CPE301 – SPRING 2019

Design Assignment 3B

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Directory: https://github.com/armonlatifi/sub_da/tree/master/DA3B

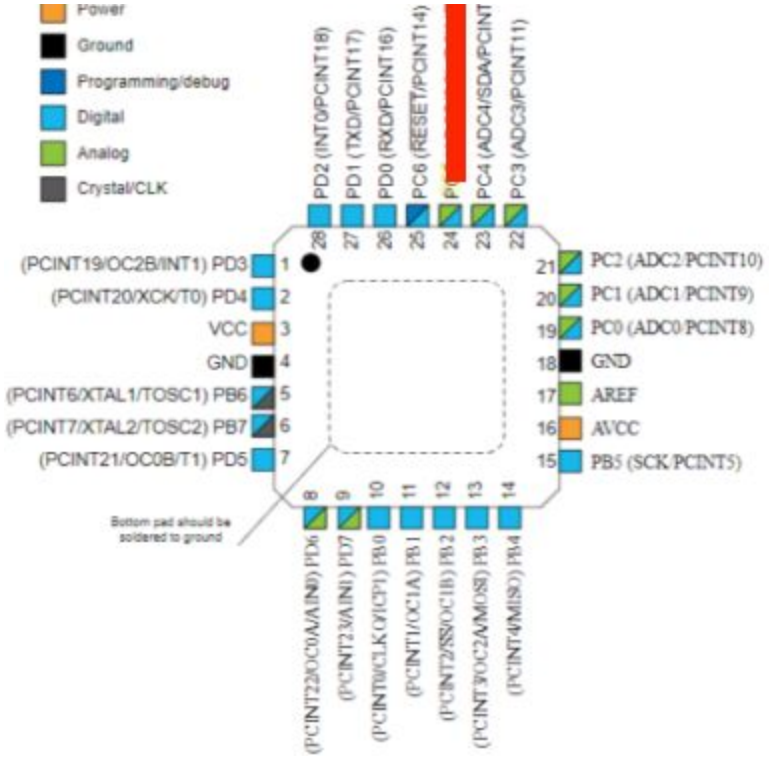
Submit the following for all Labs:

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).

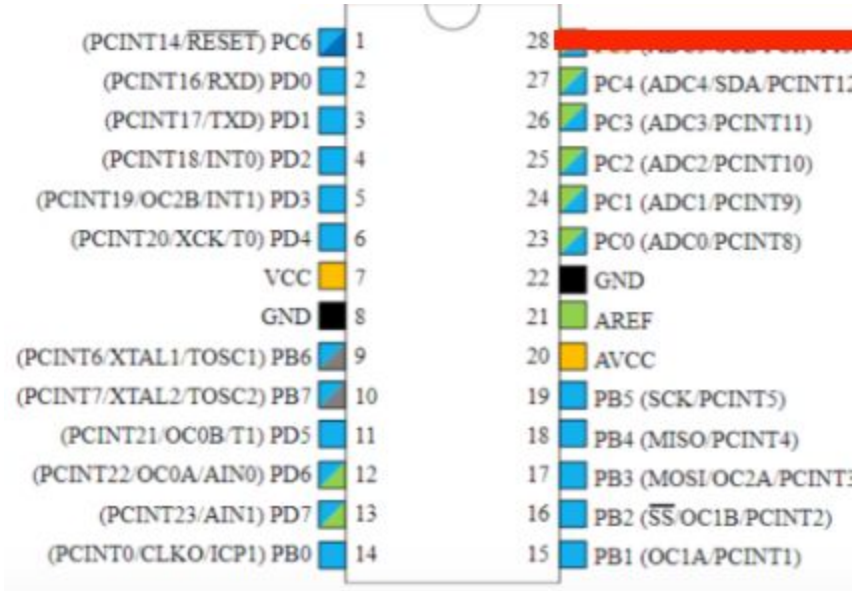
1. COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS

List of Components used:

