CPE301 – SPRING 2019

Design Assignment 4B

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Primary Github address: https://github.com/regis-shaquille/submissions-SR
Directory: https://github.com/regis-shaquille/submissions-SR/tree/master/Design%20Assignments

Submit the following for all Labs:

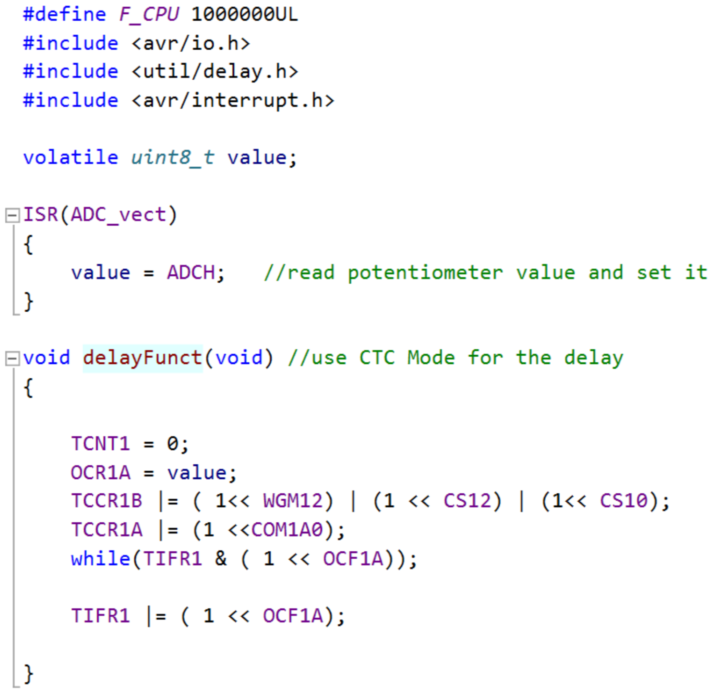
1. In the document, for each task submit the modified or included code (only) with highlights and justifications of the modifications. Also, include the comments.
2. Use the previously create a Github repository with a random name (no CPE/301, Lastname, Firstname). Place all labs under the root folder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

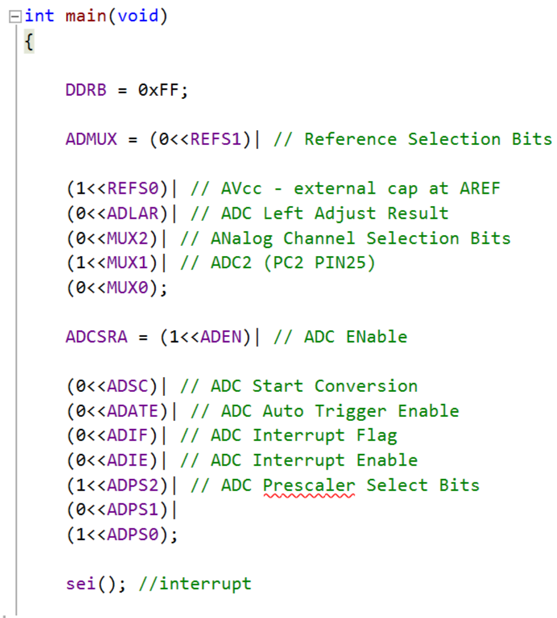
Atmega328P Xplained Mini Board
Stepper Motor
Servo Motor
1k Potentiometer
ULN2003 Breakout Chip
Breadboard

