ARM HW2

2019. 03. 22.

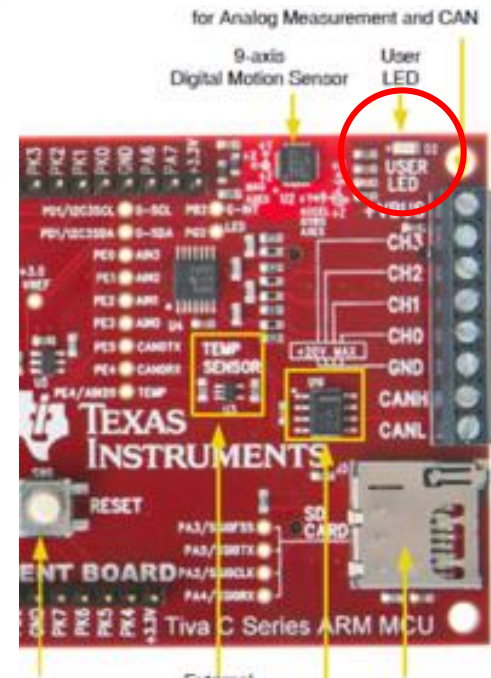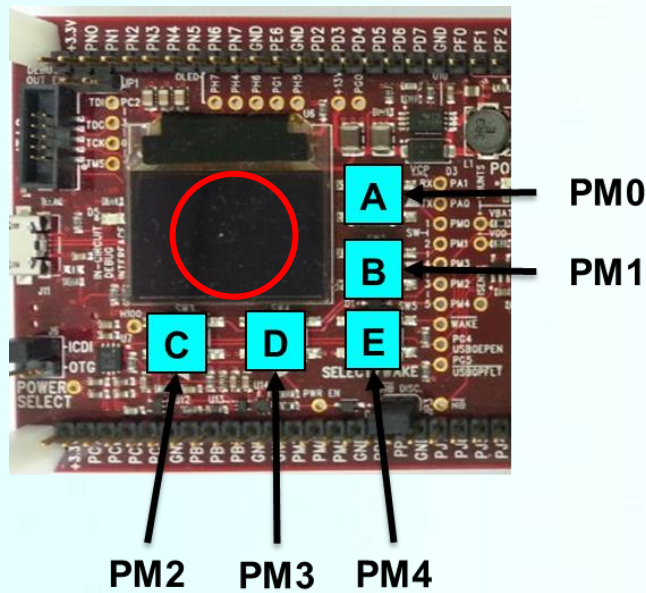Embedded System LAB
SKKU

Implementation Topic

Using switch
- **LED ON and OFF**
- **LED Blink Speed**

Implementation Condition

Using switch

- **A : LED ON**
- **B : LED OFF**
- **C : LED Blink 5 times Slow (ON → OFF → ON → OFF → …)**
- **D : LED Blink 5 times Fast**

How to use LED (PG2)

Table 2-2. User Switches and User LED Signals

GPIO Pin	Pin Function	Feature
PM0	GPIO	SW1 (Up)
PM1	GPIO	SW2 (Down)
PM2	GPIO	SW3 (Left)
PM3	GPIO	SW4 (Right)
PM4	GPIO	SW5 (Select/Wake)
PG2	GPIO	User LED

