Faculty of Engineering

Ain Shams University

CSE 211s: Introduction to Embedded Systems

REPORT (5)

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Sec.: 1

Program: CSE

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Question 2:

Q2. Write Embedded C application that blinks the three LED lights after delay 1 minute for 3 times where the LEDS blink each time after one second.

Upon starting the program, all the LEDS should be turned on. Assume the SysTick timer operates on 16 MHZ.

Check through the simulated Kit that the behavior of your code is correct and then download your code on the kit.

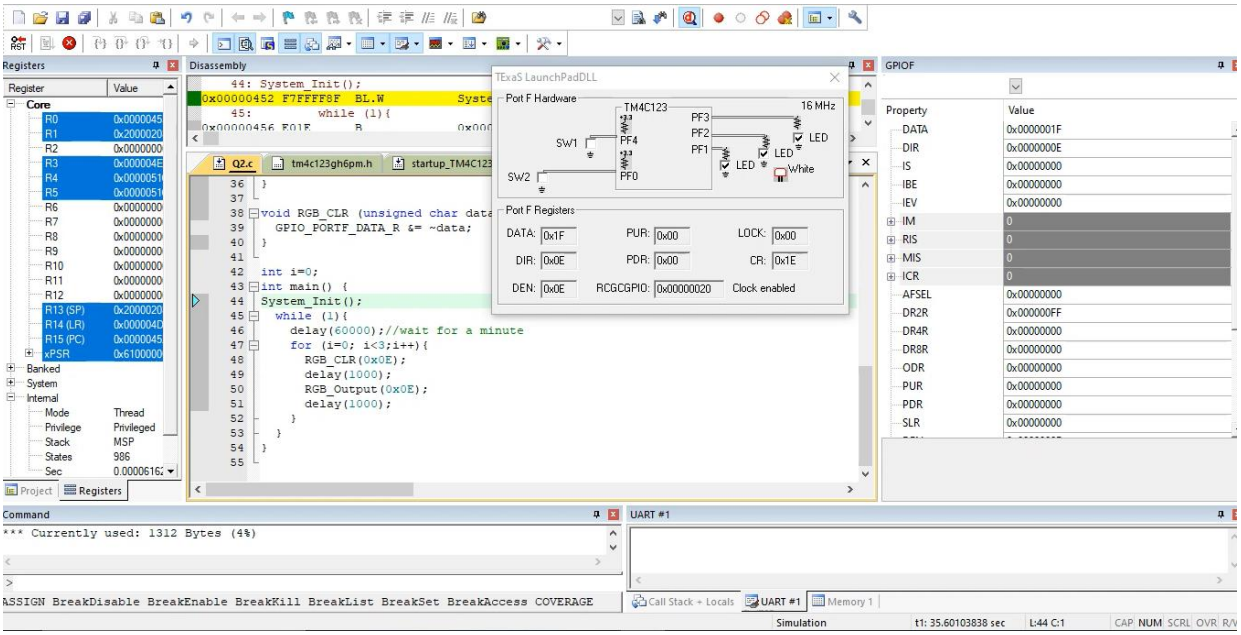
C code:

```
#include "tm4c123gh6pm.h"


void System_Init (void) {
        SYSCTL_RCGCGPIO_R |= 0x20;
        while ((SYSCTL_PRGPIO_R & 0x20)==0);
        GPIO_PORTF_LOCK_R= GPIO_LOCK_KEY;
        GPIO_PORTF_CR_R |= 0x0E;
        GPIO_PORTF_AMSEL_R &= ~0x0E;
        GPIO_PORTF_PCTL_R &= 0x0000FFF0;
        GPIO_PORTF_AFSEL_R &=0x0E;
        GPIO_PORTF_DIR_R |= 0x0E;
        GPIO_PORTF_DEN_R |= 0x0E;
        GPIO_PORTF_DATA_R |= 0x0E;
}

void SysTick_wait ( unsigned long delay ) {
        NVIC_ST_CTRL_R=0x00;
        NVIC_ST_RELOAD_R= delay-1;
        NVIC_ST_CURRENT_R=0;
        NVIC_ST_CTRL_R=0x05;
        while((NVIC_ST_CTRL_R&0x00010000)==0);
}

void delay (unsigned long time) {
        int i=0;
        while ( i < time ) {
                SysTick_wait (16000); // 1msec
                i++;
        }
}
```

