CPE301 – FALL 2019

Design Assignment 3B

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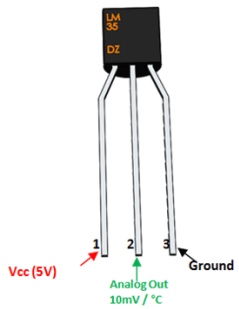
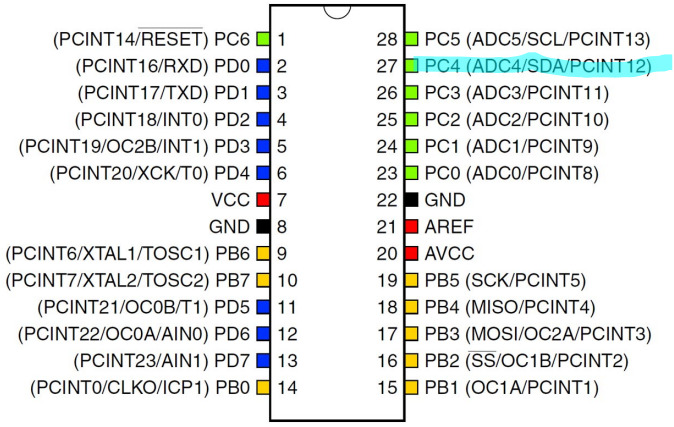
Directory: https://github.com/Alira-Coffman/submission-repo/tree/master/ESD301/DA/DA3B

1. COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS



Atmega 328p board



Arduino shield

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

```c
#define BAUD 9600
#define F_CPU 16000000UL
#define BAUD_PRESCALLER (((F_CPU / (BAUD * 16UL))) - 1)
#include <time.h>
#include <avr/io.h>
#include <stdio.h>
#include <util/delay.h>
#include <util/setbaud.h>
#include <avr/interrupt.h>
#include <stdlib.h>


/****FUNCTION DECLARATIONS***/
void USART_putstring(char* StringPtr);
void USART_init(void);
void timer_init();
void read_temp();
void adc_init (void); //function to initialize ADC


/*****GLOABALS*****/
volatile float my_temp; // temp float
char tempString[15]; // temp string for conversion
int timerCheck = 0;
volatile float tempC;
volatile float tempF;

/*SENTENCES*/
char letConnect[] = "Lets get connected.... ";
char connect[] = "CONNECTED! :D";
char dots[] = "..... ";
char tempSent[] = "Temp: ";
char Space[] = "\n";


int main()
{


    USART_putstring(letConnect);
    USART_putstring(dots);
    USART_putstring(Space);
    USART_putstring(dots);
    USART_putstring(Space);
    USART_putstring(connect);
    _delay_ms(100);
    USART_init();
    adc_init();
    while(1)
    {
        _delay_ms(1000);
        //read_temp();

    snprintf(tempString, sizeof(tempString), "%f\r\n", my_temp);
        USART_putstring(tempString);

    }
}


void USART_init( void )
{
    UBRR0H = 0;
    UBRR0L = F_CPU/16/BAUD - 1; // Used for the BAUD prescaler
    UCSR0C = _BV(UCSZ01) | _BV(UCSZ00); /* 8-bit data */
    UCSR0B = _BV(RXEN0) | _BV(TXEN0);   /* Enable RX and TX */
    TCCR1B |= 5; //(1 << CS12) | (1 << CS10); // Sets prescaler to 1024
    TIMSK1 = (1 << TOIE1); // Enables overflow flag
```

