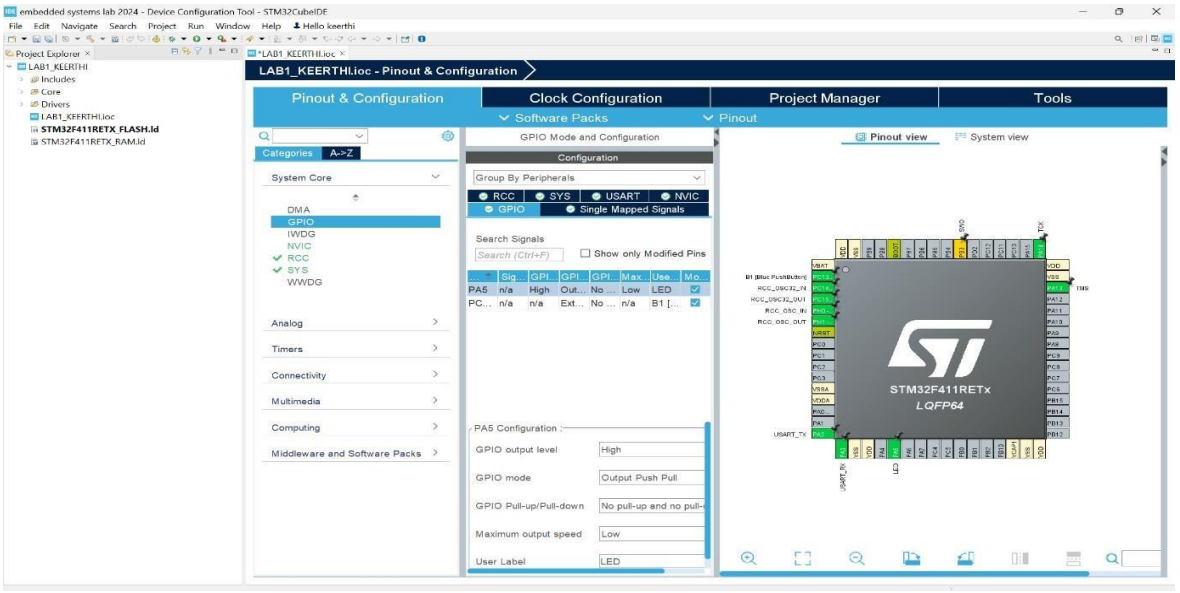
2. Key Steps (Screenshots of key steps (e.g., PA5 configuration, code in main.c).

Step 5: I configured **PA5** as 'GPIO_Output' and named it 'LED' for the pin.



