CPE301 – FALL 2019

Design Assignment 4B

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Primary Github address: https://github.com/Jonesc30/Submission

Directory: Submission

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**

Atmega328PB, shield, stepper motor, ULN2003A, wires, servo motor, external power supply (FTDI)

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

//stepper

#define *F\_CPU* 16000000UL

#include <avr/io.h>

#include <util/delay.h>

#include <avr/interrupt.h>

void adc\_int(void);

void timer\_init(void);

volatile unsigned int speed; // Value of delay AKA speed

volatile int stop = 0; // Variable used to stop operation

int main(void)

{

DDRB = 0x0F; // Set PD0 - PD3 as outputs for stepper motor

adc\_int(); // Initialize ADC

TCCR1B = 0x0D; // Set CTC mode and 1024 prescaler

while(1){

while((ADCSRA&(1<<ADIF))==0); // wait for ADC conversion

if (ADC <= 4) {stop = 0; speed = 1;}

if (ADC <= 85) {stop = 0; speed = 2;}

if (ADC <= 170) {stop = 0; speed = 3;}

if (ADC <= 255) {stop = 0; speed = 4;}

if (ADC <= 340) {stop = 0; speed = 5;}

if (ADC <= 425) {stop = 0; speed = 6;}

if (ADC <= 510) {stop = 0; speed = 7;}

if (ADC <= 595) {stop = 0; speed = 8;}

if (ADC <= 680) {stop = 0; speed = 9;}

if (ADC <= 765) {stop = 0; speed = 10;}

if (ADC <= 850) {stop = 0; speed = 11;}

if (ADC <= 935) {stop = 0; speed = 12;}

if (ADC <= 1015) {stop = 0; speed = 13;}

if (ADC >= 1016) {stop = 1;}

OCR1A = speed; // set OCR1A to the determined speed

TCNT1 = 0x00; // reset the clock

if(stop == 0){

// If the ADC value is not at its MAX value then step with desired delay

while((TIFR1 & 0x2) != 0x2);

PORTB = 0x09;

TIFR1 |= (1<<OCF1A);

while((TIFR1 & 0x2) != 0x2);

PORTB = 0x08;

TIFR1 |= (1<<OCF1A);

while((TIFR1 & 0x2) != 0x2);

PORTB = 0X0C;

TIFR1 |= (1<<OCF1A);

while((TIFR1 & 0x2) != 0x2);

PORTB = 0X04;

TIFR1 |= (1<<OCF1A);

while((TIFR1 & 0x2) != 0x2);

PORTB = 0x06;

TIFR1 |= (1<<OCF1A);

while((TIFR1 & 0x2) != 0x2);

PORTB = 0x02 ;

TIFR1 |= (1<<OCF1A);

while((TIFR1 & 0x2) != 0x2);

PORTB = 0X03;

TIFR1 |= (1<<OCF1A);

while((TIFR1 & 0x2) != 0x2);

PORTB = 0X01;

TIFR1 |= (1<<OCF1A);

}

}

}

void adc\_int(void){

ADMUX = (0<<REFS1)| // Reference Selection Bits

(1<<REFS0)| // AVcc-external cap at AREF

(0<<ADLAR)| // ADC Left Adjust Result

(0<<MUX3) |

(0<<MUX2) | // ANalogChannel Selection Bits

(0<<MUX1) | // ADC0 (PC0)

(0<<MUX0);

ADCSRA = (1<<ADEN)| // ADC Enable

(1<<ADSC) | // ADC Start Conversion

(1<<ADATE)| // ADC Auto Trigger Enable

(0<<ADIF) | // ADC Interrupt Flag

(1<<ADIE) | // ADC Interrupt Enable

(1<<ADPS2)| // ADC PrescalerSelect Bits

(1<<ADPS1)|

(1<<ADPS0);

