CPE301 – SPRING 2019

Design Assignment 3B

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Primary Github address: https://github.com/RickyPerez79/submission_da.git
Directory: 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

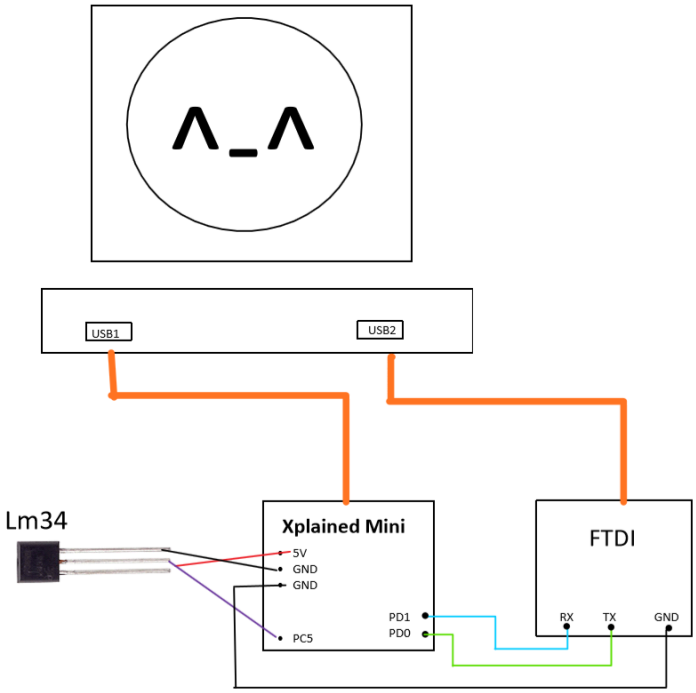
- Xplained Mini
- FTDI Chip
- LM34

2. DEVELOPED CODE OF TASK 1/A

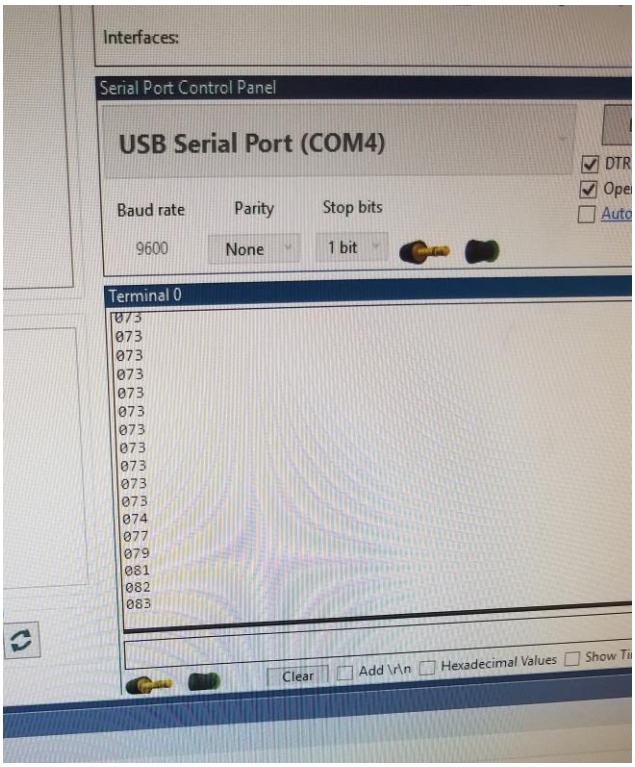
```
/*
 * DA3B.c
 *
 * Created: 3/29/2019 12:04:14 AM
 * Author : perezr1
 */

#define F_CPU 16000000UL
#define BAUD_RATE 9600
#include <avr/io.h>
#include <util/delay.h>
#include <avr/interrupt.h>

void usart_init();
void usart_send(unsigned char ch);

// TCNT1 = 65535 - ( ((16Mz/1024) * 1sec) - 1 ) = 49911
int main(void)
{
    usart_init();

       /** Setup and enable ADC **/

       ADMUX = (0<<REFS1)|
                     (1<<REFS0)| //AVcc - external cap at AREF
                     (0<<ADLAR)| //ADC Left Adjust Result
                     (1<<MUX2)| //Analog Channel Selection Bits
                     (0<<MUX1)| //ADC5(PC5, PIN28)
                     (1<<MUX0);
                     //(0<<MUX0);
       ADCSRA =(1<<ADEN)|  //ADC Enable
                     (0<<ADSC)|  //ADC Start Conversion
                     (1<<ADATE)| //ADC Auto Trigger Enable
                     (0<<ADIF)| //ADC Interrupt Flag
                     (0<<ADIE)| //ADC Interrupt Enable
                     (1<<ADPS2)| //ADC Prescaler Select Bits
                     (0<<ADPS1)|
                     (1<<ADPS0);
       TCCR1B = 5;   //setting the prescaler to 1024
       TIMSK1 = (1<<TOIE1); // enable interrupt flag
       TCNT1  = 49911; //set TCNT1
       sei();// enable interrupt
       while(1)
       {
              //main loop
       }
}
```

```
ISR(TIMER1_OVF_vect)
{
		ADCSRA|=(1<<ADSC); //start conversion
		while((ADCSRA&(1<<ADIF)) ==0); //wait for conversion to finish

		ADCSRA |= (1<<ADIF);

		int a = ADCL;
		a = a | (ADCH<<8);
		a = (a/1024.0) * 5000/10;
		usart_send((a/100)+'0');
		a = a % 100;
		usart_send((a/10) + '0');
		a = a % 10;
		usart_send((a)+'0');
		usart_send('\r');

		TCNT1 = 49911; // resets timer
}

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

void usart_send(unsigned char ch)
{
	while(!(UCSR0A & (1<<UDRE0)));  //wait until UDR0 is empty
	UDR0 = ch;                                          //transmit ch
}

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

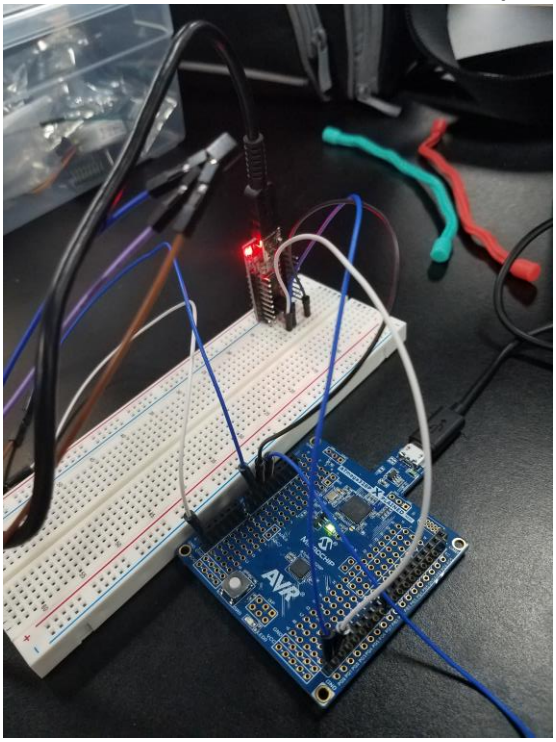
3. SCHEMATICS



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



5. SCREENSHOT OF EACH DEMO (BOARD SETUP)



6. VIDEO LINKS OF EACH DEMO

https://www.youtube.com/watch?v=qwGHYGVMrFY

7. GITHUB LINK OF THIS DA

https://github.com/RickyPerez79/submission_da.git

Student Academic Misconduct Policy

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

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

RICKY PEREZ