Datasheet-TM4C123GH6PGE.pdf (page 667)
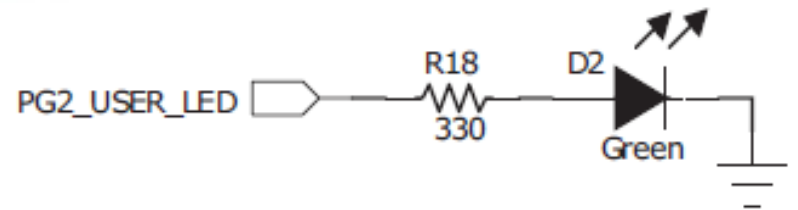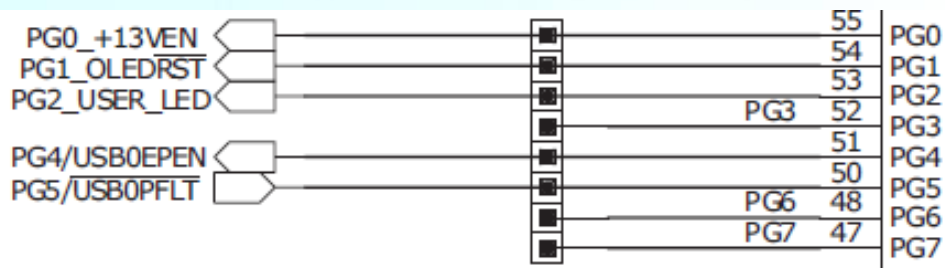
Figure 10-3. GPIODATA Write Example
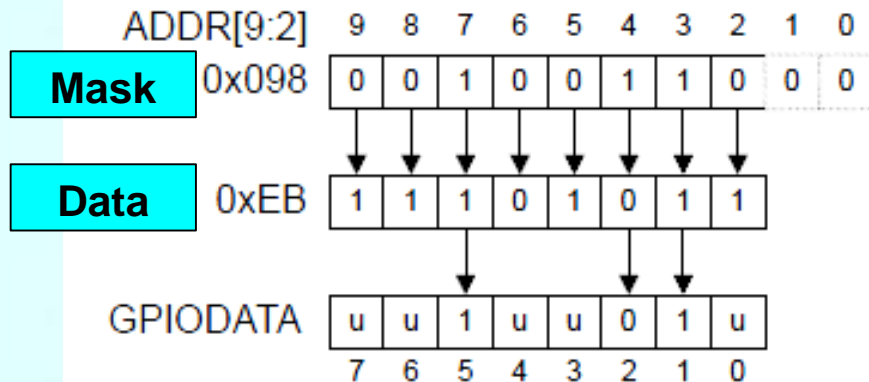
Figure 10-4. GPIODATA Read Example

```
switch
※ execution code
        mov r0, #GPIO_BASE
        mov r1, #0x63000
        add r1, r1, r0
        mov r0, #0x7c
        add r1, r1, r0

        ldr r0, [r1]
        Bx lr
```


before

32-Bit Binary	
0x4006307C	0000000000000000000000000011111
0x40063090	0000000000000000000000000000100
0x400630A4	0000000000000000000000000001001
0x400630B8	0000000000000000000000000001110
0x400630CC	0000000000000000000000000010011

after

32-Bit Binary	
0x4006307C	00000000000000000000000000011101
0x40063090	00000000000000000000000000000100
0x400630A4	00000000000000000000000000001001
0x400630B8	00000000000000000000000000001100
0x400630CC	00000000000000000000000000010001

Embedded System Lab

How to use LED (PG2)

- **System Control**
  - **RCGC2 –> Enable**

- **General-Purpose Input/Outputs**
  - **GPIODIR –> Output**
  - **GPIOAFSEL –> GPIO**
  - **GPIODR8R –> 8-mA**
  - **GPIODEN –> Enable**

- **Use GPIO Port G (APB) base address.**

General-Purpose Input/Output Run Mode Clock Gating Control (RCGCGPIO)

Base 0x400F.E000
Offset 0x608
Type R/W, reset 0x0000.0000

	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
								reserved								
Type	RO	RO	RO	RO	RO	RO	RO	RO	RO	RO	RO	RO	RO	RO	RO	RO
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	reserved		R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0
Type	RO	RO	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit/Field	Name	Type	Reset	Description
11	R11	R/W	0	GPIO Port M Run Mode Clock Gating Control

Value	Description
1	Enable and provide a clock to GPIO Port M in Run mode.
0	GPIO Port M is disabled.

RCGCGPIO Initializing Example

※ **Initializing data value**

GPIO_BASE   .equ   0x40000000

RCGCGPIO   .equ   0x608   ; Enable and disable GPIO modules

※ **execution code**

```
RCGC:    mov r0, #GPIO_BASE;
         mov r1, #0xFE000
         add r1, r1, r0
         mov r0, #RCGCGPIO
         add r1, r1, r0

         ldr r0, [r1]
         orr r0, r0, #0x800    ; Enable GPIOM
         str r0, [r1]
         nop
         nop
```

0x400fe608 - 0x400FE608 <Memory Re

32-Bit Hex - TI Style

0x400FE608	000008C1	00000000 0
0x400FE654	00000000	00000000 0
0x400FE6A0	00000000	00000000 0
0x400FE6EC	00000000	00000000 0
0x400FE738	00000000	00000000 0
0x400FE784	00000000	00000000 0
0x400FE7D0	00000000	00000000 0

Hw2 check

Time & Place

- March 29th(Fri) 19:00
- Semi-conductor building 2 floor workstation room
  - 400202, 400212

How to submit

- I-campus, until March 29th 18:59
  - format
    - 2012310000_HW2.asm