**Date Submitted: 10/9/18**

**Task 00: Execute provided code**

Youtube Link: <https://www.youtube.com/watch?v=fc416JElwaU>

**#include** <stdint.h>

**#include** <stdbool.h>

**#include** "inc/hw\_memmap.h"

**#include** "inc/hw\_types.h"

**#include** "driverlib/sysctl.h"

**#include** "driverlib/gpio.h"

**#include** "driverlib/debug.h"

**#include** "driverlib/pwm.h"

**#include** "driverlib/pin\_map.h"

**#include** "inc/hw\_gpio.h"

**#include** "driverlib/rom.h"

**#define** PWM\_FREQUENCY 55 // 55Hz frequency base to control servo

**int** **main**(**void**)

{

**volatile** uint32\_t ui32Load;

**volatile** uint32\_t ui32PWMClock;

**volatile** uint8\_t ui8Adjust;

ui8Adjust = 83; // center position to create pulse width of 1.5ms => 90 Degree turn

// CPU to run at 40 MHz

ROM\_SysCtlClockSet(SYSCTL\_SYSDIV\_5|SYSCTL\_USE\_PLL|SYSCTL\_OSC\_MAIN|SYSCTL\_XTAL\_16MHZ);

// PWM clock at 625 kHz

ROM\_SysCtlPWMClockSet(SYSCTL\_PWMDIV\_64);

// Enable PWM1 and GPIOD

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_PWM1);

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_GPIOD);

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_GPIOF);

// Configure Port D Pin 0 as PWM output

ROM\_GPIOPinTypePWM(GPIO\_PORTD\_BASE, GPIO\_PIN\_0);

ROM\_GPIOPinConfigure(GPIO\_PD0\_M1PWM0);

HWREG(GPIO\_PORTF\_BASE + GPIO\_O\_LOCK) = GPIO\_LOCK\_KEY;

HWREG(GPIO\_PORTF\_BASE + GPIO\_O\_CR) |= 0x01;

HWREG(GPIO\_PORTF\_BASE + GPIO\_O\_LOCK) = 0;

ROM\_GPIODirModeSet(GPIO\_PORTF\_BASE, GPIO\_PIN\_4|GPIO\_PIN\_0, GPIO\_DIR\_MODE\_IN);

ROM\_GPIOPadConfigSet(GPIO\_PORTF\_BASE, GPIO\_PIN\_4|GPIO\_PIN\_0, GPIO\_STRENGTH\_2MA, GPIO\_PIN\_TYPE\_STD\_WPU);

ui32PWMClock = **SysCtlClockGet**() / 64;

ui32Load = (ui32PWMClock / PWM\_FREQUENCY) - 1;

**PWMGenConfigure**(PWM1\_BASE, PWM\_GEN\_0, PWM\_GEN\_MODE\_DOWN);

**PWMGenPeriodSet**(PWM1\_BASE, PWM\_GEN\_0, ui32Load);

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_0, ui8Adjust \* ui32Load / 1000);

ROM\_PWMOutputState(PWM1\_BASE, PWM\_OUT\_0\_BIT, true);

ROM\_PWMGenEnable(PWM1\_BASE, PWM\_GEN\_0);

**while**(1)

{

**if**(ROM\_GPIOPinRead(GPIO\_PORTF\_BASE,GPIO\_PIN\_4)==0x00)

{

ui8Adjust--;

**if** (ui8Adjust < 56)

{

ui8Adjust = 56;

}

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_0, ui8Adjust \* ui32Load / 1000);

}

**if**(ROM\_GPIOPinRead(GPIO\_PORTF\_BASE,GPIO\_PIN\_0)==0x00)

{

ui8Adjust++;

**if** (ui8Adjust > 111)

{

ui8Adjust = 111;

}

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_0, ui8Adjust \* ui32Load / 1000);

}

ROM\_SysCtlDelay(100000);

