CPE301 – FALL 2019

Design Assignment 2C

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Directory:

Submit the following for all Labs:

- In the document, for each task submit the modified or included code (only) with highlights and justifications of the modifications. Also, include the comments.
- 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.
- If multiple asm/c files or other libraries are used, create a folder LabXX-TYY and place these files inside the folder.
- 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).

- **COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS**

List of Components used
Block diagram with pins used in the Atmega328P

- **INITIAL/MODIFIED/DEVELOPED CODE OF TASK 1/A**

TASK 1 (PART A)

```
#define F_CPU 16000000UL
#include <avr/io.h>
int main(void){
	int c = 0;
	TCCR01 = 0;
	TCCR02 |= (1<<CS03) | (1<<CS00);
	DDRB |= (1<<3);
   while (1){
```

```
            c=0;
            TCNT0 = 00000000;
            while (c<38){
                  if(TCNT0 == 11111111){
                        c++;
                        TCNT0 = 00000000;
                  }
            }
            PORTB = (1<<3);
            c = 0;
            TCNT0 = 00000000;
            while (c<26){
                  if(TCNT0 == 11111111){
                        c++;
                        TCNT0 = 00000000;
                  }
            }
            PORTB = (1<<3);
   }
}
```

Task 1 (Part B)

```
#define F_CPU 16000000UL
#include <avr/io.h>
int main(void){
      DDRC &= (0<<3);
      PORTC |= (1<<3);
      DDRB |= (1<<3);
      TCCR01 = 0;
      TCCR02 |= (1<<CS03) | (1<<CS00);
      int c = 0;
      while (1){
            if(!(PINC & (1<<PINC3))){
                  PORTB &= ~(1<<3);
                  c = 0;
                  TCNT0 = 00000000;
                  while(c<83) {
                        if(TCNT0 == 11111111){
                              c++;
                              TCNT0 = 00000000;
                        }
                  }
            }
      else{
```

```
            PORTB |= (1<<3);
        }
}
        return 0;
}
```

Task 2

```
#define F_CPU 16000000UL
#include <avr/interrupt.h>
#include <avr/io.h>
uint8_t OVF_C = 0;
uint8_t OVF_L = 26;
int main(void){
        DDRB |= (1<<3);
        TCCR01 = 0;
        TCCR02 |= (1<<CS03) | (1<<CS00);
        TCNT0 = 6;
        TIMSK0 = (1<<TOIE0);
        sei();
        while (1) {
        }
}
ISR (TIMER0_OVF_vect){
        OVF_C++;
            if (OVF_C == OVF_L){
                PORTB ^= (1<<3);
                    if(OVFLIMIT == 26){
                        OVFLIMIT = 38;
                    }
                    else{
                        OVF_L = 26;
                        }
                    OVF_C = 0;
                }
        TCNT0 = 6;
}
```

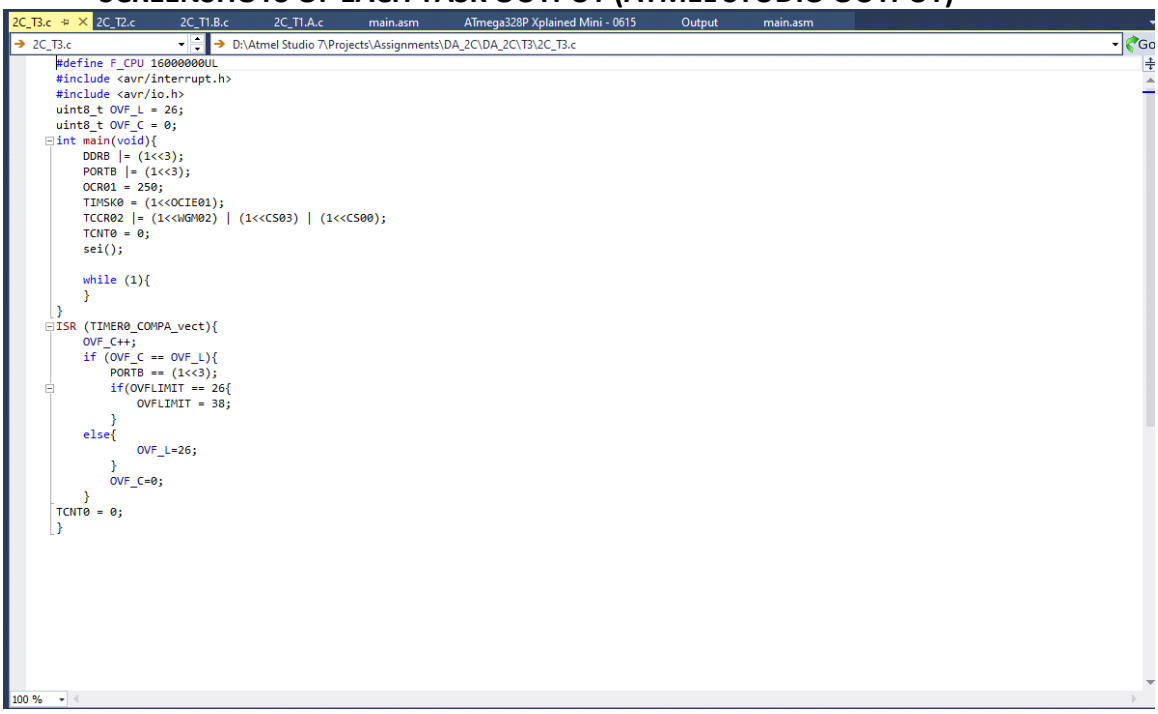
Task 3

```
#define F_CPU 16000000UL
#include <avr/interrupt.h>
#include <avr/io.h>
uint8_t OVF_L = 26;
uint8_t OVF_C = 0;
int main(void){
```

```
        DDRB |= (1<<3);
        PORTB |= (1<<3);
        OCR01 = 250;
        TIMSK0 = (1<<OCIE01);
        TCCR02 |= (1<<WGM02) | (1<<CS03) | (1<<CS00);
        TCNT0 = 0;
        sei();

        while (1){
        }
}
ISR (TIMER0_COMPA_vect){
        OVF_C++;
        if (OVF_C == OVF_L){
                PORTB == (1<<3);
                if(OVFLIMIT == 26{
                        OVFLIMIT = 38;
                }
        else{
                        OVF_L=26;
                }
                OVF_C=0;
        }
TCNT0 = 0;
}
```