- Assembler
- Simulator
- Debugger
- Breadboard
- Atmega328P
- Wires
- Microusb cord
- Atmel studio 7
- Xplained mini
- LM34


Power
Ground
Programming/debug
Digital
Analog
Crystal/CLK
PD2 (INT0/PCINT18)
PD1 (TXD/PCINT17)
PD0 (RXD/PCINT16)
PC6 (RESET/PCINT14)
PC4 (ADC4/SDA/PCINT
PC3 (ADC3/PCINT11)
(PCINT19/OC2B/INT1) PD3
(PCINT20/XCK/T0) PD4
VCC
GND
(PCINT6/XTAL1/TOSC1) PB6
(PCINT7/XTAL2/TOSC2) PB7
(PCINT21/OC0B/T1) PD5
PC2 (ADC2/PCINT10)
PC1 (ADC1/PCINT9)
PC0 (ADC0/PCINT8)
GND
AREF
AVCC
PB5 (SCK/PCINT5)
Bottom pad should be soldered to ground
(PCINT22/OC0A/AIN0) PD6
(PCINT23/AIN1) PD7
(PCINT0/CLKO/ICP1) PB0
(PCINT1/OC1A) PB1
(PCINT2/SS/OC1B) PB2
(PCINT3/OC2A/MOSI) PB3
(PCINT4/MISO) PB4


TR
RX
TX
/CC
CTS
ND
RTS


(PCINT14/RESET) PC6
(PCINT16/RXD) PD0
(PCINT17/TXD) PD1
(PCINT18/INT0) PD2
(PCINT19/OC2B/INT1) PD3
(PCINT20/XCK/T0) PD4
VCC
GND
(PCINT6/XTAL1/TOSC1) PB6
(PCINT7/XTAL2/TOSC2) PB7
(PCINT21/OC0B/T1) PD5
(PCINT22/OC0A/AIN0) PD6
(PCINT23/AIN1) PD7
(PCINT0/CLKO/ICP1) PB0
PC4 (ADC4/SDA/PCINT1
PC3 (ADC3/PCINT11)
PC2 (ADC2/PCINT10)
PC1 (ADC1/PCINT9)
PC0 (ADC0/PCINT8)
GND
AREF
AVCC
PB5 (SCK/PCINT5)
PB4 (MISO/PCINT4)
PB3 (MOSI/OC2A/PCINT
PB2 (SS/OC1B/PCINT2)
PB1 (OC1A/PCINT1)

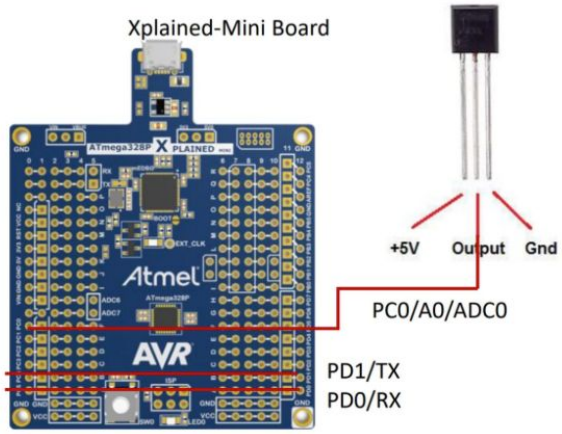
2. INITIAL/MODIFIED/DEVELOPED CODE OF TASK 1/A

```
#define F_CPU 16000000UL //set clock speed
#define BAUD_RATE 9600 //set baud rate

#include <util/delay.h>
#include <avr/io.h>

void usart_init ();
void usart_send (unsigned char ch);
int main (void)
{
	usart_init ();

	ADMUX= 0xC8;
	ADCSRA= 0x87;			//enable ADC

	while (1)
	{
		ADCSRA|=(1<<ADSC);   //begin converting
		while((ADCSRA&(1<<ADIF))==0);
		ADCSRA |= (1<<ADIF);

		int a = ADCL;
		a = a | (ADCH<<8);
		a -= 266;
			if(a < 0)
			{
				usart_send('-');
				a *= -1;
			}
		usart_send((a/100)+'0');
		a = a % 100;
		usart_send((a/10)+'0');
		a = a % 10;
		usart_send((a)+'0');
		usart_send('\r');

		_delay_ms(100);
	}
	return 0;
}


void usart_init (void)
{
	UCSR0B = (1<<TXEN0);
	UCSR0C = (1<< UCSZ01)|(1<<UCSZ00);
	UBRR0L = F_CPU/16/BAUD_RATE-1;
}

void usart_send (unsigned char ch)
{
	while (! (UCSR0A & (1<<UDRE0)));
	UDR0 = ch;

void usart_print(char* str)
```