}

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

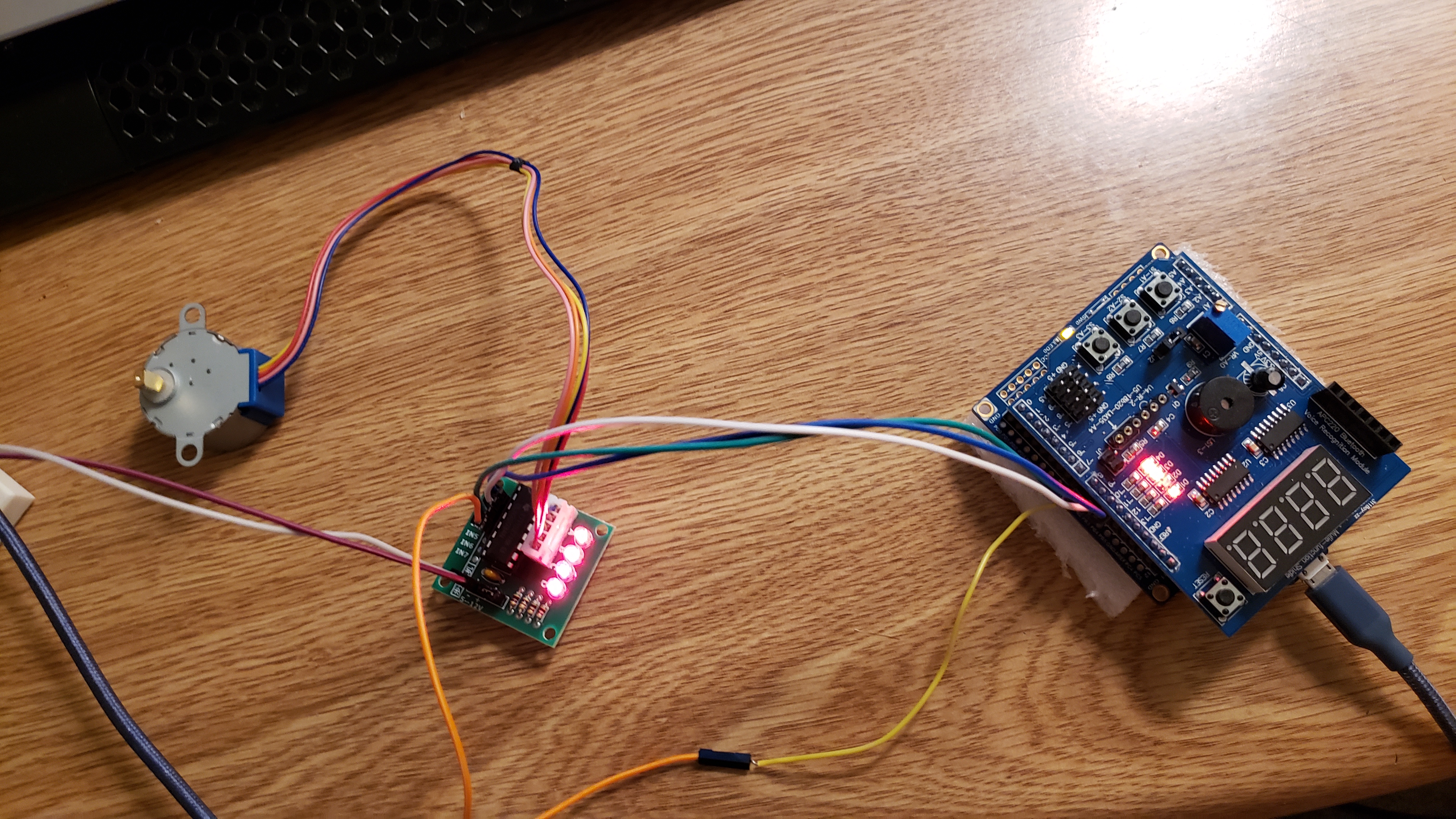
|  |  |
| --- | --- |
|  | #define F\_CPU 16000000UL |
|  | #include <avr/io.h> |
|  | #include <util/delay.h> |
|  | #include <avr/interrupt.h> |
|  | int check = 0; |
|  | int main(void) |
|  |  |
|  | { |
|  |  |
|  |  |
|  | DDRB = 0xFF; //DDRB as an output |
|  | DDRD = 0xFF; |
|  | TCCR1B |= (1<<WGM13) | (1<<WGM12) | (1<<CS11) | (1<<CS10); |
|  | TCCR1A |= (1<<COM1A1) | (1<<COM1B1) | (1<<WGM11); |
|  | ICR1=4999; |
|  | ADMUX = 0x60; |
|  | ADCSRA = 0xA6; |
|  |  |
|  | while (1) |
|  | { |
|  | ADCSRA |= ( 1 << ADSC); //start conversion |
|  | while((ADCSRA & (1 << ADIF))== 0); |
|  | check = ADCH; //temp value |
|  |  |
|  | if(check == 0) // minimum value |
|  | { |
|  | OCR1A = 0; //turn 0 deg |
|  | \_delay\_ms(500); |
|  | } |
|  | if(check == 255) // maximum pot value |
|  | { |
|  | //PORTB = ( 1 << PORTB2); |
|  | OCR1A = 535; //turn 180 |
|  | \_delay\_ms(500); |
|  | } |
|  | } |
|  | } |

