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/CC1352/Assignment%206

Youtube Playlist link (root): https://www.youtube.com/watch?v=btl1zXyK-Vg

https://www.youtube.com/shorts/jQWYwipdMoo

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.

Portable Code:

```
#include <stdint.h>


/* POSIX Header files */
#include <pthread.h>


/* RTOS header files */
#include <ti/sysbios/BIOS.h>


/* Driver header files */
#include <ti/drivers/GPIO.h>


#include <ti/drivers/Board.h>


/* Mutex to protect the reading/writing of the temperature variables */
pthread_mutex_t temperatureMutex;


extern void *temperatureThread(void *arg0);
extern void *consoleThread(void *arg0);


/* Stack size in bytes. Large enough in case debug kernel is used. */
#define THREADSTACKSIZE 1024


/*
 * ======== main ========
```

```c
 */
int main(void)
{
    pthread_t thread;
    pthread_attr_t attrs;
    struct sched_param priParam;
    int retc;

    Board_init();

    /* Initialize the attributes structure with default values */
    pthread_attr_init(&attrs);

    /* Set priority, detach state, and stack size attributes */
    priParam.sched_priority = 1;
    retc            = pthread_attr_setschedparam(&attrs, &priParam);
    retc |= pthread_attr_setdetachstate(&attrs, PTHREAD_CREATE_DETACHED);
    retc |= pthread_attr_setstacksize(&attrs, THREADSTACKSIZE);
    if (retc != 0)
    {
        /* failed to set attributes */
        while (1) {}
    }

    retc = pthread_create(&thread, &attrs, consoleThread, NULL);
    if (retc != 0)
    {
        /* pthread_create() failed */
        while (1) {}
```

```c
    }

    /*
     *  Let's make the temperature thread a higher priority .
     *  Higher number means higher priority in TI-RTOS.
     */
    priParam.sched_priority = 2;
    retc            = pthread_attr_setschedparam(&attrs, &priParam);
    if (retc != 0)
    {
        /* failed to set priority */
        while (1) {}
    }


    retc = pthread_create(&thread, &attrs, temperatureThread, NULL);
    if (retc != 0)
    {
        /* pthread_create() failed */
        while (1) {}
    }

    /* Create a mutex that will protect temperature variables */
    retc = pthread_mutex_init(&temperatureMutex, NULL);
    if (retc != 0)
    {
        /* pthread_mutex_init() failed */
        while (1) {}
    }
```
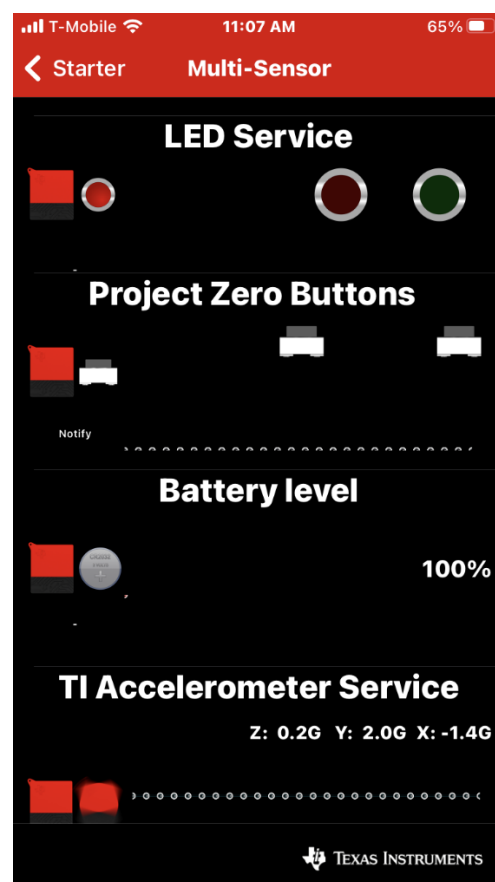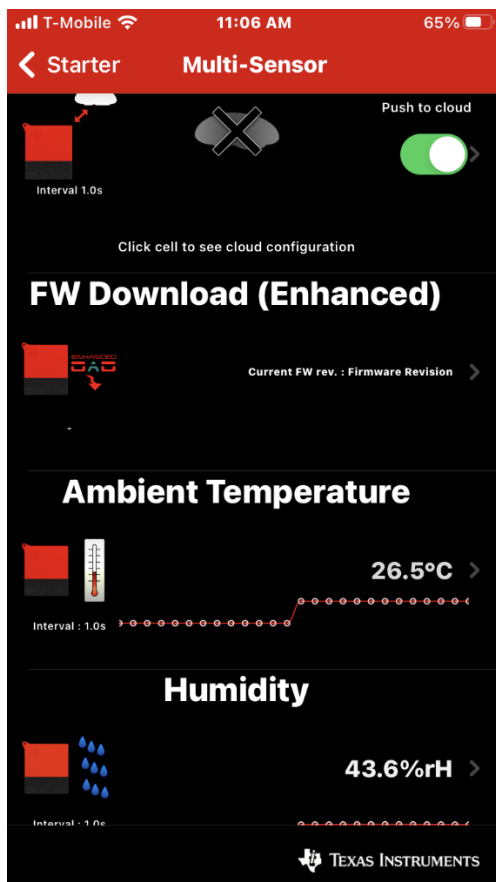
```c
    /* Initialize the GPIO since multiple threads are using it */
    GPIO_init();

    /* Start the TI-RTOS scheduler */
    BIOS_start();

    return (0);
}
```

