Department of Computer Engineering

BLG 351E
Microcomputer Laboratory
Experiment Report

Experiment No : 1

Experiment Date : 16/10/17

Group Number : Monday - 1

Group Members :

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1 INTRODUCTION

This lab aims to help students to gain more experince in the MSP430 Education Board,, MSP430G2552 microcontroller and its assembly language.

2 EXPERIMENT

The general purpose input and output using the port of microcontroller can be performed by configuring and reading/setting the corresponding registers of the selected port.

2.1 PART I

In this part of the experiment, the task was controlling LED 2 on Port 1 using the push button on Port 2. Program toggles LED 2 whenever P2.2 is pressed. P1 is configured as output. P2 is configured as input. We are first reading the P2.2 if it is pressed we are going to ON layer. Within this layer, the output is reversed. So if it is 1 we change it to 0 or vice versa.

```
;
RESET       mov.w   #__STACK_END,SP         ; Initialize stackpointer
StopWDT     mov.w   #WDTPW|WDTHOLD,&WDTCTL  ; Stop watchdog timer

SetupP2                 clr.b   &P2IN
                        clr.b   &P2OUT
                        clr.b   &P1OUT
                        bis.b   #11111111b, &P1DIR      ;P1 output for LED (second led is output)
                        bis.b   #00000000b, &P2DIR      ;P2 input for button (third button is input)

;-------------------------------------------------------------------------------
; Main loop here
;-------------------------------------------------------------------------------

Mainloop                bit.b   #00000100b, &P2IN       ; Read switch at P2.2
                        jnz             ON              ; if it is pressed jmp to ON
                        jmp     Wait                    ; branch to a delay routine

ON                      xor.b   #00000010b, &P1OUT      ; change P1.1
                        jmp     Wait                    ; branch to a delay routine

Wait                    mov.w   #50000,R15              ; load R15 with value for delay
L1                      dec.w   R15                     ; decrement R15
                        jnz     L1                      ; if R15 is not zero jump to L1
                        jmp     Mainloop                ; jump to the Mainloop label


;-------------------------------------------------------------------------------
```

Code for Part 1

2.2 PART II

In this part we wrote an assembly program that counts how many time P2.3 is pressed. To do that we used a counter and for counter we created a variable in memory. After that result is printed to Port 1.

To create a variable we added following line before .text part.

var1 .byte 0

```
RESET       mov.w   #__STACK_END,SP         ; Initialize stackpointer
StopWDT     mov.w   #WDTPW|WDTHOLD,&WDTCTL  ; Stop watchdog timer

SetupP2                 clr.b   &P2IN
                        clr.b   &P2OUT
                        clr.b   &P1OUT
                        bis.b   #11111111b, &P1DIR      ;P1 output for LED (second led is output)
                        bis.b   #00000000b, &P2DIR      ;P2 input for button (third button is input)

;-------------------------------------------------------------------------------
; Main loop here
;-------------------------------------------------------------------------------

Mainloop                bit.b   #00000100b, &P2IN       ;Read switch at P2.2
                        jnz     ON                      ;If it is pressed go to ON
                        jmp     Wait                    ;branch to a delay routine

ON                      inc.w   var1                    ; inc counter var1
                        mov.w   var1,&P1OUT             ; send var1 as output to P1
                        jmp     Wait                    ; branch to a delay routine

Wait                    mov.w   #50000,R15              ;load R15 with value for delay
L1                      dec.w   R15                     ;decrement R15
                        jnz     L1                      ;if R15 is not zero jump to L1
                        jmp     Mainloop                ;jump to the Mainloop label
```

2.3 PART III

In this part of the experiment, the code in the second part was altered further to add an reset button to system. We used the P2.1 for this aim. Whenever P2.1 is pressed counter is cleared and 0 is pressed to screen as a result.

```
Mainloop                bit.b   #00000001b, &P2IN       ;If reset button is pressed
                        jnz     CLEAR                   ;Jump to CLEAR

                        bit.b   #00000100b, &P2IN       ;Read switch at P2.2
                        jnz     ON                      ;If it is pressed go to ON
                        jmp     Wait                    ;branch to a delay routine

ON                      inc.w   var1                    ; inc counter var1
                        mov.w   var1,&P1OUT             ; send var1 as output to P1
                        jmp     Wait                    ; branch to a delay routine

CLEAR                   clr.b   var1                    ; clear the counter
                        clr.b   &P1OUT                  ; send empty counter to P1
                        jmp     Mainloop

Wait                    mov.w   #50000,R15              ;load R15 with value for delay
L1                      dec.w   R15                     ;decrement R15
                        jnz     L1                      ;if R15 is not zero jump to L1
                        jmp     Mainloop                ;jump to the Mainloop label
```

Code for Part 3

3 CONCLUSION

The only difficulty we faced was an occasional initialization error, the cause of which could not be determined and which could easily be fixed by disconnecting and connecting the microcomputer. After solving the first question it was easy to understand but first part took a lot of time.