Programming Phase

Objectives:

Learn to install and set up STM32CubeIDE. Practice toggling LEDs at 2Hz using two timing methods: ***HAL_Delay()*** and ***HAL_GetTick()***. Understand the difference between ***HAL_GPIO_TogglePin()*** and ***HAL_GPIO_WritePin()***.

Main Tasks:

Install *STM32Cube IDE* along with the necessary software tools required for STM32 programming. Follow the provided link and instructions carefully:
How to Download and Install STM32CubeIDE Latest Version | STM32 CubeIDE for ...

For the following subtasks, you are required to build a circuit on the breadboard from your KIT with two LEDs, LED1 (connected as active high), and LED2 (connected as active low) both connected to the STM32 bluepill. To power on the STM32 bluepill, you may use Micro-USB cable or the TTL cable provided in the KIT. Send the circuit connection to your mentor before powering it on to make sure that the connections are correct and safe.

Subtask 1:

Write a code that toggles LED1 in your circuit with a frequency of 2Hz (turn on and off 2 times per second). You MUST do the task **2** times, each time using a different method to control the timing:

1. Using ***HAL_Delay()*** function.
2. Using ***HAL_GetTick()*** function.

Use the ***HAL_GPIO_TogglePin()*** function for this subtask.

Subtask 2:

Write a code to toggle LED1 and LED2 with a frequency of 5Hz, the two LEDs should light up together and turn off together. You MUST do the task **2** times, each time using a different method specified in **subtask 1**. Use ***HAL_GPIO_WritePin()*** function for this subtask.

Optional Task:

Write a documentation explaining the concept of interrupt in microcontrollers, the documentation must contain the following topics:

1. Definition of interrupt concept in programming.
2. The purpose and use cases.
3. Interrupt types in microcontrollers (E.g. external interrupt, timer interrupt, communication protocol interrupt, …).
4. The differences between blocking and non-blocking code concepts.
5. The differences between Polling vs Interrupts

All resources must be listed.

Hints:

As part of our encouragement for you to not fully rely on AI to complete your tasks, the following are some helpful resources to help you completing the task:

1. https://deepbluembedded.com/stm32-blue-pill-pinout-programming-guide/
2. https://deepbluembedded.com/stm32-led-blink-code-example/
3. https://youtu.be/e_NSqz5P8Qk?si=dCZoTpSA5b1LxzKK
4. https://youtu.be/rQDa_vxYM2Q?si=SfwwqmlwStwqepe3

Note: these are not the only available resources to help you complete the tasks. Also they are not necessarily explaining the exact requirements of the task, but they contain some helpful information

Submission:

- Record a video explaining the circuit connections and the code and send it to your mentor.
- Send the main.c file to your mentor.
- Complete and submit this task in one PDF file for both main and optional (if done) tasks.
- Add a picture of your circuit connections to the PDF file.
- Add a screenshot of the configurations of IOC to the PDF file.
- Add a screenshot of the code of each subtask to the PDF file (only what you have modified in the generated code).
- Name the PDF files with task3_groupx_your_name, (replace x with your group number).
- This task should be submitted before 18th Aug 10:00pm (Malaysia time), 05:00pm (Makkah time).
- Your mentor must approve your task answer file before submission.
- Submit the PDF file to the Google form.