}

}

**------------------------------------------------------------------------------------**

**Task 01:**

Youtube Link: <https://www.youtube.com/watch?v=8K-54iGfwzk>

**#include** <stdint.h>

**#include** <stdbool.h>

**#include** "inc/hw\_memmap.h"

**#include** "inc/hw\_types.h"

**#include** "driverlib/sysctl.h"

**#include** "driverlib/gpio.h"

**#include** "driverlib/debug.h"

**#include** "driverlib/pwm.h"

**#include** "driverlib/pin\_map.h"

**#include** "inc/hw\_gpio.h"

**#include** "driverlib/rom.h"

**#define** PWM\_FREQUENCY 55 // 55Hz frequency base to control servo

**int** **main**(**void**)

{

**volatile** uint32\_t ui32Load;

**volatile** uint32\_t ui32PWMClock;

**volatile** uint8\_t ui8Adjust;

ui8Adjust = 121; // center position to create pulse width of 1.5ms => 90 Degree turn

// CPU to run at 40 MHz

ROM\_SysCtlClockSet(SYSCTL\_SYSDIV\_5|SYSCTL\_USE\_PLL|SYSCTL\_OSC\_MAIN|SYSCTL\_XTAL\_16MHZ);

// PWM clock at 625 kHz

ROM\_SysCtlPWMClockSet(SYSCTL\_PWMDIV\_64);

// Enable PWM1 and GPIOD

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_PWM1);

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_GPIOD);

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_GPIOF);

// Configure Port D Pin 0 as PWM output

ROM\_GPIOPinTypePWM(GPIO\_PORTD\_BASE, GPIO\_PIN\_0);

ROM\_GPIOPinConfigure(GPIO\_PD0\_M1PWM0);

// Set up SW1 and SW2

HWREG(GPIO\_PORTF\_BASE + GPIO\_O\_LOCK) = GPIO\_LOCK\_KEY;

HWREG(GPIO\_PORTF\_BASE + GPIO\_O\_CR) |= 0x01;

HWREG(GPIO\_PORTF\_BASE + GPIO\_O\_LOCK) = 0;

ROM\_GPIODirModeSet(GPIO\_PORTF\_BASE, GPIO\_PIN\_4|GPIO\_PIN\_0, GPIO\_DIR\_MODE\_IN);

ROM\_GPIOPadConfigSet(GPIO\_PORTF\_BASE, GPIO\_PIN\_4|GPIO\_PIN\_0, GPIO\_STRENGTH\_2MA, GPIO\_PIN\_TYPE\_STD\_WPU);

// PWM clock = SYSCLOCK / 64

// Count = PWM clock / 55Hz

ui32PWMClock = **SysCtlClockGet**() / 64;

ui32Load = (ui32PWMClock / PWM\_FREQUENCY) - 1;

**PWMGenConfigure**(PWM1\_BASE, PWM\_GEN\_0, PWM\_GEN\_MODE\_DOWN);

**PWMGenPeriodSet**(PWM1\_BASE, PWM\_GEN\_0, ui32Load);

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_0, ui8Adjust \* ui32Load / 1000);

ROM\_PWMOutputState(PWM1\_BASE, PWM\_OUT\_0\_BIT, true);

ROM\_PWMGenEnable(PWM1\_BASE, PWM\_GEN\_0);

**while**(1)

{

**if**(ROM\_GPIOPinRead(GPIO\_PORTF\_BASE,GPIO\_PIN\_4)==0x00)

{

ui8Adjust--;

**if** (ui8Adjust < 56)

{

ui8Adjust = 56;

}

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_0, ui8Adjust \* ui32Load / 1000);

}

**if**(ROM\_GPIOPinRead(GPIO\_PORTF\_BASE,GPIO\_PIN\_0)==0x00)

{

//ui8Adjust++;

**if** (ui8Adjust > 111)

{

ui8Adjust = 111;

}

**else**

{

ui8Adjust = 56 + ui8Adjust;