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

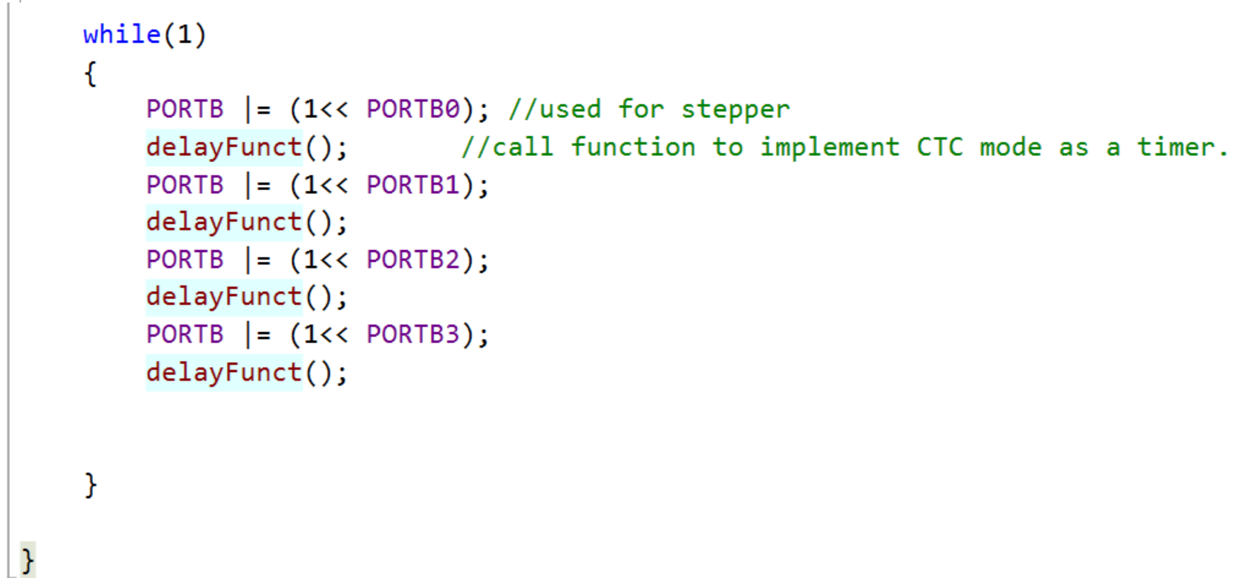
Insert initial code here



```
#define F_CPU 1000000UL
#include <avr/io.h>
#include <util/delay.h>
#include <avr/interrupt.h>

volatile uint8_t value;

ISR(ADC_vect)
{
    value = ADCH;   //read potentiometer value and set it
}

void delayFunct(void) //use CTC Mode for the delay
{

    TCNT1 = 0;
    OCR1A = value;
    TCCR1B |= ( 1<< WGM12) | (1 << CS12) | (1<< CS10);
    TCCR1A |= (1 <<COM1A0);
    while(TIFR1 & ( 1 << OCF1A));

    TIFR1 |= ( 1 << OCF1A);

}
```



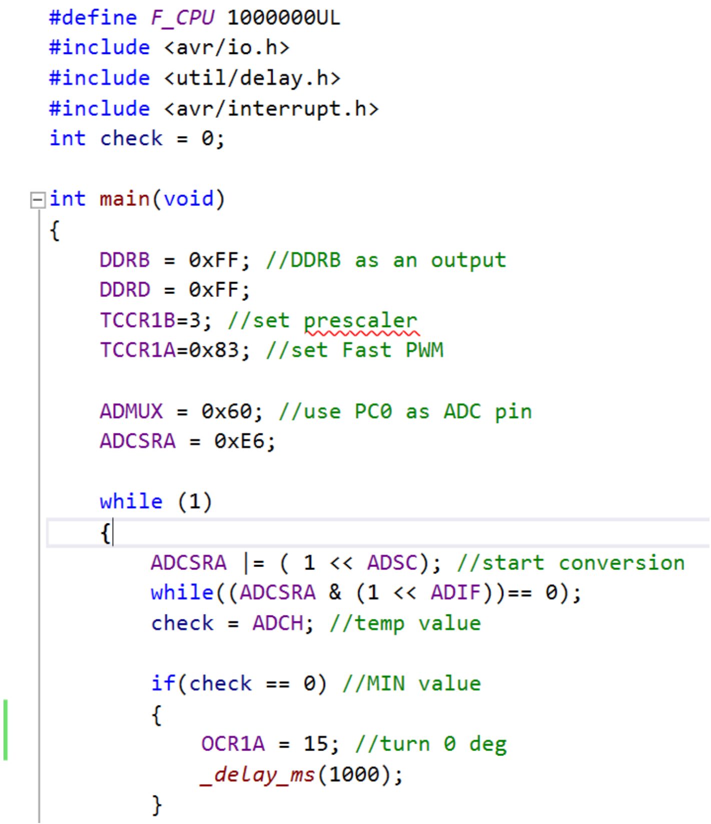
```
int main(void)
{

    DDRB = 0xFF;

    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);

    sei(); //interrupt
```



