

Midterm 1

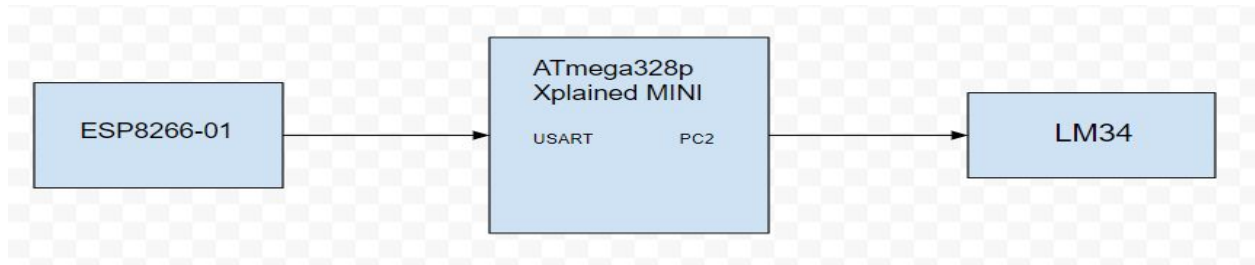
DO NOT REMOVE THIS PAGE DURING SUBMISSION:

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

Atmega328p Xplained Mini, FTDI, LM34, ESP8266-01.



2. INITIAL/DEVELOPED CODE OF TASK 1/A

```
/*
 * Midterm1.c
 *
 * Created: 4/4/2018 2:48:28 PM
 * Author : JSharpHalpin
 */

/* ADC Test
For an Atmega 48 88 or 168
Sends ADC results to the serial port
Set your terminal to 2400 N 8 1
Atmega168 DIP TX PD1 (pin3)
Atmega168 DIP RX PD0 (pin2)
Atmega168 DIP ADC2 PC2 (PIN25) */
#define F_CPU 16000000UL //set clock rate at 16 Mhz
#define BAUD 9600 //set baud rate to 9600
#define MYUBRR F_CPU/16/BAUD-1 //set the UBRR number

// #define UBRR_1200 51
// #define UBRR_2400 25 // for 1Mhz
// #define UBRR_2400 207 // for 8Mhz with .2% error
// #define UBRR_9600 51 // for 8Mhz with .2% error
// #define UBRR_19200 25 // for 8Mhz with .2% error
#include <avr/io.h>
#include <util/delay.h>
#include <stdio.h>
#include <avr/interrupt.h>

void read_adc(void); // Function Declarations
void adc_init(void);
void USART_init( unsigned int ubrr );
void USART_tx_string(char *data);
volatile unsigned int adc_temp;
char outs[20];

void usart_init(void)
{
    UCSR0B |= (1<<TXEN0) | (1<<RXEN0) | (1<<RXCIE0); // enable receive transmit of usart
    UCSR0C = (1<<UCSZ01) | (1<<UCSZ00); // | (1<<URSEL);
    UBRR0L = BAUD; // Fosc=16Mhz, UBRR value = 104 (0x67)
}

void usart_send( unsigned char ascii)
{
    while(!(UCSR0A & (1<<UDRE0)));
    UDR0 = ascii;
}
```

```

unsigned char usart_receive(void)
{
    while (!(UCSR0A & (1<<RXCIF0)));
    return UDR0;
}

void send_AT( unsigned char message[])
{
    unsigned char i=0;
    while(message[i] != '\0')
    {
        usart_send(message[i]); // This sends data to esp
        i++;
    }
}

int main(void) {
    unsigned char AT[] = "AT\r\n";
    unsigned char CIPMUX[] = "AT+CIPMUX=1\r\n";
    unsigned char CIPSTART[] = "AT+CIPSTART=0,\"TCP\", \"api.thingspeak.com\",80\r\n";
    unsigned char CIPSEND[] = "AT+CIPSEND=0,110\r\n";
    unsigned char GET_DATA[] = "GET https://api.thingspeak.com/apps/thinghttp/send_request?api_key=SBYXUXDC8TLMA50V\r\n";
    unsigned char SEND_DATA[] = "GET https://api.thingspeak.com/update?api_key=RLIBH668P4MZTR86=50\r\n";

    adc_init(); // Initialize the ADC (Analog / Digital Converter)
    USART_init(MYUBRR); // Initialize the USART (RS232 interface)
    USART_tx_string("Connected!\r\n"); // we're alive!
    _delay_ms(125); // wait a bit
    sei();

    _delay_ms(200);
    send_AT(AT);
    _delay_ms(2000);
    send_AT(CIPMUX);
    _delay_ms(2000);
    send_AT(CIPSTART);
    _delay_ms(2000);
    send_AT(GET_DATA);
    _delay_ms(2000);
    send_AT(SEND_DATA);

    while(1)
    {
    }
}

