CPE301 – FALL 2019

Midterm 1

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Primary Github address: https://github.com/Alira-Coffman/submission-repo/

Directory: https://github.com/Alira-Coffman/submission-repo/tree/master/Midterm

Submit the following for all Labs:

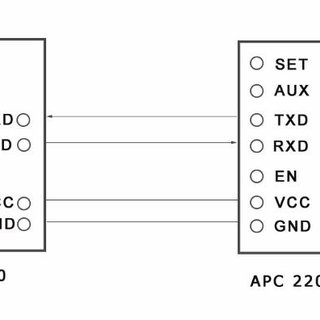
1. In the document, for each task submit the modified or included code (only) with highlights and justifications of the modifications. Also, include the comments.
2. Use the previously create a Github repository with a random name (no CPE/301, Lastname, Firstname). Place all labs under the root folder 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**

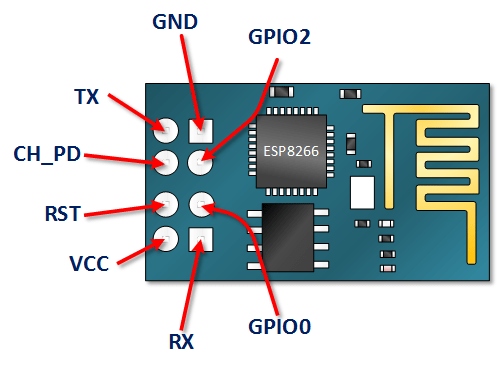
Atmega328p

Arduino Shield

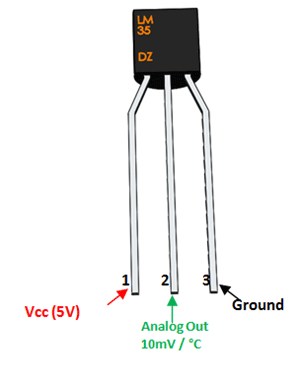
Used the APC220(pin out below)



ESP8266:

https://i1.wp.com/henrysbench.capnfatz.com/wp-content/uploads/2016/12/ESP8266-PINOUT.png

LM35 temperature sensor:



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

#define *F\_CPU* 16000000UL

#include <avr/io.h>

#include <stdlib.h>

#include <avr/interrupt.h>

#include <stdio.h>

#include <util/delay.h>

#include <math.h>

#define BAUDRATE 115200

#define BAUD\_PRESCALLER (int)*round*(((((double)*F\_CPU* / ((double)BAUDRATE \* 8.0))) - 1.0))

void USART\_init(void);

void USART\_transmit(unsigned char data);

void USART\_putstring(char\* StringPtr);

void ADC\_init (void); //function to initialize ADC

void ESP\_init();

void UART\_sendString(volatile unsigned char AT[]);

float readTemperatue();

//VARIABLES

volatile float myTemp; //holds temp

char \* tempString[10];

volatile unsigned char AT[];

void UART\_sendString(volatile unsigned char AT[])

{

volatile unsigned char len = 0;

volatile unsigned char i;

while(AT[len] != 0)

{

len++;

}

for(i = 0x00; i < len; i++){

// Wait for the transmitter to finish

while(!(UCSR0A & (1<<UDRE0)));

UDR0 = AT[i];

}

}

int main(void)

{

USART\_init(); //initialize USART

ADC\_init (); //initialize ADC

ESP\_init();

TCCR0A = 0x00; //set normal operation

TCCR0B |= (1 << CS02); //set prescalar to 256

TCNT0 = 6;

TIMSK0 |= (1 << TOIE0);

sei(); //set interrupt

while (1)

{

}

}

/\*INITALIZE FUNCTIONS\*/

void USART\_init(void)

{

UCSR0A = (1 << U2X0);

UBRR0H = (*uint8\_t*)(BAUD\_PRESCALLER >> 8);

UBRR0L = (*uint8\_t*)(BAUD\_PRESCALLER);

UCSR0B = (1 << RXEN0) | (1 << TXEN0);

UCSR0C = (3 << UCSZ00);