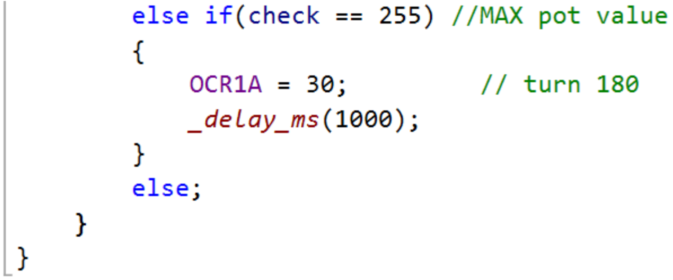
```
    while(1)
    {
        PORTB |= (1<< PORTB0); //used for stepper
        delayFunct();       //call function to implement CTC mode as a timer.
        PORTB |= (1<< PORTB1);
        delayFunct();
        PORTB |= (1<< PORTB2);
        delayFunct();
        PORTB |= (1<< PORTB3);
        delayFunct();


    }

}
```

3. DEVELOPED MODIFIED CODE OF TASK 2/A from TASK 1/A

Insert only the modified sections here



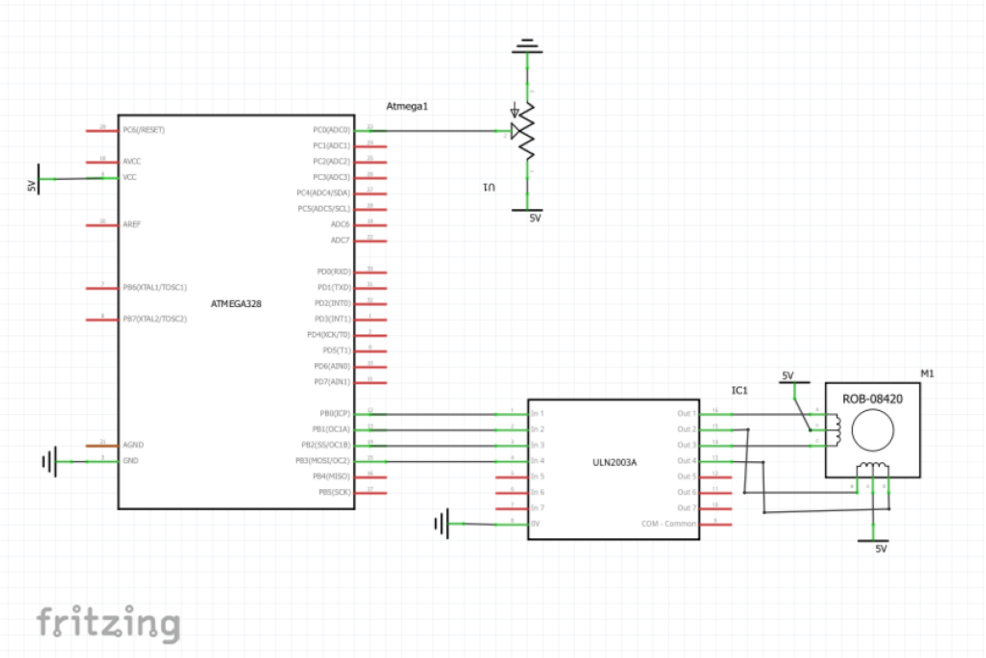
```
#define F_CPU 1000000UL
#include <avr/io.h>
#include <util/delay.h>
#include <avr/interrupt.h>
int check = 0;

int main(void)
{
    DDRB = 0xFF; //DDRB as an output
    DDRD = 0xFF;
    TCCR1B=3; //set prescaler
    TCCR1A=0x83; //set Fast PWM

    ADMUX = 0x60; //use PC0 as ADC pin
    ADCSRA = 0xE6;

    while (1)
    {
        ADCSRA |= ( 1 << ADSC); //start conversion
        while((ADCSRA & (1 << ADIF))== 0);
        check = ADCH; //temp value

        if(check == 0) //MIN value
        {
            OCR1A = 15; //turn 0 deg
            _delay_ms(1000);
        }
```



