CPE403 – Advanced Embedded Systems

Design Assignment 4

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Github Repository link (root): https://github.com/AngeloNol/Design_Assignments

Youtube Playlist link (root): Assignment 4

1. Code for Tasks

```
 /* XDC module Headers */
#include <xdc/std.h>
#include <xdc/runtime/System.h>

/* BIOS module Headers */
#include <ti/sysbios/BIOS.h>
#include <ti/sysbios/knl/Clock.h>
#include <ti/sysbios/knl/Task.h>
#include <ti/sysbios/knl/Semaphore.h>
#include <ti/drivers/GPIO.h>

#include <ti/drivers/Board.h>

#include <unistd.h>
#include <stdint.h>
#include <stddef.h>

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

/* Driver Header files */
#include <ti/drivers/ADC.h>
#include <ti/display/Display.h>

/* Driver configuration */
#include "ti_drivers_config.h"

/* For usleep() */
#include <unistd.h>
#include <stddef.h>
```

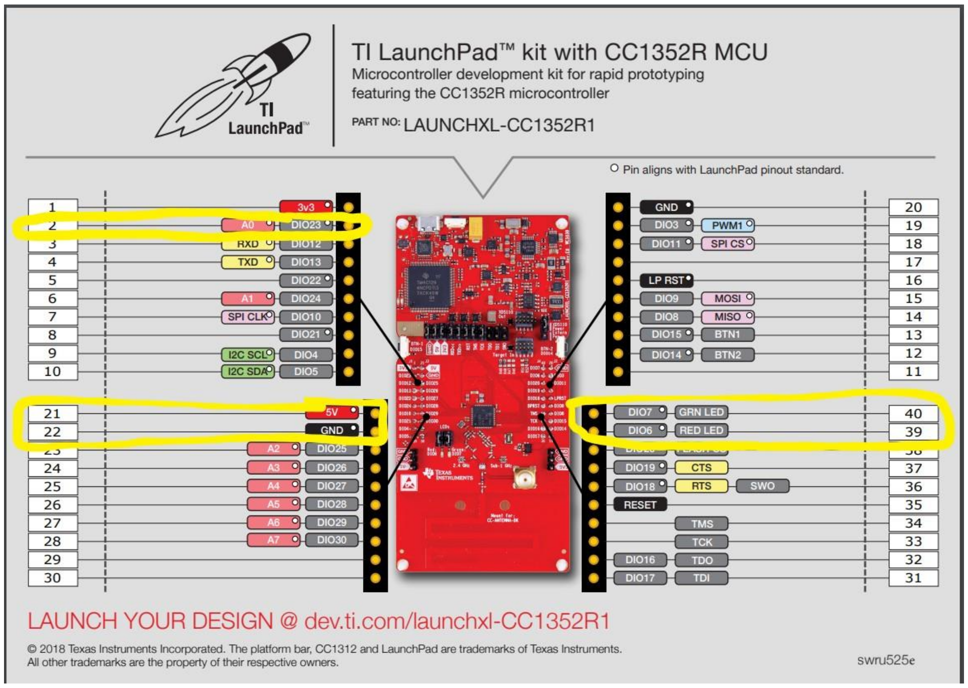
```
/* Driver Header files */
#include <ti/drivers/PWM.h>

#define ADC_SAMPLE_COUNT  (10)

/* ADC conversion result variables */
uint16_t adcValue0;
int_fast16_t res;//ADC



static Display_Handle display;



#define TASKSTACKSIZE   512

Void task1Fxn(UArg arg0, UArg arg1);
Void task2Fxn(UArg arg0, UArg arg1);
Void task3Fxn(UArg arg0, UArg arg1);
Void heartBeatFxn(UArg arg0, UArg arg1);

Int resource = 0;
UInt32 sleepTickCount;

//PWM
uint16_t   pwmPeriod = 3000;
uint16_t   duty = 0;



Task_Struct task1Struct, task2Struct,task3Struct;
```

```
Char task1Stack[TASKSTACKSIZE],
task2Stack[TASKSTACKSIZE],task3Stack[TASKSTACKSIZE];
Semaphore_Struct semStruct;
Semaphore_Handle semHandle;
PWM_Handle pwm1 = NULL;

/*
*  ======== main ========
*/
int main()
{

    /* Construct BIOS objects */
    Task_Params taskParams;
    Semaphore_Params semParams;
    PWM_Params params;



    /* Call driver init functions */
    Board_init();
    ADC_init();
    Display_init();
    PWM_init();
    GPIO_init();

    //PWM
    PWM_Params_init(&params);
    params.dutyUnits = PWM_DUTY_US;
    params.dutyValue = 0;
    params.periodUnits = PWM_PERIOD_US;
    params.periodValue = pwmPeriod;
```

```
pwm1 = PWM_open(CONFIG_PWM_0, &params);

if (pwm1 == NULL) {
    /* CONFIG_PWM_0 did not open */
    while (1);
 }

//HeartBeat
/* Configure the LED pin */
   GPIO_setConfig(REDLED, GPIO_CFG_OUT_STD | GPIO_CFG_OUT_LOW);

  /* Turn on user LED */
  GPIO_write(REDLED, CONFIG_GPIO_LED_ON);

/* Open the display for output */
display = Display_open(Display_Type_UART, NULL);
if (display == NULL) {
   /* Failed to open display driver */
   while (1);
}

/* Construct writer/reader Task threads */
Task_Params_init(&taskParams);
taskParams.stackSize = TASKSTACKSIZE;
taskParams.stack = &task1Stack;
taskParams.priority = 1;
Task_construct(&task1Struct, (Task_FuncPtr)task1Fxn, &taskParams, NULL);

taskParams.stack = &task2Stack;
taskParams.priority = 2;
Task_construct(&task2Struct, (Task_FuncPtr)task2Fxn, &taskParams, NULL);
```

```
    taskParams.stack = &task3Stack;
    taskParams.priority = 3;
    Task_construct(&task3Struct, (Task_FuncPtr)task3Fxn, &taskParams, NULL);

    PWM_start(pwm1);

    /* Construct a Semaphore object to be use as a resource lock, inital count 1 */
    Semaphore_Params_init(&semParams);
    Semaphore_construct(&semStruct, 1, &semParams);

    /* Obtain instance handle */
    semHandle = Semaphore_handle(&semStruct);



    /* We want to sleep for 10000 microseconds */
    sleepTickCount = 1000000 / Clock_tickPeriod;

    BIOS_start();    /* Does not return */








    return(0);
}
```