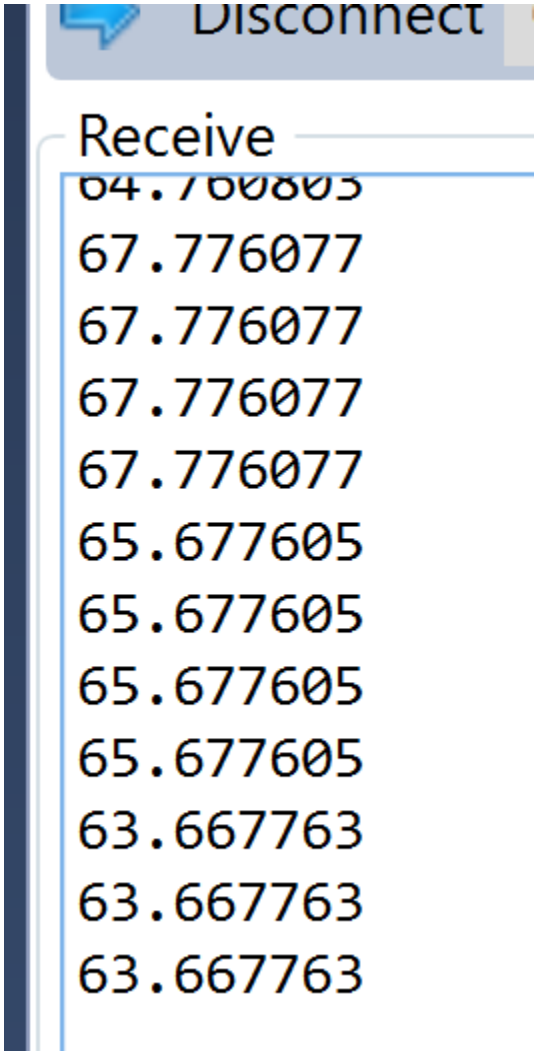
```
    TCNT1 = 49911; // 1 second delay = (0xFFFF) - TCNT = 65535 - 15624 = 49911
    sei();
}
void USART_putstring(char* StringPtr)
{
    while ((*StringPtr != '\0')){
        while (!(UCSR0A & (1 << UDRE0)));
        UDR0 = *StringPtr;
        StringPtr++;
    }
}

void timer_init()
{
    TCCR0A = 0;                 //NORMAL MODE OPERATION
    TCCR0B  = 0X05;             //THE PRESCALER SET TO 1024
    TCNT0 = 0X00;               //COUNTER VALUE = 0
    TIMSK0 = (1<<TOIE0);        //ENABLE INTERRUPT
    sei();                      //ENABLE GLOBAL INTERRUPT
}

void adc_init()
{
    ADMUX =  (0<<REFS1) | //REFERENCE SELECTION BITS
    (1<<REFS0) |
    (0<<ADLAR) |
    (1<<MUX2)  |
    (0<<MUX1)  |
    (0<<MUX0);

    ADCSRA = (1<<ADEN)  | //ADC ENABLE
    (0<<ADSC)  |
    (0<<ADATE) |
    (0<<ADIF)  |
    (0<<ADIE)  |
    (1<<ADPS2) |
    (1<<ADPS1) |
    (1<<ADPS0);
}

void read_temp()
{
    unsigned char i = 10;
    //adc_temp = 0;
    while(i--)
    {
        ADCSRA |= (1<<ADSC);
        while(ADCSRA & (1<<ADSC));
        my_temp += ADC;
    }
    my_temp = my_temp/10;          //Average of LM35 values
    my_temp = (my_temp*1.8) +32; //farenheit :D


}
ISR (TIMER1_OVF_vect)
{
    //USART_putstring("Temp: ");
    timerCheck++;
    read_temp();
```

```
8       timerCheck++;
9       read_temp();
0       //_delay_ms(1000); //delay 1 s
1
2
3
4   }
```

