CPE301 – SPRING 2019

Design Assignment DA3B

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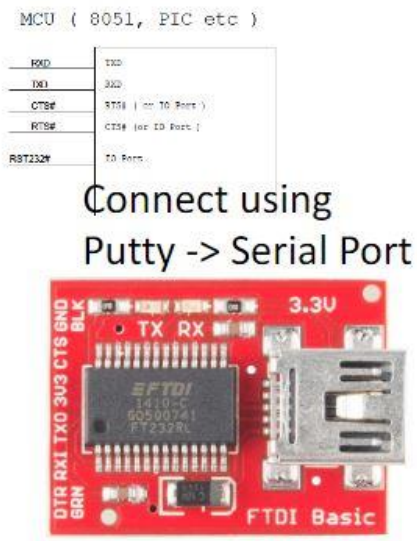
Primary Github address: https://github.com/guerrj1/Submission_DA.git
Directory: DA3B - https://github.com/guerrj1/Submission_DA/tree/master/DA3B

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

-ATMega328p
-FTDI Basic
-Mini-USB Cable
-Micro-USB Cable
-Male to male wires
-Breadboard
-LM34



FTDI Chip Connection Diagram

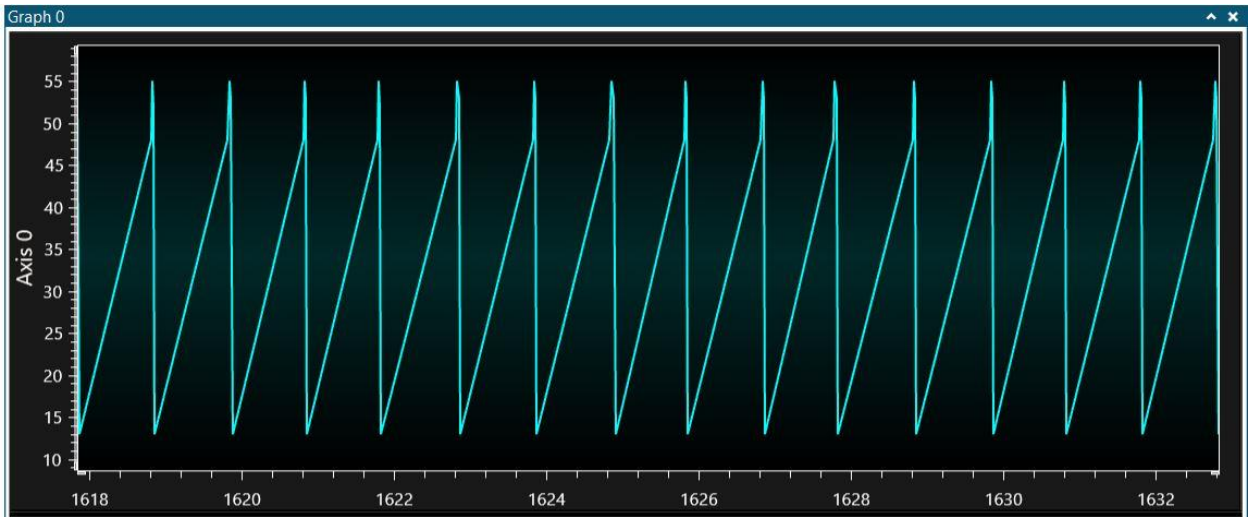
2. DEVELOPED CODE OF TASK 1 C CODE

```
//DA3B

#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);

int main (void)
{
	//usart_init ();

	/** Setup and enable ADC **/
	ADMUX = (0<<REFS1)|    // Reference Selection Bits
	(1<<REFS0)|    // AVcc - external cap at AREF
	(0<<ADLAR)|    // ADC Left Adjust Result
	(1<<MUX2)|     // Analog Channel Selection Bits
	(0<<MUX1)|     // ADC5 (PC5 PIN27) temp is read from here
	(1<<MUX0);
```

```
        ADCSRA = (1<<ADEN)|    // ADC ENable
        (0<<ADSC)|     // ADC Start Conversion
        (0<<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);

        //Timer initialization
        TCCR1B = 5;          //prescaler of 1024
        TIMSK1 = (1<<TOIE1);
        TCNT1 = 49911;      //timer counter

        usart_init ();
        sei();              //enable interrupt

        while (1)
        {
        }
        return 0;
}


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; //reset the timer counter to this value
}


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)));    //wait until UDR0 is empty
        UDR0 = ch;                                                  //transmit ch
}

void usart_print(char* str)
{
        int i = 0;
```

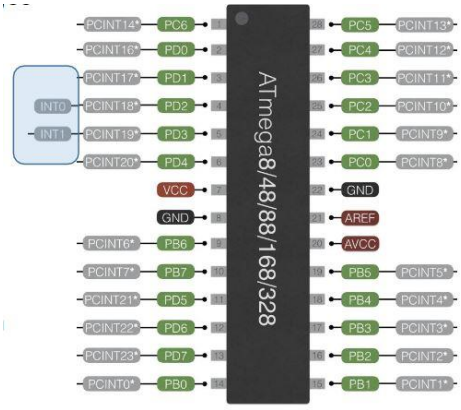
```
        while(str[i] != 0)
        usart_send(str[i]);
}
```