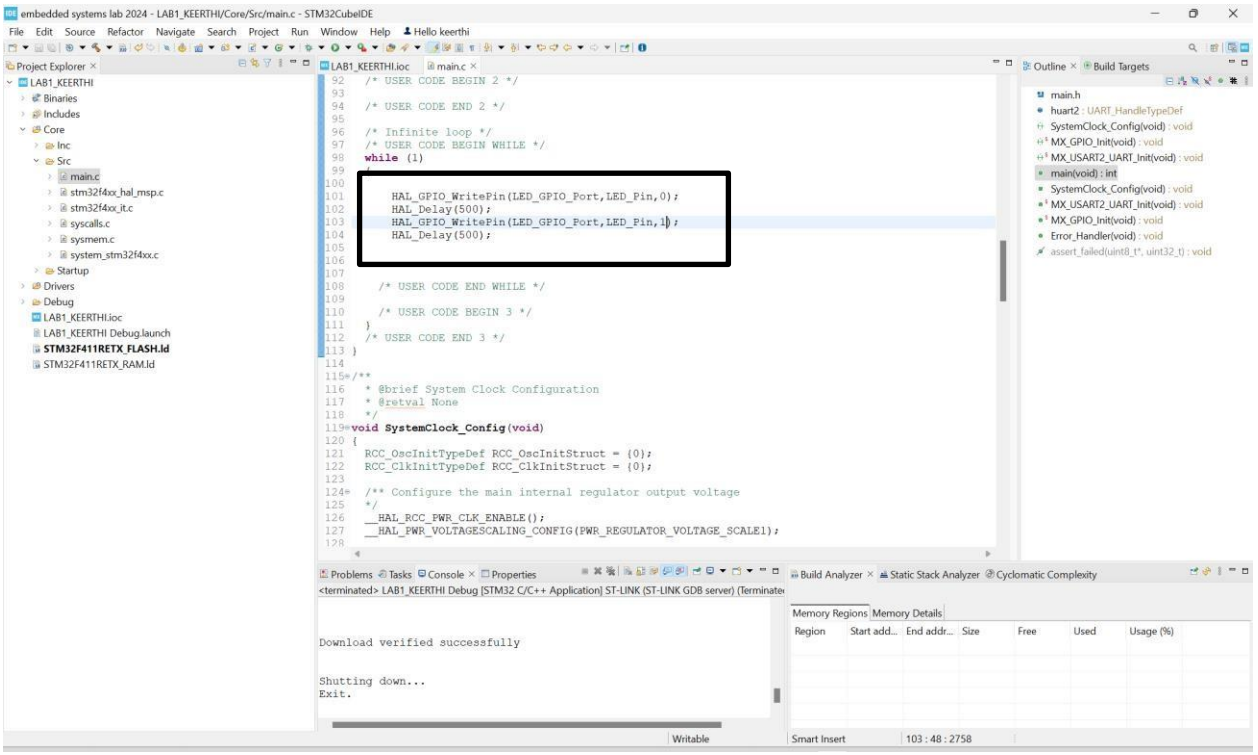


Step 6: I have actually set the ‘GPIO output level High’ in system core under PA5 and saved the file. There is No-pull up and No-pull down for GPIO.

