

把触发引脚从 PF4 改为 PF0, 尝试电平触发模式, 并在中断服务程序对切断状态。重新验证试验结果, 分析实验现象。

实验代码相关更改:

解锁 PF0 代码:

```
SYSCTL_RCGCGPIO_R |= 0x00000020; // (a) activate clock for port F
unsigned int delay = SYSCTL_RCGCGPIO_R; // allow time for clock to start
GPIO_PORTF_LOCK_R = 0x4C4F434B; // 2) unlock GPIO Port F
GPIO_PORTF_CR_R = 0x1F;
```

更改触发模式为低电平触发:

```
GPIO_PORTF_IS_R |= 0x01; // (d) PF0 is level-sensitive
GPIO_PORTF_IBE_R &= ~0x01; // PF0 is not both edges
GPIO_PORTF_IIEV_R &= ~0x01; // PF0 low level event
```

GPIO_PORTF_IS_R 寄存器控制是边缘触发还是电平触发, 低电平为电平触发, 高电平为电平触发

GPIO_PORTF_IBE_R 寄存器控制是双边缘/电平触发还是单边缘/电平触发, 低电平为单边缘/电平触发, 高电平为双边缘/电平触发

GPIO_PORTF_IIEV_R 寄存器在 GPIO_PORTF_IBE_R 寄存器为低电平时有效, 低电平时下降沿/低电平触发, 高电平时上升沿/高电平触发。

完整配置代码如下:

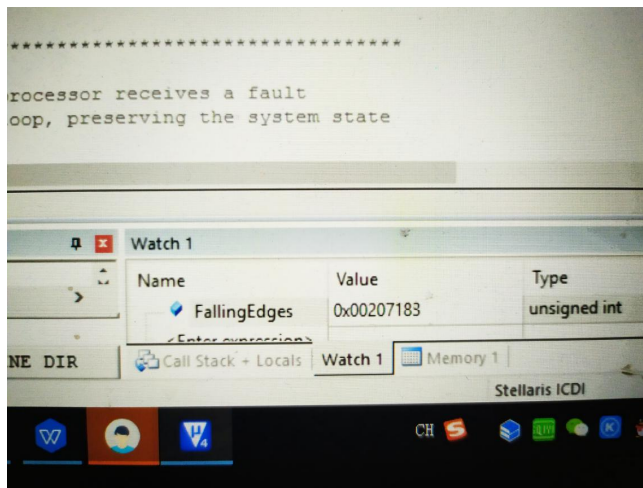
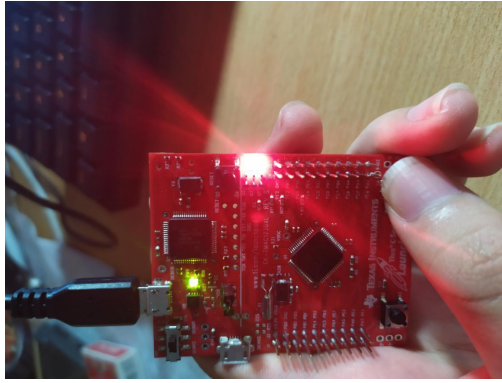
```
void EdgeCounter_Init(void){
    SYSCTL_RCGCGPIO_R |= 0x00000020; // (a) activate clock for port F
    unsigned int delay = SYSCTL_RCGCGPIO_R; // allow time for clock to start
    GPIO_PORTF_LOCK_R = 0x4C4F434B; // 2) unlock GPIO Port F
    GPIO_PORTF_CR_R = 0x1F;

    FallingEdges = 0; // (b) initialize counter
    GPIO_PORTF_DIR_R &= ~0x01; // (c) make PF0 in (built-in button)
    GPIO_PORTF_DIR_R |= 0x02; // make PF1 out
    GPIO_PORTF_AFSEL_R &= ~0x03; // disable alt funct on PF0-1
    GPIO_PORTF_DEN_R |= 0x03; // enable digital I/O on PF0-1
    GPIO_PORTF_PCTL_R &= ~0x000000FF; // configure PF0-1 as GPIO
    GPIO_PORTF_AMSEL_R = 0; // disable analog functionality on PF
    GPIO_PORTF_PUR_R |= 0x01; // enable weak pull-up on PF0
    GPIO_PORTF_IS_R |= 0x01; // (d) PF0 is level-sensitive
    GPIO_PORTF_IBE_R &= ~0x01; // PF0 is not both edges
    GPIO_PORTF_IIEV_R &= ~0x01; // PF0 low level event
    GPIO_PORTF_ICR_R = 0x01; // (e) clear flag4
    GPIO_PORTF_IM_R |= 0x01; // (f) arm interrupt on PF4 *** No IME bit as
    NVIC_PRI7_R = (NVIC_PRI7_R & 0xFFFF0000) | 0x00A00000; // (g) priority 5
    NVIC_ENO_R = 0x40000000; // (h) enable interrupt 30 in NVIC
    EnableInterrupts(); // (i) Clears the I bit
}

void GPIOPortF_Handler(void){
    GPIO_PORTF_ICR_R = 0x01; // acknowledge flag4
    GPIO_PORTF_DATA_R ^= 0x02;
    FallingEdges = FallingEdges + 1;
}

//debug code
int main(void){
    EdgeCounter_Init(); // initialize GPIO Port F interrupt
    while(1){
        WaitForInterrupt();
    }
}
```

实验现象分析:



将实验改为边缘触发后：

```
GPIO_PORTF_IS_R &= 0x00;    //PFO 设为边缘触发
```

对比结果：

Watch 1		
Name	Value	Type
FallingEdges	0x00000001	unsigned int
<Enter expression>		

实验现象表明电平触发存在极大的抖动现象，FallingEdges 在按下按钮时会增加很多。但是，边缘触发情况下，抖动现象就不是很明显了。