

Design Assignment 4B

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Primary Github address: <https://github.com/WorkuT1226/CPE301.git>

Directory:

Submit the following for all Labs:

- In the document, for each task submit the modified or included code (only) with highlights and justifications of the modifications. Also, include the comments.
 - 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.
 - If multiple asm/c files or other libraries are used, create a folder LabXX-TYY and place these files inside the folder.
 - 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).
- **COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS**
 - **INITIAL/MODIFIED/DEVELOPED CODE OF TASK 1/A**

Task 1

```
/*  
 * Task 1 (Stepper Motor).c  
 *  
 * Created: 11/10/2019 6:14:01 PM  
 * Author : Worku  
 */
```

```
#define F_CPU 16000000UL  
#include <avr/io.h>  
#include <avr/interrupt.h>  
  
int main(void){  
    DDRC = 0xFF;  
    TCCR1A |= (1<<WGM01);
```

```

TCCR1B |= (1<<WGM12)|(1<< CS12)|(1<<CS10);

ADMUX |= (1<<REFS0);
ADCSRA |= (1<<ADEN)|(1<<ADSC)|(1<<ADATE)|(ADPS2)|(1<<ADPS1)|(1<<ADPS0);

while (1){
    while ((ADCSRA & (1<<ADIF)) == 0);
    OCR1A = ADC;

    TCNT1 = 0;
    while (TCNT0 != OCR1A) {}
    PORTC = 0xF9;

    TCNT1 = 0;
    while (TCNT0 != OCR1A) {}
    PORTC = 0xF3;

    TCNT1 = 0;
    while (TCNT0 != OCR1A) {}
    PORTC = 0xF6;

    TCNT1 = 0;
    while (TCNT0 != OCR1A) {}
    PORTC = 0xFF;
}
}

```

Task 2

```

/*
 * Task 2 (Servo Motor).c
 *
 * Created: 11/11/2019 11:17:14 PM
 * Author : Worku
 */
#define F_CPU 16000000UL
#include <avr/io.h>
#include <util/delay.h>
int main(void){
    TCCR1A |= (1<<COM1A1)|(1<<COM1B1)|(1<<WGM11);\
    TCCR1B |= (1<<WGM13)|(1<<WGM12)|(1<<CS11)|(1<<CS10);
    DDRC = 0x03;

    DDRC = 0x20;

    ADMUX |= (1<<REFS0);
    ADCSRA |= (1<<ADEN)|(1<<ADSC)|(1<<ADATE)|(ADPS2)|(1<<ADPS1)|(1<<ADPS0);

    while (1){
        while ((ADCSRA & (1<<ADIF)) == 0);
        OCR1A = ADC;
    }
}

```

- SCREENSHOTS OF EACH TASK OUTPUT (ATMEL STUDIO OUTPUT)

Task 1

```
/*
 * Task 1 (Stepper Motor).c
 * Created: 11/10/2019 6:14:01 PM
 * Author : Wotku
 */

#define F_CPU 16000000UL
#include <avr/io.h>
#include <avr/interrupt.h>

int main(void){
    DDRC = 0xFF;
    TCCR1A |= (1<<WM01);
    TCCR1B |= (1<<WM12)|(1<<CS12)|(1<<CS10);

    ADMUX |= (1<<REFS0);
    ADCSRA |= (1<<ADEN)|(1<<ADSC)|(1<<ADIF)|(1<<ADPS2)|(1<<ADPS1)|(1<<ADPS0);

    while (1){
        while ((ADCSRA & (1<<ADIF)) == 0);
        OCR1A = ADC;

        TCNT1 = 0;
        while (TCNT0 != OCR1A) {}
        PORTC = 0xF9;

        TCNT1 = 0;
        while (TCNT0 != OCR1A) {}
        PORTC = 0xF3;

        TCNT1 = 0;
        while (TCNT0 != OCR1A) {}
        PORTC = 0xF6;

        TCNT1 = 0;
        while (TCNT0 != OCR1A) {}
        PORTC = 0xFF;
    }
}
```

