ECE-231 Lab Assignment #4

Assigned Thursday 3/7/24
Due: 11:59 pm Saturday 3/16/24

Moodle References:

- Lecture 8 and 9 cover Interrupt concepts and programming
- Lecture 10 covers Thread concepts and programming

A. Create a shell script file named “pwm_gen.sh”

1. Write code that configures the pin **P9_16** as a **pwm pin** and starts a PWM of period 1 second and 50% duty cycle
2. Configure the pin **P8_8** as a GPIO **input pin**
3. Enable **rising edge** interrupt on pin **P8_8**

B. Take a jumper wire and connect pin P9_16 to P8_8 on your beaglebone

C. Develop a C program that meets the following requirements:

4. Create a new **thread** function
5. Inside the thread,
    a. Use Linux **epoll** to configure interrupt settings
    b. Use **epoll_wait(..)** to wait for the interrupt
    c. When a rising edge interrupt occurs on pin P8_8, take a timestamp using **clock_gettine(CLOCK_MONOTONIC,..)**, and store only the seconds part **(tv_sec)** of the timestamp in a **buffer array** of size **10**
    d. Store **10 timestamp** measurements in the buffer array using the steps above
6. Once the buffer is full, exit the thread, and print the timestamps from the buffer array to your terminal/command line from within your main function

C. Write a makefile and use it to compile your C program

D. Run the program binary and observe the terminal output

Notes:

- You have to use your beaglebone for this assignment
- This is an individual assignment: you must write your own code and do not share it
- Read the instructions carefully multiple times to understand the program requirements and to produce the desired outcome

- The lecture material supporting this assignment has already been covered in the class
- The TAs will support you during lab hours

What to turn in:

- By the deadline, upload to Moodle the following list of files:
    - C source code file
    - Makefile
    - shell script file
    - Video recording that shows your beaglebone with jumper wire pins connection, and the terminal output printing 10 timestamps