CPE301 – SPRING 2019

Midterm2

Student Name: Kyungseo Yun
Student #: 2001091216
Student Email: yunk93@unlv.nevada.edu
Primary Github address: https://github.com/biscuit0x/submission_yun.git
Directory: submission_yun/DesignAssignments/midterm2/

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).

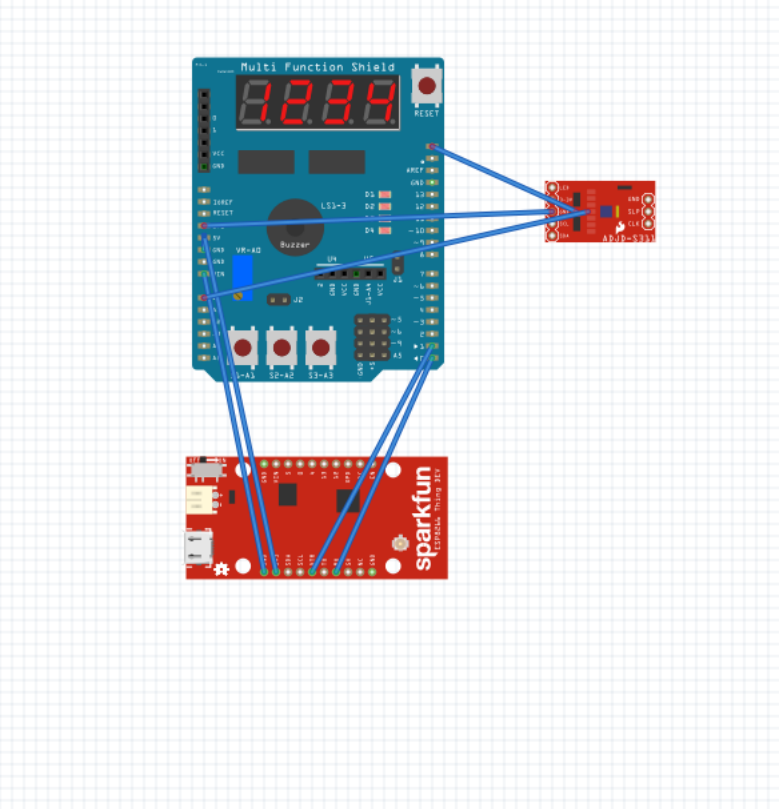
1. Components :
atmega328
jumper wires
esp8366
APDS-9960

