Faculty of Engineering

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CSE 211s: Introduction to Embedded Systems

REPORT (3)

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Sec.: 1

Program: CSE

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Question 2:

Q2. TIVAC LaunchPad has two build-in switches SW 1 (PF4) and SW 2(PF0), Three LEDS (Red (PF1), Blue (PF2), Green (PF3)).

- If both switches are pressed, → turn on the Red LED.
- If SW1 is pressed, SW2 is not pressed → turn on the Blue LED.
- SW2 is pressed, SW1 is not pressed → turn on the Green LED.

Check through the simulated Kit that the behavior of your code is correct.

Header file (IO.h):

```
#define GPIO_PORTF_DATA_R       (*((volatile unsigned long *)0x400253FC))
#define GPIO_PORTF_DIR_R        (*((volatile unsigned long *)0x40025400))
#define GPIO_PORTF_AFSEL_R      (*((volatile unsigned long *)0x40025420))
#define GPIO_PORTF_PUR_R        (*((volatile unsigned long *)0x40025510))
#define GPIO_PORTF_DEN_R        (*((volatile unsigned long *)0x4002551C))
#define GPIO_PORTF_LOCK_R       (*((volatile unsigned long *)0x40025520))
#define GPIO_PORTF_CR_R         (*((volatile unsigned long *)0x40025524))
#define GPIO_PORTF_AMSEL_R      (*((volatile unsigned long *)0x40025528))
#define GPIO_PORTF_PCTL_R       (*((volatile unsigned long *)0x4002552C))
#define PF4                     (*((volatile unsigned long *)0x40025040))
#define PF3                     (*((volatile unsigned long *)0x40025020))
#define PF2                     (*((volatile unsigned long *)0x40025010))
#define PF1                     (*((volatile unsigned long *)0x40025008))
#define PF0                     (*((volatile unsigned long *)0x40025004))
#define GPIO_LOCK_KEY           0x4C4F434B  // Unlocks the GPIO_CR register
#define SYSCTL_RCGCGPIO_R       (*((volatile unsigned long *)0x400FE608))
#define SYSCTL_PRGPIO_R         (*((volatile unsigned long *)0x400FEA08))
#define RED                                                     0x02
#define BLUE                                                    0x04
#define GREEN                                                   0x08
#define PF123_mask              0x0E
#define PF04_mask               0x11
#define PF_mask                 0x20
#define PF_SW1_mask                     0x10
#define PF_SW2_mask                     0x01
```

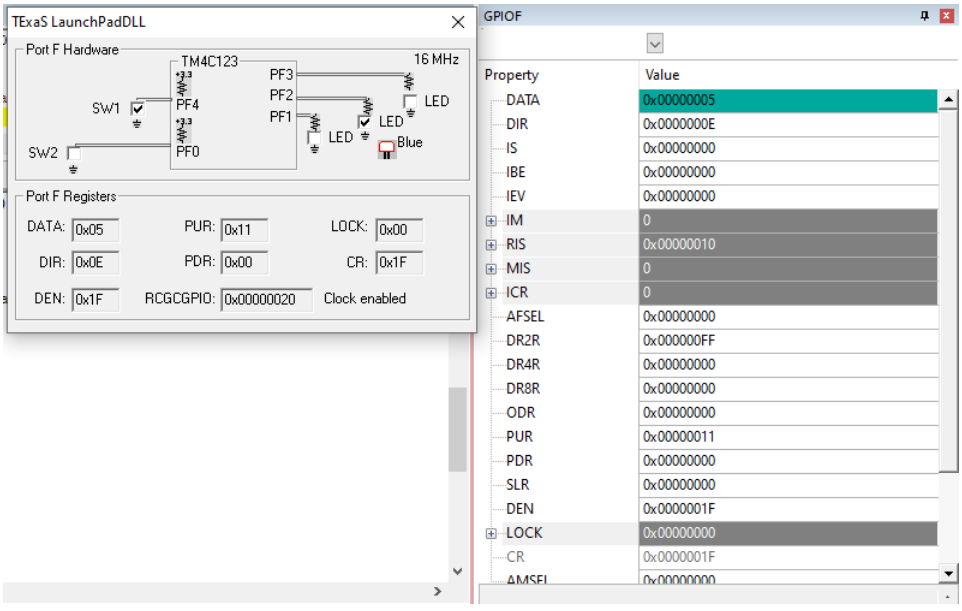
C code:

```
#include "IO.h"

void RGB_Init(void){
	SYSCTL_RCGCGPIO_R |= PF_mask; //enable clk for port F
	while ((SYSCTL_PRGPIO_R & PF_mask) == 0); //check for the clk delay
	GPIO_PORTF_LOCK_R = GPIO_LOCK_KEY; //break the lock of port F
GPIO_PORTF_CR_R |= PF123_mask; //enable making changes in leds pins (PF1,PF2&PF3)
	GPIO_PORTF_AMSEL_R &= ~PF123_mask; //disable analog mode
	GPIO_PORTF_AFSEL_R &= ~PF123_mask; //disable using alternate functions (use the
pins as GPIO)
	GPIO_PORTF_PCTL_R &= ~0x0000FFF0; //clear the bits corresponfing to the 3 pins
	GPIO_PORTF_DEN_R |= PF123_mask; //enable using the pins in digital mode
	GPIO_PORTF_DIR_R |= PF123_mask; //set the bits corresponding to the pins to 1 to
use them as output
	GPIO_PORTF_DATA_R &= ~PF123_mask;
}

void Switches_Init(void){
	GPIO_PORTF_LOCK_R = GPIO_LOCK_KEY;
	GPIO_PORTF_CR_R |= PF04_mask; //enable making changes in switches pins (PF0&PF4)
	GPIO_PORTF_AMSEL_R &= ~PF04_mask;
	GPIO_PORTF_AFSEL_R &= ~PF04_mask;
	GPIO_PORTF_PCTL_R &= ~0x000F000F; //clear the bits corresponfing to the 2
switches
	GPIO_PORTF_DEN_R |= PF04_mask;
	GPIO_PORTF_DIR_R &= ~PF04_mask; //set the bits corresponding to the switches to 0
to use them as input
	GPIO_PORTF_PUR_R |= PF04_mask;
}

unsigned char SW1_Input(void){
	char pressed1 = GPIO_PORTF_DATA_R & PF_SW1_mask;
	return pressed1;
}

unsigned char SW2_Input(void){
	char pressed2 = GPIO_PORTF_DATA_R & PF_SW2_mask;
	return pressed2;
}

void RED_Output(unsigned char data){
	GPIO_PORTF_DATA_R &= ~PF123_mask;
	GPIO_PORTF_DATA_R |= data;
}

void BLUE_Output(unsigned char data){
	GPIO_PORTF_DATA_R &= ~PF123_mask;
	GPIO_PORTF_DATA_R |= data;
}
```

