UNIVERSITY OF SAINT THOMAS – SAINT PAUL – MN
Electrical and Computer Engineering

ENGR 432: REAL TIME SYSTEMS
LAB 2: WORKING WITH LIBRARIES AND STMCUBE.
Spring 2023

Individual Work

The goal of this lab is to get you familiar with using libraries and visual tools to develop embedded software. Writing code using libraries and graphical tools such as STMCubeMX ease developers' life by reducing development efforts, potential errors, time and cost.

> **Upload to Canvas your C code from all parts into a single compressed folder. Upload also a page document with your thoughts and analysis including any problems you faced and how you managed to solve them.**
>
> **The time to demo this lab is Tuesday Feb. 21 during the class time.**

In Lab 1, we worked with GPIOs manually mostly at the bare metal without heavily using any libraries. In this lab you are asked to:

> Redo the three parts from Lab 1 below using STM32CubeMX and the HAL (Hardware Abstraction Library) library. Please refer to the documentation manuals on Canvas. In this Lab, you are required to initialize using STMCubeMX and to use as many predefined functions in the HAL library as possible.

> You may also refer to Keil help page to read more about Keil and STM32CubeMX:

> https://www.keil.com/pack/doc/STM32Cube/General/html/cubemx_proj.html

A) **Lab1_1.c** : Light up LED LD1 on the board. You might have to press Reset after you download code to the board.

B) **Lab1_2.c**: Toggle all the LEDs with a delay of 1 sec.

C) **Lab1_3.c:** Design an up counter and down counter display on the 3 LEDs. Pressing the BLUE push button will start the up count. Pressing the push button again will start the down counter. Pressing the push button again will start the up count again and so on and so forth. The delay for up counting is 1 seconds and the delay for the down counting is 2 seconds.