CPE403 – Advanced Embedded Systems

Design Assignment

DO NOT REMOVE THIS PAGE DURING SUBMISSION:

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Github Repository link (root):
https://github.com/saibalaji1997/githubfiles/tree/main/TIVAC/Assignment%203

Youtube Playlist link (root): https://www.youtube.com/watch?v=dmMR4-ruIxc

Follow the submission guideline to be awarded points for this Assignment.

Submit the following for all Assignments:

1. In the document, for each task submit the modified or included code (from the base code) with highlights and justifications of the modifications. Also include the comments. If no base code is provided, submit the base code for the first task only.
2. Create a private Github repository with a random name (no CPE/403, Lastname, Firstname). Place all labs under the root folder TIVAC, sub-folder named Assignment1, with one document and one video link file for each lab, place modified c files named as asng_taskxx.c.
3. If multiple c files or other libraries are used, create a folder asng1_t01 and place these files inside the folder.
4. The folder should have a) Word document (see template), b) source code file(s) with startup_ccs.c and other include files, c) text file with youtube video links (see template).
5. Submit the doc file in canvas before the due date. The root folder of the github assignment directory should have the documentation and the text file with youtube video links.
6. Organize your youtube videos as playlist under the name “cpe403”. The playlist should have the video sequence arranged as submission or due dates.
7. Only submit pdf documents. Do not forget to upload this document in the github repository and in the canvas submission portal.

1. Code for Tasks. for each task submit the modified or included code (from the base code) with highlights and justifications of the modifications. Also include the comments. If no base code is provided, submit the base code for the first task only. Use separate page for each task.

ADC Task Code:

```
#include <stdint.h>
#include <stdbool.h>
#include "inc/tm4c123gh6pm.h"
#include "inc/hw_memmap.h"
#include "inc/hw_types.h"
#include "driverlib/sysctl.h"
#include "driverlib/interrupt.h"
#include "driverlib/gpio.h"
#include "driverlib/timer.h"


int main(void)
{
   uint32_t ui32Period;


SysCtlClockSet(SYSCTL_SYSDIV_5|SYSCTL_USE_PLL|SYSCTL_XTAL_16MHZ|SYSCTL_OSC_MAIN);

   SysCtlPeripheralEnable(SYSCTL_PERIPH_GPIOF);
   GPIOPinTypeGPIOOutput(GPIO_PORTF_BASE, GPIO_PIN_1|GPIO_PIN_2|GPIO_PIN_3);

   SysCtlPeripheralEnable(SYSCTL_PERIPH_TIMER0);
   TimerConfigure(TIMER0_BASE, TIMER_CFG_PERIODIC);

   ui32Period = (SysCtlClockGet() / 10) / 2;
   TimerLoadSet(TIMER0_BASE, TIMER_A, ui32Period -1);

   IntEnable(INT_TIMER0A);
   TimerIntEnable(TIMER0_BASE, TIMER_TIMA_TIMEOUT);
   IntMasterEnable();

   TimerEnable(TIMER0_BASE, TIMER_A);

   while(1)
   {
   }
```

```
}

void Timer0IntHandler(void)
{
   // Clear the timer interrupt
   TimerIntClear(TIMER0_BASE, TIMER_TIMA_TIMEOUT);

   // Read the current state of the GPIO pin and
   // write back the opposite state
   if(GPIOPinRead(GPIO_PORTF_BASE, GPIO_PIN_2))
   {
      GPIOPinWrite(GPIO_PORTF_BASE, GPIO_PIN_1|GPIO_PIN_2|GPIO_PIN_3, 0);
   }
   else
   {
      GPIOPinWrite(GPIO_PORTF_BASE, GPIO_PIN_2, 4);
   }
}
```

UART Display Task Code:

```
#include<stdint.h>
#include<stdbool.h>
#include"inc/hw_memmap.h"
#include"inc/hw_types.h"
#include"driverlib/gpio.h"
#include"driverlib/pin_map.h"
#include"driverlib/sysctl.h"
#include"driverlib/uart.h"
#define GPIO_PA0_U0RX 0x00000001 // UART PIN ADDRESS FOR UART RX
#define GPIO_PA1_U0TX 0x00000401 // UART PIN ADDRESS FOR UART TX
int main(void)
{
   // SYSTEM CLOCK AT 40 MHZ
   SysCtlClockSet(SYSCTL_SYSDIV_5|SYSCTL_USE_PLL|SYSCTL_OSC_MAIN|
   SYSCTL_XTAL_16MHZ);
   // ENABLE PERIPHERAL UART 0
   SysCtlPeripheralEnable(SYSCTL_PERIPH_UART0);
   SysCtlPeripheralEnable(SYSCTL_PERIPH_GPIOA);
   // ENABLE GPIO PORT A,FOR UART
   GPIOPinConfigure(GPIO_PA0_U0RX); // PA0 IS CONFIGURED TO UART RX
   GPIOPinConfigure(GPIO_PA1_U0TX); // PA1 IS CONFIGURED TO UART TX
```

