CPE301 – SPRING 2018

Midterm

DO NOT REMOVE THIS PAGE DURING SUBMISSION:

The student understands that all required components should be submitted in complete for grading of this assignment.

NO	SUBMISSION ITEM	COMPLETED (Y/N)	MARKS (/MAX)
1.	COMPONENTS LIST		
2.	TASK 1 & 2 COMPLETE CODE W/ COMMENTS AND SCREENSHOTS		
3.	AT FIRMWARE DOWNLOAD AND VERSION CONFIRMATION		
4.	THINGSPEAK ACCOUNT AND CHANNEL KEY		
5.	FLASH AND TRANSMISSION		
6.	THINGSPEAK GRAPH		

1. COMPONENTS LIST

Needed:
FTDI232R chip
ATMEGA328P Microcontroller
LM34 Sensor
ESP8266-01

2. TASK 1 & 2 COMPLETE CODE W/ COMMENTS AND SCREENSHOTS

```c
/*
 * midterm1.c
 *
 * Created: 4/11/2018 11:09:31 AM
 * Author : YKengne
 */

#include <stdlib.h>
#include <avr/io.h>
#include <avr/interrupt.h>
#include <util/delay.h>
#include <stdio.h>
#include <stdint.h>
#define F_CPU 8000000UL

#define FOSC 16000000                        //Frequency
#define BAUD 9600                            //Baud Rate
#define MYUBRR FOSC/16/BAUD-1     //Automatic BAUD rate calculation

volatile uint8_t adcValue;

volatile uint8_t fifteenPlus = 120;        //


/*Function Declarations*/
void USART_Init();
void ADC_Init();
void outputChr(unsigned char c);
void outputStr(char *c);
void readTemp();

void AT_Tx(char *t);

ISR(ADC_vect)
{
      ADCSRA |= (1 << ADIF);      //Reset flag
      adcValue = ADCH;            //MSB 8-bits of ADC form left shift of ADLAR
}


ISR(TIMER1_OVF_vect)
{
      TIFR1 |= (1 << TOV1);       //Clr Flag
      fifteenPlus++;
```

```c
}

int main(void)
{
        TCCR1B |= (1 << CS12) | (1 << CS10);      //Set prescale 1024
        TIMSK1 |= (1 << TOIE1);                              //enable OVF interrupt

        unsigned int oneFive = 0;

        ADC_Init();                  //initialize ADC
        USART_Init();          //UART initialization


        while (1)
        {
                if(fifteenPlus>=120)
                {
                        readTemp();
                        fifteenPlus = 0;
                }
        }
}


void USART_Init()
{


        UBRR0H = (MYUBRR>>8);        //Shift MSB "top" of UBRR0H 0100 0100 >> 8 -> UBRR0H
0000 0000
        UBRR0L = MYUBRR;             //UBRR0L 0100 0100

        UCSR0B |= (1 << RXEN0) | (1 << TXEN0);    //Enable Rec and Trans
        UCSR0B |= (1 << RXCIE0);                            //Enable Rec INT
        UCSR0C |= (1 << UCSZ01) | (1 << UCSZ00); //Set frame 8-bit, 1 STP
}
void ADC_Init()
{
        DDRC   = 0;                    //Set PORTC as input for adc
