Peer Review #1

This review is regarding Lab 1: Project creation and debugging. The goal of this lab is to become familiar with the tools that will be given to us throughout the semester and to also setup a simple circuit using a new microcontroller and toggle an LED using a button. Given to us in this lab includes the following: A breadboard (with studio), a TM32 NUCLEO-L432KC Board, and wires. We were also given a C program to use in programming the board, the point of this program was to attach a button and LED and use these devices, so that when pushing the button would toggle the LED on also on the board. This program was able to accomplish this by following these steps in given order:

1. Establish variables used and state of LED, button, and toggles
2. Enter an endless loop that will only change states if the program sees the button has been pushed
3. After seeing the button pressed, change states of LED and also increment the toggles variable
4. Delay for 1 second and then enter back into the loop

This worked well for my experiment. Setup was pretty straightforward, and wiring was described to us first before being given a simple schematic shown in Figure 1.

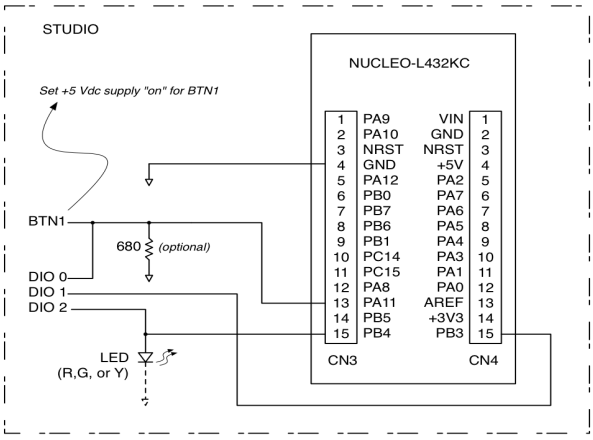

Figure 1

After setting up the lab, I found the button to be a little strange. When pressing the button, the 1 second delay was making it difficult to see immediate results and was at first confusing. However, I noticed it was working correctly after seeing the LED was not flashing on its own anymore, like it does when the board is first powered on. After noticing this and seeing the toggle work on both the LED and on the DIO port of waveforms, I knew that it had worked.

Attached on the next page is a copy of the .c file used in this lab.

```
/*=====================================================*/
/* Victor P. Nelson *//* Modified by: Joey Hines, Spring 2021 */
/* Edited by: Soham Roy, 13Jan2021 *//* Fixed errors about PB3-PB4 bit
pattern and comments */
/* ELEC 3040/3050 - Lab 1, Program 1 */
/* Toggle LED1 while button pressed, with short delay inserted */
/* Count toggles */
/* Program has one error that must be corrected. */
/*=====================================================*/

#include "stm32l4xx.h" /* Microcontroller information */

/* Define global variables */
int toggles; /* number of times LED state toggled */

/*-----------------------------------------------------*/
/* Initialize GPIO pins used in the program */
/* PA11 = push button */
/* PB4 = LDR, PB5 = green LED */
/*-----------------------------------------------------*/
void PinSetup () {
      /* Configure PA0 as input pin to read push button */
      RCC->AHB2ENR |= 0x01; /* Enable GPIOA clock (bit 0) */
      GPIOA->MODER &= ~(0x00C00000); /* General purpose input mode */
      /* Configure PB4,PB3 as output pins to drive LEDs */
      RCC->AHB2ENR |= 0x02; /* Enable GPIOB clock (bit 1) */
      GPIOB->MODER &= ~(0x000003C0); /* Clear PB4-PB3 mode bits */
      GPIOB->MODER |= (0x00000140); /* General purpose output mode*/
}

/*-------------------------------------------------------------*/
/* Delay function - do nothing for about 1 second */
/*-------------------------------------------------------------*/
void delay () {
      int volatile i,j,n;
      for (i=0; i<20; i++) { //outer loop
            for (j=0; j<20000; j++) { //inner loop
                  n = j; //dummy operation for single-step test
                  } //do nothing
            }
      }
/*-----------------------------------------------*/
/* Main program */
/*-----------------------------------------------*/
int main(void) {
unsigned int sw1; //state of SW1
unsigned char led1; //state of LED1
PinSetup(); //Configure GPIO pins
led1 = 0; //Initial LED state
toggles = 0; //#times LED state changed
```

```
/* Endless loop */
      while (1) { //Can also use: for(;;) {
            if (led1 == 0) { //LED off
                  GPIOB->BSRR = 0x0010 << 16; //Reset PB4=0 to turn OFF
            LED (in BSRRupper half)
            }
            else { //LED on
                  GPIOB->BSRR = 0x0010; //Set PB4=1 to turn ON LED (in
            BSRR lowhalf)
            }
            sw1 = GPIOA->IDR & 0x0800; //Read GPIOA and mask all but
            bit 11
            /* Wait in loop until SW1 pressed */
            while (sw1 == 0) { //Wait for SW1 = 1 on PA11
                  sw1 = GPIOA->IDR & 0x0800; //Read GPIOA and mask all
                  but bit 11
            }

            delay(); //Time delay for button release
            led1 = ~led1; //Complement LED1 state
            toggles = ++; //Increment #times LED toggled
      } /* repeat forever */
}
```