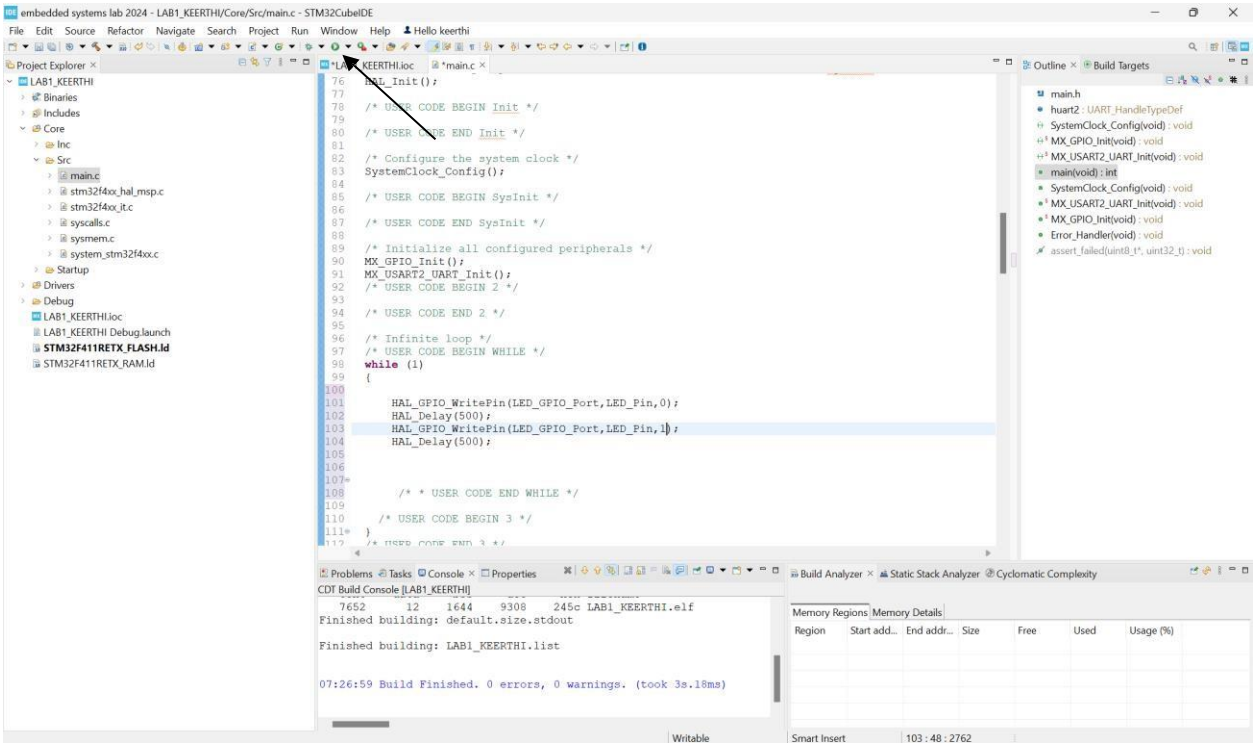


3. **Compilation and Execution** (The outcome of compiling and running the code.)

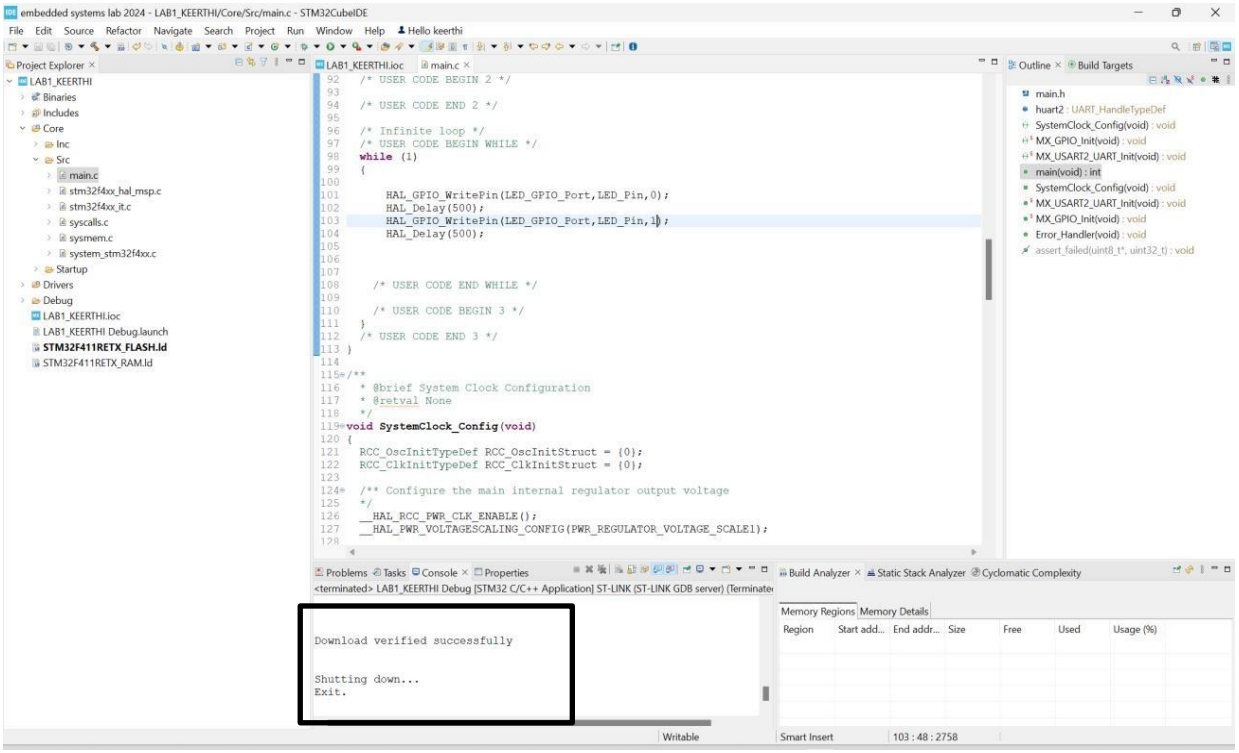
- After step-6, for the experimental setup, I connected the microcontroller board to the laptop via USB cable.
- After the experimental setup , I went to src -> main.c and then I wrote the code in the line 99 -104 with a delay of 500 inside while loop as shown in the below figure.