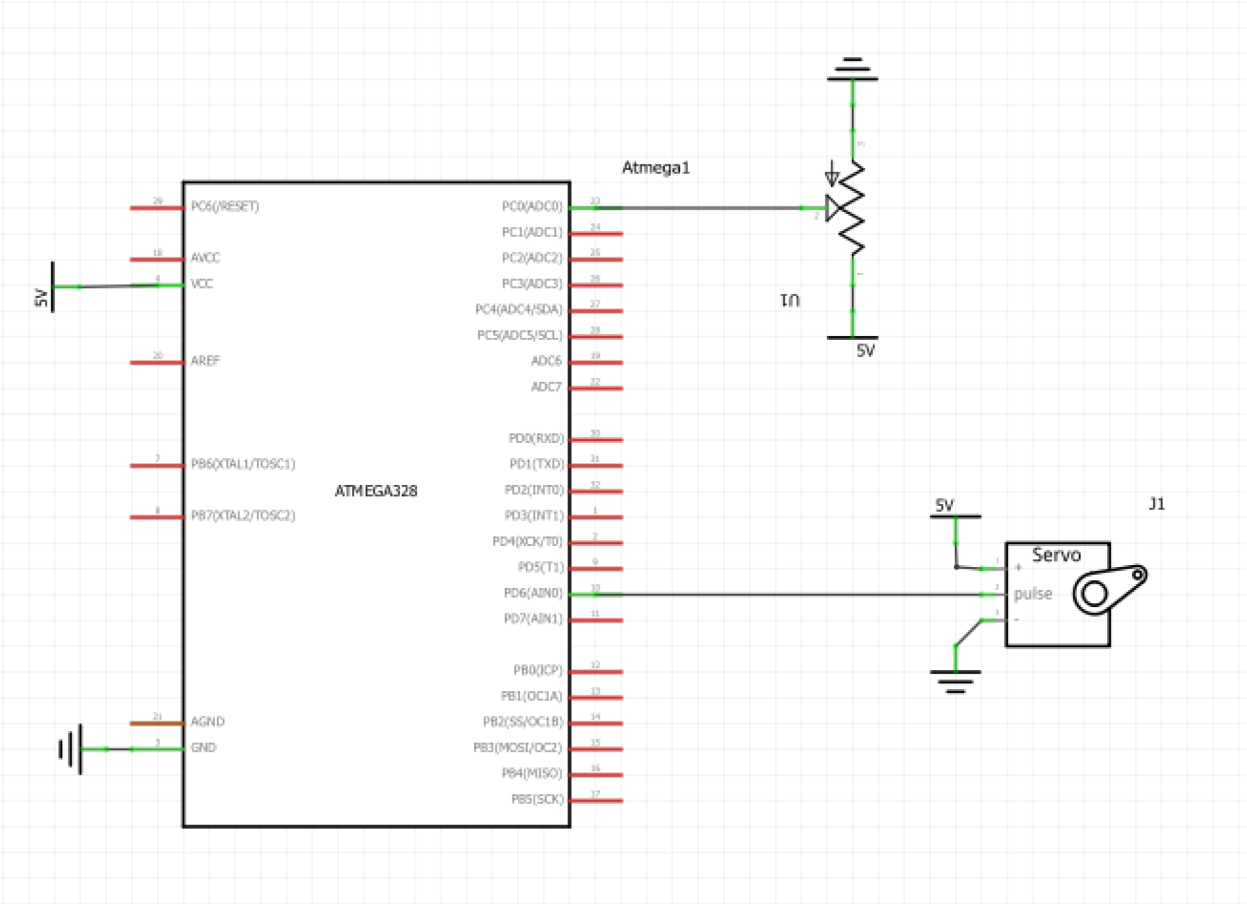
```
        else if(check == 255) //MAX pot value
        {
            OCR1A = 30;         // turn 180
            _delay_ms(1000);
        }
        else;
    }
}
```

4. SCHEMATICS

Task 1:

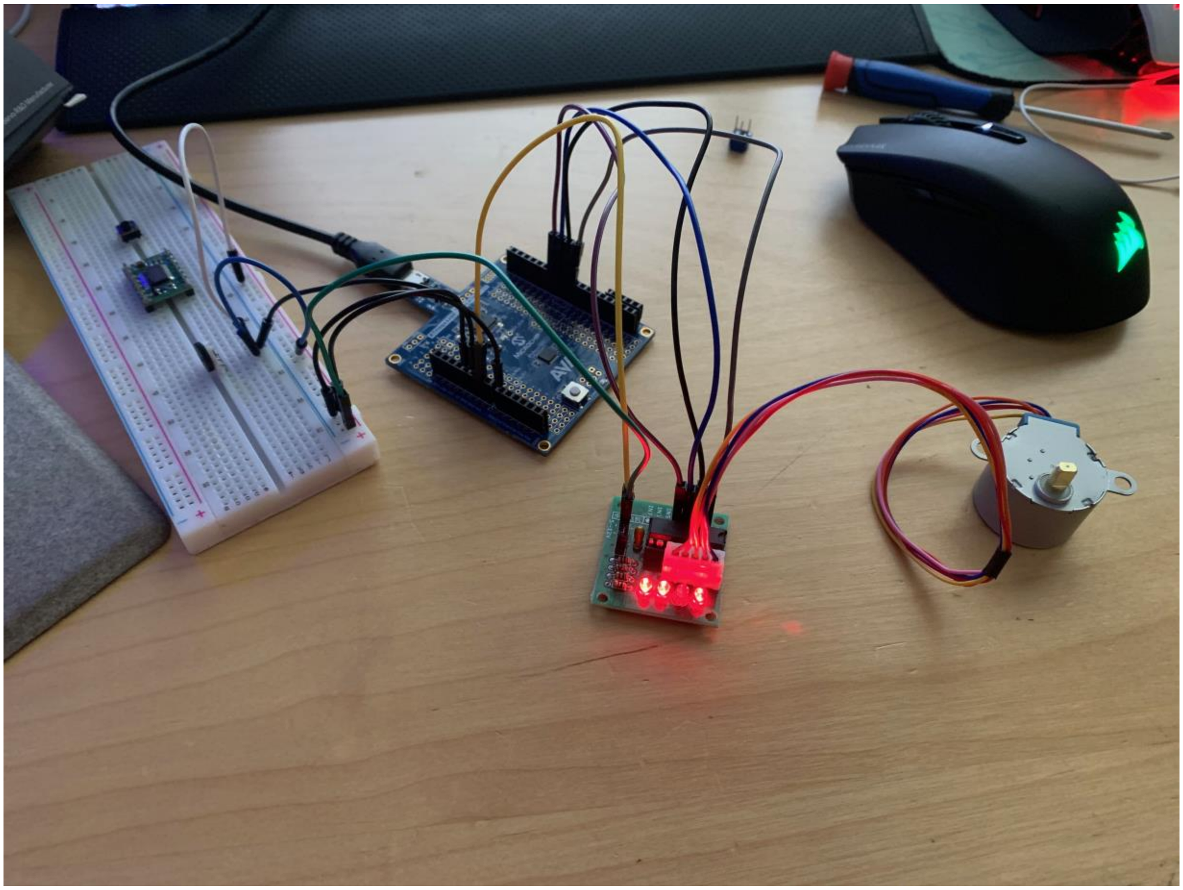

Atmega1
ATMEGA328
PC6(/RESET)
AVCC
VCC
5V
AREF
PB6(XTAL1/TOSC1)
PB7(XTAL2/TOSC2)
AGND
GND
PC0(ADC0)
PC1(ADC1)
PC2(ADC2)
PC3(ADC3)
PC4(ADC4/SDA)
PC5(ADC5/SCL)
ADC6
ADC7
PD0(RXD)
PD1(TXD)
PD2(INT0)
PD3(INT1)
PD4(XCK/T0)
PD5(T1)
PD6(AIN0)
PD7(AIN1)
PB0(ICP)
PB1(OC1A)
PB2(SS/OC1B)
PB3(MOSI/OC2)
PB4(MISO)
PB5(SCK)
U1
5V
IC1
ULN2003A
In 1
In 2
In 3
In 4
In 5
In 6
In 7
0V
Out 1
Out 2
Out 3
Out 4
Out 5
Out 6
Out 7
COM - Common
5V
M1
ROB-08420
5V
fritzing

