Lab7 STM32 Interrupt and Exception

實驗七 STM32 Interrupt and Exception

1. Lab objectives 實驗目的

- Understand how to set stm32 SysTick timer.
- Understand the setting and principle of NVIC and External.

- 瞭解 STM32 SysTick timer 設定
- 瞭解 STM32 NVIC 和 External 設定和原理

2. Theory 實驗原理

Please check the course materials.
請參考上課講義。

3. Steps 實驗步驟

3.1. Lab7.1: SysTick timer interrupt setting (30%)

設定 clock source 為 HSI 的 SysTick timer。並利用 SysTick timer 中斷機制, 控制 LED 使它暗 3 秒，亮 3 秒 (SysTick 3 秒中斷一次)。

Set the clock source as HSI's SysTick timer. And use the SysTick timer interruption to control the LED being dark 3 seconds and being light 3 second (SysTick interrupt one time every three seconds).

main.c

```
void GPIO_init() {}
void SystemClock_Config() {}
void SysTick_Handler(void) {}

int main(){
        SystemClock_Config();
        GPIO_init();
        while(1) {
        }
}
```

3.2. Lad7.2: Multiple External Interrupt setting (30%)

設定 keypad 的 input 腳為外部中斷的輸入源，當沒按任何按鍵時，一顆 LED 會保持在亮的狀態，當按下按鍵時會觸發中斷，使 LED 會亮、暗各保持 0.5秒為一次閃爍。閃爍次數為 Keypad 對應的次數，閃爍結束後 LED 會回到一開始的亮燈狀態。

Set the interruption as input source for input pin of keypad. A LED will keep lighting when button is not pressed, otherwise program will be interrupted by pressing button. LED will flash with the number times which you enter from the keypad mapping value (light and dark each for 0.5 second), after that LED will back to the initial lighting state.

	X0	X1	X2	X3
Y0	1	2	3	10
Y1	4	5	6	11
Y2	7	8	9	12
Y3	15	0	14	13

main.c

```
void init_GPIO(){
}
void EXTI_config(){

}
void NVIC_config(){
}

void EXTIx_IRQHandler(void){

}
int main()
{
   NVIC_config();
   EXTI_config();
   init_GPIO();
}
```

3.3. Lab7.3: 簡單鬧鐘 (40%)

利用 SysTick timer、User button 和蜂鳴器設計一個簡單的鬧鐘，keypad 上每一個按鈕代表設定倒數計時幾秒，當輸入為 0 時則倒數 0 秒即馬上倒數結束。時間輸入完畢後，Systick timer 會開始計時，而當時間到後，使蜂鳴器響起，直到使用者按下 User button 後才會停止發出聲音並回到等待使用者輸入，注意 timer 開始計時到使用者關閉蜂鳴器的期間，keypad 不會有任何作用。

Use SysTick timer, user button and buzzer to design a simple alarm clock. Each button on keypad means how many second need to count to zero and alarming. After entering time, Systick timer will start counting and buzzer will alarm when the counting finish. After that, when user presses user button, buzzer will stop alarming and wait for the next input. Note that keypad cannot work between start counting and stop the buzzer.

	X0	X1	X2	X3
Y0	1	2	3	10
Y1	4	5	6	11
Y2	7	8	9	12
Y3	15	0	14	13