

按键切换模式

呼吸灯(见呼吸灯)

闪烁

设置CCR=arr, delay函数延时, 再改变CCR值为0, 实现关灯

```
void LED_BLINK(void){
    TIM_SetCompare1(TIM2,999);
    TIM_SetCompare2(TIM2,999);
    Delay_ms(250);
    TIM_SetCompare1(TIM2,0);
    TIM_SetCompare2(TIM2,0);
    Delay_ms(250);
}
```

模式切换

标志: mode

- 宏定义blink,breath
- mode=blink => 闪烁; mode=breath => 呼吸

EXTI(external interrupt)中断

1. 复用引脚

```
RCC_APB2PeriphClockCmd(RCC_APB2Periph_AFIO,ENABLE);
//打开AFIO时钟
```

启用 APB2 总线上 AFIO 外设的时钟

2. 选择中断源

```
GPIO_EXTILineConfig(GPIO_PortSourceGPIOB,GPIO_PinSource10); //PB10为中断源
```

3. 外部中断

宏定义EXTI初始化函数

```
#define EXTI_CFG(_LINE, _MODE, _Trigger, _LineCmd) \
do
```

```

{
    EXTI_InitTypeDef EXTI_InitStructure;
    EXTI_InitStructure.EXTI_Line = _LINE;
    EXTI_InitStructure.EXTI_Mode = _MODE;
    EXTI_InitStructure.EXTI_Trigger = _Trigger;
    EXTI_InitStructure.EXTI_LineCmd = _LineCmd;
    EXTI_Init(&EXTI_InitStructure);
} while (0)

```

- "\"表示不换行
- 用do-while包装，可确保EXTI_CFG整体执行

```
EXTI_CFG(EXTI_Line10, EXTI_Mode_Interrupt, EXTI_Trigger_Falling, ENABLE);
```

- Line10 => Pin10
- _Falling: 下降沿触发，表示引脚电平由1变为0后触发中断
- ENABLE使能中断

宏定义NVIC初始化函数

```

#define NVIC_CFG(_Channel, _PreemptionPriority, _SubPriority, _Cmd)
\
do
\
{
\
    NVIC_InitTypeDef NVIC_InitStructure;
\
    NVIC_InitStructure.NVIC_IRQChannel = _Channel;
\
    NVIC_InitStructure.NVIC_IRQChannelPreemptionPriority =
    _PreemptionPriority; \
    NVIC_InitStructure.NVIC_IRQChannelSubPriority = _SubPriority;
\
    NVIC_InitStructure.NVIC_IRQChannelCmd = _Cmd;
\
    NVIC_Init(&NVIC_InitStructure);
\
} while (0)

```

- NVIC用于配置优先级
- _Channel为EXTI通道
 - 0~4: EXTIx_IRQn
 - 5~9: EXTI9_5_IRQn
 - 10~15: EXTI15_10_IRQn

4. 外部中断函数

```
void EXTI15_10_IRQHandler(void){
    if(EXTI_GetITStatus(EXTI_Line10)==SET){
        if(mode==blink) mode=breath;
        else if(mode==breath) mode=blink;
        EXTI_ClearITPendingBit(EXTI_Line10);
    }
}
```

- 固定函数名
- 函数介绍

1. EXTI_GetITStatus(EXTI_Line10):

- 返回值：ITStatus //SET或RESET
 - ITStatus的定义：

```
typedef enum {RESET = 0, SET = !RESET} FlagStatus, ITStatus;
```

2. EXTI_ClearITPendingBit(EXTI_Line10);

- 清除中断标志

进入中断函数执行中断程序后**模式切换**

开关灯

Pin0引脚按钮用于开关控制

1. EXTI中断
2. 标志：led_on,每进入中断函数变为! led_on
3. 改变呼吸灯函数，实现led_on控制

```
void BREATHING_LIGHT(void){
    if(led_on){
        if(direction){
            brightness++;
            if(brightness>=1000){
                direction=0;
            }
        }

        if(direction==0){
            if(brightness==0){
                direction=1;
            }
            brightness--;
        }
    }
}
```

```
    }  
    TIM_SetCompare1(TIM2,brightness);  
    TIM_SetCompare2(TIM2,brightness);  
  }  
  else{  
    TIM_SetCompare1(TIM2,0);  
    TIM_SetCompare2(TIM2,0);  
  }  
}
```