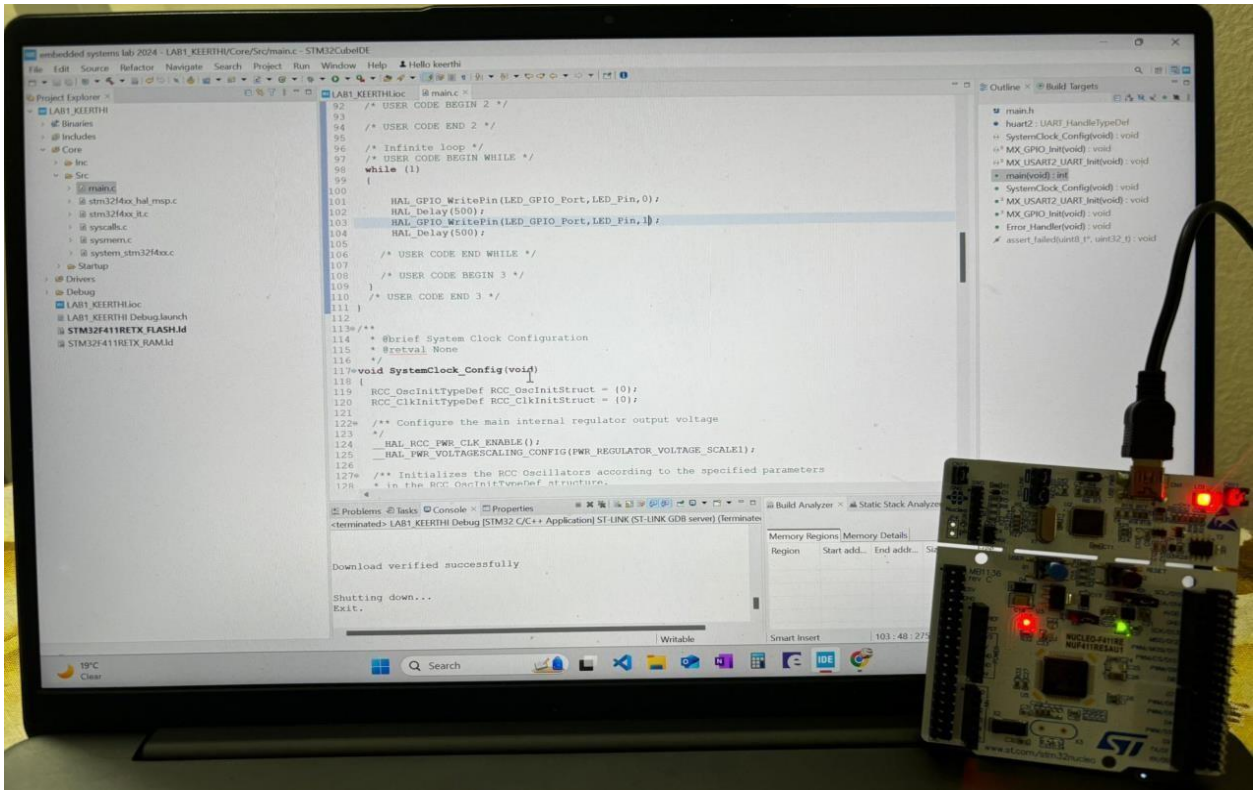


- Then , I build the main.c by clicking the icon as highlighted in below figure.



- The console window shows the compilation result. Upon successful compilation , the led starts blinking with 500ms delay.