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

Controlling LPSTK using BLE app:

Cancel   **TI Enhanced OAD profile**

ENHANCED
OAD

Select FW File

File Loaded: dmm_154sensor_remote_display_oad_app_C...   ⓘ

Device Upgrade complete !
Device has now finished OAD
and rebooted

OK

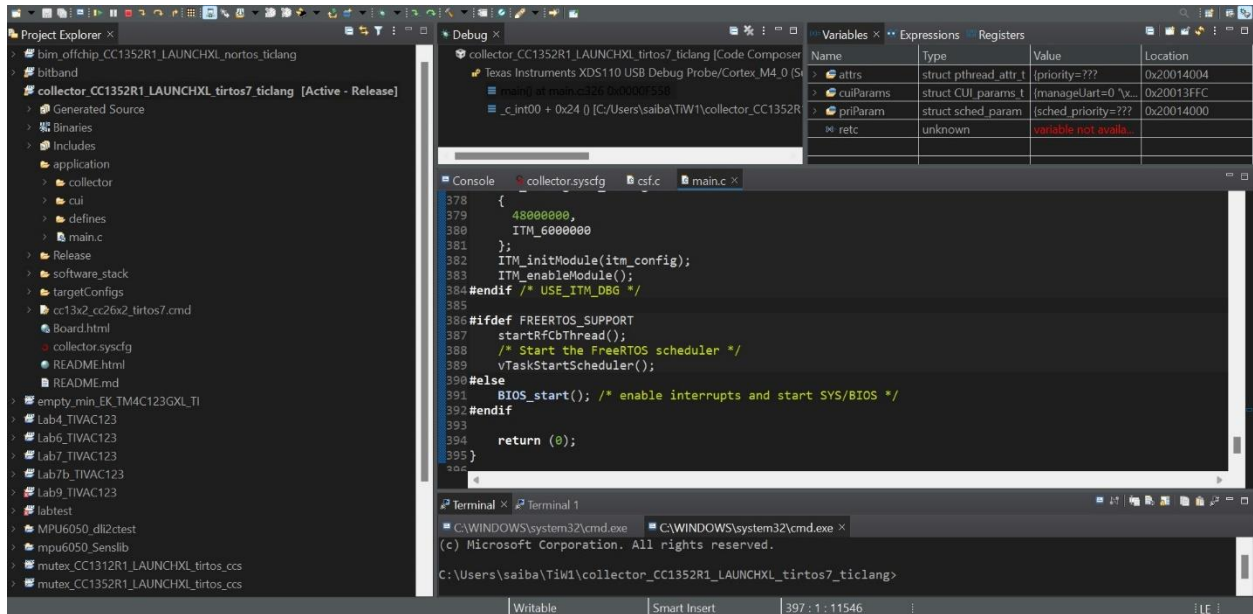|	
Block	799
Bytes:	191924 / 191924
Spe...	3.5 Kb/s
State:	OAD Image Enable OK
Total Time:	53.35
Blocksize:	244