3. Graph From Data Visualizer for Task 2

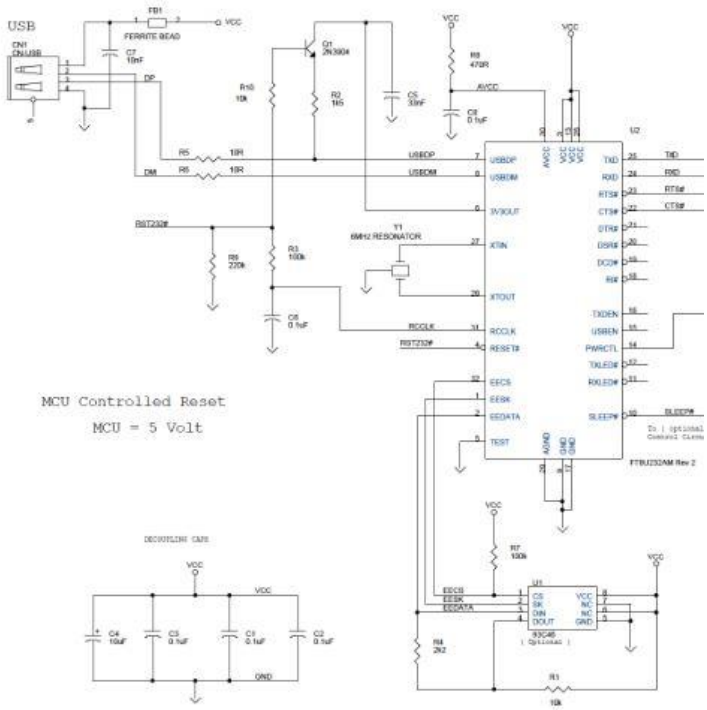


Data Visualizer Graph

4. SCHEMATICS

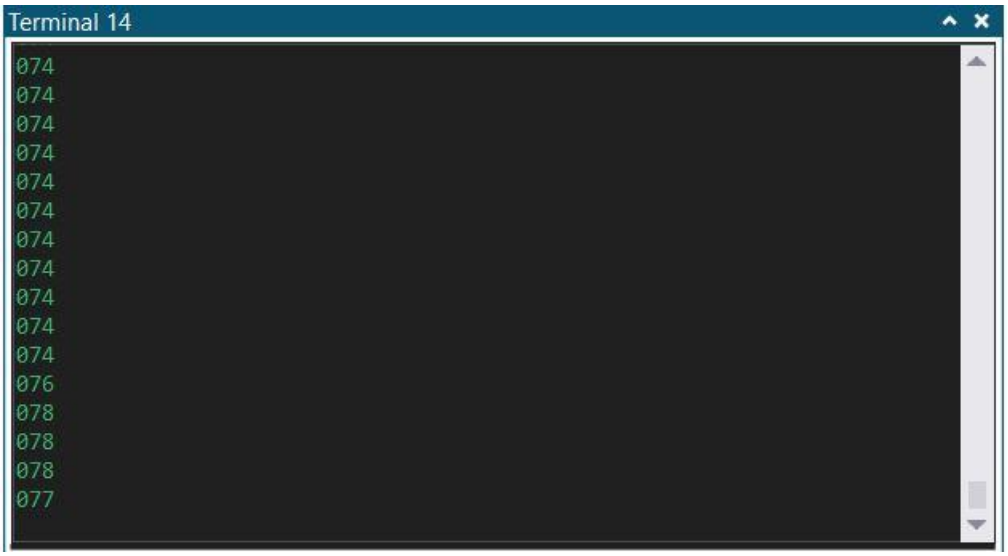


Atmega328P



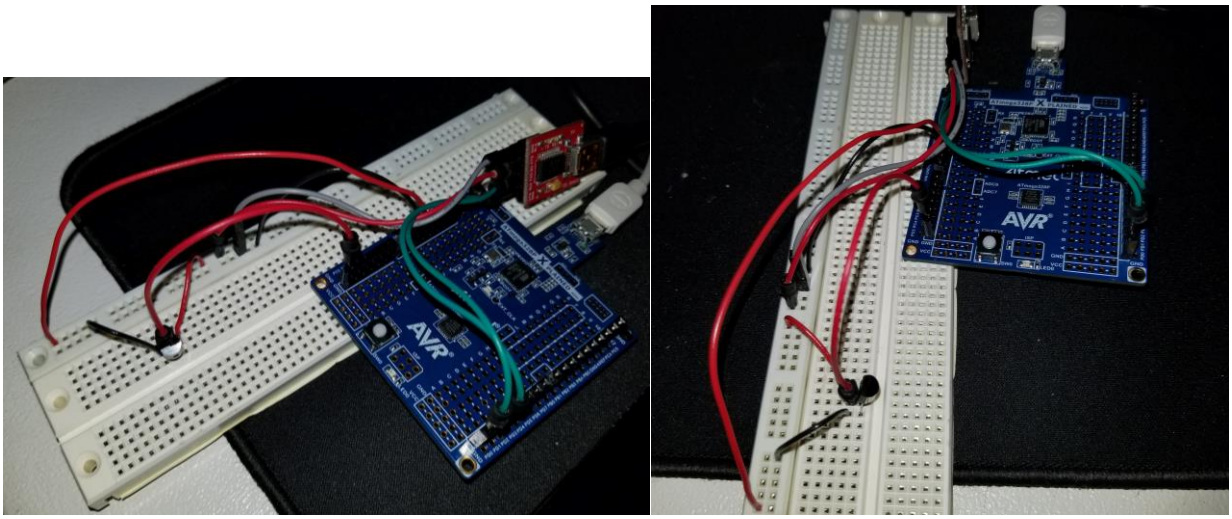
Atmega328P and FTDI Schematic

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



Displaying temperature from temperature sensor in Fahrenheit every 1 second on the Data Visualizer terminal.

6. SCREENSHOT OF EACH DEMO (BOARD SETUP)



Atmega328P Connected with the FTDI Chip with LM34 on the breadboard.

7. VIDEO LINKS OF EACH DEMO

https://youtu.be/gGHhRtadBio

8. GITHUB LINK OF THIS DA

https://github.com/guerrj1/Submission_DA/tree/master/DA3B

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

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