Design Assignment 2A

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Directory: https://github.com/armonlatifi/sub_da/tree/master/DA2A

 Submit the following for all Labs:

1. In the document, for each task submit the modified or included code (only) with highlights and justifications of the modifications. Also, include the comments.

2. Use the previously create a Github repository with a random name (no CPE/301, Lastname, Firstname). Place all labs under the root folder ESD301/DA, sub-folder named LABXX, with one document and one video link file for each lab, place modified asm/c files named as LabXX-TYY.asm/c.

3. If multiple asm/c files or other libraries are used, create a folder LabXX-TYY and place these files inside the folder.

4. The folder should have a) Word document (see template), b) source code file(s) and other include files, c) text file with youtube video links (see template).

1.   COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS

List of Components used:
- Assembler
- Simulator
- Debugger
- Breadboard
- Atmega328P
- Wires
- Microusb cord
- Atmel Studio
- LED
- switch
- Arudino Multi-function shield
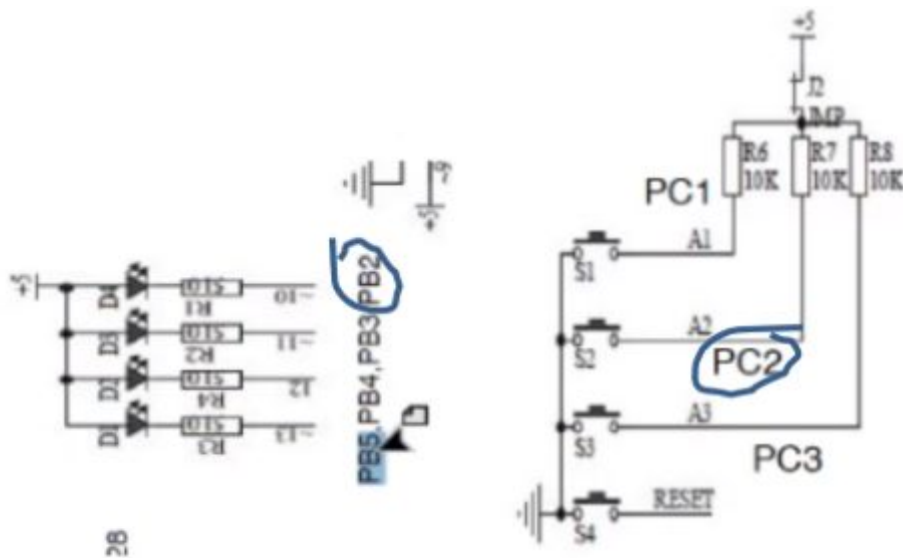
2.   INITIAL/MODIFIED/DEVELOPED CODE OF TASK 1/A

part_1.asm

```
start:
.org 0


        LDI R16,4
        SBI DDRB, 0x2
        LDI R17,0
        out PORTB,R17
        LDI R20,5
```

```
        STS TCCR1B,R20 ;set prescaler to 1024
        LDI R18, 0


begin:
        RCALL delay
        EOR R17,R16 ;led enable
        out PORTB,R17
        RCALL delay_2
        EOR R17,R16 ;led enable
        out PORTB,R17
        RJMP begin

delay:
        LDS R29, TCNT1H ;upper bit
        LDS R28, TCNT1L ;lower bit
        CPI R28,0x8B ;compare
        BRSH body
        RJMP delay

body:
        CPI R29,0x1A
        BRSH done
        RJMP delay

delay_2:
        LDS R29, TCNT1H ;upper bit
        LDS R28, TCNT1L ;lower bit
        CPI R28,0xB2 ;compare
        BRSH body_2
        RJMP delay_2

body_2:
        CPI R29,0x11
        BRSH done
        RJMP delay_2

done:
        LDI R20,0x00
        STS TCNT1H,R20
        LDI R20,0x00
        STS TCNT1L,R20
        RET
```

part_1.c

```c
#include <avr/io.h>
#define F_CPU 16000000UL //set clock speed
#include <util/delay.h>

int main(void){
        DDRB |= (1<<PB2); //port b as output
        while(1){
                PORTB |= (1<<PB2); //enable led
                _delay_ms(290);
                PORTB &= ~(1<<PB2); //disable led
                _delay_ms(435);
```

```
        }
        return 1;
}
```