```

```

void adc_init(void)
{
    /** Setup and enable ADC **/
    ADMUX = (0<<REFS1)| // Reference Selection Bits

    (1<<REFS0)| // AVcc - external cap at AREF
    (0<<ADLAR)| // ADC Left Adjust Result
    (0<<MUX2)| // ANalog Channel Selection Bits
    (1<<MUX1)| // ADC2 (PC2 PIN25)
    (0<<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);

    // Timer/Counter1 Interrupt Mask Register

    TIMSK1 |= (1<<TOIE1); // enable overflow interrupt
    TCCR1B |= (1<<CS12)|(1<<CS10); // native clock
    TCNT1 = 49911; //set Timer counter
}

/* READ ADC PINS */
void read_adc(void) {
    unsigned char i =4;
    adc_temp = 0;
    while (i-->0) {
        ADCSRA |= (1<<ADSC);
        while(ADCSRA & (1<<ADSC));
        adc_temp+= ADC;
        _delay_ms(50);
    }
    adc_temp = adc_temp / 8; // Average a few samples
    adc_temp = adc_temp /2;
}

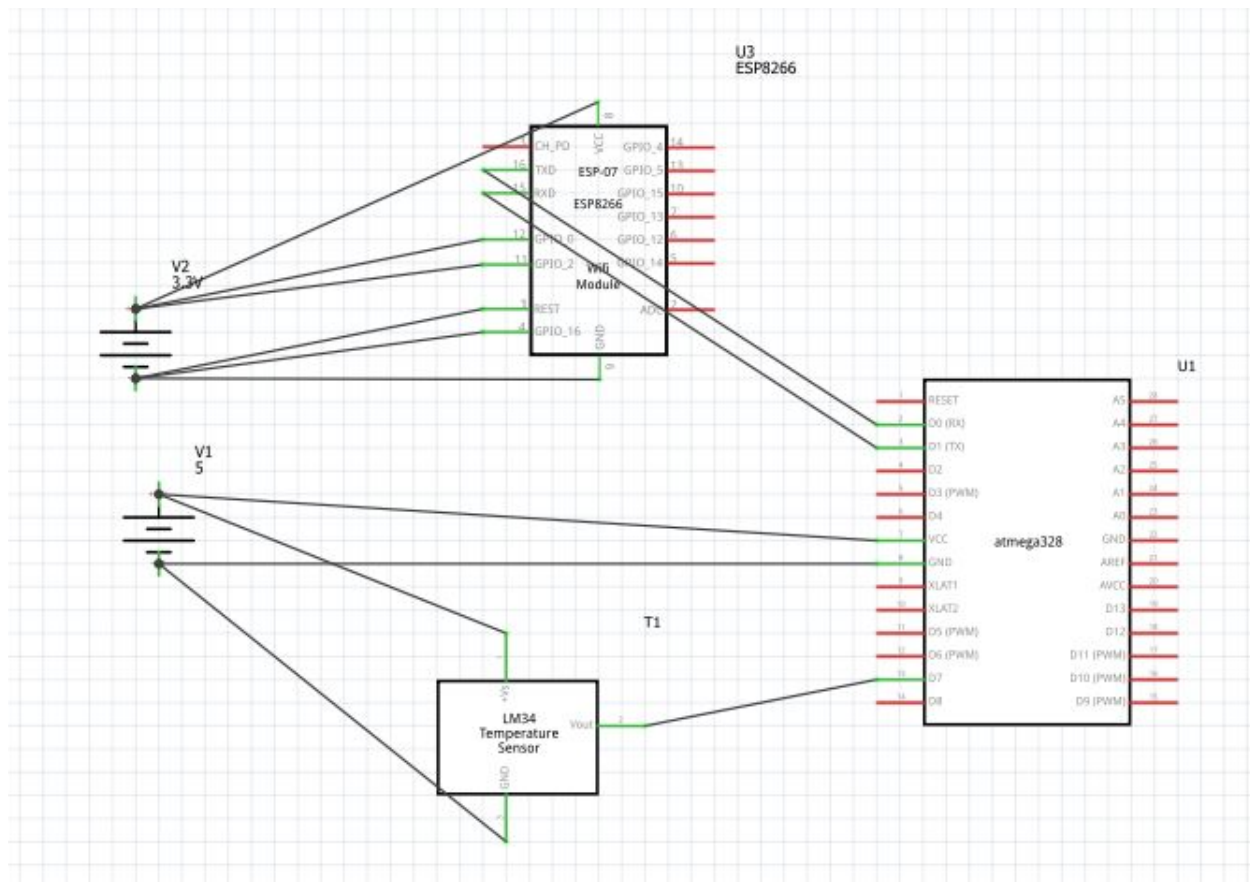
/* INIT USART (RS-232) */
void USART_init( unsigned int ubrr ) {
    UBRR0H = (unsigned char)(ubrr>>8);
    UBRR0L = (unsigned char)ubrr;
    UCSR0B = (1 << TXEN0); // Enable receiver, transmitter & RX interrupt
    UCSR0C = (3 << UCSZ00); //asynchronous 8 N 1
}

void USART_tx_string( char *data ) {
    while ((*data != '\0')) {
        while (!(UCSR0A & (1 <<UDRE0)));
        UDR0 = *data;
        data++;
    }
}

ISR(TIMER1_OVF_vect)
{
    read_adc(); //call the ADC read function
    snprintf(outs,sizeof(outs),"%3d\r\n", adc_temp); // print it
    USART_tx_string(outs); //Outputs a string to the screen
    TCNT1 = 49911; //reset Timer counter
}