1. **SCHEMATICS**

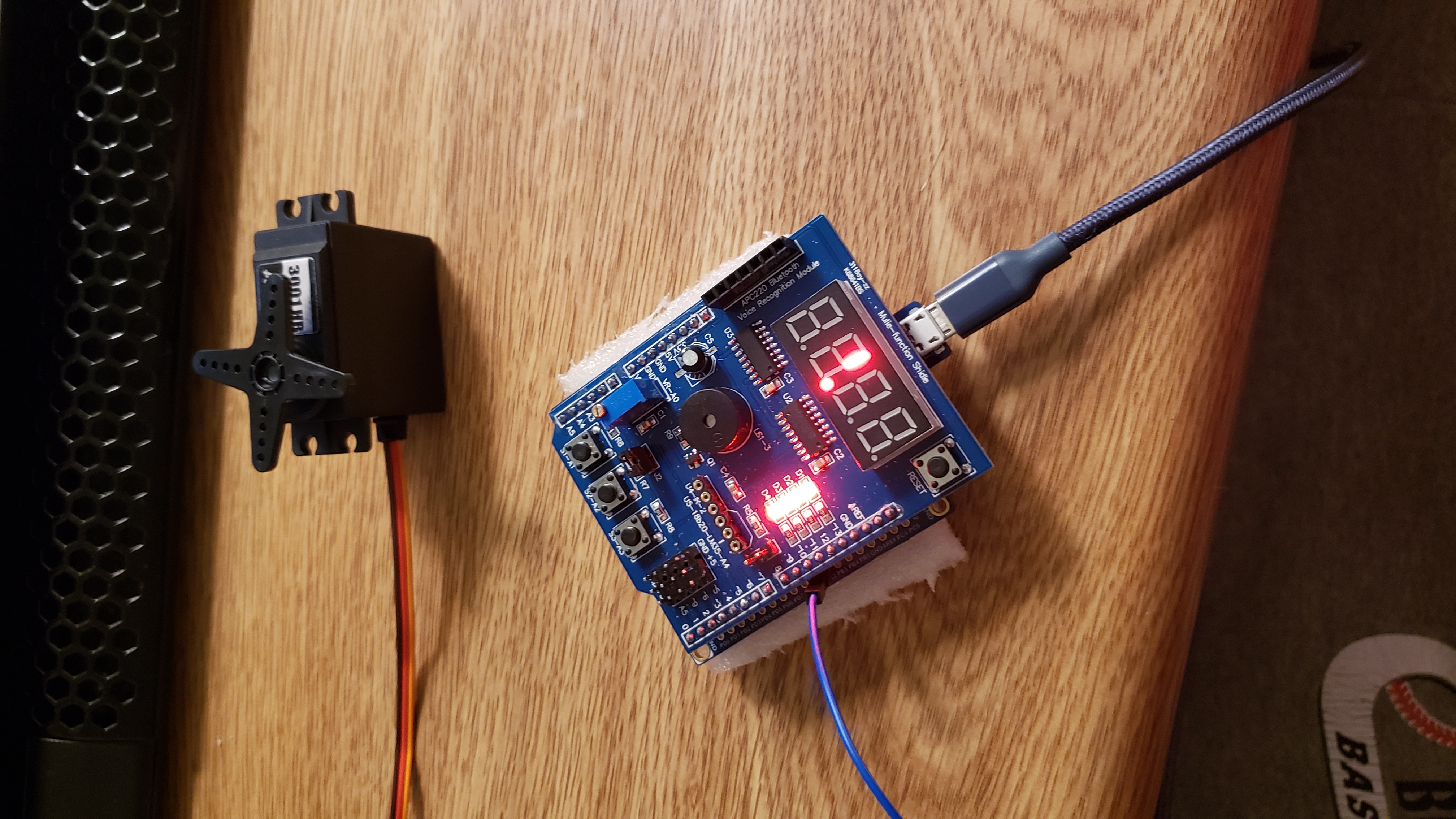
Use fritzing.org

1. **SCREENSHOTS OF EACH TASK OUTPUT (ATMEL STUDIO OUTPUT)**
2. **SCREENSHOT OF EACH DEMO (BOARD SETUP)**

Task 1



Task2



1. **VIDEO LINKS OF EACH DEMO**

Task 1:

<https://www.youtube.com/watch?v=TOrjVZSJRDw>

Task 2:

<https://www.youtube.com/watch?v=b8L6A1nOE-g>

1. **GITHUB LINK OF THIS DA**

<https://github.com/Jonesc30/Submission/tree/master/DesignAssignments>

**Student Academic Misconduct Policy**

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

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

Cody Jones