}

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_0, ui8Adjust \* ui32Load / 1000);

}

ROM\_SysCtlDelay(100000);

}

}

**------------------------------------------------------------------------------------**

**Task 02:**

Youtube Link: <https://www.youtube.com/watch?v=Qr739lzWFDc>

**#include** <stdint.h>

**#include** <stdbool.h>

**#include** "inc/hw\_memmap.h"

**#include** "inc/hw\_types.h"

**#include** "driverlib/sysctl.h"

**#include** "driverlib/gpio.h"

**#include** "driverlib/debug.h"

**#include** "driverlib/pwm.h"

**#include** "driverlib/pin\_map.h"

**#include** "inc/hw\_gpio.h"

**#include** "driverlib/rom.h"

**#define** PWM\_FREQUENCY 55 // 55Hz frequency base to control servo

**int** **main**(**void**)

{

**volatile** uint32\_t ui32Load;

**volatile** uint32\_t ui32PWMClock;

**volatile** uint8\_t ui8Adjust; //adjust the position of duty cycle

ui8Adjust = 100; // initial 10%

// CPU to run at 40 MHz

ROM\_SysCtlClockSet(SYSCTL\_SYSDIV\_5|SYSCTL\_USE\_PLL|SYSCTL\_OSC\_MAIN|SYSCTL\_XTAL\_16MHZ);

// PWM clock at 625 kHz

ROM\_SysCtlPWMClockSet(SYSCTL\_PWMDIV\_64);

//Enable PWM1 and GPIOF

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_PWM1);

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_GPIOF);

//Configure PF1 as a PWM

ROM\_GPIOPinTypePWM(GPIO\_PORTF\_BASE, GPIO\_PIN\_1);

ROM\_GPIOPinConfigure(GPIO\_PF1\_M1PWM5);

// Set up SW1 and SW2.

HWREG(GPIO\_PORTF\_BASE + GPIO\_O\_LOCK) = GPIO\_LOCK\_KEY;

HWREG(GPIO\_PORTF\_BASE + GPIO\_O\_CR) |= 0x01;

HWREG(GPIO\_PORTF\_BASE + GPIO\_O\_LOCK) = 0;

ROM\_GPIODirModeSet(GPIO\_PORTF\_BASE, GPIO\_PIN\_4|GPIO\_PIN\_0, GPIO\_DIR\_MODE\_IN);

ROM\_GPIOPadConfigSet(GPIO\_PORTF\_BASE, GPIO\_PIN\_4|GPIO\_PIN\_0, GPIO\_STRENGTH\_2MA, GPIO\_PIN\_TYPE\_STD\_WPU);

// PWM clock = SYSCLOCK / 64

// Count = PWM clock / 55Hz

ui32PWMClock = **SysCtlClockGet**() / 64;

ui32Load = (ui32PWMClock / PWM\_FREQUENCY) - 1;

**PWMGenConfigure**(PWM1\_BASE, PWM\_GEN\_2, PWM\_GEN\_MODE\_DOWN);

**PWMGenPeriodSet**(PWM1\_BASE, PWM\_GEN\_2, ui32Load);

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_5, ui8Adjust \* ui32Load / 1000);

ROM\_PWMOutputState(PWM1\_BASE, PWM\_OUT\_5\_BIT, true);

ROM\_PWMGenEnable(PWM1\_BASE, PWM\_GEN\_2);

**while**(1)

{

// SW1 is pressed to go form 10% to 90% duty cycle

**if**(ROM\_GPIOPinRead(GPIO\_PORTF\_BASE,GPIO\_PIN\_4)==0x00)

{

ui8Adjust++;

**if** (ui8Adjust > 900)

{

ui8Adjust = 900;

}

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_5, ui8Adjust \* ui32Load / 1000);

}

ROM\_SysCtlDelay(100000);

