CPE301 – SPRING 2021

Design Assignment 2A

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Primary Github address: https://github.com/cpemejia/design\_assignments.git

Directory: design\_assignments

1. **COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS**
2. Atmel studio d.logic analyzer
3. Atmega328pb
4. Multifunction shield

Part1:

A picture containing diagram

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Part 2

A picture containing diagram

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

;

; DA\_2A.asm

;

; Created: 2/22/2021 10:04:43 PM

; Author : ElmerOMejia

;

.INCLUDE "M328pbDEF.INC"

.cseg

.ORG 0x00

LDI R16, LOW(RAMEND)

OUT SPL, R16

LDI R16, HIGH(RAMEND)

OUT SPH, R16

SBI DDRB, 3 ; set PB 3 output

loop:

CBI PORTB, 3 ; turn on portB

LDI R20, 15 ; delay 15x

CALL delay ; call delay subroutine

SBI PORTB, 3 ; turn off portB

LDI R20, 5 ; delay 5x

CALL delay ; call delay subroutine

rjmp loop ; endless loop

delay: ; delay for a 0.05s delay

LDI R16, 3 ; load immediate 3 to R16

L1: ; label 1

LDI R17, 105 ; load immediate 105 into R17

L2:

LDI R18, 255 ; load immediate 255, into R18

L3:

NOP ; NOP for more delay

NOP

NOP

NOP

NOP

NOP

NOP

DEC R18

BRNE L3

DEC R17

BRNE L2

DEC R16

BRNE L1

DEC R20

BRNE delay

ret

\*

\* DA\_2AC.c

\*

\* Created: 2/23/2021 5:44:39 PM

\* Author : ElmerOMejia

\*/

#include <avr/io.h>

#define *F\_CPU* 16000000UL // 16MHz

#include <util/delay.h>

int main(void)

{

DDRB |= (1<<PB3); // set output to pb3

while (1)

{

PORTB &= ~(1<<PB3); // turn pb3 on

*\_delay\_ms*(750); // delay for 0.75s

PORTB |= (1<<PB3); // turn off led

*\_delay\_ms*(250); // delay for 0.25s

}

return 1;

}

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

;

; DA\_2A2.asm

;

; Created: 2/23/2021 4:22:58 PM

; Author : ElmerOMejia

;

; Replace with your application code

.INCLUDE "M328pbDEF.INC"

.cseg

.ORG 0x00

LDI R16, HIGH(RAMEND)

OUT SPH, R16

LDI R16, LOW(RAMEND)

OUT SPL, R16

SBI PORTC, 3 ; enable pull up

SBI DDRB, 3 ; set PB3 output

loop:

SBIS PINC, 3 ; skip next if not pressed

RJMP pressed

CBI PORTB, 3 ; turn on portB led

LDI R20, 15 ; delay 15x

CALL delay ; call delay subroutine

SBI PORTB, 3 ; turn off portB led

LDI R20, 5 ; delay 5x

CALL delay ; call delay subroutine

RJMP loop ; endless loop

pressed:

SBI PORTB, 3 ; led pb3 off

SBI DDRB, 2 ; set PB2 as output

CBI PORTB, 2 ; led pb2 on

LDI R20, 40 ; 2s delay

CALL delay

SBI PORTB, 2 ; led pb2 off

SBIS PINC, 3 ; skip next if not pressed

RJMP pressed

RJMP loop

delay: ; delay for a 0.05s delay

LDI R16, 3 ; load immediate 3 to R16

L1: ; label 1

LDI R17, 105 ; load immediate 105 into R17

L2:

LDI R18, 255 ; load immediate 255, into R18

L3:

NOP ; NOP for more delay

NOP

NOP

NOP

NOP

NOP

NOP

DEC R18

BRNE L3

DEC R17

BRNE L2

DEC R16

BRNE L1

DEC R20

BRNE delay

Ret

/\*

\* DA\_2AC.c

\*

\* Created: 2/23/2021 5:44:39 PM

\* Author : ElmerOMejia

\*/

#include <avr/io.h>

#define *F\_CPU* 16000000UL

#include <util/delay.h>

int main (void)

{

DDRB |= (1<<PB3); // set PB3 output

PORTB |= (1<<PB3); // set PB3 off

//set PORTC.3 for input

DDRC &= (0 << 3);

PORTC |= (1 << 3);

while(1){

PORTB &= ~(1<<PB3); // output PB3 on

*\_delay\_ms*(750); // delay of 0.75s

PORTB |= (1<<PB3); // output PB3 off

*\_delay\_ms*(250); // delay of 0.25s

if (!(PINC & (1<<PINC3)))

{

PORTB |= (1<<PB3); //PB3 off

PORTB &= ~(1<<2); // set PORTB.2 for output

*\_delay\_ms*(2000); // delay of 2s

PORTB |= (1<<2); // PB2 off

PORTB &= ~(1<<PB3); // PB3 output on

}

}

return 1;

}

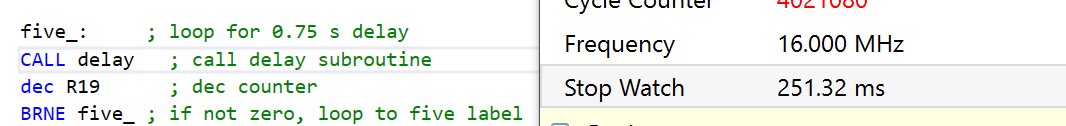
1. **SCREENSHOTS OF EACH TASK OUTPUT (ATMEL STUDIO OUTPUT)**

0.75s delay

Graphical user interface, text, application

Description automatically generated

0.25s delay



Graphical user interface, website

Description automatically generated

Graphical user interface

Description automatically generated

Task 2:

Graphical user interface

Description automatically generated

1. **SCREENSHOT OF EACH DEMO (BOARD SETUP)**

A picture containing text

Description automatically generatedA picture containing text, indoor, electronics

Description automatically generated

1. **VIDEO LINKS OF EACH DEMO**

<https://www.youtube.com/channel/UCgodP1yHEZXuYbDRVgoLNzQ/featured>

1. **GITHUB LINK OF THIS DA**

<https://github.com/cpemejia/design_assignments.git>

**Student Academic Misconduct Policy**

<http://studentconduct.unlv.edu/misconduct/policy.html>

“This assignment submission is my own, original work”.

Elmer Mejia