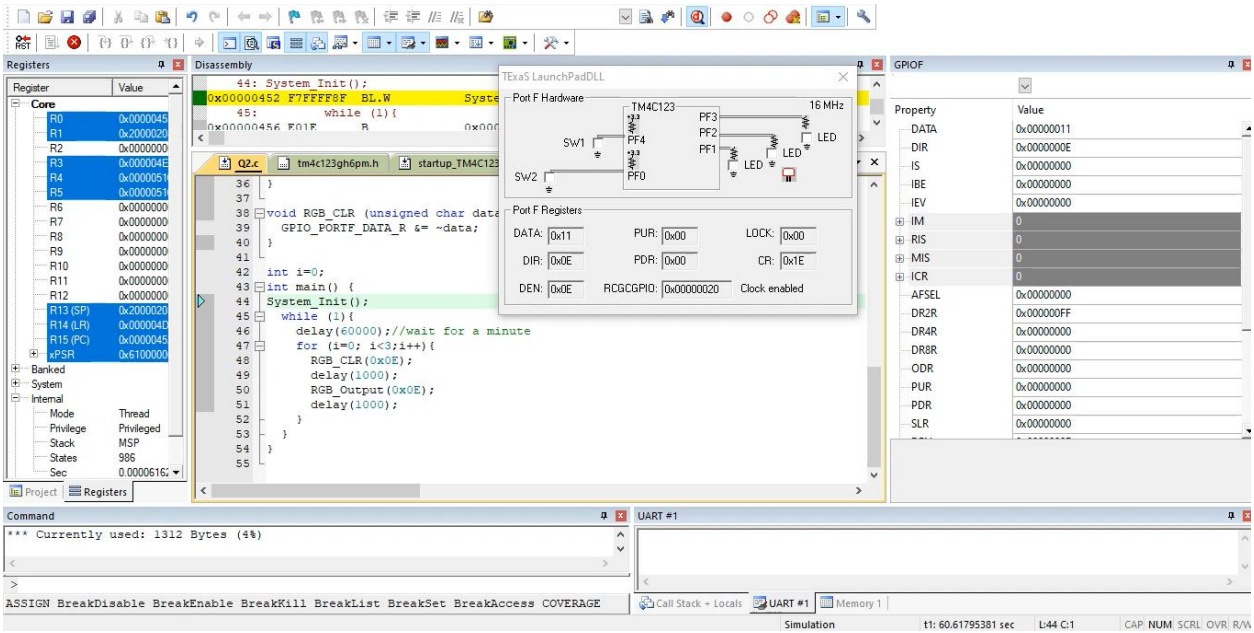
```
void RGB_Output (unsigned char data) {
        GPIO_PORTF_DATA_R |=data;
}

void RGB_CLR (unsigned char data) {
        GPIO_PORTF_DATA_R &= ~data;
}

int i=0;
int main() {
System_Init();
        while (1){
                delay(60000);//wait for a minute
                for (i=0; i<3;i++){
                        RGB_CLR(0x0E);
                        delay(1000);
                        RGB_Output(0x0E);
                        delay(1000);
                }
        }
}
```

SnapShots:

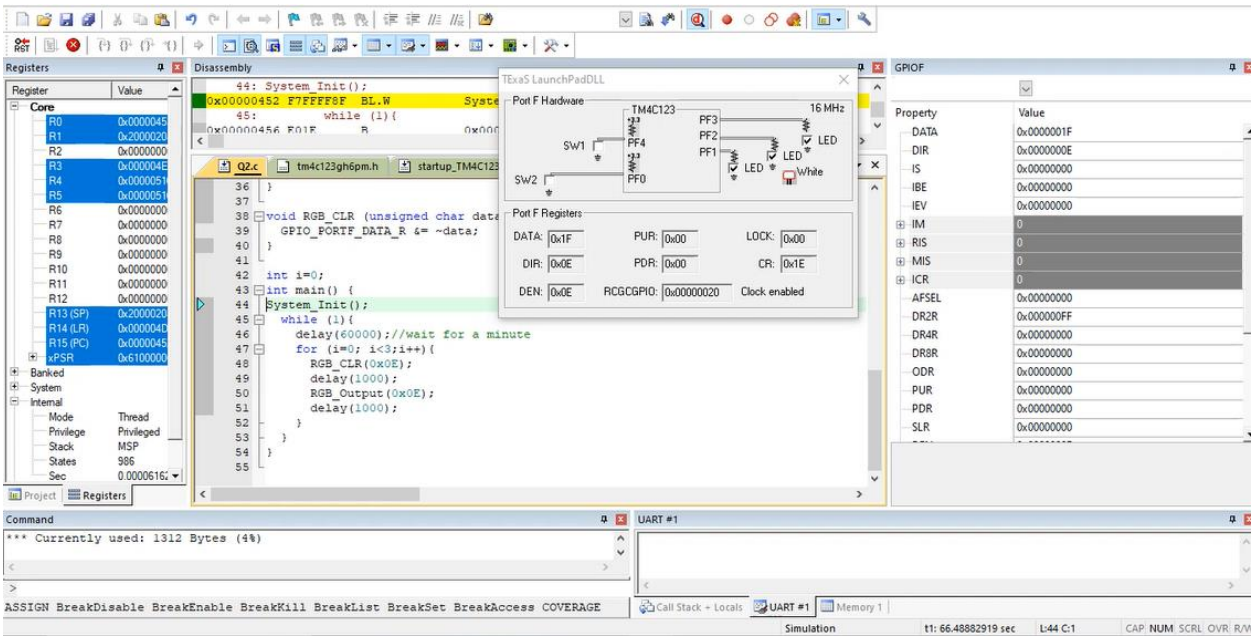
Program Started, all LEDs are ON



After 1 min delay



Blinking for 1 sec




```
44: System_Init();
0x00000452 F7FFFF8F   BL.W       Syste
45:         while (1){
0x00000456 E01E       B          0x000
36 }
37
38 void RGB_CLR (unsigned char data
39   GPIO_PORTF_DATA_R &= ~data;
40 }
41
42 int i=0;
43 int main() {
44 System_Init();
45   while (1){
46     delay(60000);//wait for a minute
47     for (i=0; i<3;i++){
48       RGB_CLR(0x0E);
49       delay(1000);
50       RGB_Output(0x0E);
51       delay(1000);
52     }
53   }
54 }
55
```

Video showing the LEDs with timer changing:

Click here