ARM HW5

2019. 04. 12.

Embedded System LAB
SKKU

Implementation Topic

Interrupt

- Timer based User led blink
- Change the blink frequency by pushing the switch
  - ex) Switch A : Slower / Switch B : Faster

Timer

- **We will use**
  - **32-Bit Timer 0A**

Timer	Up/Down Counter
16/32-Bit Timer 0	Timer A
	Timer B
16/32-Bit Timer 1	Timer A
	Timer B
16/32-Bit Timer 2	Timer A
	Timer B
16/32-Bit Timer 3	Timer A
	Timer B
16/32-Bit Timer 4	Timer A
	Timer B
16/32-Bit Timer 5	Timer A
	Timer B
32/64-Bit Wide Timer 0	Timer A
	Timer B

※TM4C123GH6PGE datasheet 725page

Flowchart

- Data value define
- Vector table
- Switch, LED, Timer Initialization
- INTEN
  - Timer
  - Switch
- Unmasking
- Interrupt default Handler
- Handler code
  - Timer
  - IntGPIOm

Timer Initialization

- **RCGCTIMER**
  - **16/32-BitGeneral-PurposeTimerRunModeClockGatingControl**
  - **Enable and provide a clock to 16/32-bit general-purpose timer 0**
- **GPTMCFG**
  - **GPTM Configuration**
  - **Setting 32-bit timer configuration in 16/32-bit timer**
- **GPTMIMR**
  - **GPTM Interrupt Mask**
  - **16/32-bit Timer A is triggered – Time-out interrupt**
- **GPTMCTL**
  - **GPTM Control**
  - **Timer A is enabled**

※This is minimum setting about Timer initialization
If you want more detail setting, please see the datasheet.

Flowchart

- Data value define
- Vector table
- Switch, LED, Timer Initialization
- INTEN
  - Timer - 16/32-bit Timer 0A
  - Switch
- Unmasking
- Interrupt default Handler
- Handler code
  - Timer
  - IntGPIOm

Flowchart

- Data value define
- Vector table
- Switch, LED, Timer Initialization
- INTEN
  - Timer
  - Switch
- Unmasking
- Interrupt default Handler
- Handler code
  - Timer – GPTMICR, BLINK (LEDON, LEDOFF)
  - IntGPIOm

Flowchart

- Data value define
- Vector table
- Switch, LED, Timer Initialization
- INTEN
  - Timer
  - Switch
- Unmasking
- Interrupt default Handler
- Handler code
  - Timer
  - IntGPIOm – GPIO interrupt clear, Switch input, Slower, Faster
    - For coding about Slower and Faster, You have to use ‘GPTMTnILR’
    - Refer ‘GPTMTAR’

Vector table, switch setting

```
          .global __stack
__stack:

;-------------------------------------------------------------------------
                        ; Interrupt Vectors
;-------------------------------------------------------------------------
                        .sect   ".intvecs"
                        .align  4
                        .field  IntDefaultHandler,32        ; g_pfnVectors[0] @ 0
                        .field  IntDefaultHandler,32        ; g_pfnVectors[1] @ 32
                        .field  IntDefaultHandler,32        ; g_pfnVectors[2] @ 64
                        .field  IntDefaultHandler,32        ; g_pfnVectors[3] @ 96
                        .field  IntDefaultHandler,32        ; g_pfnVectors[4] @ 128
                        .field  IntDefaultHandler,32        ; g_pfnVectors[5] @ 160
```

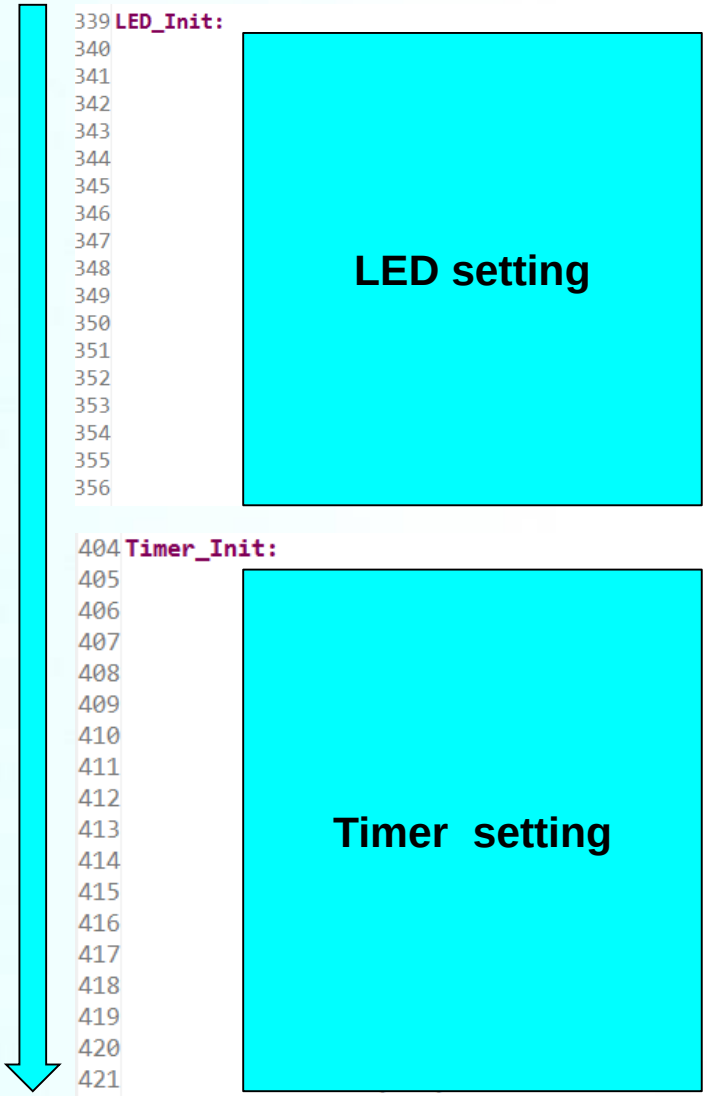
⋮

```
                        .field  IntGPIOm,32     ; g_pfnVectors[127] @ 4064
```

