Lab 3 – PWM with General-Purpose Timer

CSE 479 – Advanced Embedded Systems

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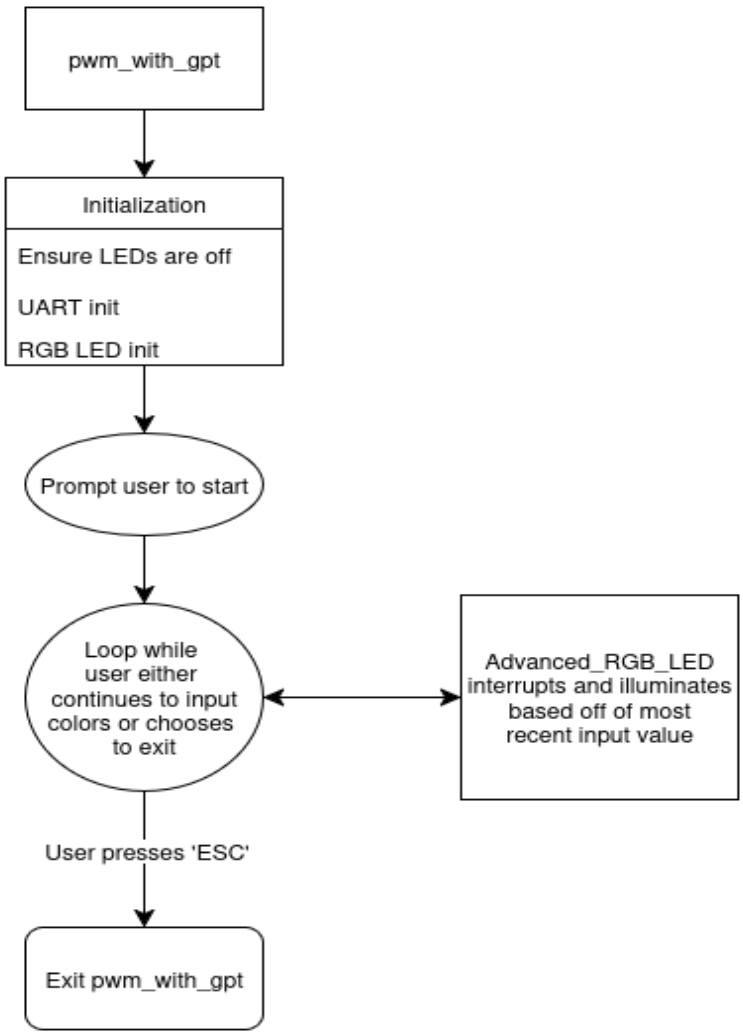
Program Overview:

Description:

The Advanced RGB LED allows users to input the hex code for any color desired. This version of the program operates using a general-purpose timer, which controls the duty cycle of each RGB value by holding the signal high for a number of interrupts ranging from 0 to 255. This ratio of high versus low signals produces a duty cycle that determines the intensity of the corresponding red, green, or blue LED.

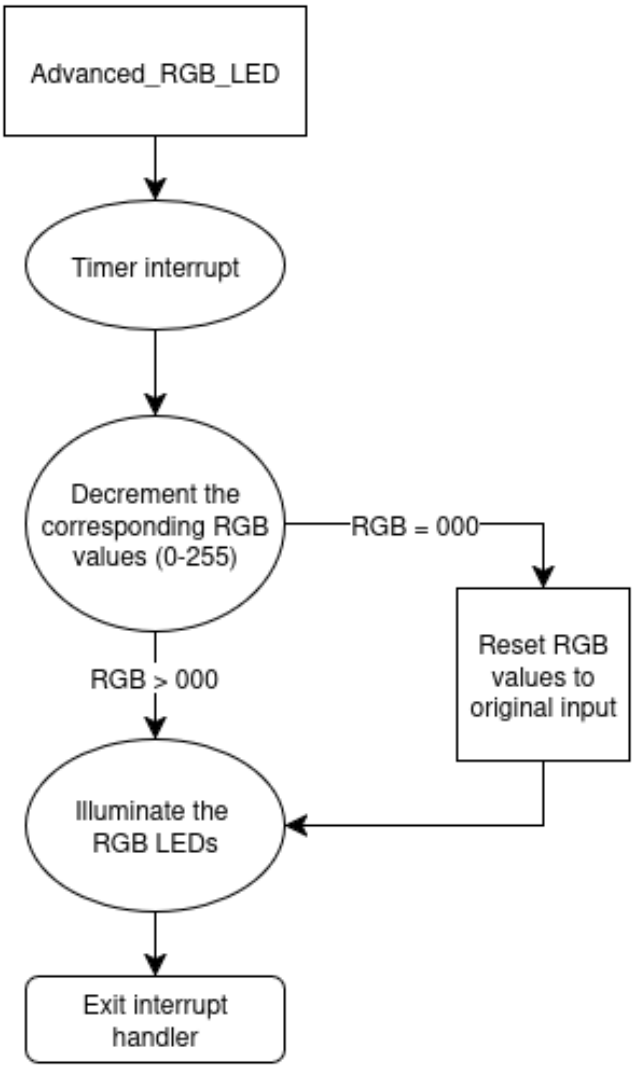
High-Level Flowchart:



Subroutines:

Advanced_RGB_LED:

This routine uses a general-purpose timer that interrupts every 256 clock cycles. Each time an interrupt occurs, the RGB value input by the user is decremented for each color, meaning that bytes 0, 1, and 2 of the hexcode are each decremented. Once all values have reached 0, the hexcode is reset to its original value. This process produces appropriate duty cycles for each LED, which control the LED's intensity. The combination of these duty cycles result in the RGB LED appearing to light up as the color that the user specified. This cycle continues as the user either inputs more colors or until the user decides to exit the program.



string2hex:

This routine takes a string that is formatted as a proper hexadecimal (0x--------) and converts it into an actual hexadecimal value. Each character is read from most- to least-significant and checked if it is equivalent to the ASCII values for '0' through 'F'. If it is, the character is converted to its hexadecimal value and left-shifted to the appropriate position. The value is returned if a NULL byte or an invalid character is found.