}

void ESP\_init()

{

UART\_sendString("AT\r\n");

USART\_putstring("AT+CWMODE=1\r\n");

*\_delay\_ms*(20);

USART\_putstring("AT+CWJAP=\"Alira\",\"Password\"\r\n");

*\_delay\_ms*(20);

// Enable connection

UART\_sendString("AT+CIPMUX=0\r\n");

*\_delay\_ms*(50);

}

void ADC\_init (void)

{

ADMUX = (0<<REFS1)|

(1<<REFS0)|

(0<<ADLAR)|

(1<<MUX2)|

(0<<MUX1)| // ADC5 PC4

(0<<MUX0);

ADCSRA = (1<<ADEN)|

(0<<ADSC)|

(0<<ADATE)|

(0<<ADIF)|

(0<<ADIE)|

(0<<ADPS2)| // ADC Prescaler

(1<<ADPS1)|

(1<<ADPS0);

}

/\*END OF INITS\*/

void USART\_transmit(unsigned char data)

{

while(!(UCSR0A & (1 << UDRE0)));

UDR0 = data;

}

float readTemperatue()

{

ADCSRA |= (1<<ADSC);

if(ADCSRA & (1<<ADSC));

myTemp = ADC;

*\_delay\_ms*(50);

}

void USART\_putstring(char \*StringPtr)

{

while ((\*StringPtr != '\0')){

while (!(UCSR0A & (1 << UDRE0)));

UDR0 = \*StringPtr;

StringPtr++;

}

}

ISR(TIMER0\_COMPA\_vect)

{

*\_delay\_ms*(10);

UART\_sendString("AT+CIPSTART=\"TCP\",\"api.thingspeak.com\",80\r\n");

*\_delay\_ms*(20);

UART\_sendString("AT+CIPSEND=45\r\n");

*\_delay\_ms*(20);

// // Send temperature

UART\_sendString("GET /update?key=IF6XQMA7HD4SUDOL&field1=");

readTemperatue();

*snprintf*(tempString, sizeof(tempString), "%f\r\n", myTemp);

UART\_sendString(tempString);

UART\_sendString("\r\n\r\n");