2. C code

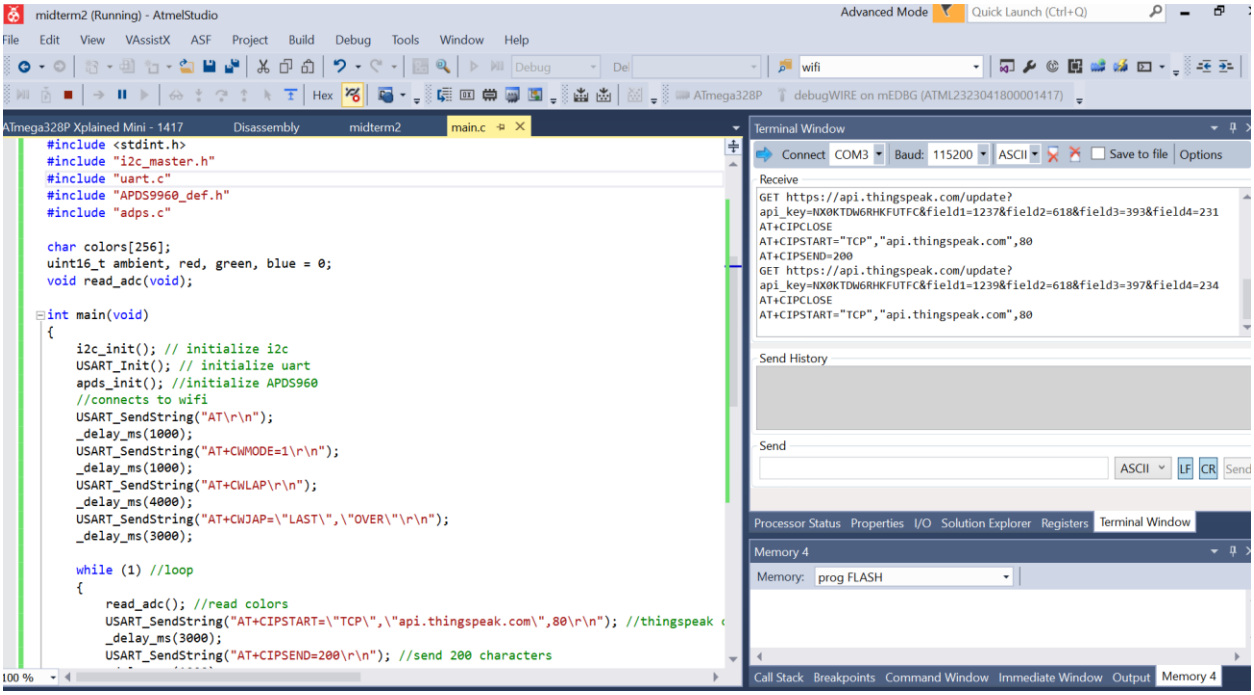
```
/*
 * midterm2.c
 *
 * Created: 12/14/2019 1:48:41 PM
 * Author : jayne
 */

#define F_CPU 16000000UL
#define BAUD_PRESCALAR (((F_CPU / (BAUDRATE * 16UL))) - 1)
#define I2C_WRITE 0x00
#define I2C_READ 0x01
#define APDS9960_WRITE_ADR (APDS9960_I2C_ADDR << 1) | I2C_WRITE
#define APDS9960_READ_ADR (APDS9960_I2C_ADDR << 1) | I2C_READ
#include <avr/io.h>
#include <util/delay.h>
#include <stdio.h>
#include <stdlib.h>
#include <stdint.h>
#include "i2c_master.h"
#include "uart.c"
#include "APDS9960_def.h"
#include "adps.c"

char colors[256];
uint16_t ambient, red, green, blue = 0;
void read_adc(void);

int main(void)
{
	i2c_init(); // initialize i2c
	USART_Init(); // initialize uart
	apds_init(); //initialize APDS960
	//connects to wifi
	USART_SendString("AT\r\n");
	_delay_ms(1000);
	USART_SendString("AT+CWMODE=1\r\n");
	_delay_ms(1000);
	USART_SendString("AT+CWLAP\r\n");
	_delay_ms(4000);
	USART_SendString("AT+CWJAP=\"LAST\",\"OVER\"\r\n");
	_delay_ms(3000);

    while (1) //loop
    {
		read_adc(); //read colors
		USART_SendString("AT+CIPSTART=\"TCP\",\"api.thingspeak.com\",80\r\n");
//thingspeak connection
		_delay_ms(3000);
		USART_SendString("AT+CIPSEND=200\r\n"); //send 200 characters
		_delay_ms(1000);
```

```
            snprintf(colors, sizeof(colors),"GET
https://api.thingspeak.com/update?api_key=NX0KTDW6RHKFUTFC&field1=%d&field2=%d&field3=%d&
field4=%d\r\n", ambient, red, green, blue);
            USART_SendString(colors); //send temperature
            _delay_ms(1000);
            USART_SendString("AT+CIPCLOSE\r\n"); //end
            _delay_ms(1000);
    }
}

void read_adc(void) {       //read sensor values
       i2c_start(APDS9960_WRITE_ADR);
       i2c_write(APDS9960_CDATAL);
       i2c_stop();
       i2c_start(APDS9960_READ_ADR);
       ambient =((int)i2c_read_ack()|((int)i2c_read_ack()<<8));
       red = ((int)i2c_read_ack()|((int)i2c_read_ack()<<8));
       green = ((int)i2c_read_ack()|((int)i2c_read_ack()<<8));
       blue = ((int)i2c_read_ack()|((int)i2c_read_ack()<<8));
       i2c_stop();
}
```