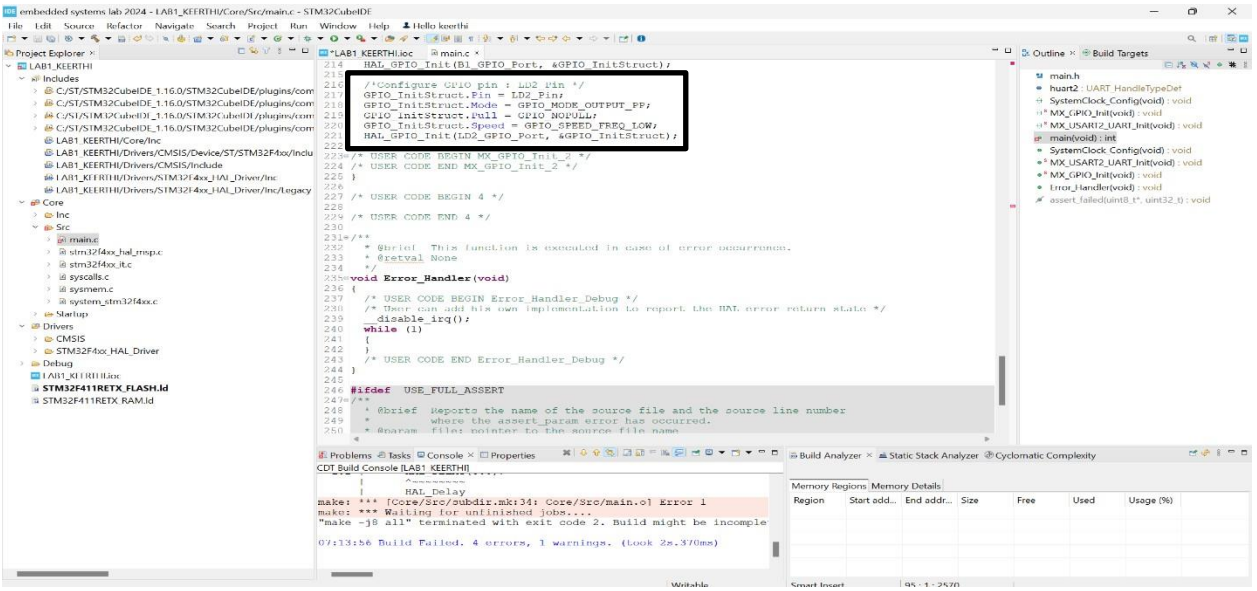
- Below is a video demonstration of LED Blinking with 500ms (milli-seconds) delay.

https://drive.google.com/file/d/1jpBnuUX46IO7lstNoPhQz_rwcGl6pRpI/view?usp=drive_link

4. Challenges Encountered and Their Resolutions (Any challenges faced and how they were resolved (e.g., file generation issues or pin configuration problems).

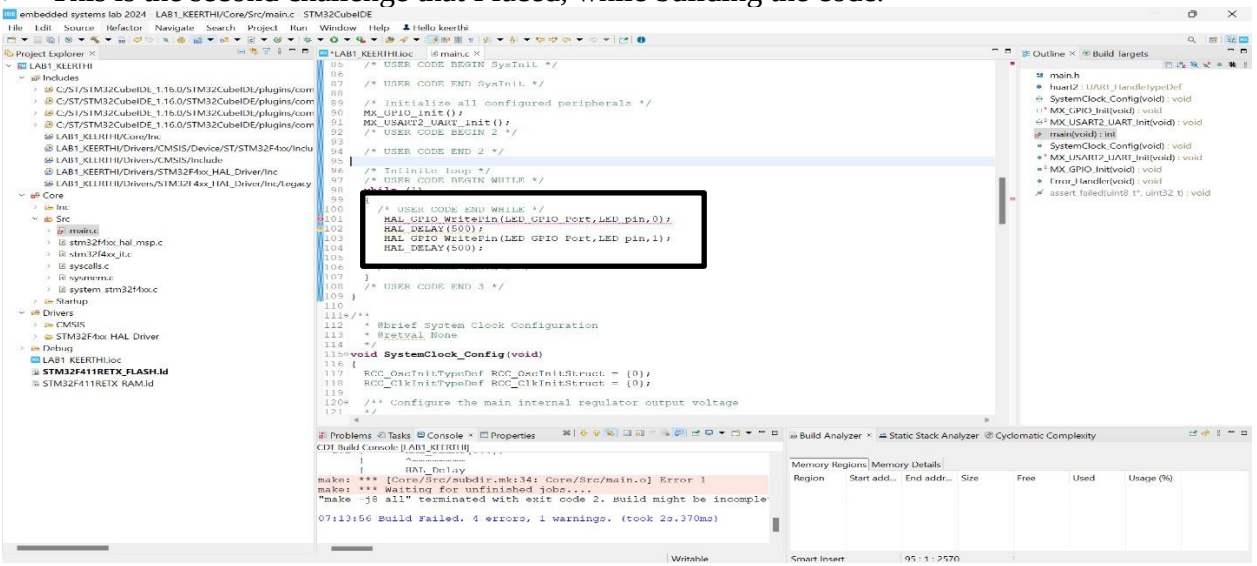
Problem-1:

- This is the first challenge that I faced while configuring the LED Pin. Even after configuring the LED Pin, it's not been reflected in the main.c code.



Problem-2:

- This is the second challenge that I faced, while building the code.



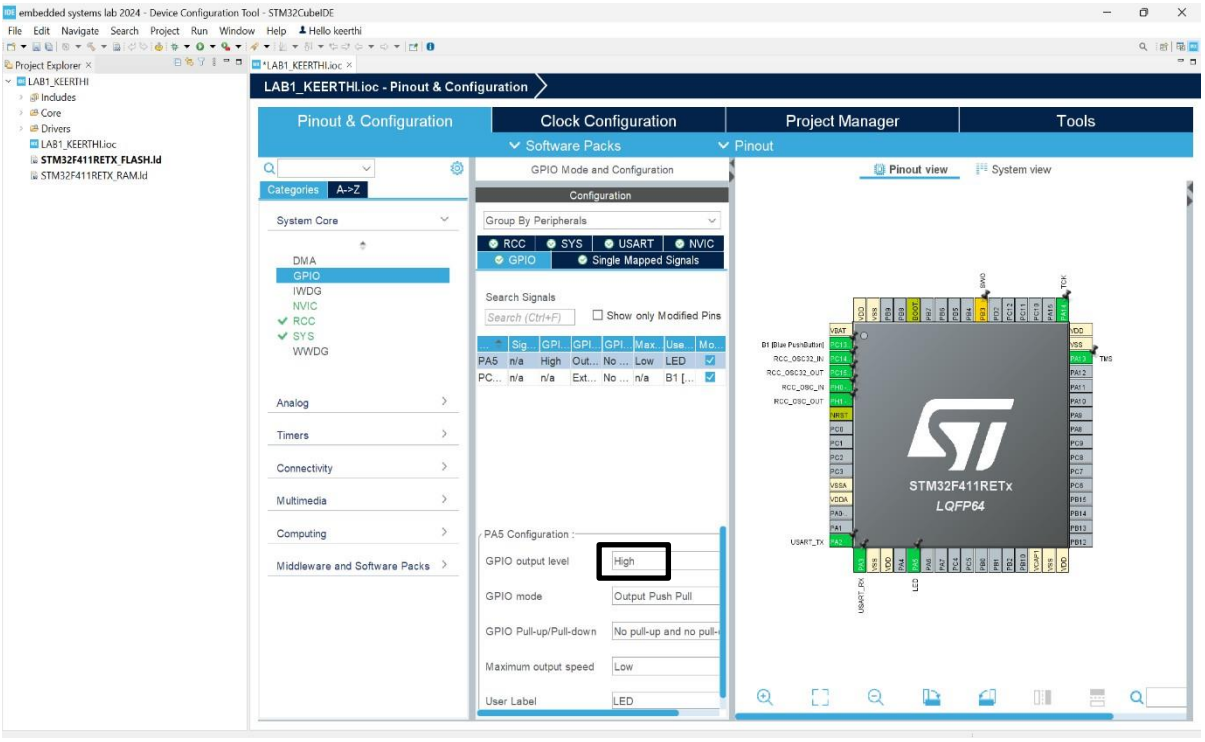
Resolution:

- I did not save after configuration due to which this problem arose. To solve this issue, I went back to the pin configuration and here I reconfigured the pin PA5(LED) mode to GPIO OUTPUT, set output level High and Saved it. Then configured pin got reflected in the main.c code.

