CpE301 - Design Assignment 3

Design Assignment 3:
DUE: 3/24/2016
The goal of the assignment is to modify the above codes to do the following:

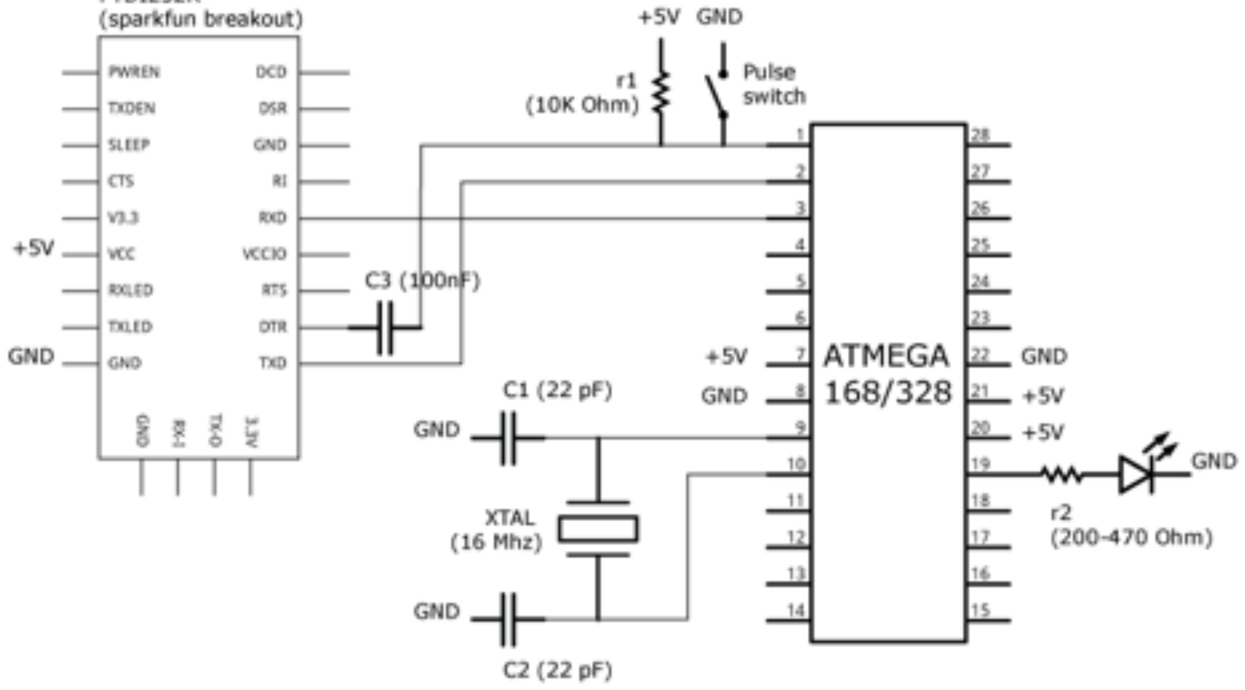
1. Write a C AVR program that will monitor the LM34/35 connected to an Analog pin to display the temperature in F on the serial terminal every 1 sec. Use a timer with interrupt for the 1 sec delay. You can use a FTDI chip for serial to USB conversion.

Submission:

The following are required for successful completion of the design assignment:

a. AVR C code that has been compiled and working.
b. The C code should be well documented with explanation of every instruction.
c. A word document that contains the flow chart of the assembly code along with the snapshots of the schematics, components connected on the breadboard and screen shoots.

NOTES:
Connecting the Microcontroller to PC using RS232-USB chip thro' USB connector.
Using a FTDI chip or Breakout Board - Use a 5V FTDI board.



Code Snippets:
USART CODE:

```
// This code waits for a character and transmits the character back (with interrupts)

#include <avr/io.h>
#include <stdint.h>                    // needed for uint8_t
#include <avr/interrupt.h>

#define FOSC 16000000                      // Clock Speed
#define BAUD 9600
#define MYUBRR FOSC/16/BAUD -1

volatile char ReceivedChar;

int main( void )
{
   /*Set baud rate */
   UBRR0H = (MYUBRR >> 8);
   UBRR0L = MYUBRR;

   UCSR0B |= (1 << RXEN0) | (1 << TXEN0);      // Enable receiver and transmitter
   UCSR0B |= (1 << RXCIE0);                   // Enable reciever interrupt
   UCSR0C |= (1 << UCSZ01) | (1 << UCSZ00);    // Set frame: 8data, 1 stp
  while(1)
   {
      ;                                  // Main loop
   }
}

ISR (USART_RX_vect)
{
   ReceivedChar = UDR0;                      // Read data from the RX buffer
   UDR0 = ReceivedChar;                      // Write the data to the TX buffer
}

————————————————//using FILE *stream ———————————————————————-
int USART0SendByte(char u8Data, FILE *stream)
{
         //wait while previous byte is completed
         while(!(UCSR0A&(1<<UDRE0))){};
         // Transmit data
         UDR0 = u8Data;
return 0;
}

//set stream pointer
FILE usart0_str = FDEV_SETUP_STREAM(USART0SendByte, NULL, _FDEV_SETUP_WRITE);

 printf("ADC ST_ARRAY[%u] = %u\r\n", index, array[index]);
————————————————//end FILE *stream ———————————————————————-
```

ADC CODE:

```
#include <avr/io.h>
#include <stdint.h>       // needed for uint8_t
#include <avr/interrupt.h>

volatile uint8_t ADCvalue;    // Global variable, set to volatile if used with ISR
int main(void)
{
   ADMUX = 0;                // use ADC0
    ADMUX |= (1 << REFS0);    // use AVcc as the reference
    ADMUX |= (1 << ADLAR);    // Right adjust for 8 bit resolution
   ADCSRA |= (1 << ADPS2) | (1 << ADPS1) | (1 << ADPS0); // 128 prescale for 16Mhz
    ADCSRA |= (1 << ADATE);   // Set ADC Auto Trigger Enable
   ADCSRB = 0;               // 0 for free running mode
   ADCSRA |= (1 << ADEN);    // Enable the ADC
    ADCSRA |= (1 << ADIE);    // Enable Interrupts
   ADCSRA |= (1 << ADSC);    // Start the ADC conversion
   sei();    // Thanks N, forgot this the first time =P
 while (1)
    {
    }
}

ISR(ADC_vect)
{
    ADCvalue = ADCH;          // only need to read the high value for 8 bit
}
```