



Experiment 3 – Interrupt Usage on MSP430

Preliminaries:

1. Students who will attend to this experiment are assumed to know:
 - Usage of basic I/O registers on MSP430
 - Usage of timers on MSP430
 - Usage of timer and port interrupts on MSP430
2. Study related topics from course slides and the textbook
3. Run example codes from slides and textbook
4. Study datasheets for MSP430 and the launchpad you picked up
5. Always comment your code!!

Work:

- Basic I/O registers are PxOUT, PxIN, PxREN.
 - Timers that are going to be used in this experiment are Timer A, Timer B.
 - All three modes of Timer A and B are needed for this experiment.
 - Interactions with timers will be only by interrupt handling using ISR in this experiment.
1. What are the modes for MSP430 timer Timer A? Give at least one example of usage for each mode.
 2. What is an interrupt and interrupt service routine(ISR)? What is the meaning of pragma macro TIMERA0_VECTOR or PORT1_VECTOR?
 3. What does the interrupt edge select register do in the concept of port interrupts?
 4. Write a code in C that turns off/on an LED by using port interrupts. LED should be on when the button is pressed down, it should turn off when the button is released. Usage of any kind of delay function/loop is FORBIDDEN. You can not use methods like “while(P1IN&BIT3 != 0)”. Use port interrupts to handle button input. (*Hint: Be careful about the algorithm, LED should turn off immediately when the button is released*)
-



5. Write a code in C with following flow of operation(Use interrupt service routine for handling timer interrupts):

- Configure Timer A to work in up mode
- Configure LEDs as outputs on necessary ports
- Configure Timer A interval to generate an initial interrupt by setting timer compare value as small as possible.
- Turn on and off the LEDs with such intervals that blinking interval gets multiplied by 2 every time until your timer compare value is at its maximum. After that it should start from the initial value you set earlier.

(Hint: Blinking interval pattern should be something like: $x \rightarrow 2x \rightarrow 4x \rightarrow \dots$, x being as small as possible. You may not see blinking for first few intervals, after that blinking should slow down since the interval gets higher. When the interval is reached to the maximum value $2^n x$, interval should be x again.)

6. Write a code in C that blinks one of the LEDs on your launchpad. Use interrupt service routine for handling timer interrupts. Blinking intervals should use Timer A operation similar to the previous question. Usage of any kind of delay function/loop is FORBIDDEN. Blinking pattern should alternate between a short blink and long blink with each cycle, i.e.

LED is on \rightarrow Short delay \rightarrow LED is off \rightarrow Short delay \rightarrow LED is on \rightarrow Long delay \rightarrow LED is off \rightarrow Long delay \rightarrow LED is on \rightarrow Short delay...

Notes :

- You should prepare a preliminary work report with the answers of the questions on the “Work” part.
 - All answers should be in English, it may be better to put your C codes in a Text box for better readability, code parts has to use a Type Writer font like Courier New
 - You should upload your preliminary file as a PDF with all answers and codes inside. Zip, Rar, Word document or any other format than PDF will not be accepted.
 - Without a proper preliminary work, you cannot participate in experiment!! You will be notified at the start of experiment about sufficiency of your preliminary works.
-