

Temple University
College of Engineering
Department of Electrical and Computer Engineering (ECE)

Student Lab Report Cover Page

Course Number : 3613

Course Section : 001 / 002

Experiment # : Lab # 8

Student Name (print) : Von Kaukeano

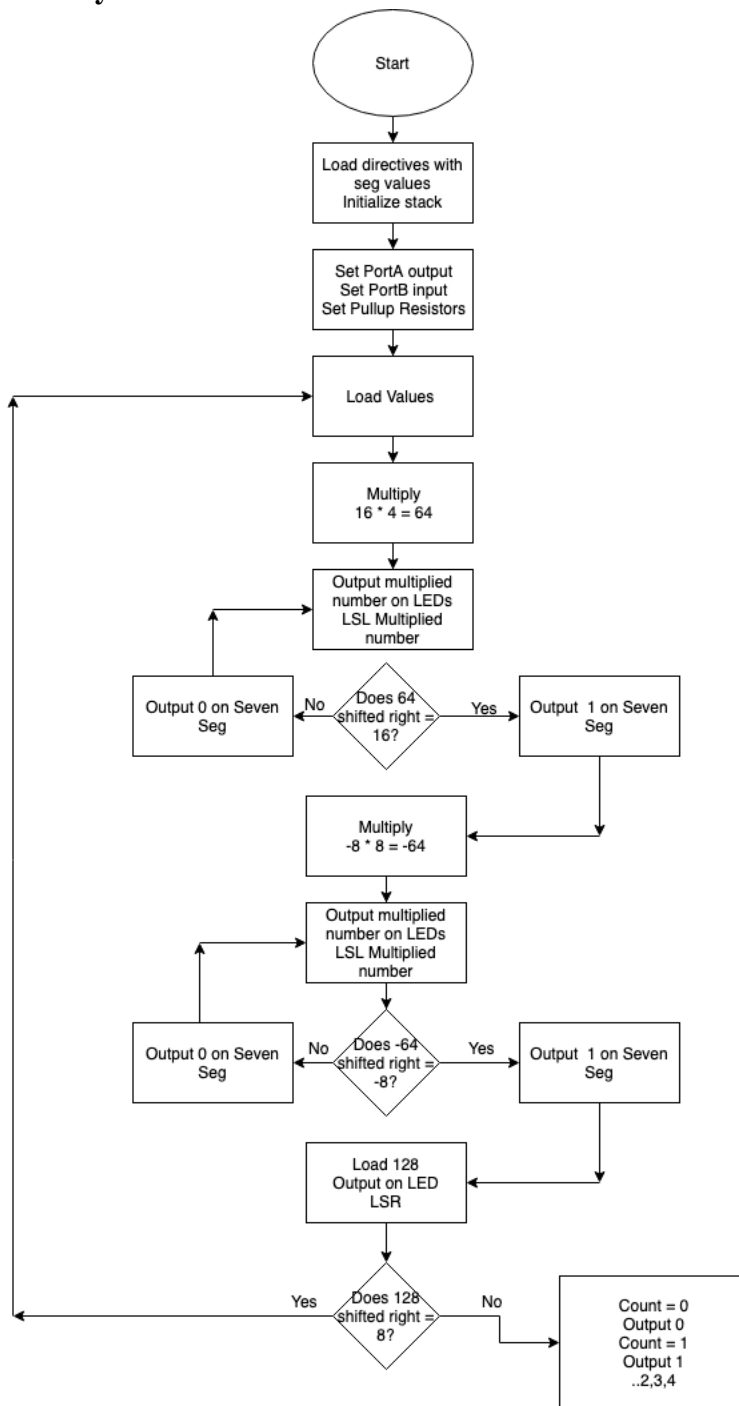
TUId# : 915596703

Date : 10/24/19

Grade : _____ /100

TA Name : Sung Choi

- Activity 1



```

.EQU ZERO = 0B00111111
.EQU ONE = 0B00000110
.EQU TWO = 0B01011011
.EQU THREE = 0B01001111
.EQU FOUR = 0B01100110
  
```

```
LDI R16,LOW(RAMEND)
```

```
OUT SPL,R16
LDI R17,HIGH(RAMEND)
```

```
LDI R16,$00
LDI R17,$FF
OUT PORTB , R17
OUT DDRA,R17
OUT DDRB,R16
```

```
RELOAD:
; N values
LDI R22,16
LDI R17,-8
LDI R16,128
; Multpliers
LDI R19,8
LDI R21,4
;Reset
LDI R31, 0
;Counter
LDI R28,0
;SREG TO CHECK FOR Z FLAG
LDI R30,SREG
```

```
MUL R22,R21
MOV R20,R0 ;R20 = 16 * 4
```

```
MUL R17,R19
MOV R23,R0 ;R23 = -8 * 8
```

```
MUL1:
OUT PORTA,R20
CALL DELAY1
OUT PORTA,R31
CALL DELAY1
CLR R30
LSL R22
CP R22,R20
BRNE ZERO_OUT1
RJMP ONE_OUT1
```

```
MUL2:
OUT PORTA,R23
```

```
CALL DELAY1
OUT PORTA,R31
CALL DELAY1
CLR R30
LSL R17
CP R17,R23
BRNE ZERO_OUT2
RJMP ONE_OUT2
```

```
DIV1:
OUT PORTA,R16
CALL DELAY1
OUT PORTA,R31
CALL DELAY1
CPI R28,0
BREQ ZERO_COUNT
CLR R30
LSR R16
CP R16,R19
BRNE COUNT_1
RJMP FOUR_COUNT
```

```
COUNT_1:
CPI R28,1
BREQ ONE_COUNT
```

```
COUNT_2:
CPI R28,2
BREQ TWO_COUNT
```

```
COUNT_3:
CPI R28,3
BREQ THREE_COUNT
```

```
COUNT_4:
CPI R28,4
BREQ BRANCH_HELP
```

```
ZERO_OUT1:
LDI R29,ZERO
OUT PORTA,R29
CALL DELAY2
OUT PORTA,R31
CALL DELAY2
```