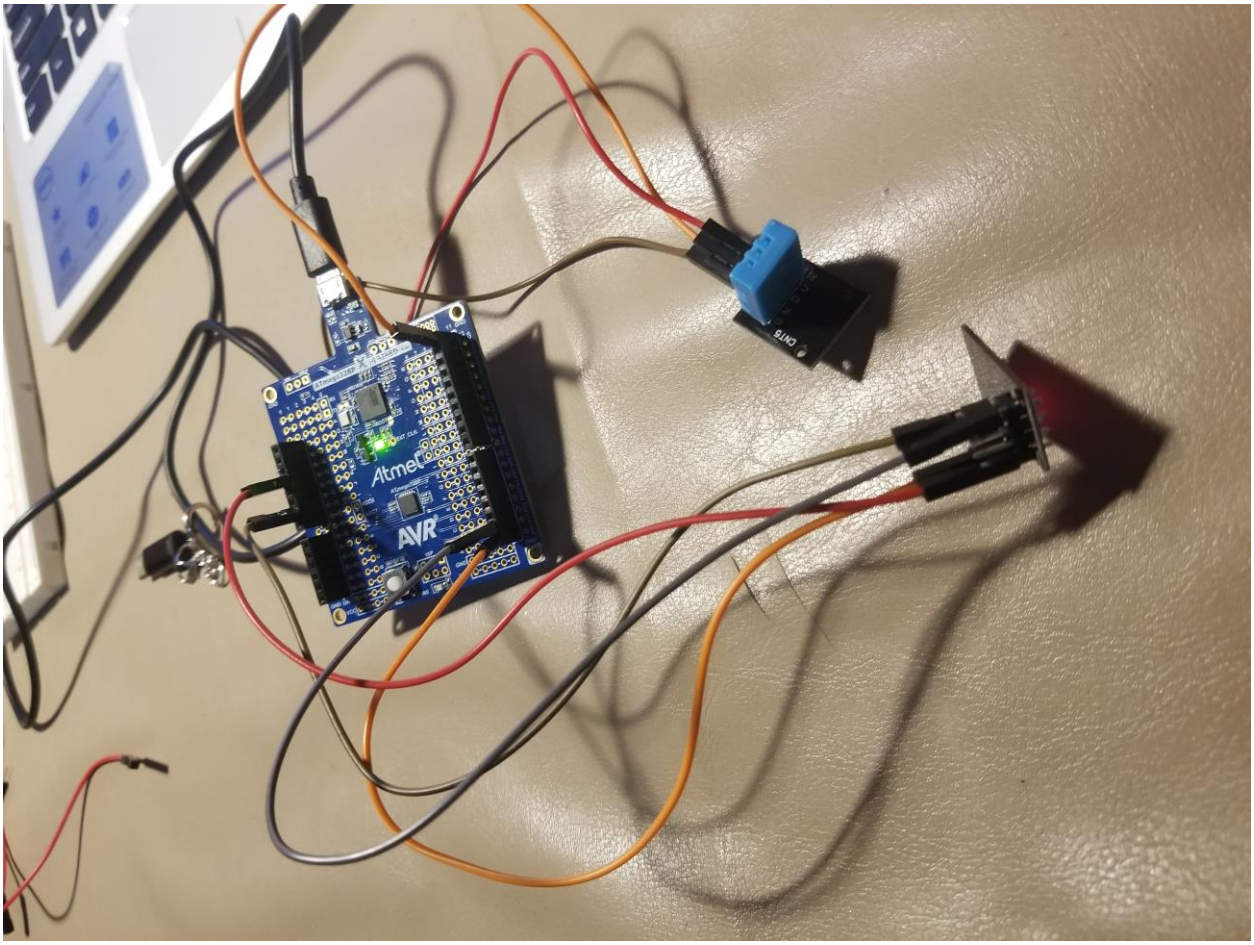
3. Schematic



4. Screenshot
Atmel studio :


midterm2 (Running) - AtmelStudio
Advanced Mode
Quick Launch (Ctrl+Q)
File Edit View VAssistX ASF Project Build Debug Tools Window Help
wifi
ATmega328P Xplained Mini - 1417
Disassembly
midterm2
main.c
#include <stdint.h>
#include "i2c_master.h"
#include "uart.c"
#include "APDS9960_def.h"
#include "adps.c"
char colors[256];
uint16_t ambient, red, green, blue = 0;
void read_adc(void);
int main(void)
{
i2c_init(); // initialize i2c
USART_Init(); // initialize uart
apds_init(); //initialize APDS960
//connects to wifi
USART_SendString("AT\r\n");
_delay_ms(1000);
USART_SendString("AT+CWMODE=1\r\n");
_delay_ms(1000);
USART_SendString("AT+CWLAP\r\n");
_delay_ms(4000);
USART_SendString("AT+CWJAP=\"LAST\",\"OVER\"\r\n");
_delay_ms(3000);
while (1) //loop
{
read_adc(); //read colors
USART_SendString("AT+CIPSTART=\"TCP\",\"api.thingspeak.com\",80\r\n"); //thingspeak
_delay_ms(3000);
USART_SendString("AT+CIPSEND=200\r\n"); //send 200 characters
100 %
Terminal Window
Connect COM3 Baud: 115200 ASCII Save to file Options
Receive
GET https://api.thingspeak.com/update?
api_key=NX0KTDW6RHKFUTFC&field1=1237&field2=618&field3=393&field4=231
AT+CIPCLOSE
AT+CIPSTART="TCP","api.thingspeak.com",80
AT+CIPSEND=200
GET https://api.thingspeak.com/update?
api_key=NX0KTDW6RHKFUTFC&field1=1239&field2=618&field3=397&field4=234
AT+CIPCLOSE
AT+CIPSTART="TCP","api.thingspeak.com",80
Send History
Send
ASCII LF CR
Processor Status Properties I/O Solution Explorer Registers Terminal Window
Memory 4
Memory: prog FLASH
Call Stack Breakpoints Command Window Immediate Window Output Memory 4

5. Photo / video



https://youtu.be/az4UatoSAaE