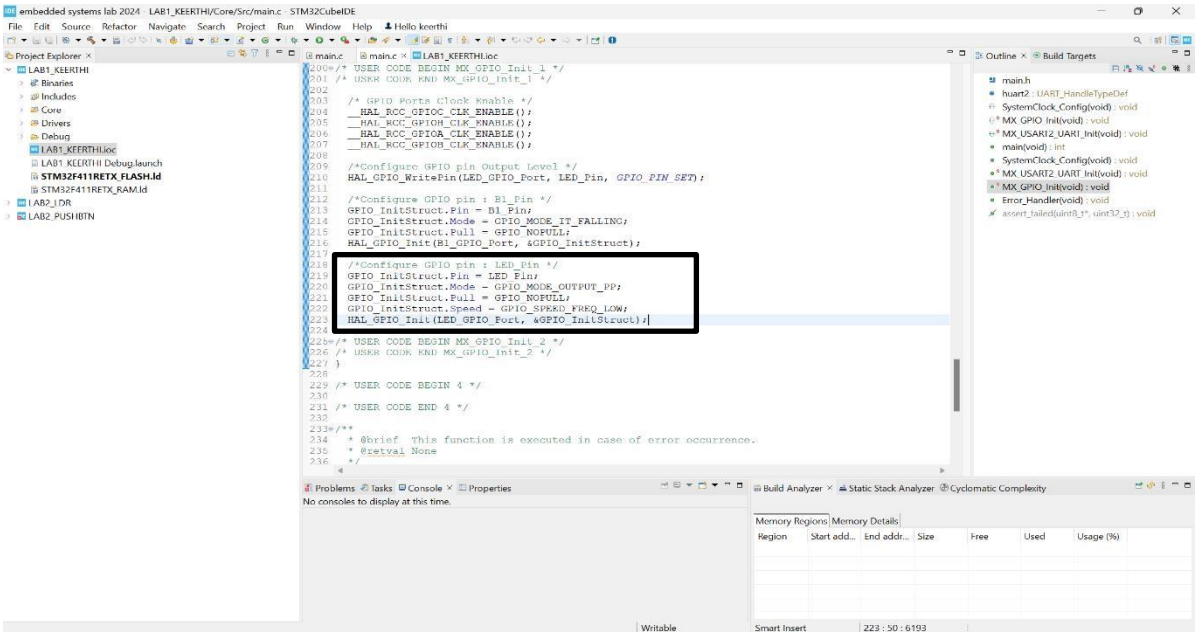
- The problem-2 error is because it has LED_pin mentioned in the code. As, LED_pin is not configured before, it showed an error. Once after configuring and saving the pin configuration. The error got resolved.

5. <u>Configuring the Pin to Illuminate the LED</u> (Explanation of how the pin was configured to light up the LED)

1. Pin Selection: I have selected the pin PA5.



2. Pin Configuration: The software tool installed helped me to configure the microcontroller board such as peripherals and pins. I configured the pin as GPIO(General Purpose Input/Output) Output pin and named it as LED. In the system Core on GPIO I have defined that this GPIO level should be High. The Configured pin is reflected in the main.c as shown below.



3. **Connection:** Once after configuring, I have connected the board with laptop and then in main.c, I wrote the code inside while loop to blink an Led with 500ms delay and follow up the same by successfully running this code.so finally, the green color led started blinking with a delay of 500ms.

