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Department of Computer Engineering

BLG 351E Microcomputer Laboratory Experiment Report

Experiment No : 1
Experiment Date : 13.10.2017

Group Number : Friday - 13
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1 INTRODUCTION

This experiment consists of 3 parts. In the first part, we used the code snippet from the test booklet and tried the code snippet that taught us how to turn on and turn off the 1st LED in the experiment set. In the second part, we changed the code part that we used in the first part and created a program which sequentially goes from the 1st LED to the 8th LED and turn off all LEDs and starts the 1st LED again. In the last section, a loop was created that increased to turn on all LEDs up to the 8th LED, then decrease from the 8th LED such as knight rider.

2 EXPERIMENT

2.1 EXPERIMENT 1

This part of the experiment provided us to identify the MSP430 training set, the MSP430G2253 microcontroller and the MSP430 assembly language. We used Code Composer Studio to write assembly code. In this program, we have learned how the code should be compiled and how it is run on the microcontroller.

We run the code in compiler given below in the test book and we learn that the 1st LED on the circuit started to blink at certain intervals.

SetupP1	bis.b	#001h,&P1DIR	; P1.0 output
			;
Mainloop	xor.b	#001h,&P1OUT	; Toggle P1.0
Wait	mov.w	#050000,R15	; Delay to R15
L1	dec.w	R15	; Decrement R15
	jnz	L1	; Delay over?
	jmp	Mainloop	; Again

2.2 EXPERIMENT 2

In the second part of the experiment, we changed the code given to us. As a result, starting with the first LED, we have created a loop that goes sequentially to the 8th LED and turn off all of it when it comes to the end and returns to the 1st LED. The code looks like the one below.

SetupP1	bis.b	#0ffh,&P1DIR
Mainloop	mov.b	#001h,&P1OUT
Shift	rlc	&P1OUT
	cmp	#080h,&P1OUT
	jeq	Mainloop
Timer	mov.w	#050000,R15
L1	dec.w	R15
	jnz	L1
	jmp	Shift

The program consists of three parts, the main loop, the shift part and the timer part. In the program, we first set the first port to use all LEDs. Later we assigned # 001h to the first port. This enabled us to turn on the first LED in 8 LEDs. This value was then compared to # 080h which is the last LED's address. We tried to check whether P1OUT come to 8th LED. If it is not equal, it is passed to the timer section. As a timer, a large value was assigned to register R15 and this value was reduced one time each time. If the register value is not equal to 0, the loop repeats. When the register is equal to 0, the loop is exited. During this time the light remains on. If the value in the first port is equal to # 080, the main loop will return to the beginning and continue to light from the first LED.

2.3 EXPERIMENT 3

In the last part of the experiment, in addition to the code in the second part, when we arrived at the 8th LED, the program go back decreasingly to the 1st LED instead of going directly.

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SetupP1      bis.b   #0FFh, & P1DIR
Mainloop     mov.b   #001h, & P1OUT
              jmp     Timer
ShiftLeft    rlc.w   & P1OUT
              cmp     #080h,& P1OUT
              jeq     ShiftRight
              jmp     Timer
ShiftRight   jmp     Timer2
L1           rrc.w   &P1OUT
              cmp     #001h,& P1OUT
              jeq     Mainloop
              jmp     Timer2
Timer        mov.w   #050000, R15
L2           dec.w   R15
              jnz     L2
              clrc
              jmp     ShiftLeft
Timer2       mov.w   #050000, R15
L3           dec.w   R15
              jnz     L3
              clrc
              jmp     L1
    
```

The program consists of four parts, the main loop, the shift left part, the shift right part and the timers' part. In the program, we first set the first port to use all LEDs. Later we assigned # 001h to the first port. This enabled us to turn on the first LED in 8 LEDs. The program jump to the first timer section and let the first LED remain on for a while. The return of the first timer is to the Shift Left label. The Shift Left section shifts the value in P1OUT to the left, allowing the 2nd LED to light. This process continues up to the 8th LED. When the program reaches the 8th LED, it jumps to the Shift Right. The Shift Right section also shift the P1OUT value to the right, allowing the 7th LED to light. This process continues up to the 1st LED. The program continues to loop from the beginning when it reaches the 1st LED.

3 CONCLUSION

We had a problem with Code Composer Studio because we have not used it before. We also had a problem with the computer connection to the microcomputer due to the cable. In general we learned assembly language for microcomputer. We have learned about debug and compilation processes for Code Composer Studio and get familiar with usage of some commands.