

Design Assignment 2B

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Primary Github address: <https://github.com/WorkuT1226/CPE301.git>

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**

```
; AssemblerApplication1.asm
```

```
; Created: 10/5/2019 6:21:20 PM
```

```
; Author : Worku Tafara
```

```
;
```

```
.org 0
```

```
jmp START
```

```
.org 0x02
```

```
jmp TARGET
```

```
START:
```

```

ldi R20, HIGH(RAMEND)
out SPH, R20
ldi R20, LOW(RAMEND)
out SPL, R20
ldi R20, 2
sts EICRA, R20
sbi DDRB, 3
sbi PORTB, 3
sbi PORTD, 2
cbi DDRC, 3
sbi PORTC, 3
ldi R20, 1<<INT0
out EIMSK, R20
sei
here:
jmp here
TARGET:
in R21, PORTB
ldi R22, (1<<3)
eor R21, R22
out PORTB, R21
; Delay 6 000 000 cycles
; 375ms at 16.0 MHz
        ldi R18, 31
        ldi R19, 113
        ldi R20, 31
L1:
dec R20
    brne L1
dec R19
    brne L1
dec R18
    brne L1
nop

```

- **DEVELOPED MODIFIED CODE OF TASK 2/A from TASK 1/A**

C code

```

#include <avr/io.h>
#include <avr/interrupt.h>
#include <util/delay.h>
#define F_CPU 16000000UL
int main(void){

```

```

DDRB |= (1<<3);
PORTB |= (1<<3);
DDRC &= (0<<3);
PORTC |= (1<<3);
EIMSK = (1<<INT0);
EICRA = (1<<ISC01);
sei ();

```

```

while (1) {}
}
ISR (INT0_vect) {
    PORTB ^= (1<<3);
    _delay_ms(1333);
}

```

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

```

; AssemblerApplication1.asm
; Created: 10/5/2019 6:21:20 PM
; Author : Worku Tafara
;
.org 0
jmp START
.org 0x02
jmp TARGET

START:
ldi R20, HIGH(RAMEND)
out SPH, R20
ldi R20, LOW(RAMEND)
out SPL, R20
ldi R20, 2
sts EICRA, R20
sbi DDRB, 3
sbi PORTB, 3
sbi PORTD, 2
cbi DDRC, 3
sbi PORTC, 3
ldi R20, 1<<INT0
out EIMSK, R20
sei

here:
jmp here

```

```

main.asm - ASF Wizard
here:
jmp here

TARGET:
in R21, PORTB
ldi R22, (1<<3)
eor R21, R22
out PORTB, R21

; Delay 6 000 000 cycles
; 375ms at 16.0 MHz

ldi R18, 31
ldi R19, 113
ldi R20, 31

L1:
dec R20
brne L1
dec R19
brne L1
dec R18
brne L1
nop

```

```

CFile1.c
// AssemblerApplication1.asm
// Created: 10/5/2019 6:21:20 PM
// Author : Worku Tafara

#include <avr/io.h>
#include <avr/interrupt.h>
#include <util/delay.h>
#define F_CPU 16000000UL

int main(void){
    DDRB |= (1<<3);
    PORTB |= (1<<3);
    DDRC &= (0<<3);
    PORTC |= (1<<3);
    EIPSK = (1<<INT0);
    EICRA = (1<<ISC01);
    sei ();

    while (1) {}

    ISR (INT0_vect) {
        PORTB ^= (1<<3);
        _delay_ms(1333);
    }
}

```

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

```

main.asm  Output  main.asm  CFile1.c  T2
Show output from: Build
Target "PreBuildEvent" skipped, due to false condition; ('$(PreBuildEvent)' != '') was evaluated as ('' != '').
Target "CoreBuild" in file "D:\Atmel Studio 7\7.0\Vs\Assembler.targets" from project "D:\Atmel Studio 7\Projects\Assignments\DA_2A\T2\T2.asmproj" (target "Build" d
Task "RunAssemblerTask"
D:\Atmel Studio 7\7.0\toolchain\avr8\avrasm\avrasm2.exe -f -o "T2.hex" -m "T2.map" -l "T2.lss" -S "T2.tmp" -W+ie -I"D:\Atmel Studio 7\7.0\Packs\atm
AVRASM: AVR macro assembler 2.2.7 (build 69 Jul 26 2017 16:25:06)
Copyright (C) 1995-2017 ATMEL Corporation
[buildin](2): Including file 'D:\Atmel Studio 7\7.0\Packs\atmel\ATmega_DFP\1.2.209\avrasm\inc\m328pdef.inc'
[buildin](2): Including file 'D:\Atmel Studio 7\7.0\Packs\atmel\ATmega_DFP\1.2.209\avrasm\inc\m328pdef.inc'
"ATmega328P" memory use summary [bytes]:
Segment  Begin  End  Code  Data  Used  Size  Use%
-----
[.cseg] 0x000000 0x000022  34    0   34  32768  0.1%
[.dseg] 0x000100 0x000100    0    0    0   2048  0.0%
[.eseg] 0x000000 0x000000    0    0    0    1024  0.0%
Assembly complete, 0 errors, 0 warnings
Done executing task "RunAssemblerTask".
Done building target "CoreBuild" in project "T2.asmproj".
Target "PostBuildEvent" skipped, due to false condition; ('$(PostBuildEvent)' != '') was evaluated as ('' != '').
Target "Build" in file "D:\Atmel Studio 7\7.0\Vs\Avr.common.targets" from project "D:\Atmel Studio 7\Projects\Assignments\DA_2A\T2\T2.asmproj" (entry point):
Done building target "Build" in project "T2.asmproj".
Done building project "T2.asmproj".

Build succeeded.
***** Build: 1 succeeded or up-to-date, 0 failed, 0 skipped *****

```

- **VIDEO LINKS OF EACH DEMO**

<https://youtu.be/ZWJ7K3NarFc>

- **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