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

LPSTK TI 15.4-Stack O/P:
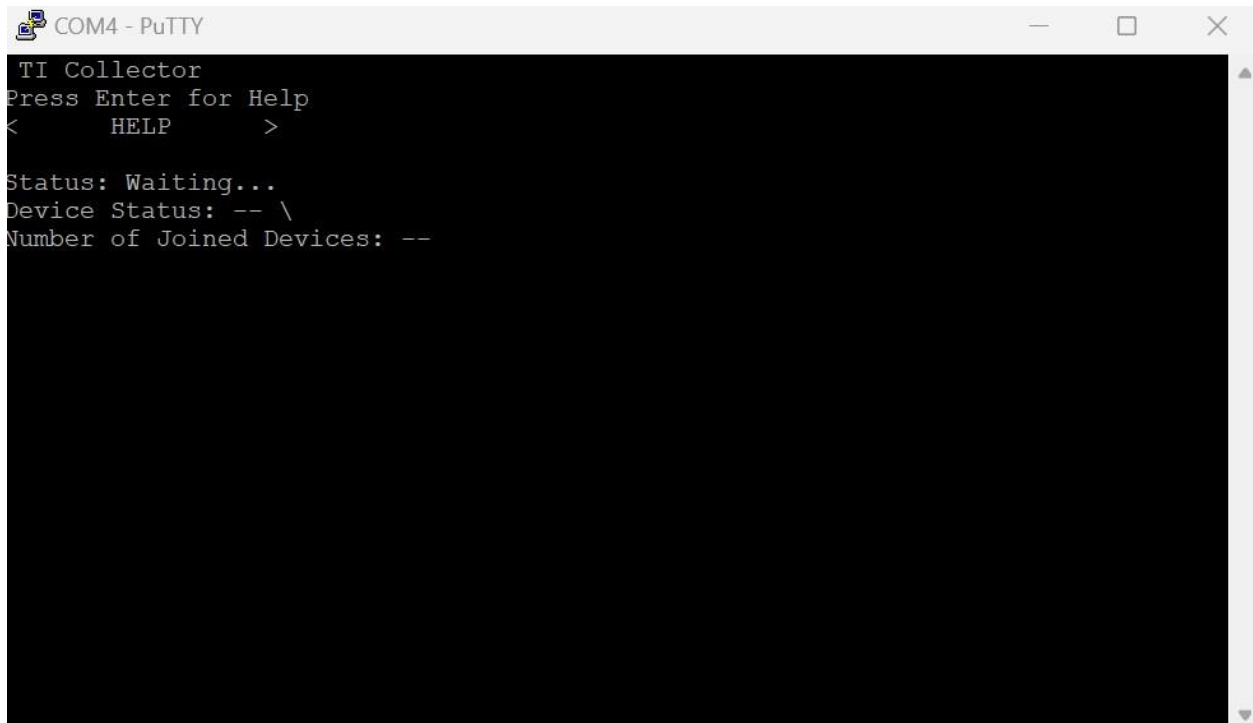
```
 COM4 - PuTTY                                                    —    □    ✕

TI Collector
Press Enter for Help
<        HELP        >

Status: Started--Mode=NBCN, Addr=0xaabb, PanId=0x0001, Ch=2, PermitJoin=On
Device Status: Sensor - Addr=0x0001, Temp=0, Humidity=0, Light=0, RSSI=-82 \
Number of Joined Devices: 1
```

