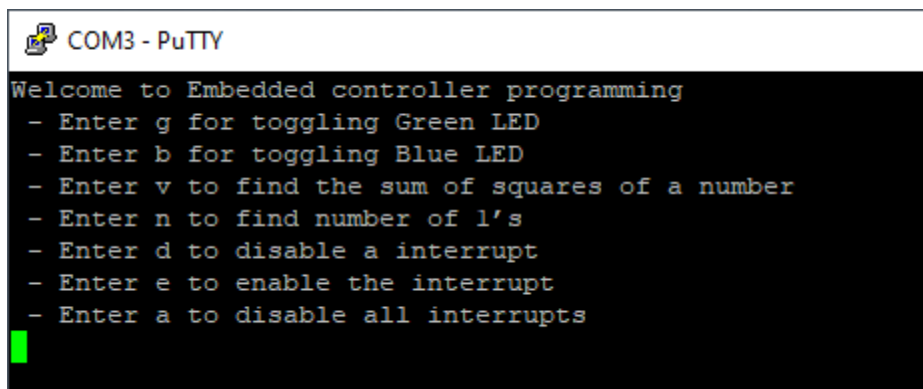


Date: 8/2/2021

## Midterm

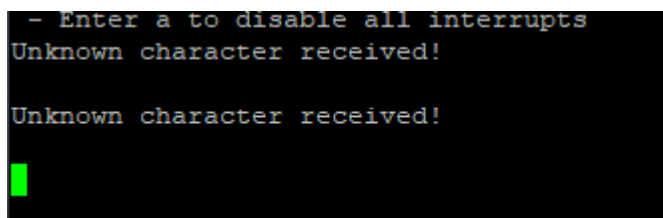
See below for the terminal output of the methods defined for this assignment. Please see attached files for full comments within function prototypes.

Full prompt developed with the HAL\_UART\_Transmit\_IT() call.



```
COM3 - PuTTY
Welcome to Embedded controller programming
- Enter g for toggling Green LED
- Enter b for toggling Blue LED
- Enter v to find the sum of squares of a number
- Enter n to find number of 1's
- Enter d to disable a interrupt
- Enter e to enable the interrupt
- Enter a to disable all interrupts
█
```

Unknown character input:



```
- Enter a to disable all interrupts
Unknown character received!
Unknown character received!
█
```

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Toggle green or blue LEDs via software and interrupts. With regard to question #1.6, this method would not display the system “freeze” behavior that would occur under polling with a rapid number of inputs.

```
Blue button pressed
g
g
g
█
```

```
- Enter a to disable all interrupts
b
b
b
█
```


Toggle blue LED via an external interrupt on GPIO 13. I should note that in the GPIO EXTI callback function, I was unable to successfully call the logMsg() function without the processor freezing and had to use the standard HAL\_UART\_Transmit() call to transmit the button press message. I suspect this has to do with the interrupt’s prioritization levels but did not have time to sufficiently test this theory out.

```
Blue button pressed
Blue button pressed
█
```

```
105 // Implement the callback method for HAL_GPIO_EXTI_IRQHandler()
106 void HAL_GPIO_EXTI_Callback(uint16_t GPIO_Pin)
107 {
108     if (GPIO_Pin == GPIO_PIN_13)
109     {
110         HAL_GPIO_TogglePin(LED3_WIFI_LED4_BLE_GPIO_Port, LED3_WIFI_LED4_BLE_Pin);
111         //logMsg(&huart1, "Blue button pressed"); // Using interrupt method would cause system to hang?
112         char* statusMsg = "Blue button pressed\n";
113         HAL_UART_Transmit(&huart1, (uint8_t*) statusMsg, strlen(statusMsg), 1000);
114     }
115 }
116
```

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Enable or disable the external interrupt:

 COM3 - PuTTY

```
e
GPIO_EXTI13 enabled
Blue button pressed
Blue button pressed
d
GPIO_EXTI13 disabled
█
```

Disable all interrupts, requiring a hardware reset:

```
Sum of squares for 3 is 14
a
█
```

Calculate the sum of squares in a given number, hardcoded to 14 in this example:

```
v
Sum of squares for 3 is 14
█
```

Calculate the number of ones in a given number, hardcoded to 7 in this example:

```
n
Number of ones in 7 is 3
█
```