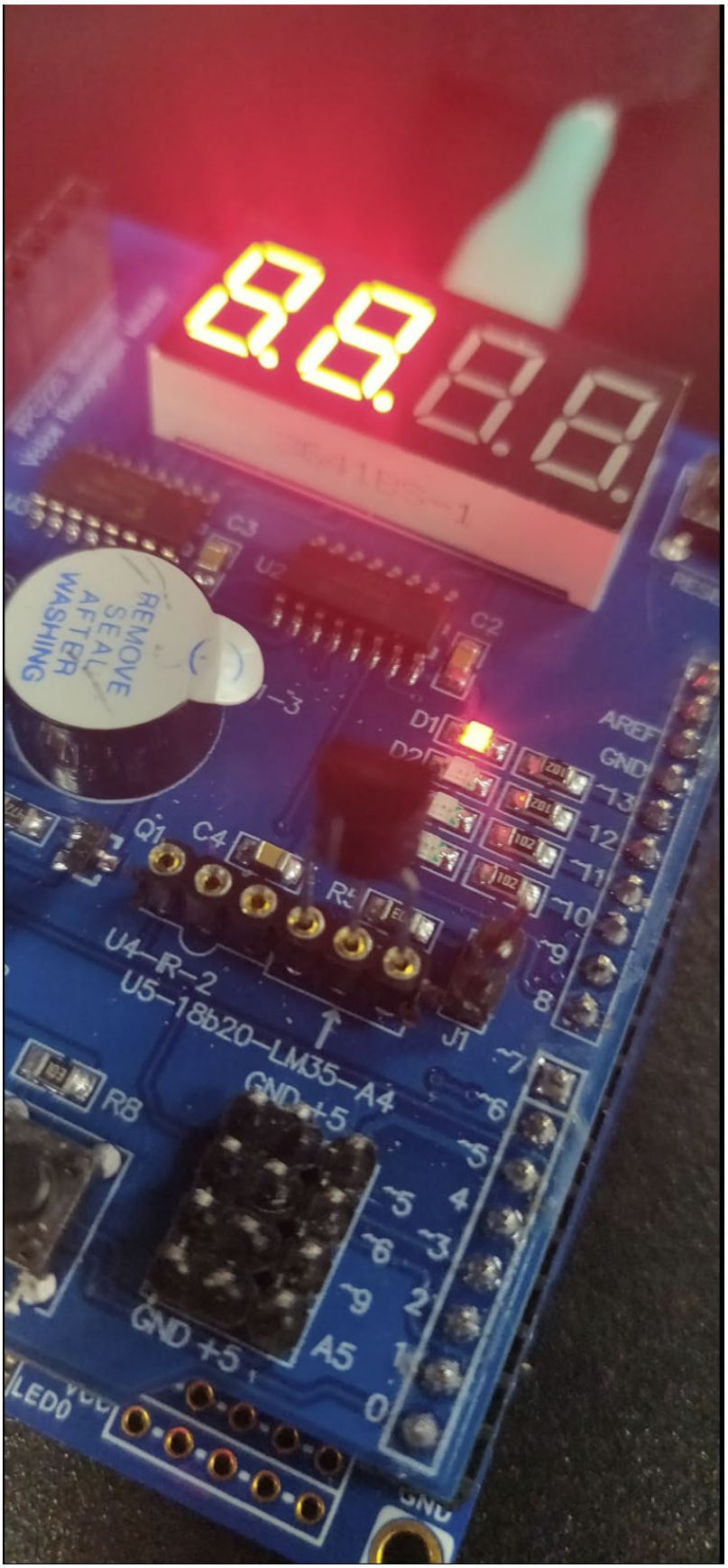
3. SCHEMATICS

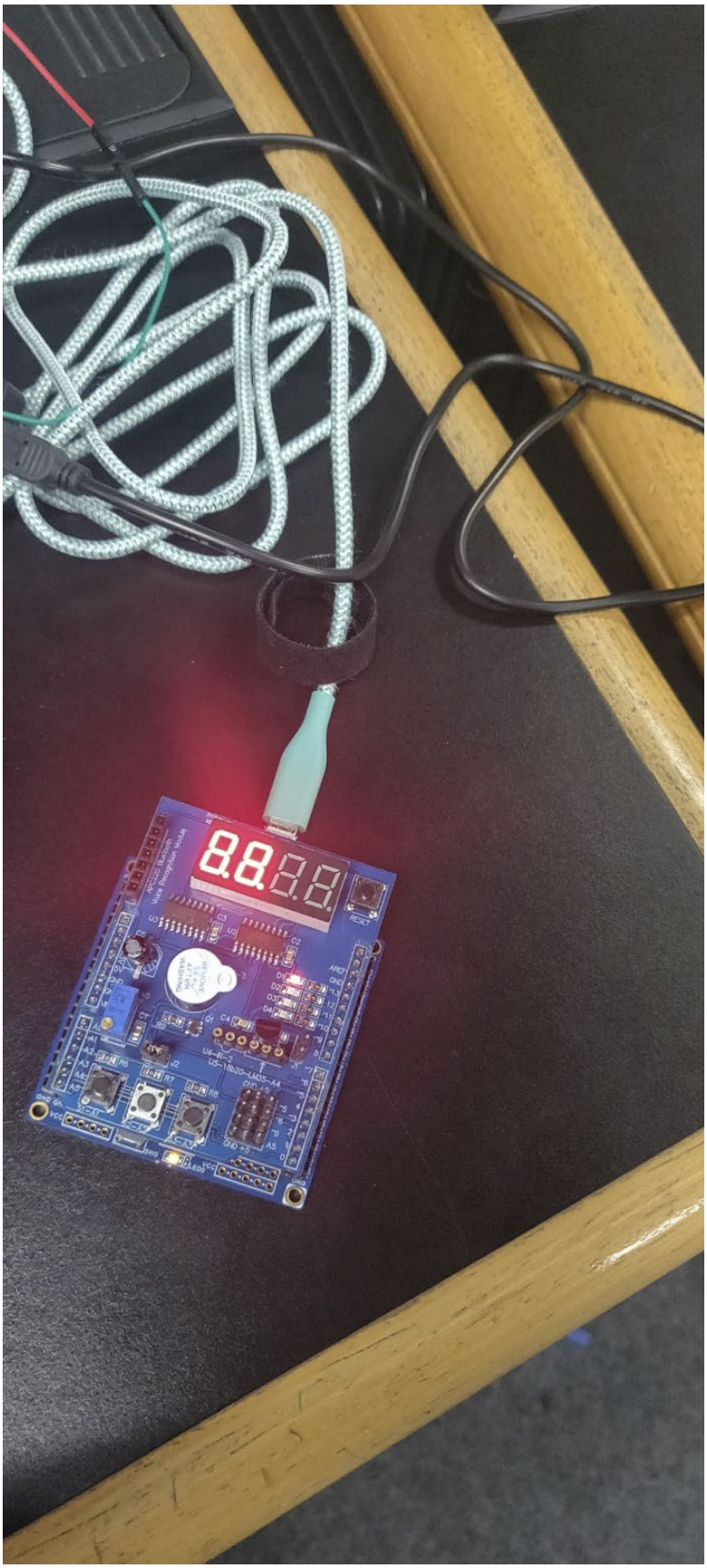
4. SCREENSHOTS OF EACH TASK OUTPUT (ATMEL STUDIO OUTPUT)

a.



5. SCREENSHOT OF EACH DEMO (BOARD SETUP)


REMOVE SEAL AFTER WASHING
U4-R-2
U5-18b20-LM35-A4
GND +5
GND +5
A5
LED0
D1
Q1
C4
R8
J1
AREF
GND



6. VIDEO LINKS OF EACH DEMO

https://youtu.be/gvmnlwf74gY

7. GITHUB LINK OF THIS DA

https://github.com/Alira-Coffman/submission-repo/tree/master/ESD301/DA/DA3B

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