Sensor & Collector:

```
 Command Prompt          ✕    > Windows PowerShell      ✕    +  ∨

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\saiba> C:\ti\ccs1210\ccs\ccs_base\common\uscif\xds110\xdsdfu.exe -e

USB Device Firmware Upgrade Utility
Copyright (c) 2008-2019 Texas Instruments Incorporated.  All rights reserved.

Scanning USB buses for supported XDS110 devices...


<<<< Device 0 >>>>

VID: 0x0451    PID: 0xbef3
Device Name:   XDS110 Embed with CMSIS-DAP
Version:       3.0.0.22
Manufacturer:  Texas Instruments
Serial Num:    L4100DH1
Mode:          Runtime
Configuration: Standard


Found 1 device.
PS C:\Users\saiba>
```
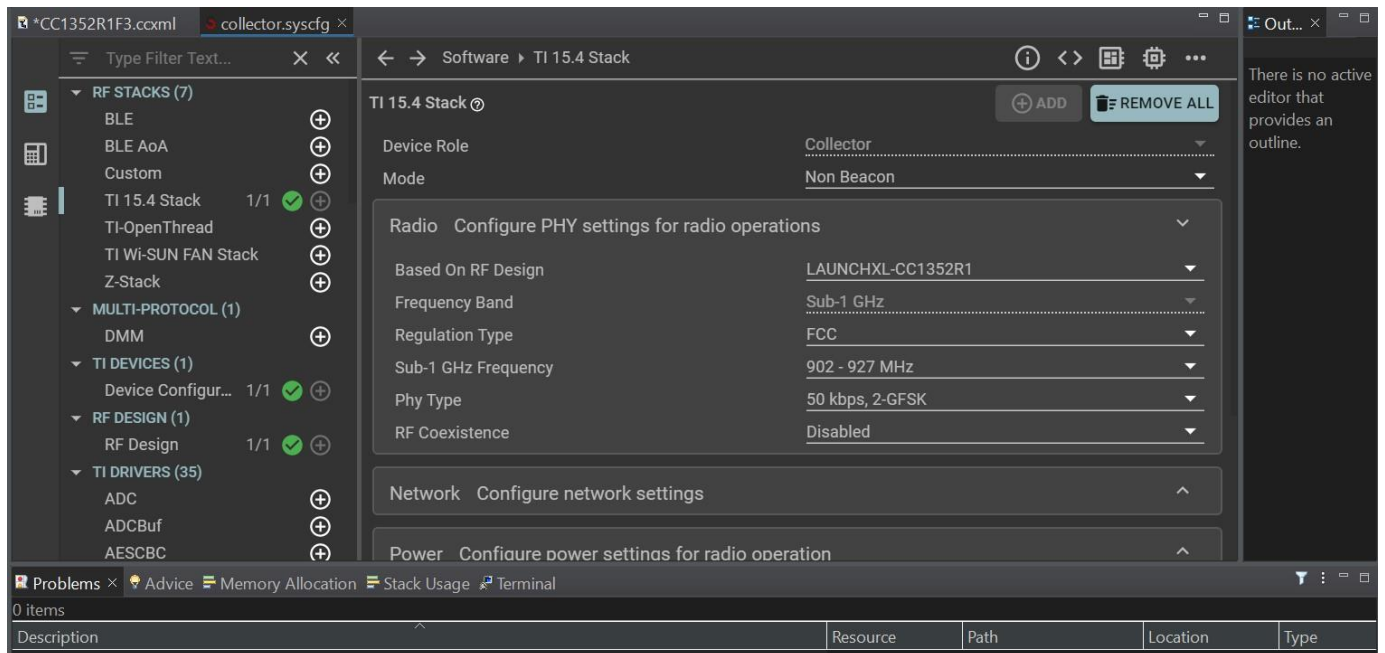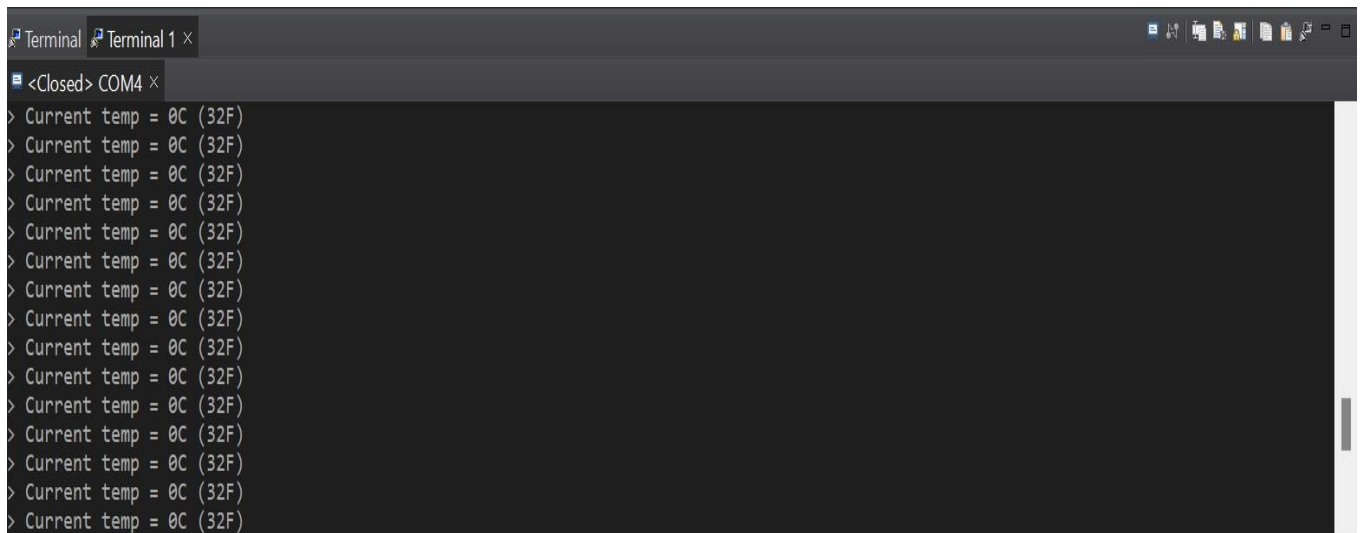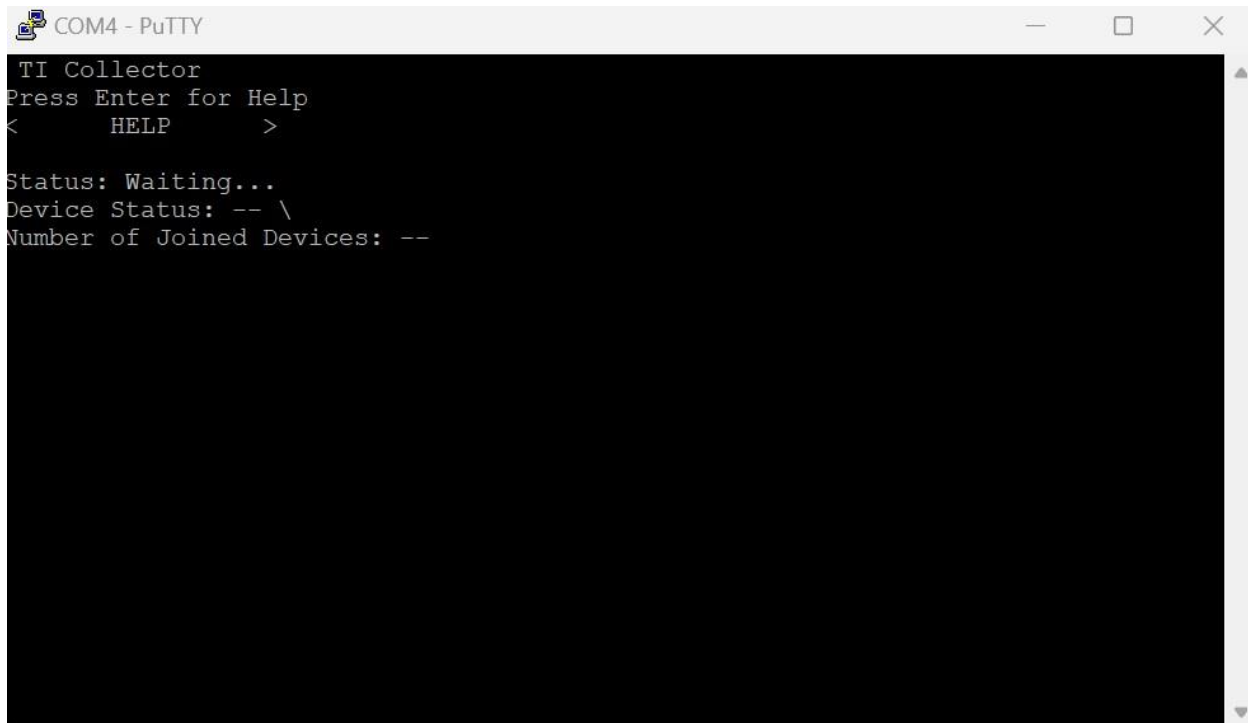
Remote Sensor O/P:

Collector UART:

```
COM4 - PuTTY                                         —    □    ✕
 TI Collector
Press Enter for Help
<        HELP        >

Status: Waiting...
Device Status: -- \
Number of Joined Devices: --
```

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