CPE301 – SPRING 2019

Design Assignment 3B

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1. **COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS**

List of components: Internal resistor, Pin C PORT B, Atmega328P

Pins: PB02 and PC02, LED1 and SW1 switch, FTDI chip. And LM34 temperature sensor.

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

/\*

\* DA3B C code.c

\*

\* Created: 3/29/2019 8:09:03 PM

\* Author : Mat Tomljenovic

\*/

#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)| // ADC4 (PC5 PIN28)

(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);

TCCR1B = 0x05; //set pre-scaler to 1024

TCNT1 = 7811; //set counter to 1 sec period

TIMSK1 = (1 << TOIE1); //set overflow interrupt

sei(); //enable global interrupts

while (1)

{

}

}

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]);

}

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 = 0; //reset timer to 0

}

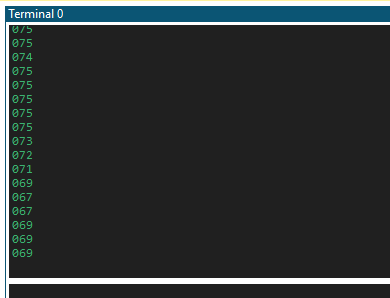
1. **DEVELOPED MODIFIED CODE OF TASK 2/A from TASK 1/A**

Same as above.

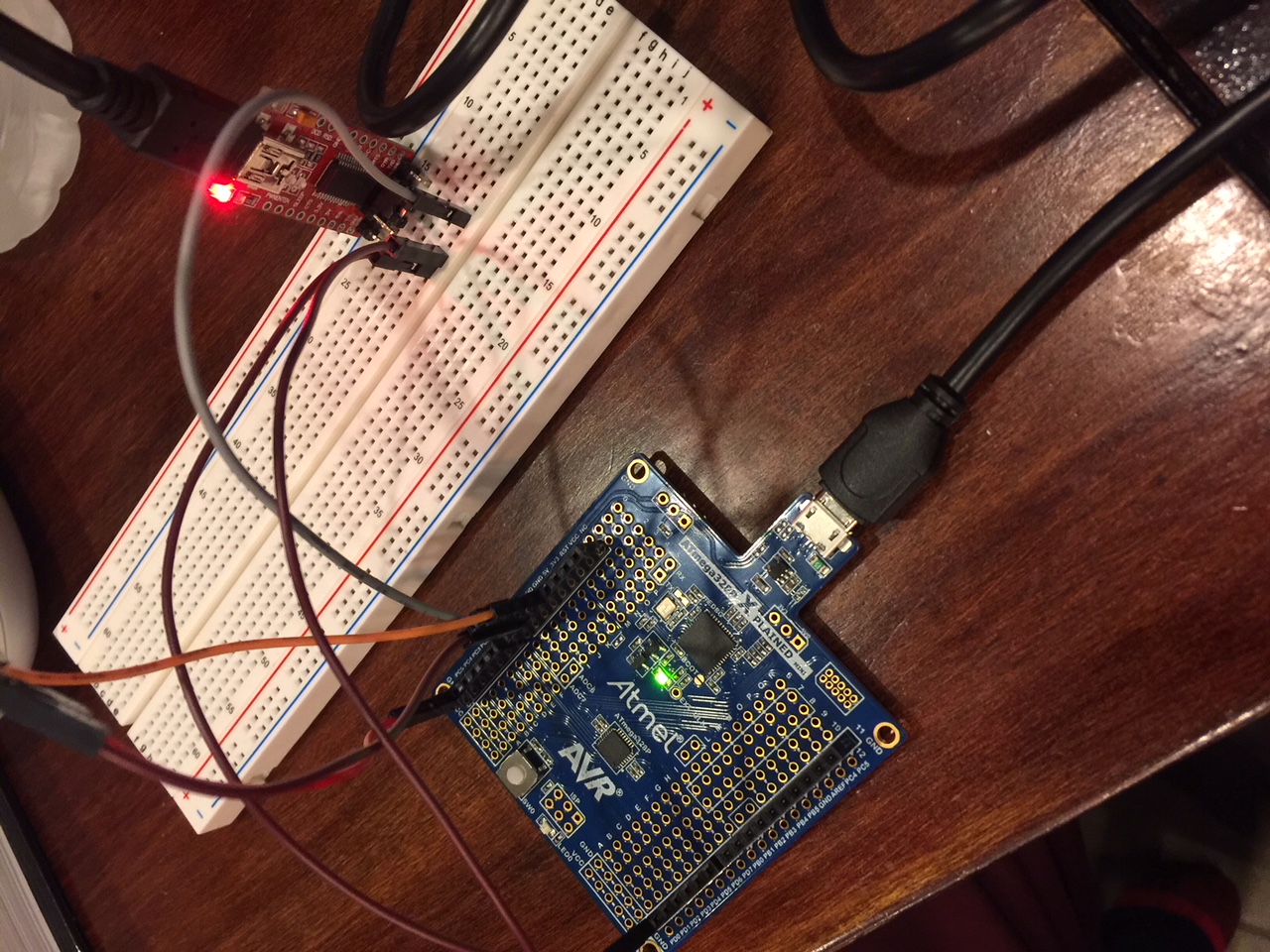
1. **SCHEMATICS**

Use fritzing.org

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



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



1. **VIDEO LINKS OF EACH DEMO**

https://youtu.be/-JxaMCwtsWg

1. **GITHUB LINK OF THIS DA**

https://github.com/matcroatia/DA3B

**Student Academic Misconduct Policy**

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

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

Matija Tomljenovic