Output: ATmega328P Xplained Mini - 0615 Error List main.c Task 1 (Stepper Motor)

main.c D:\Atmel Studio 7\Projects\Assignments\DA_4B\Task 1 (Stepper Motor)\Task 1 (Stepper Motor)\main.c

```
TCNT1 = 0;
while (TCNT0 != OCR1A) {}
PORTC = 0xF3;

TCNT1 = 0;
while (TCNT0 != OCR1A) {}
PORTC = 0xF6;

TCNT1 = 0;
while (TCNT0 != OCR1A) {}
PORTC = 0xFF;
}
```

```
Output  Output  Error List  main.c  Task 1 (Stepper Motor)
Show output from: Build
----- Build started: Project: Task 1 (Stepper Motor), Configuration: Debug AVR -----
Build started.
Project "Task 1 (Stepper Motor).cproj" (default targets):
Target "PreBuildEvent" skipped, due to false condition; ('$(PreBuildEvent)'!='') was evaluated as (''!='').
Target "CoreBuild" in file "D:\Atmel Studio 7\7.0\Vs\Compiler.targets" from project "D:\Atmel Studio 7\Projects\Assignments\DA_4B\Task 1 (Stepper Motor)\Task 1 (Stepper Motor).cproj"
Task "RunCompilerTask"
Shell Utils Path D:\Atmel Studio 7\7.0\shellUtils
D:\Atmel Studio 7\7.0\shellUtils\make.exe all --jobs 4 --output-sync
Building file: ../main.c
Invoking: AVR/GNU C Compiler : 5.4.0
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-gcc.exe" -x c -funsigned-char -funsigned-bitfields -DDEBUG -I"D:\Atmel Studio 7\7.0\Packs\avr8\avr8-gnu-toolchain\avr8\avr8-gnu-toolchain\bin\avr-gcc.exe" -o Task 1 (Stepper Motor).elf main.o -Wl,-Map=Task 1 (Stepper Motor).map -Wl,--start-group -Wl,-end-group
Finished building: ../main.c
Building target: Task 1 (Stepper Motor).elf
Invoking: AVR/GNU Linker : 5.4.0
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-gcc.exe" -o Task 1 (Stepper Motor).elf main.o -Wl,-Map=Task 1 (Stepper Motor).map -Wl,--start-group -Wl,-end-group
Finished building target: Task 1 (Stepper Motor).elf
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-objcopy.exe" -O ihex -R .eeprom -R .fuse -R .lock -R .signature -R .user_signatures "Task 1 (Stepper Motor).elf" "Task 1 (Stepper Motor).hex"
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-objcopy.exe" -h -S "Task 1 (Stepper Motor).elf" > "Task 1 (Stepper Motor).iss"
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-objcopy.exe" -O srec -R .eeprom -R .fuse -R .lock -R .signature -R .user_signatures "Task 1 (Stepper Motor).elf" "Task 1 (Stepper Motor).srec"
text data bss dec hex filename
312 0 0 312 138 Task 1 (Stepper Motor).elf
Done executing task "RunCompilerTask".
Task "RunOutputFileVerifyTask"
Program Memory Usage : 312 bytes 1.0 % Full
Data Memory Usage : 0 bytes 0.0 % Full
Done executing task "RunOutputFileVerifyTask".
Done building target "CoreBuild" in project "Task 1 (Stepper Motor).cproj".
Target "PostBuildEvent" skipped, due to false condition; ('$(PostBuildEvent)'!='') was evaluated as (''!='').
Target "Build" in file "D:\Atmel Studio 7\7.0\Vs\Avr.common.targets" from project "D:\Atmel Studio 7\Projects\Assignments\DA_4B\Task 1 (Stepper Motor)\Task 1 (Stepper Motor).cproj"
Done building target "Build" in project "Task 1 (Stepper Motor).cproj".
Done building project "Task 1 (Stepper Motor).cproj".

Build succeeded.
===== Build: 1 succeeded or up-to-date, 0 failed, 0 skipped =====
|
```