}

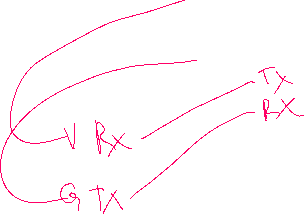
1. **SCHEMATICS**

3.3v

ATMEGA

Arduino shield

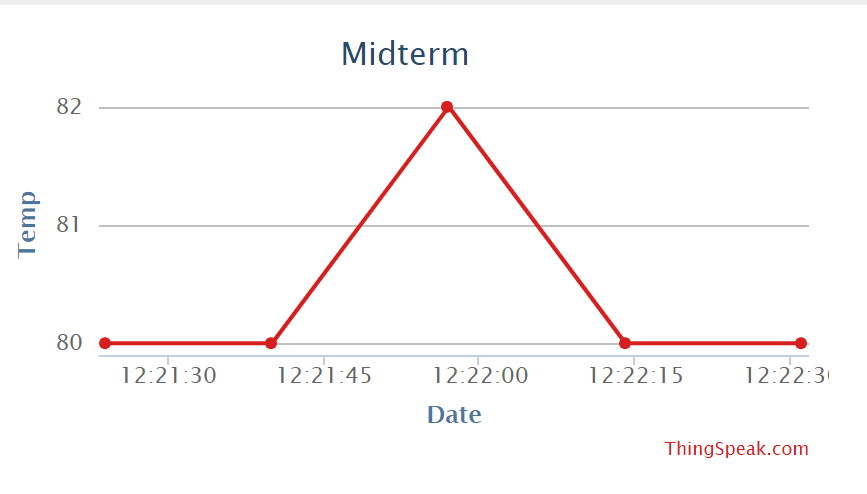
gnd



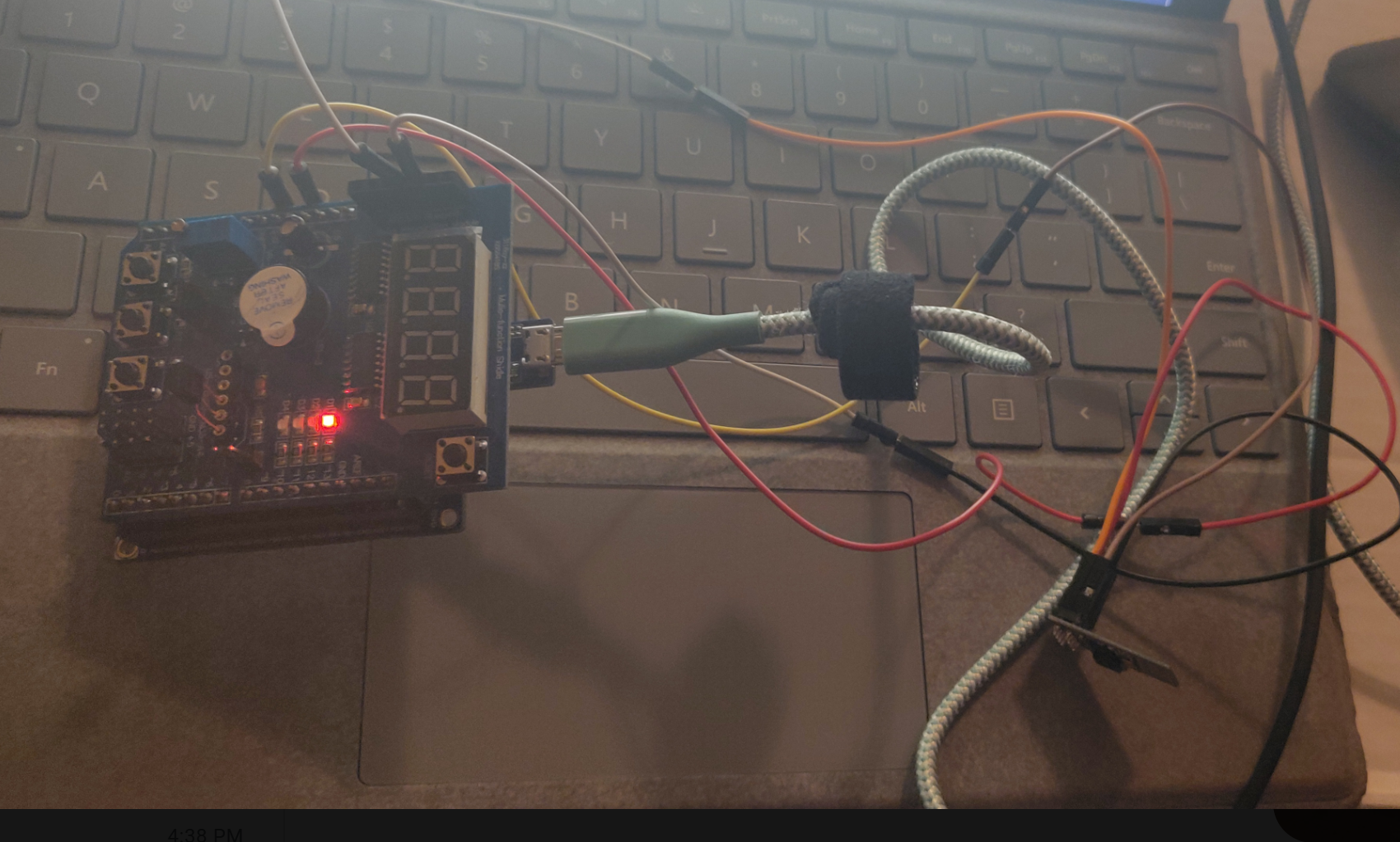
WIFI



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



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



1. **Video links**

**https://www.youtube.com/watch?v=AM\_zD48u9p0&feature=youtu.be**

1. **GITHUB LINK OF THIS DA**

**https://github.com/Alira-Coffman/submission-repo/tree/master/Midterm**

**Student Academic Misconduct Policy**

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

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