- **SCREENSHOTS OF EACH TASK OUTPUT (ATMEL STUDIO OUTPUT)**



2C_T3.c | 2C_T2.c | 2C_T1.B.c | 2C_T1.A.c | main.asm | ATmega328P Xplained Mini - 0615 | Output | main.asm

2C_T2.c — D:\Atmel Studio 7\Projects\Assignments\DA_2C\DA_2C\T2\2C_T2.c

```c
#define F_CPU 16000000UL
#include <avr/interrupt.h>
#include <avr/io.h>
uint8_t OVF_C = 0;
uint8_t OVF_L = 26;
int main(void){
    DDRB |= (1<<3);
    TCCR01 = 0;
    TCCR02 |= (1<<CS03) | (1<<CS00);
    TCNT0 = 6;
    TIMSK0 = (1<<TOIE0);
    sei();
    while (1) {
    }
}
ISR (TIMER0_OVF_vect){
    OVF_C++;
        if (OVF_C == OVF_L){
            PORTB ^= (1<<3);
                if(OVFLIMIT == 26){
                    OVFLIMIT = 38;
                }
                else{
                    OVF_L = 26;
                    }
                OVF_C = 0;
            }
    TCNT0 = 6;
}
```

100 %

2C_T3.c | 2C_T2.c | 2C_T1.B.c | 2C_T1.A.c | main.asm | ATmega328P Xplained Mini - 0615 | Output | main.asm

2C_T1.B.c — D:\Atmel Studio 7\Projects\Assignments\DA_2C\DA_2C\T1\Part B\2C_T1.B.c

```c
#define F_CPU 16000000UL
#include <avr/io.h>
int main(void){
    DDRC &= (0<<3);
    PORTC |= (1<<3);
    DDRB |= (1<<3);
    TCCR01 = 0;
    TCCR02 |= (1<<CS03) | (1<<CS00);
    int c = 0;
    while (1){
        if(!(PINC & (1<<PINC3))){
            PORTB &= ~(1<<3);
            c = 0;
            TCNT0 = 00000000;
            while(c<83) {
                if(TCNT0 == 11111111){
                    c++;
                    TCNT0 = 00000000;
                }
            }
        }
    else{
        PORTB |= (1<<3);
    }
}
    return 0;
}
```