Task 2

```
main.c  Output  Error List  main.c  Task 1 (Stepper Motor)
/*
 * Task 2 (Servo Motor).c
 *
 * Created: 11/11/2019 11:17:14 PM
 * Author: Wooku
 */
#define F_CPU 16000000UL
#include <avr/io.h>
#include <util/delay.h>
int main(void){
    TCCR1A |= (1<<COM1A1)|(1<<COM1B1)|(1<<WGM11);
    TCCR1B |= (1<<WGM13)|(1<<WGM12)|(1<<CS11)|(1<<CS10);
    DDRC = 0x03;

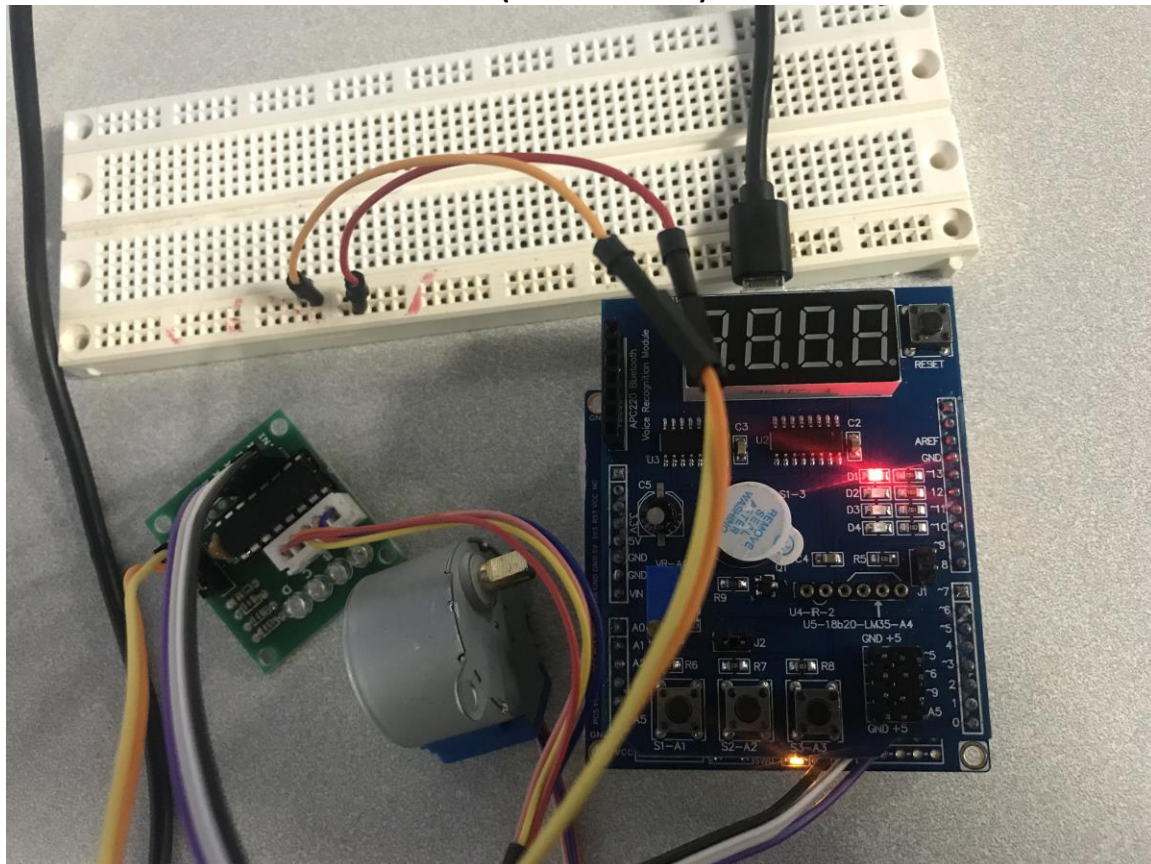
    DDRC = 0x20;

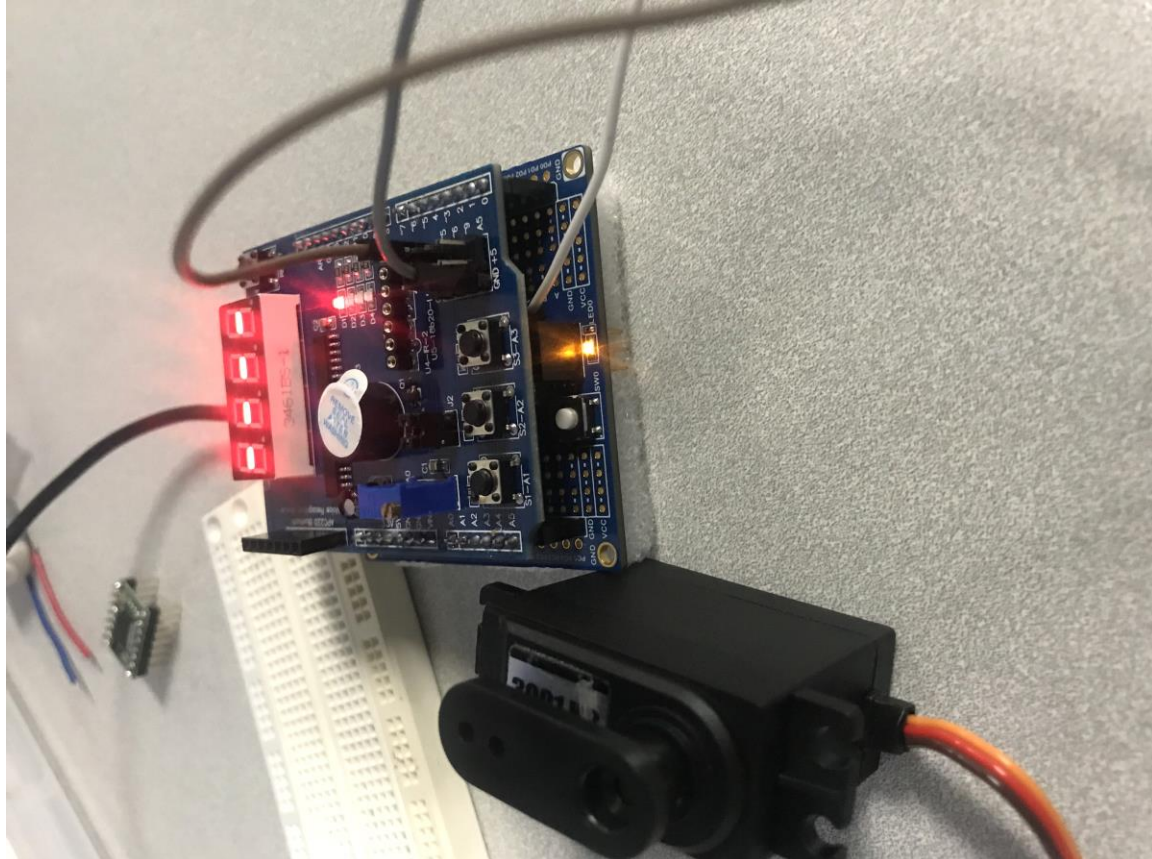
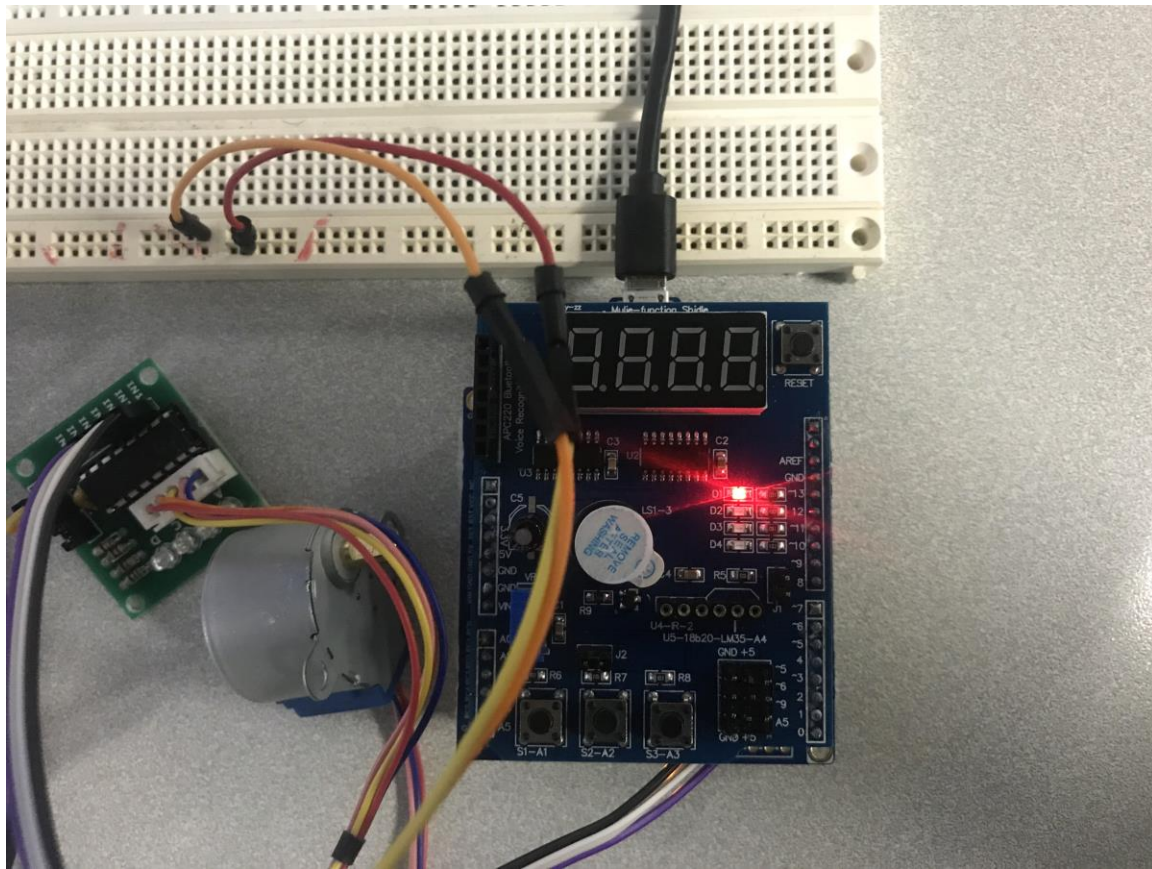
    ADMUX |= (1<<REFS0);
    ADCSRA |= (1<<ADEN)|(1<<ADSC)|(1<<ADIF)|(1<<ADPS2)|(1<<ADPS1)|(1<<ADPS0);

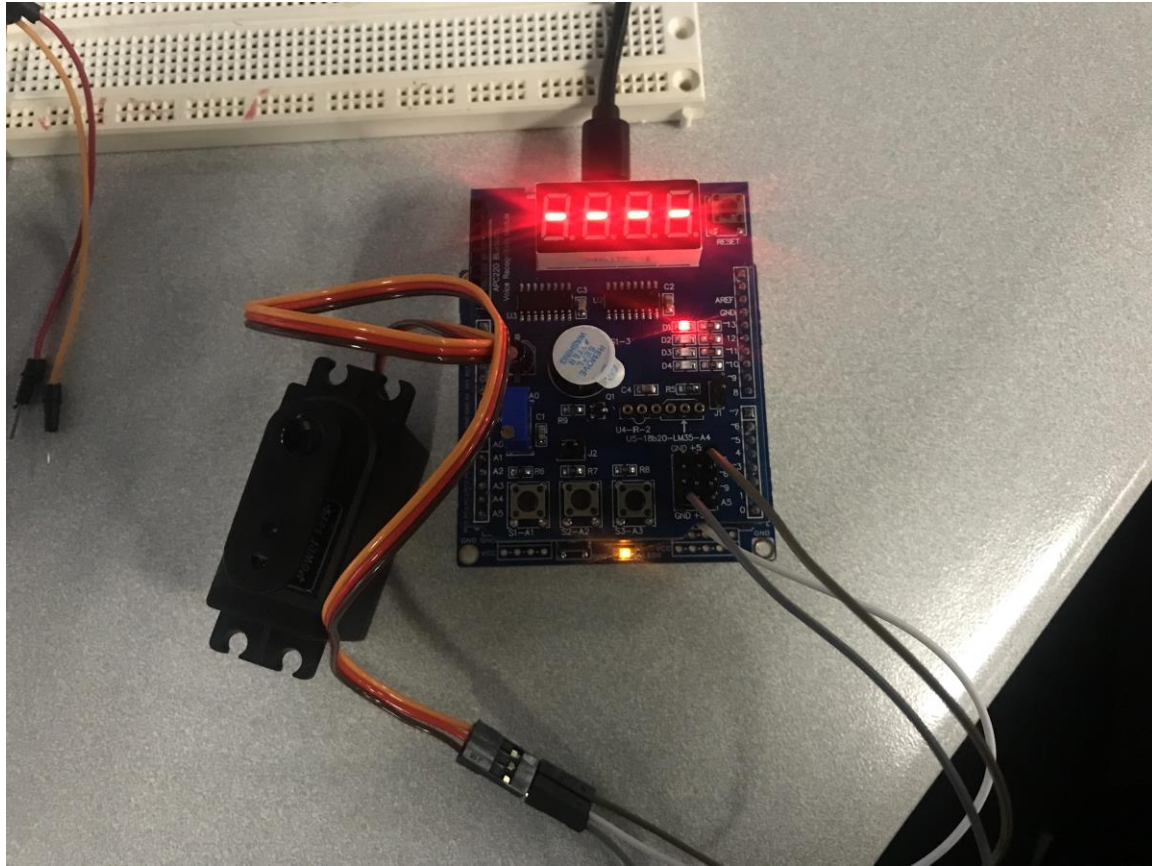
    while (1){
        while ((ADCSRA & (1<<ADIF)) == 0);
        OCR1A = ADC;
    }
}
```

```
main.c | Output | X | Atmega328P Xplained Mini - 0615 | Error List
Show output from: Build
----- Build started: Project: Task 2 (Servo Motor), Configuration: Debug AVR -----
Build started.
Project "Task 2 (Servo Motor).cproj" (default targets):