        DIDR0  = 0x01;                        //Disable Digi input on ADC0

        ADMUX = 0;                            //Sets Mux selection bits to 0 ADC0 used
        ADMUX |= (1 << REFS0);       //Use Vcc Ref voltage selectin 01
        ADMUX |= (1 << ADLAR);       //Left adjust ADC Reg, ADCH 8-bit Resolution


        ADCSRA |= (1 << ADEN);       //Enable ADC
        ADCSRA |= (1 << ADATE); //Set ADC Auto Trig
        ADCSRA |= (1 << ADIE);       //Enable Interrupts
        ADCSRA |= (1 << ADPS2) | (1 << ADPS1) | (0 << ADPS0); //8MHz, Pre-Scale 64 =
125KHz
        ADCSRA |= (1 << ADSC);       //Start Conversion

        ADCSRB = 0;                    //Free running mode
        sei();                         //Enable interrupts
```

```c
}

void outputChr(unsigned char c)
{
        UDR0 = c;       //Display Char on Serial
        _delay_ms(800);
}

void outputStr(char *c)
{
        unsigned int i = 0;  //loop control
        while(c[i] != 0)
        outputChr(c[i++]);
}

void readTemp()
{
        char seeTemp[8];
        float  lm34_0;                  //For ASCII Temp output
        float  lm34_1;                  //For showing valued of ADC


        while((ADCSRA & (1 << ADIF)) == 0);                     //Wait for conversion to
finish

        /*Conversion to °F*/
        lm34_0 = (adcValue * 5.0 / 0x100) * 100.0;      //(ADC * 5 = 200 /256) * 100

        dtostrf(lm34_0, 5, 2, seeTemp);                         //Float to char conversion


        AT_Tx(seeTemp);



}

void AT_Tx(char *t)
{
        /*Build Strings for AT+ commands*/
        unsigned char CIPStart[]    = "AT+CIPSTART=\"TCP\",\"api.thingspeak.com\",80\r\n";
        unsigned char CIPSend[]           = "AT+CIPSEND=51\r\n";
        unsigned char Data[]        = "GET /update?api_key=X5GNOJ6AFIEO0XRP&field1=";
        unsigned char temp0               = "t";
        unsigned char temp1               = "\r\n";
        unsigned char CIPClose[]    = "AT+CIPCLOSE\r\n";


        _delay_ms(2000);
        outputStr(CIPStart); //Send Start String

        _delay_ms(2000);
        outputStr(CIPSend);             //Number of Char being sent

        _delay_ms(2000);
        outputStr(Data);                //Get command sent
        outputStr(t);                   //Temperature string added to end of Get command
        outputStr("\n\r");              //Enter key
```
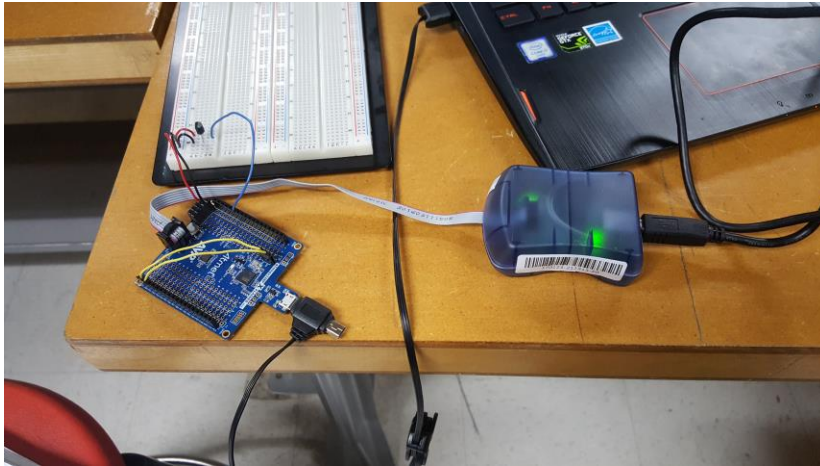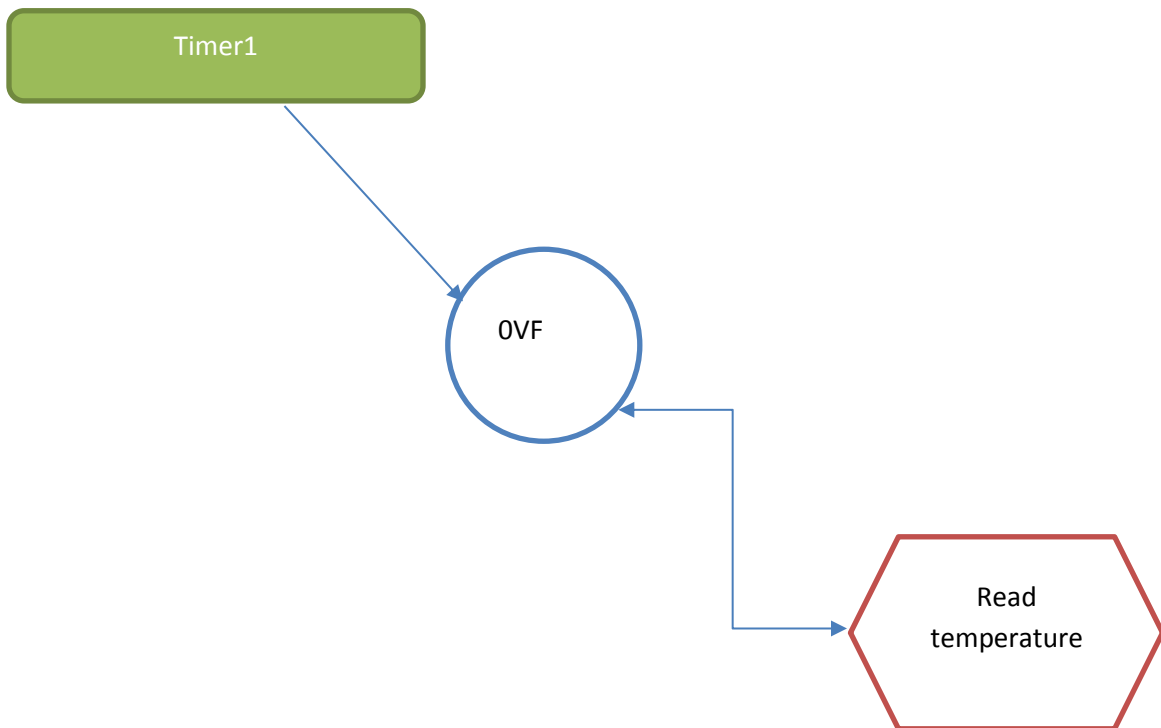
3. Schematic