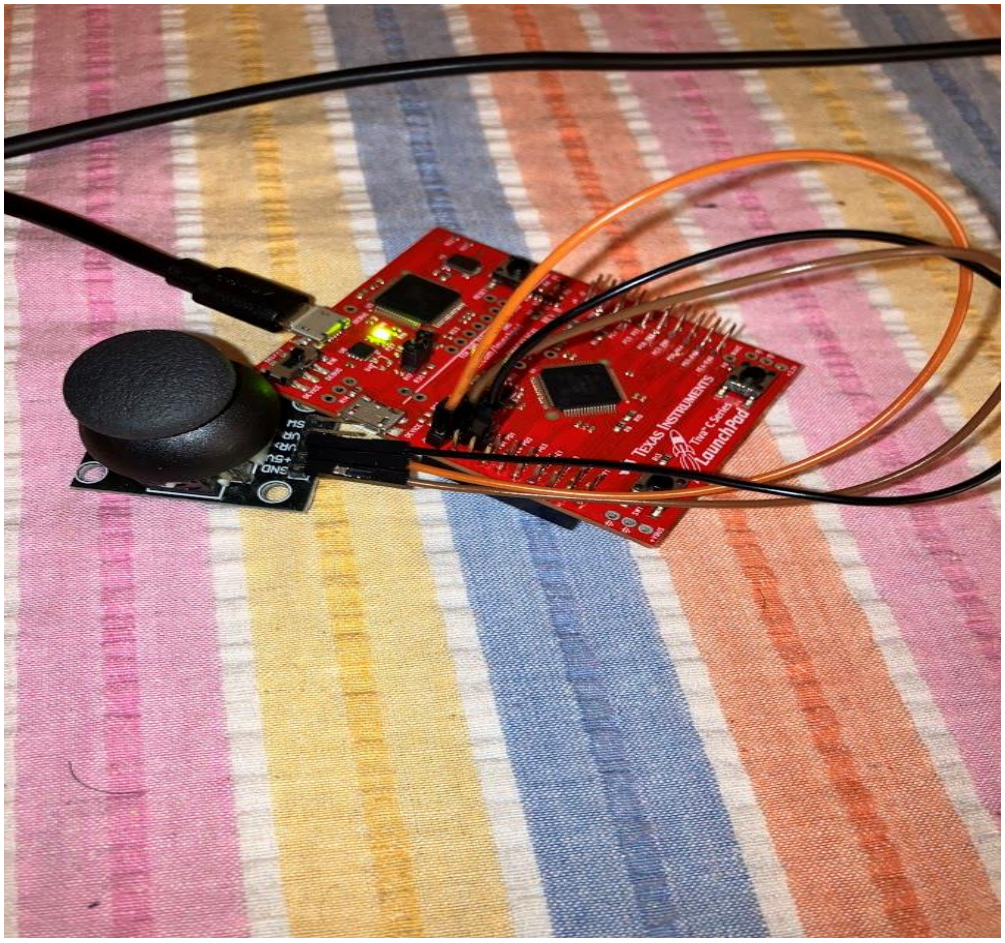
```
  GPIOPinTypeUART(GPIO_PORTA_BASE, GPIO_PIN_0 | GPIO_PIN_1);
  // CONFIGURE UART, BAUD RATE 115200, DATA BITS 8, STOP BIT 1, PARITY NONE
  UARTConfigSetExpClk(UART0_BASE, SysCtlClockGet(), 115200,
  (UART_CONFIG_WLEN_8 | UART_CONFIG_STOP_ONE | UART_CONFIG_PAR_NONE));
  UARTCharPut(UART0_BASE, 'E');
  UARTCharPut(UART0_BASE, 'c');
  UARTCharPut(UART0_BASE, 'h');
  UARTCharPut(UART0_BASE, 'o'); // SEND "Echo Output: " IN UART
  UARTCharPut(UART0_BASE, ' ');
  UARTCharPut(UART0_BASE, 'O');
  UARTCharPut(UART0_BASE, 'u');
  UARTCharPut(UART0_BASE, 't');
  UARTCharPut(UART0_BASE, 'p');
  UARTCharPut(UART0_BASE, 'u');
  UARTCharPut(UART0_BASE, 't');
  UARTCharPut(UART0_BASE, ':');
  UARTCharPut(UART0_BASE, ' ');
  UARTCharPut(UART0_BASE, '\n');
  while (1)
   {
     //UART ECHO - what is received is transmitted back //
     if (UARTCharsAvail(UART0_BASE)) UARTCharPut(UART0_BASE,
     UARTCharGet(UART0_BASE));
   }
}
```

