M451 RGB LED Dimming

Example Code Introduction for 32-bit NuMicro® Family

Information

Application	This code uses timer to control I/O of LEDs to do RGB dimming.
BSP Version	M451 Series BSP CMSIS V3.01.003
Hardware	NuEdu-SDK-M451 v2.0

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1 Function Description

1.1 Introduction

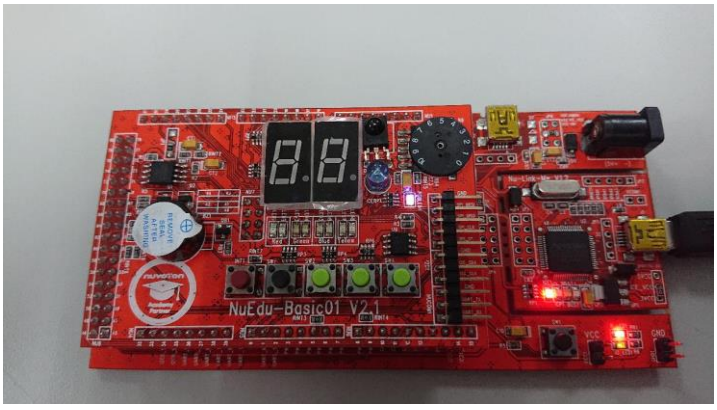
This code use timer to control I/O of LEDs to do RGB dimming. The LED dimming is always with PWM duty control. if the number of LEDs is greater than PWM channel, user need other function control all LEDS. This code only use one timer to process all the I/O state of LEDs to do RGB dimming.

1.2 Principle

There are five parameters in the program, LED1_R, LED1_G, LED1_B, Blink and brea. LED1_R, LED1_G and LED1_B are RGB brightness and the input value can be 0 to 100 corresponding 0 to 100% brightness. Blink parameter is for flashing setting and the input value can be 0 to10. The definition is to cut into 10 sheets in 1 second to set the time LED light. For example: Blink = 5 means that LED turn on for 0.5 seconds. Finally, the brea parameter set 1 to turn on the breathing light function.

User can increase the number of I/O to control more LEDs in the timer interrupt handler.

1.3 Demo Result



2 Code Description

```
void TMR1_IRQHandler(void)      //10kHz Timer
{
    uint32_t LED_duty,RLED,BLED,GLED,LED_brea;
    if(TIMER_GetIntFlag(TIMER1) == 1) {
        /* Clear Timer1 time-out interrupt flag */
        TIMER_ClearIntFlag(TIMER1);
        LED_cnt++;
        LED_duty=LED_cnt%100;
        if((brea==1)&&((brea_cnt%2)==0))     //breathing light function
            LED_brea=100-(LED_cnt/100);
        else if(brea==1)
            LED_brea=LED_cnt/100;
        else
            LED_brea=0;

        RLED=((int32_t)(LED1_R-LED_duty-LED_brea)>0)?1:0; //check LED light duty
        BLED=((int32_t)(LED1_B-LED_duty-LED_brea)>0)?1:0;
        GLED=((int32_t)(LED1_G-LED_duty-LED_brea)>0)?1:0;

        if(LED_cnt>=(Blink*1000)) {
            RLED=0;
            BLED=0;
            GLED=0;
        }

        PC->DOUT = (PC->DOUT|BIT9|BIT10|BIT11)&(~((RLED<<9)|(GLED<<10)|(BLED<<11)));
        if(LED_cnt==10000) {
            LED_cnt=0;
            brea_cnt++;
        }
    }
}
```

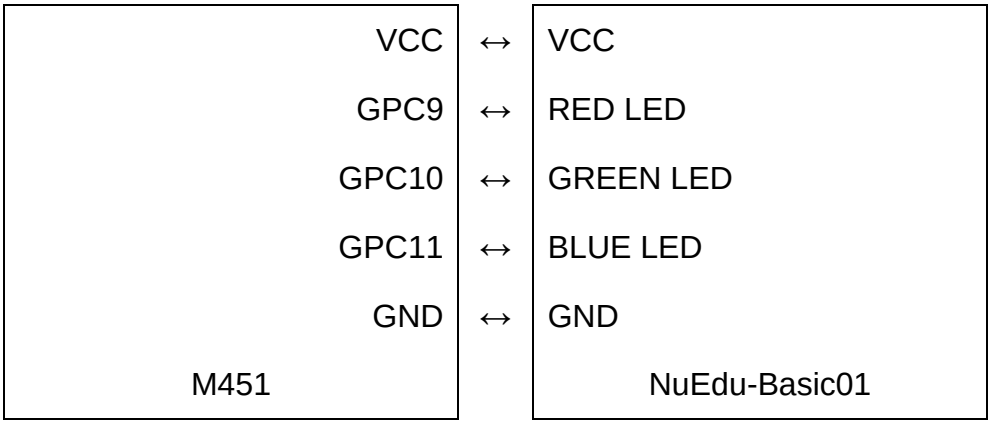
3 Software and Hardware Environment

Software Environment

- BSP version
  - M451 Series BSP CMSIS V3.01.003
- IDE version
  - Keil uVersion 5.26

Hardware Environment

- Circuit components
  - NuEdu-SDK-M451 v2.0
- Diagram



4 Directory Information

- EC_M451_RGBLED_Dimming_V1.00
  - Library — Sample code header and source files
    - CMSIS — Cortex® Microcontroller Software Interface Standard (CMSIS) by Arm® Corp.
    - Device — CMSIS compliant device header file
    - NuEdu — Library for NuEdu-SDK-xxxx board
    - StdDriver — All peripheral driver header and source files
  - SampleCode
    - ExampleCode — Source file of example code

5 How to Execute Example Code

1. Browsing into sample code folder by Directory Information (section 4) and double click M451_RGBLED_Dimming.uvproj.
2. Enter Keil compile mode
   a. Build
   b. Download
   c. Start/Stop debug session
3. Enter debug mode
   a. Run

6 Revision History

Date	Revision	Description
Jul. 11, 2019	1.00	1. Initially issued.

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