Task 2:

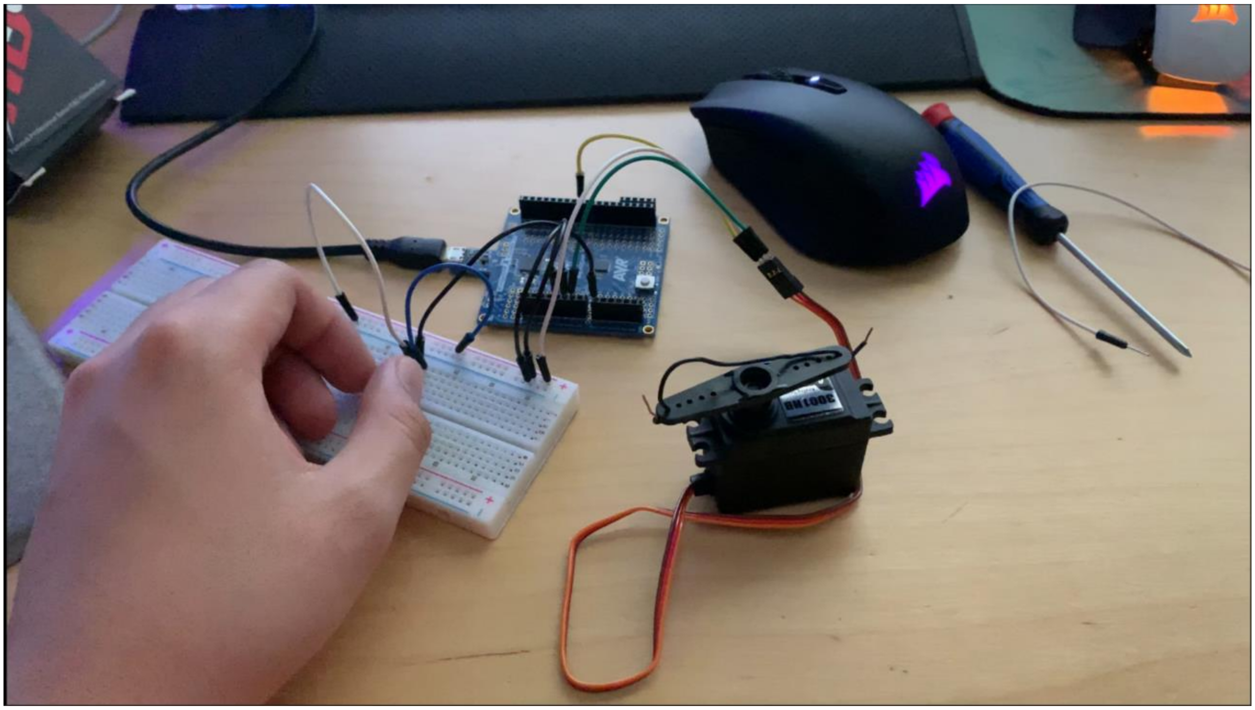

Atmega1
ATMEGA328
PC6(/RESET)
AVCC
VCC
5V
AREF
PB6(XTAL1/TOSC1)
PB7(XTAL2/TOSC2)
AGND
GND
PC0(ADC0)
PC1(ADC1)
PC2(ADC2)
PC3(ADC3)
PC4(ADC4/SDA)
PC5(ADC5/SCL)
ADC6
ADC7
PD0(RXD)
PD1(TXD)
PD2(INT0)
PD3(INT1)
PD4(XCK/T0)
PD5(T1)
PD6(AIN0)
PD7(AIN1)
PB0(ICP)
PB1(OC1A)
PB2(SS/OC1B)
PB3(MOSI/OC2)
PB4(MISO)
PB5(SCK)
U1
5V
5V
J1
Servo
+
pulse
-

5. SCREENSHOT OF EACH DEMO (BOARD SETUP)

Task1:



Task 2:



6. VIDEO LINKS OF EACH DEMO

https://www.youtube.com/watch?v=nSnMjhviTMQ

7. GITHUB LINK OF THIS DA

https://github.com/regis-shaquille/submissions-SR/tree/master/Design%20Assignments/DA4b

Student Academic Misconduct Policy

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

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