Target "PreBuildEvent" skipped, due to false condition; ('$(PreBuildEvent)'!='') was evaluated as (''!='').
Target "CoreBuild" in file "D:\Atmel Studio 7\7.0\Vs\Compiler.targets" from project "D:\Atmel Studio 7\Projects\Assignments\DA_48\Task 2 (Servo Motor)\Task 2 (Servo Motor).cproj"
Using "RunCompilerTask" task from assembly "D:\Atmel Studio 7\7.0\Extensions\Application\AvrGCC.dll".
Task "RunCompilerTask"
Shell Utils Path D:\Atmel Studio 7\7.0\shellUtils
D:\Atmel Studio 7\7.0\shellUtils\make.exe all --jobs 4 --output-sync
Building file: ../main.c
Invoking: AVR/GNU C Compiler : 5.4.0
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-gcc.exe" -x c -funsigned-char -funsigned-bitfields -DDEBUG -I"D:\Atmel Studio 7\7.0\Packs\avr8\avr8-gnu-toolchain\avr8\avr8-gnu-toolchain\bin\avr-gcc.exe" -o Task 2 (Servo Motor).elf main.o -Wl,-Map=Task 2 (Servo Motor).map -Wl,-st
Finished building target: Task 2 (Servo Motor).elf
Invoking: AVR/GNU Linker : 5.4.0
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-gcc.exe" -o Task 2 (Servo Motor).elf main.o -Wl,-Map=Task 2 (Servo Motor).map -Wl,-st