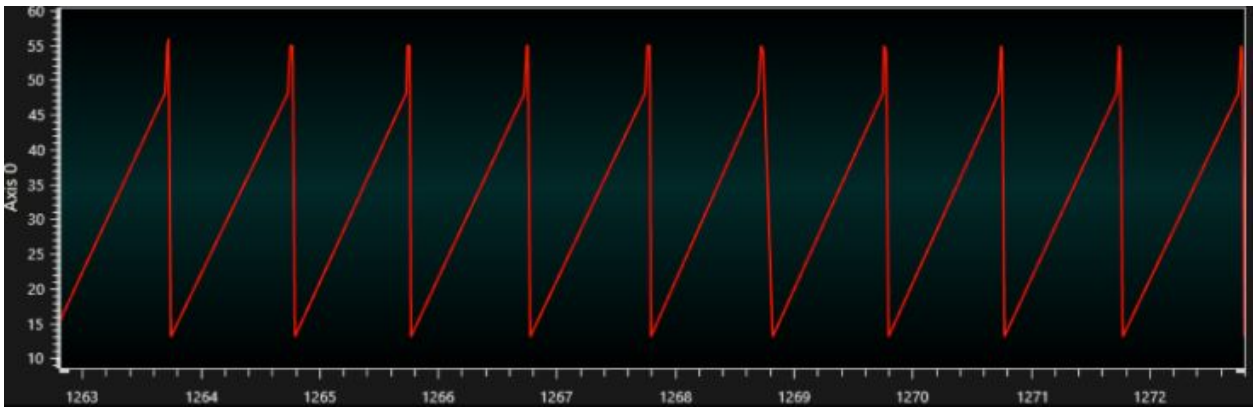
```
{
        int i = 0;
        while(str[i] != 0)
        usart_send(str[i]);
}
```

3. SCHEMATICS

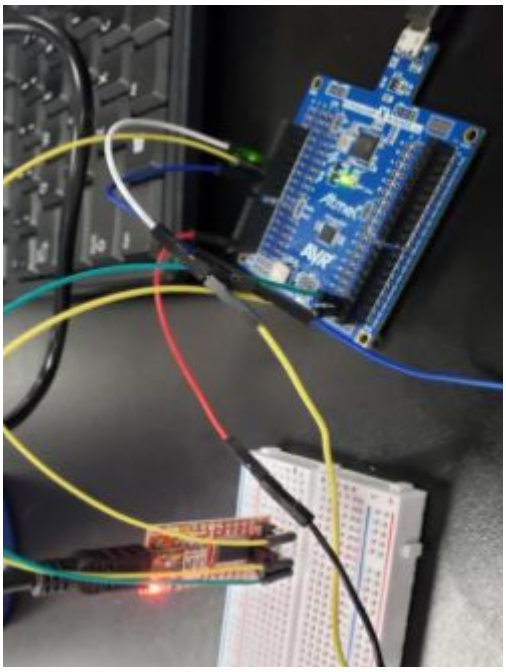
Use fritzing.org



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



5. SCREENSHOT OF EACH DEMO (BOARD SETUP)



6. GITHUB LINK OF THIS DA

https://github.com/armonlatifi/sub_da/tree/master/DA3B

Student Academic Misconduct Policy

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

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

Armon Latifi