Final Exam Part 1

Submission: Media Recording and File Uploads to Carmen

Due: Wednesday, January 13 – at the End of the Day (11:59 PM)
No Late Submissions

This exam is individual work.
You are not allowed to collaborate with others including AI.

Part 1: Coding task

Pick and implement one of the two blinking patterns below:

1. Jingle Bells Blinky – twinkling LEDs with a state machine (50 pts)

Use periodic interrupts generated by Timer B0 (B zero) to make the green and red LEDs to twinkle in a repeating "quarter-quarter-half note" pattern: The LEDs will blink three times on the beat; the third blink will be held over two beats. The same pattern repeats indefinitely, resulting in following pattern of LEDs:

red – green – red – red – green – red – green – green – red – green – red – red …

Please watch the short demo video posted to Carmen exhibiting the desired behavior.

2. Holiday Lights Blinky – simpler coding task for reduced number of points (45 pts):

Use periodic interrupts generated by Timer B0 (B zero) to make the green and red LEDs to twinkle in a simple alternating pattern: when the green LED is on the red one should be off and vice versa. For this task, you do not need to implement a state machine.

For both tasks:

While the LEDs are twinkling, the MCU is in low power mode (LPM3). **The LEDs are turned on and off following the interrupts generated by Timer B0, you are not allowed to utilize any software generated delay loops.**

Start by downloading the file Final_Exam_Part_1.asm from Carmen. In that file, I have already configured Timer B0 to throw periodic interrupts. You will write an interrupt service routine that services these interrupts. Make sure that your ISR does not modify any core registers.

The memory address for the Timer B0 interrupt vector is 0xFFF4. The interrupt flag is bit TBIFG in the 16-bit register TB0CTL. Make sure to test and clear the TBIFG bit only – DO NOT clear the entire TB0CTL register since it holds information that is critical for the correct operation of Timer B0.

Part 2: Submission – Media Recording, PDF and text files uploaded to Carmen

Media Recording:
I am asking you to take a short video **of yourself and your program in action**.
Carmen will do the recording, **do not forget to hit the submit button!**

PDF File: Screenshot of your code
Take a screenshot of your main program (including variable definitions), your ISR & IVT, and submit in a PDF file.

Text File: Your source code
Save the final version of your source code as txt file so it can be read in Carmen, and make sure that both files reflect your name, e.g., firstname_lastname.txt or name_number.txt. Easiest way to do this is to use File>Save As in CCS.

I will randomly select and run source code files throughout the semester. If your source code file does not produce the results you demonstrate in your video you will receive zero points for the assignments – end of story. Make sure to submit the correct source code in the correct format – no word or PDF files for source codes.

Submit your video recording and the two files to Carmen before the end of the day on Wednesday December 13, 2023.

Thank you for a great semester.

Best of luck with all your finals!

Happy Holidays!