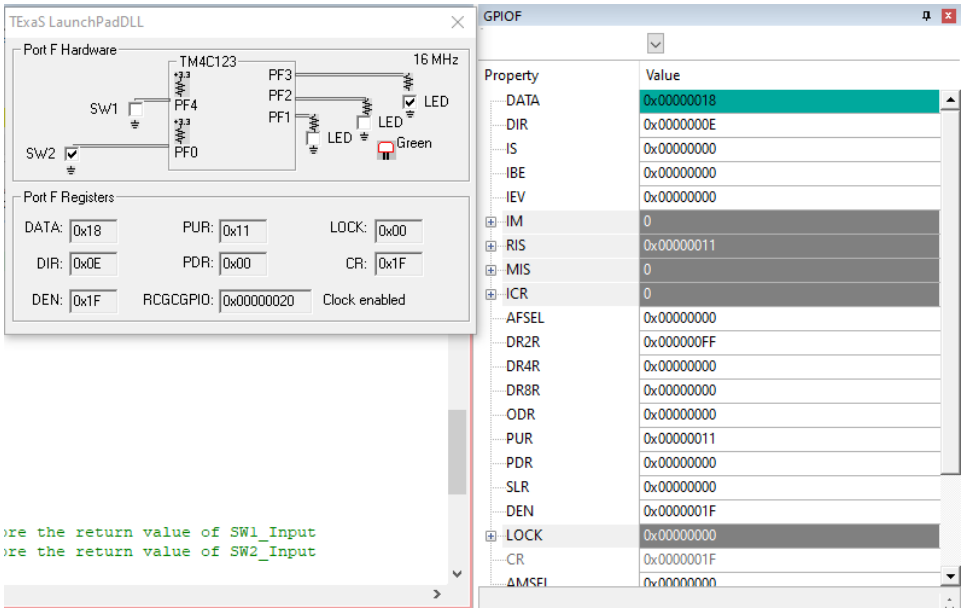
```
void GREEN_Output(unsigned char data){
        GPIO_PORTF_DATA_R &= ~PF123_mask;
        GPIO_PORTF_DATA_R |= data;}

void No_Led(){
        GPIO_PORTF_DATA_R &= 0x00;
        //GPIO_PORTF_DATA_R |= data;
}

unsigned char led;
signed char button1_in;
signed char button2_in;
int main(){
        RGB_Init();
        Switches_Init();
        while(1){
                button1_in = SW1_Input(); //store the return value of SW1_Input
                button2_in = SW2_Input(); //store the return value of SW2_Input
                if(button1_in && button2_in){
                        No_Led();
                }
                if(!button1_in && !button2_in){
                        led = RED;
                        RED_Output(led);
                }
                else if(!button1_in && button2_in){
                        led = BLUE;
                        BLUE_Output(led);
                }
                else if(button1_in && !button2_in){
                        led = GREEN;
                        GREEN_Output(led);
                }
        }
}
```

SnapShots:

Blue Led>>



Green Led>>



Red Led>>