}

}

**------------------------------------------------------------------------------------**

**Task 03:**

Youtube Link: <https://www.youtube.com/watch?v=FnKHmmFidxY>

**#include** <stdint.h>

**#include** <stdbool.h>

**#include** "inc/hw\_memmap.h"

**#include** "inc/hw\_types.h"

**#include** "driverlib/sysctl.h"

**#include** "driverlib/gpio.h"

**#include** "driverlib/debug.h"

**#include** "driverlib/pwm.h"

**#include** "driverlib/pin\_map.h"

**#include** "inc/hw\_gpio.h"

**#include** "driverlib/rom.h"

**#define** PWM\_FREQUENCY 55 // 55Hz frequency base to control servo

**int** **main**(**void**)

{

**volatile** uint32\_t ui32Load;

**volatile** uint32\_t ui32PWMClock;

**volatile** uint8\_t ui8Adjust; //adjust the position of duty cycle

ui8Adjust = 900; // initial 10%

// CPU to run at 40 MHz

ROM\_SysCtlClockSet(SYSCTL\_SYSDIV\_5|SYSCTL\_USE\_PLL|SYSCTL\_OSC\_MAIN|SYSCTL\_XTAL\_16MHZ);

// PWM clock at 625 kHz

ROM\_SysCtlPWMClockSet(SYSCTL\_PWMDIV\_64);

//Enable PWM1 and GPIOF

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_PWM1);

ROM\_SysCtlPeripheralEnable(SYSCTL\_PERIPH\_GPIOF);

//Configure PF1, PF2, PF3 as a PWM

ROM\_GPIOPinTypePWM(GPIO\_PORTF\_BASE, GPIO\_PIN\_1|GPIO\_PIN\_2|GPIO\_PIN\_3);

ROM\_GPIOPinConfigure(GPIO\_PF1\_M1PWM5);

ROM\_GPIOPinConfigure(GPIO\_PF2\_M1PWM6);

ROM\_GPIOPinConfigure(GPIO\_PF3\_M1PWM7);

// PWM clock = SYSCLOCK / 64

// Count = PWM clock / 55Hz

ui32PWMClock = **SysCtlClockGet**() / 64;

ui32Load = (ui32PWMClock / PWM\_FREQUENCY) - 1;

**PWMGenConfigure**(PWM1\_BASE, PWM\_GEN\_2, PWM\_GEN\_MODE\_DOWN);

**PWMGenConfigure**(PWM1\_BASE, PWM\_GEN\_3, PWM\_GEN\_MODE\_DOWN);

**PWMGenPeriodSet**(PWM1\_BASE, PWM\_GEN\_2, ui32Load);

**PWMGenPeriodSet**(PWM1\_BASE, PWM\_GEN\_3, ui32Load);

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_5, ui8Adjust \* ui32Load / 1000);

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_6, ui8Adjust \* ui32Load / 1000);

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_7, ui8Adjust \* ui32Load / 1000);

ROM\_PWMOutputState(PWM1\_BASE, PWM\_OUT\_5\_BIT|PWM\_OUT\_6\_BIT|PWM\_OUT\_7\_BIT, true);

ROM\_PWMGenEnable(PWM1\_BASE, PWM\_GEN\_2);

ROM\_PWMGenEnable(PWM1\_BASE, PWM\_GEN\_3);

**while**(1)

{

**int** redLED;

**int** blueLED;

**int** greenLED;

**for**(redLED = 900; redLED >= 100; redLED--)

{

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_5, redLED \* ui32Load /1000);

ROM\_SysCtlDelay(100000);

**for**(blueLED = 900; blueLED >= 100; blueLED--)

{

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_6, blueLED \* ui32Load /1000);

ROM\_SysCtlDelay(100000);

**for**(greenLED = 900; greenLED >= 100; greenLED--)

{

ROM\_PWMPulseWidthSet(PWM1\_BASE, PWM\_OUT\_7, greenLED \* ui32Load /1000);

ROM\_SysCtlDelay(100000);

}

}

}

}

}

**------------------------------------------------------------------------------------**