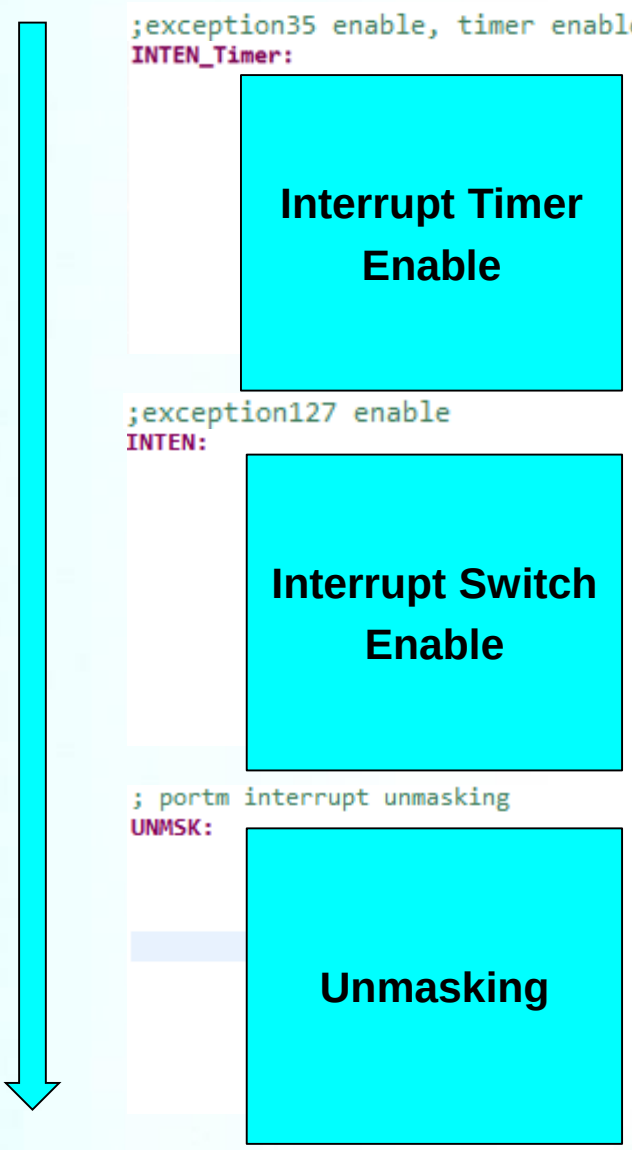
```
196 ;-----------------------------------------
197             .text                       ;
198 ;-----------------------------------------
199
200 SWITCH:
201
202
203
204
205
206
207
208
209
210
211
```