4. Flowchart

Timer1

OVF

Read temperature

5. THINGSPEAK ACCOUNT AND CHANNEL KEY

My Profile

MathWorks Account settings

MathWorks Account Email	kengneta@unlv.nevada.edu
User ID	yannick1989
Password	************

Edit MathWorks Account settings

Edit MathWorks community information

ThingSpeak settings

Time Zone	UTC
	Change Time Zone
User API Key	P9UZVI4M2296W8OL
	Generate New API Key
MQTT API Key	**Generate New MQTT API Key**

Help

MathWorks Account settings:

- MathWorks Account email and password are needed to Sign In to ThingSpeak.
- User ID is displayed as the author of your public channels.
- If you edit your MathWorks Account settings, you will need to sign out of ThingSpeak and log back in.

ThingSpeak Settings:

- Time Zone is used when displaying data in your charts, and when scheduling your ThingSpeak apps.
- User API key is required to create and manage channels using the REST API.
- MQTT API key is required to subscribe to channel topics using the MQTT API.

API Requests

Get Channel List

```
GET https://api.thingspeak.com/channels.json?api_key=P9UZVI4M2296W8OL
```

Create a Channel

```
POST https://api.thingspeak.com/channels.json
     api_key=P9UZVI4M2296W8OL
     name=My New Channel
```

Clear a Channel Feed

```
DELETE https://api.thingspeak.com/channels/CHANNEL_ID/feeds.json
       api_key=P9UZVI4M2296W8OL
```
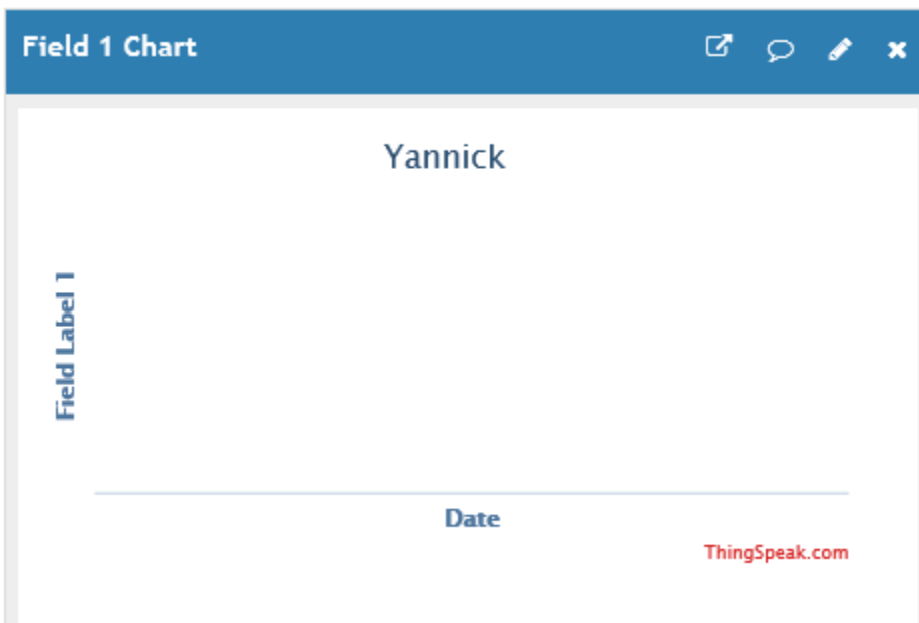
Delete a Channel

```
DELETE https://api.thingspeak.com/channels/CHANNEL_ID
       api_key=P9UZVI4M2296W8OL
```

Update Channel Metadata

```
PUT https://api.thingspeak.com/channels.json
    api_key=P9UZVI4M2296W8OL
    name=Changed Channel Name
```

Learn More

Field 1 Chart

6.   GITHUB LINK

https://github.com/Vasty1995/CPE301

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

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

Yannick Kengne Tatcha

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