RJMP MUL1

ZERO_OUT2:
LDI R29,ZERO
OUT PORTA,R29
CALL DELAY2
OUT PORTA,R31
CALL DELAY2
RJMP MUL2

ONE_OUT1:
LDI R29,ONE
OUT PORTA,R29
CALL DELAY2
OUT PORTA,R31
CALL DELAY2
RJMP MUL2

ONE_OUT2:
LDI R29,ONE
OUT PORTA,R29
CALL DELAY2
OUT PORTA,R31
CALL DELAY2
RJMP DIV1

ZERO_COUNT:
LDI R29,ZERO
OUT PORTA,R29
CALL DELAY2
OUT PORTA,R31
CALL DELAY2
INC R28
RJMP DIV1

BRANCH_HELP:
NOP
RJMP FOUR_COUNT

ONE_COUNT:
LDI R29,ONE
OUT PORTA,R29
CALL DELAY2
OUT PORTA,R31

```
CALL DELAY2
INC R28
RJMP DIV1
```

```
TWO_COUNT:
LDI R29,TWO
OUT PORTA,R29
CALL DELAY2
OUT PORTA,R31
CALL DELAY2
INC R28
RJMP DIV1
```

```
THREE_COUNT:
LDI R29,THREE
OUT PORTA,R29
CALL DELAY2
OUT PORTA,R31
CALL DELAY2
INC R28
RJMP DIV1
```

```
FOUR_COUNT:
LDI R29,FOUR
OUT PORTA,R29
CALL DELAY2
OUT PORTA,R31
CALL DELAY2
INC R28
RJMP RELOAD
```

```
; 1 Second Delay
```

```
DELAY1:
    ldi r27, 82
    ldi r26, 43
    ldi r25, 0
L1: dec r25
    brne L1
    dec r26
    brne L1
    dec r27
    brne L1
    nop
    RET
```

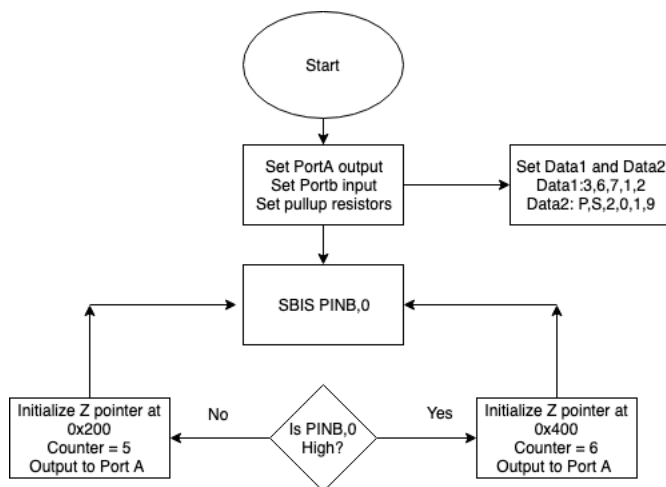
```

; HALF SECOND DELAY
DELAY2:
    ldi r25, 41
    ldi r26, 150
    ldi r27, 128
L2: dec r27
    brne L1
    dec r26
    brne L1
    dec r25
    brne L2
    RET

```

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- Activity 2



```

LDI R16,$00
LDI R17,$FF
OUT PORTB,R17
OUT DDRA,R17
OUT DDRB,R16
LDI R19,0

```

```

CHECK:
SBIS PINB,0
RJMP INIT1
RJMP INIT2

```

NUM:

```
CALL DELAY
LPM r16,Z+
OUT PORTA,R16
DEC R17
BRNE NUM
RJMP CHECK
```

```
STRING:
CALL DELAY
LPM r16,Z+
OUT PORTA,R16
DEC R18
BRNE STRING
RJMP CHECK
```

```
INIT1:
LDI R17,5 ; COUNTER FOR NUM
OUT PORTA,R19
LDI ZH,HIGH(0x0200)
LDI ZL,LOW(0x0200)
RJMP NUM
```

```
INIT2:
LDI R18,6 ;COUNTER FOR STRING
OUT PORTA,R19
LDI ZH,HIGH(0x0400)
LDI ZL,LOW(0x0400)
RJMP STRING
```

```
; HALF SECOND DELAY
```

```
DELAY:
    ldi r21, 41
    ldi r22, 150
    ldi r20, 128
L2: dec r20
    brne L2
    dec r22
    brne L2
    dec r21
    brne L2
    RET
```

```
.ORG 0x0100
DATA1:.DB 3,6,7,1,2
```


.ORG 0x0200

DATA2:.DB 'P','S','2','0','1','9'

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