Finished building target: Task 2 (Servo Motor).elf
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-objcopy.exe" -O ihex -R .eeprom -R .lock -R .signature -R .user_signatures "Task 2 (Servo Motor).elf" -j .eeprom --set-section-flags=.eeprom=alloc,load --change-section-lma .eeprom=0 -h -S "Task 2 (Servo Motor).elf" > "Task 2 (Servo Motor).hex"
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-objcopy.exe" -O srec -R .eeprom -R .fuse -R .lock -R .signature -R .user_signatures "Task 2 (Servo Motor).elf" -j .eeprom --set-section-flags=.eeprom=alloc,load --change-section-lma .eeprom=0 -h -S "Task 2 (Servo Motor).elf" > "Task 2 (Servo Motor).srec"
"D:\Atmel Studio 7\7.0\toolchain\avr8\avr8-gnu-toolchain\bin\avr-size.exe" "Task 2 (Servo Motor).elf"
text data bss dec hex filename
206 0 0 206 ce Task 2 (Servo Motor).elf
Done executing task "RunCompilerTask".
Using "RunOutputFileVerifyTask" task from assembly "D:\Atmel Studio 7\7.0\Extensions\Application\AvrGCC.dll".
Task "RunOutputFileVerifyTask"
Program Memory Usage : 206 bytes 0.6 % Full
Data Memory Usage : 0 bytes 0.0 % Full
Done executing task "RunOutputFileVerifyTask".
Done building target "CoreBuild" in project "Task 2 (Servo Motor).cproj".
Target "PostBuildEvent" skipped, due to false condition; ('$(PostBuildEvent)'!='') was evaluated as (''!='').
Target "Build" in file "D:\Atmel Studio 7\7.0\Vs\Avr.common.targets" from project "D:\Atmel Studio 7\Projects\Assignments\DA_48\Task 2 (Servo Motor)\Task 2 (Servo Motor).cproj"
Done building target "Build" in project "Task 2 (Servo Motor).cproj".
Done building project "Task 2 (Servo Motor).cproj".
Build succeeded.
***** Build: 1 succeeded or up-to-date, 0 failed, 0 skipped *****
```

- **SCREENSHOT OF EACH DEMO (BOARD SETUP)**







- VIDEO LINKS OF EACH DEMO
- GITHUB LINK OF THIS DA

Student Academic Misconduct Policy

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

"This assignment submission is my own, original work".
Worku Tafara