3.   DEVELOPED MODIFIED CODE OF TASK 2/A from TASK 1/A

part_2.asm

```
start:
        SBI DDRB, 0x4
        CBI DDRC, 0x2
        LDI r16, 0x00
        OUT PORTB, r16

loop_1:
        IN r18, PINC
        CP r16, r18
        BRNE enable
        rjmp loop_1

enable:
        LDI r18, 0xff
        OUT PORTB, r18
        RCALL delay
        rjmp start

delay:
        LDS R29, TCNT1H ;upper bit
        LDS R28, TCNT1L ;lower bit
        CPI R28,0x8B ;compare
        BRSH body
        RJMP delay

body:
        CPI R29,0x1A
        BRSH done
        RJMP delay
```

part_2.c

```
#include <avr/io.h>
#define F_CPU 16000000UL //set clock speed
#include <util/delay.h>

int main(void)
{
        DDRB |= (1<<2); //port b is output

        DDRC &= (0<<2);
        PORTC |= (1<<2);
        while(1){
                if(PINC & 0x2){
                        _delay_ms(1250); //wait
                        PORTB |= (1<<PB2); //turn led off
```
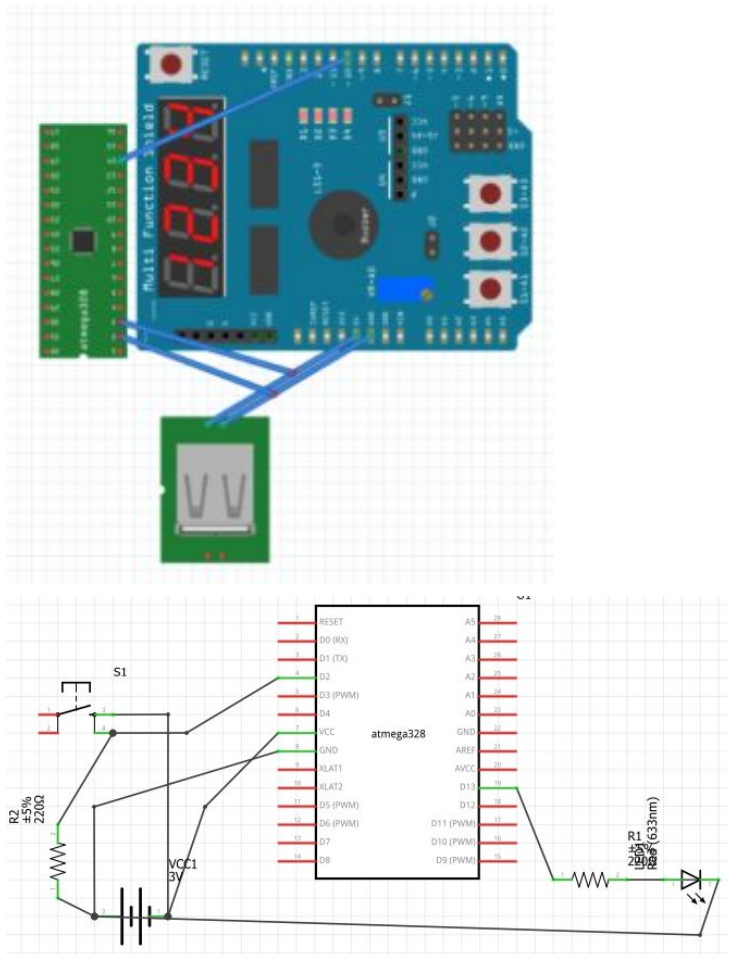
```
                    }
                    else
                            PORTB &= ~(1<<PB2); //enable led
            }
            return 0;
}
```