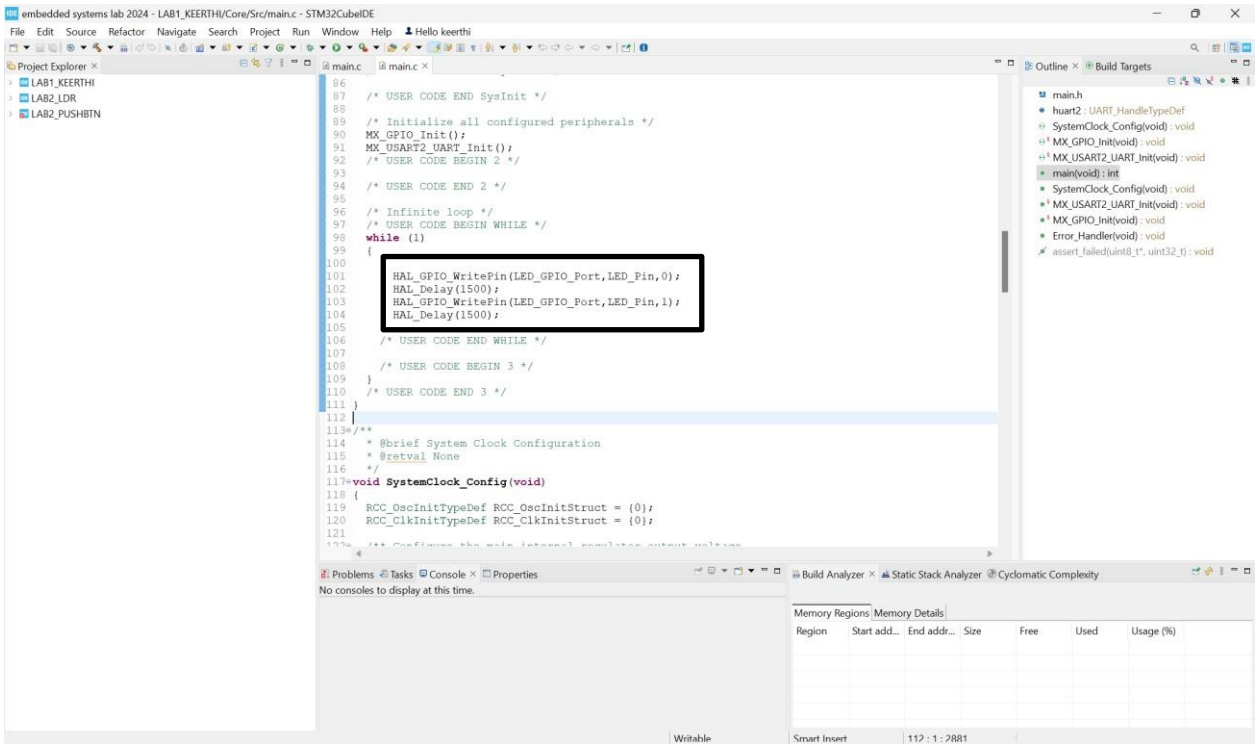
```
{
    HAL_GPIO_WritePin(LED_GPIO_Port,LED_Pin,0); // 0 indicates LED off
    HAL_Delay(500); // DELAY
    HAL_GPIO_WritePin(LED_GPIO_Port,LED_Pin,1); // 1 indicates LED on
    HAL_Delay(500); // DELAY

}
```

So, basically the LED glows for 500ms (as given in the delay) and gets off for 500ms (as given in the delay) continuously until the board is connected to the laptop.

6. LED BLINKING WITH 1500ms DELAY:

- I have followed the above steps and set the delay to 1500ms.



- Below is a video demonstration of LED Blinking with 1500ms (milli-seconds) delay.

https://drive.google.com/file/d/1h8AFKSwJLotGY59VNJYy269LRqn7H4Mj/view?usp=drive_link

Conclusion:

In this report, I successfully Reproduced a LED blinking project using the Nucleo-F411RE microcontroller board. This allowed me to get some valuable hands-on experience in terms on pin configuration and installation process. By setting the PA5 pin to GPIO Output and introducing delays of 500ms and 1500ms, I successfully achieved the LED blinking effect. This exercise enhanced my understanding of GPIO pin control, the capabilities of the Nucleo-F411RE board, and the setup process for such applications. Overall, it improved my skills in programming microcontrollers and interfacing hardware.