100 %

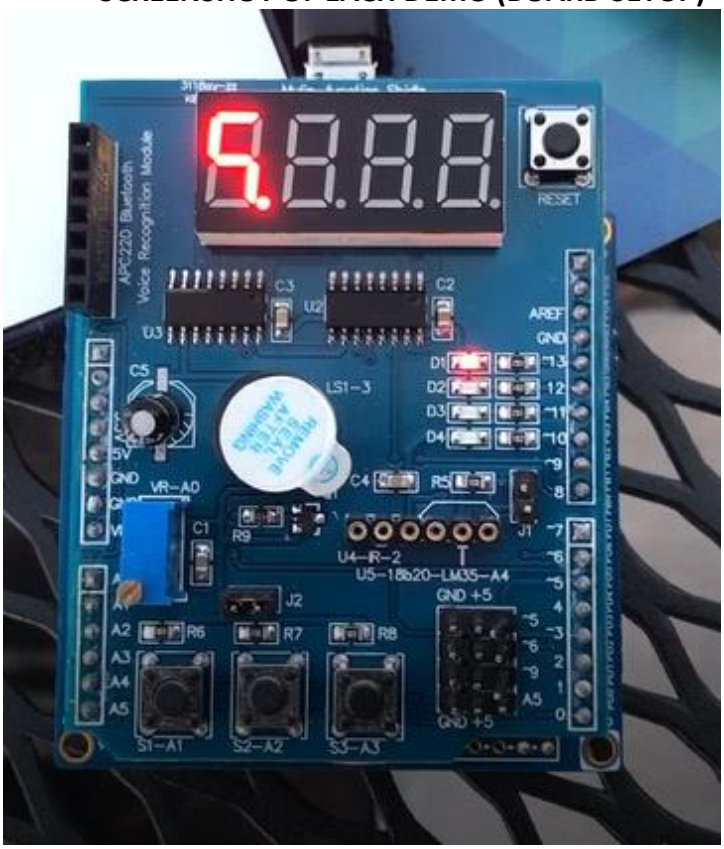
2C_T1.A.c ASF Wizard

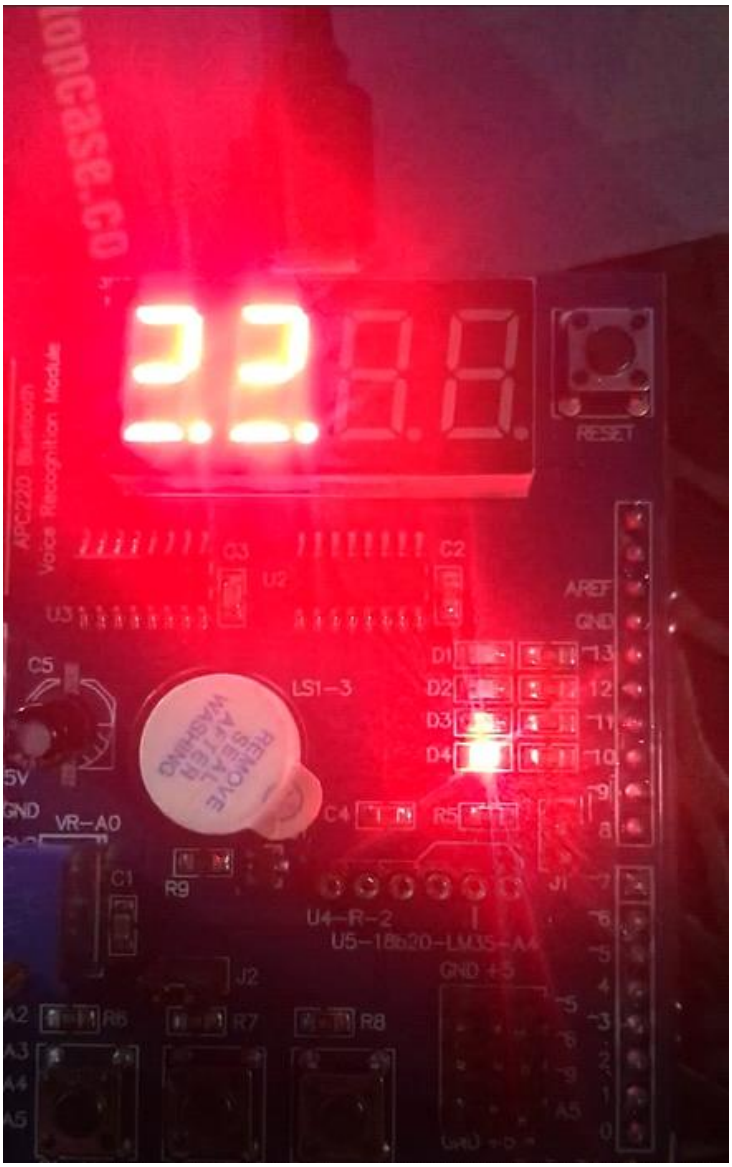
2C_T1.A.c D:\Atmel Studio 7\Projects\Assignments\DA_2C\DA_2C\T1\Part A\2C_T1.A.c Go

```
#define F_CPU 16000000UL
#include <avr/io.h>
int main(void){
    int c = 0;
    TCCR01 = 0;
    TCCR02 |= (1<<CS03) | (1<<CS00);
    DDRB |= (1<<3);
    while (1){
        c=0;
        TCNT0 = 00000000;
        while (c<38){
            if(TCNT0 == 11111111){
                c++;
                TCNT0 = 00000000;
            }
        }
        PORTB = (1<<3);
        c = 0;
        TCNT0 = 00000000;
        while (c<26){
            if(TCNT0 == 11111111){
                c++;
                TCNT0 = 00000000;
            }
        }
        PORTB = (1<<3);
    }
}
```

100 %

- **SCREENSHOT OF EACH DEMO (BOARD SETUP)**




RESET
AREF
GND
D1
D2
D3
D4
LS1-3
C5
C4
R5
R9
C1
J1
J2
U4-R-2
U5-18b20-LM35-A4
VR-A0
5V
GND
R6
R7
R8

- **VIDEO LINKS OF EACH DEMO**
  - TASK 1 https://www.youtube.com/watch?v=bG_zpe2rRg8
  - TASK 2 https://www.youtube.com/watch?v=1XigKf0U2Kg
  - TASK 3 https://www.youtube.com/watch?v=CjGpIZPzi7oHYPERLINK

- **GITHUB LINK OF THIS DA**

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

"*This assignment submission is my own, original work*".
Worku Tafara