Switch setting

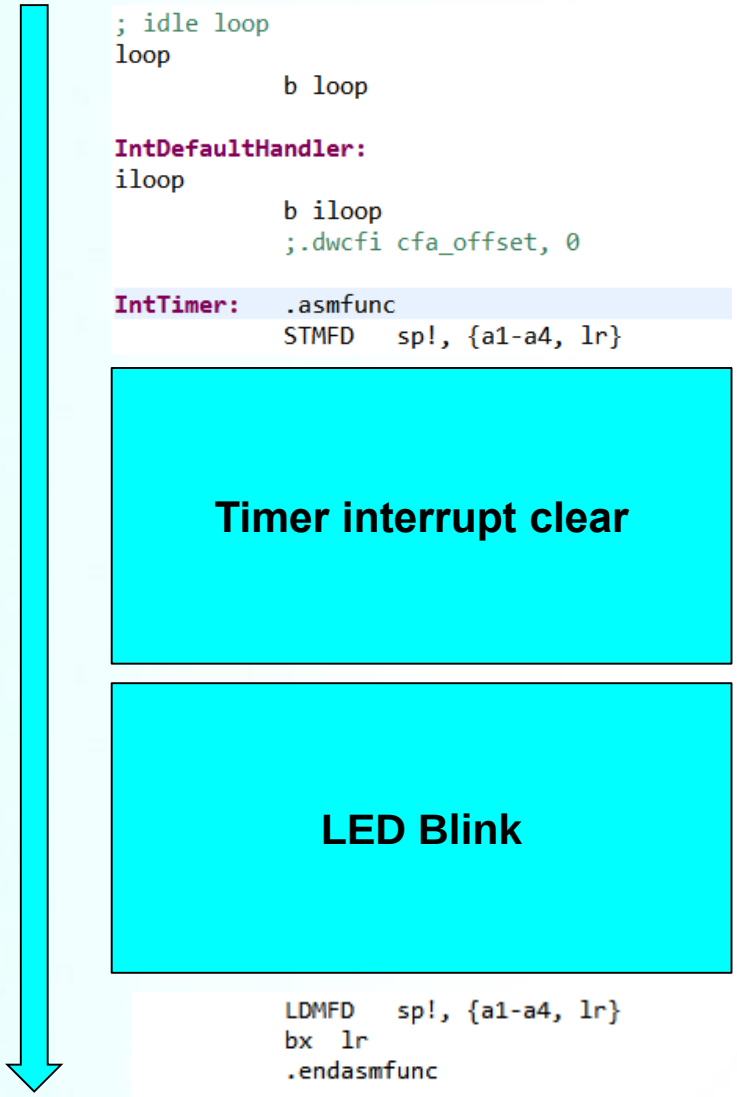
LED setting, Timer setting



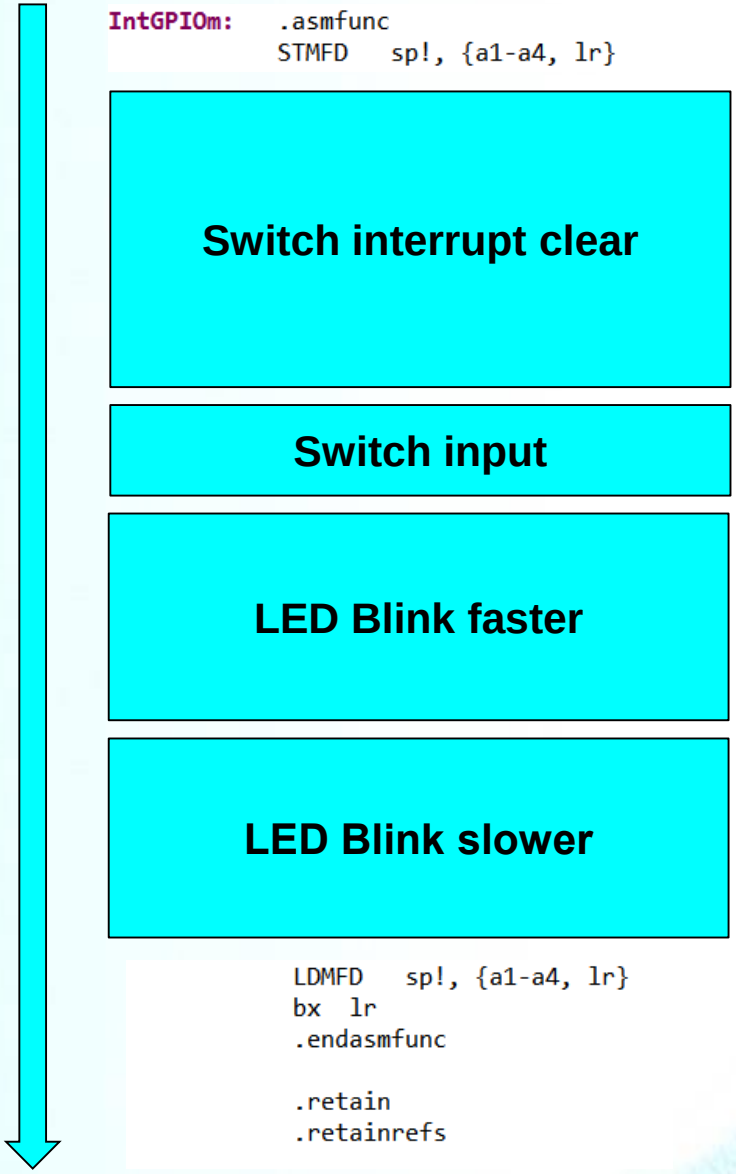
INTEN(Timer, Switch), UNMSK



Timer handler



Switch handler



HW5 check

- **Time and Place**
  - **April 19th(Fri) 19:00**
  - **Semi-conductor building 2 floor computer room**
    - **400202, 400212**
- **How to submit**
  - **.asm**
  - **I-campus, until April 19th 18:59**
    - **format**
      - **2012310000_HW5.asm**