**LAB NOTE**

**Subject: Hardware/Software Interfacing**

**Lab 4: Timers**

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# Objectives

* Using STM32F411 board and STM32CubeIDE in Windows, create code to

• Write code for the STM32F411 to configure and use Timers.

Basic:

A close-up of a computer chip

Description automatically generated

Figure 1‑1: Basic outcome

* Intermediate:

A close-up of a computer screen

Description automatically generated

Figure 1‑2: Intermediatet outcome

* Advance:

A close up of a computer

Description automatically generated

Figure 1‑3: Advance outcome

# Problems and Solutions

## Problems

* No problem

## Solutions

# Software Design

## List of function

* This function is to create a delay in micro second by counting the number of ticks has passed using CNT registers.

**void microDelay(uint32\_t usDelay)**

**{**

**// Get the current timer counter value**

**uint32\_t startTime = \_\_HAL\_TIM\_GET\_COUNTER(&htim1);**

**uint32\_t ticks = usDelay - 1; // 1 ticks = 1 us**

**// Poll the CNT register until the specified number of ticks has passed**

**while ((\_\_HAL\_TIM\_GET\_COUNTER(&htim1) - startTime) < ticks)**

**{**

**// Wait until the timer reaches the required ticks**

**}**

**}**

* This function is used to toggle LED whenever the timer overflow

**void** **HAL\_TIM\_PeriodElapsedCallback**(TIM\_HandleTypeDef \*htim)

{

**if** (htim->Instance == TIM1)

{

HAL\_GPIO\_TogglePin(GPIOA, GPIO\_PIN\_6);

}

}

## While loop

**while** (1)

{

**#ifndef** USE\_INTERRUPT

microDelay(PERIOD);

HAL\_GPIO\_TogglePin(GPIOA, GPIO\_PIN\_6);

**#endif**

/\* USER CODE END WHILE \*/

/\* USER CODE BEGIN 3 \*/

}

/\* USER CODE END 3 \*/

}

**REFERENCES**