Switch Read Task Code:

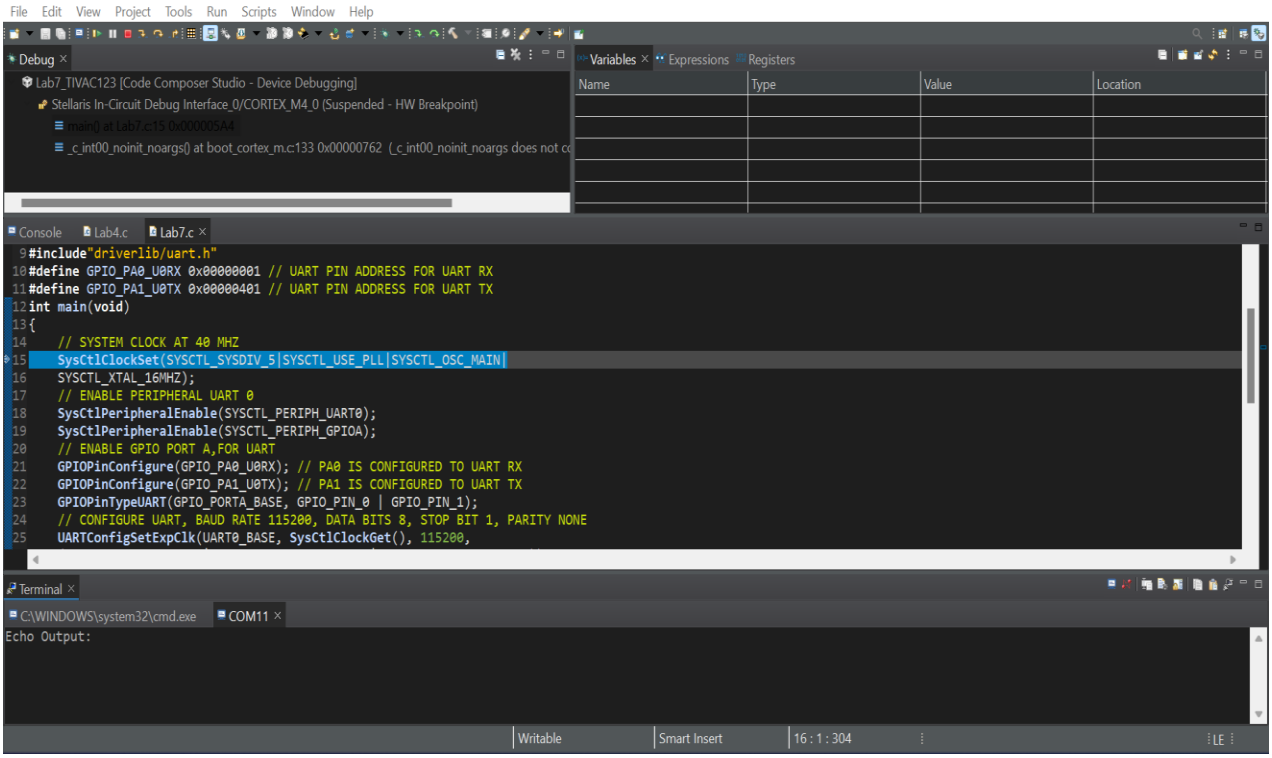
```
#include <stdint.h>
#include <stdbool.h>
#include "inc/hw_memmap.h"
#include "driverlib/gpio.h"

//Initialize switch
void switch_init(void){
  //Enable the switch
  SysCtlPeripheralEnable(SYSCTL_PERIPH_GPIOF);
  //Configure the switch as input
  GPIOPinTypeGPIOInput(GPIO_PORTF_BASE, GPIO_PIN_4 | GPIO_PIN_0);
  //Configure the pull-up resistors for the switch
  GPIOPadConfigSet(GPIO_PORTF_BASE, GPIO_PIN_4 | GPIO_PIN_0, GPIO_STRENGTH_2MA,
GPIO_PIN_TYPE_STD_WPU);
}
```

```
//Read switch status
uint8_t switch_read(void){
   return GPIOPinRead(GPIO_PORTF_BASE, GPIO_PIN_4 | GPIO_PIN_0);
}
```

2. Block diagram and/or Schematics showing the components, pins used, and interface.



3. Screenshots of the IDE, physical setup, debugging process - Provide screenshot of successful compilation, screenshots of registers, variables, graphs, etc.



4. Declaration
   I understand the Student Academic Misconduct Policy -
   http://studentconduct.unlv.edu/misconduct/policy.html

"This assignment submission is my own, original work".
Name of the Student
Sai Balaji Jai Kumar