4.   SCHEMATICS

Use fritzing.org

5.   SCREENSHOTS OF EACH TASK OUTPUT (ATMEL STUDIO OUTPUT)

Name	Value	
Program Counter	0x00000059	
Stack Pointer	0x08FD	
X Register	0x0000	
Y Register	0x08FF	
Z Register	0x0084	
Status Register	I T H S V N Z C	
Cycle Counter	11838487	
Frequency	16.000 MHz	
Stop Watch	739,905.44 µs	
Stack Pointer	0x08FF	
X Register	0x0000	
Y Register	0x1ADA	
Z Register	0x0000	
Status Register	I T H S V N Z C	
Cycle Counter	7038991	
Frequency	16.000 MHz	
Stop Watch	439,936.94 µs	
⊟ Registers		

6.   SCREENSHOT OF EACH DEMO (BOARD SETUP)
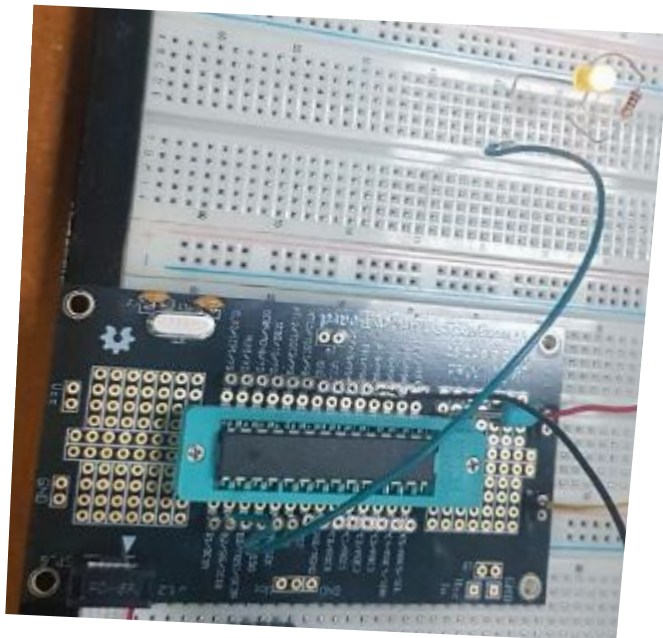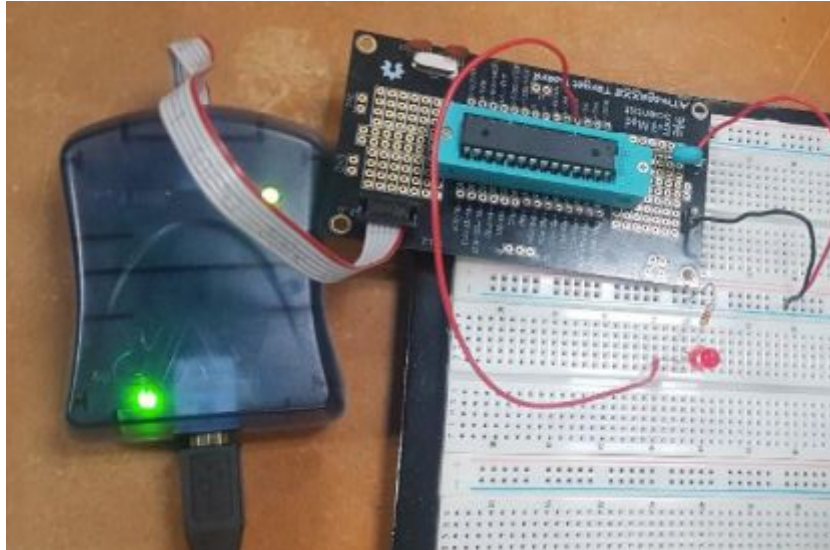
7.   GITHUB LINK OF THIS DA

https://github.com/armonlatifi/sub_da/tree/master/DA2A

Student Academic Misconduct Policy
http://studentconduct.unlv.edu/misconduct/policy.html

"*This assignment submission is my own, original work*".
Armon Latifi