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



TI LaunchPad
TI LaunchPad™ kit with CC1352R MCU
Microcontroller development kit for rapid prototyping featuring the CC1352R microcontroller
PART NO: LAUNCHXL-CC1352R1
Pin aligns with LaunchPad pinout standard.
1 3v3
2 A0 DIO23
3 RXD DIO12
4 TXD DIO13
5 DIO22
6 A1 DIO24
7 SPI CLK DIO10
8 DIO21
9 I2C SCL DIO4
10 I2C SDA DIO5
21 5V
22 GND
23 A2 DIO25
24 A3 DIO26
25 A4 DIO27
26 A5 DIO28
27 A6 DIO29
28 A7 DIO30
29
30
20 GND
19 DIO3 PWM1
18 DIO11 SPI CS
17
16 LP RST
15 DIO9 MOSI
14 DIO8 MISO
13 DIO15 BTN1
12 DIO14 BTN2
11
40 DIO7 GRN LED
39 DIO6 RED LED
38
37 DIO19 CTS
36 DIO18 RTS SWO
35 RESET
34 TMS
33 TCK
32 DIO16 TDO
31 DIO17 TDI
LAUNCH YOUR DESIGN @ dev.ti.com/launchxl-CC1352R1
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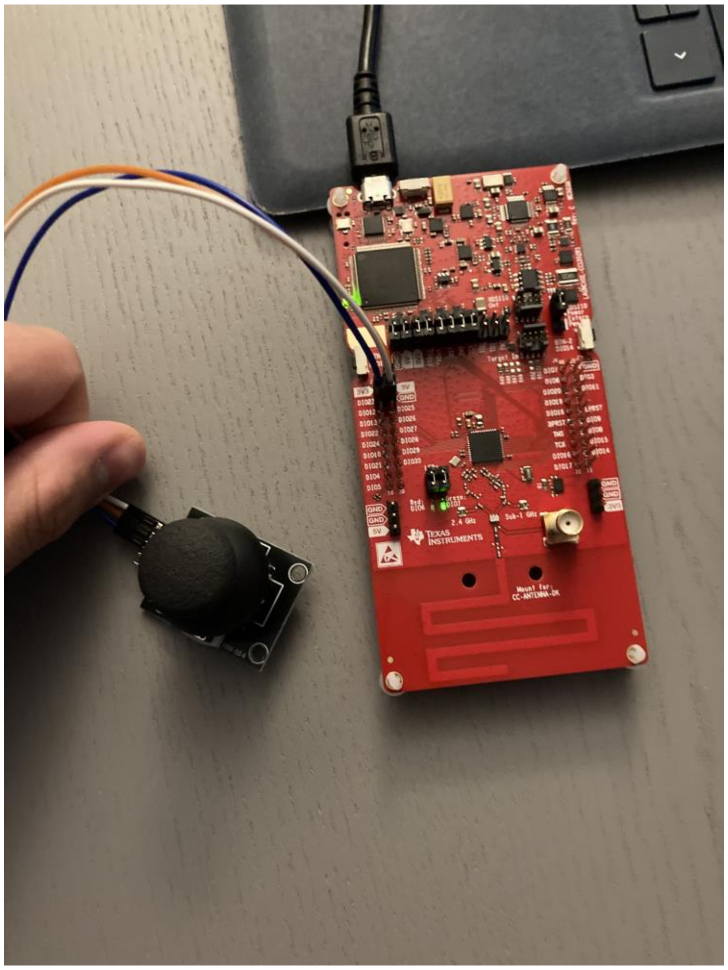
3. Screenshots of the IDE, physical setup, debugging process



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

“This assignment submission is my own, original work”.
Angelo Nolasco