```

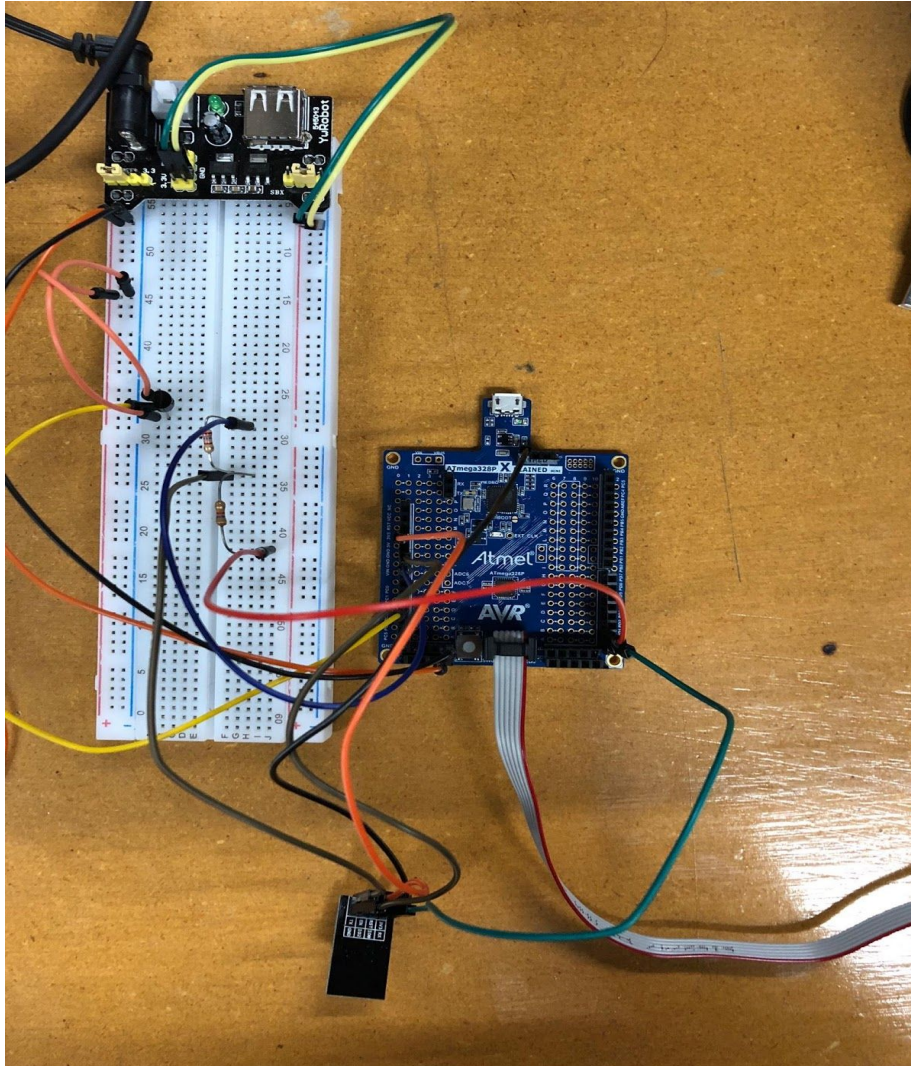
3. SCHEMATICS



4. SCREENSHOTS OF EACH TASK OUTPUT (PUTTY OUTPUT)

```
Connected!
AT
AT+CIPMUX=1
AT+CIPSTART=0,"TCP","api.thingspeak.com",80
GET https://api.thingspeak.com/apps/thinghttp/send_request?api_key=SBYXUXDC8TLMA50V
GET https://api.thingspeak.com/update?api_key=RLIBH668P4MZTRB6=50
95
89
86
85
84
84
83
83
```


5. SCREENSHOT OF EACH DEMO (BOARD SETUP)



6. VIDEO LINKS OF EACH DEMO

7. GITHUB LINK OF THIS DA

<https://github.com/jsharpin/My-Repos>

Student Academic Misconduct Policy

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

"This assignment submission is my own, original work".
Joseph Sharp Halpin