

STM32F401 Guide

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Chapter 1

Module Index

1.1 Modules

Here is a list of all modules:

led	5
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Chapter 2

File Index

2.1 File List

Here is a list of all documented files with brief descriptions:

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This implements the setup of the system clock, acces fonction (debug) and temporal fonction (delay)	
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Chapter 3

Module Documentation

3.1 led

Definition for the LED.

Macros

- `#define LED_GPIO_RCC RCC_GPIOA`
- `#define LED_PORT GPIOA`
- `#define LED_PIN GPIO5`

Functions

- `void led_setup ()`
Setup GPIO on pin.
- `void led_blink ()`
toggle LED state

3.1.1 Detailed Description

Definition for the LED.

We use the onboard LED PA5

Chapter 4

File Documentation

4.1 lowlevel/include/clock.h File Reference

This implements the setup of the system clock, acces fonction (debug) and temporal fonction (delay)

```
#include <stdint.h>
#include <libopencm3/cm3/systick.h>
#include <libopencm3/stm32/rcc.h>
```

Functions

- void `clock_setup` ()
This function setup the system clock.
- uint32_t `clock_get_systicks` ()
This function gets the number of systicks since starting.
- void `delay_ms` (uint32_t ms)
This function implements a delay in ms.

4.1.1 Detailed Description

This implements the setup of the system clock, acces fonction (debug) and temporal fonction (delay)

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Robotronik Phelma

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4.1.2 Function Documentation

4.1.2.1 delay_ms()

```
void delay_ms (
    uint32_t ms )
```

This function implements a delay in ms.

Parameters

<i>ms</i>	value of delay in ms
-----------	----------------------

4.2 lowlevel/include/gpio.h File Reference

This implements the setup of a gpio pin

```
#include <libopencm3/stm32/rcc.h>
#include <libopencm3/stm32/gpio.h>
```

Functions

- void [_gpio_setup_pin_af](#) (enum rcc_periph_clken rcc_clken, uint32_t gpio_port, uint16_t gpio_pin, uint8_t gpio_altfun)
This function setup a pin for an alternate function.
- void [_gpio_setup_pin](#) (enum rcc_periph_clken clken, uint32_t port, uint16_t pin, uint8_t mode)
This function setup a GPIO pin for standard input or output.

4.2.1 Detailed Description

This implements the setup of a gpio pin

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4.2.2 Function Documentation

4.2.2.1 `_gpio_setup_pin()`

```
void _gpio_setup_pin (
    enum rcc_periph_clken clken,
    uint32_t port,
    uint16_t pin,
    uint8_t mode )
```

This function setup a GPIO pin for standard input or output.

Parameters

<i>clken</i>	the clock of the port to enable
<i>port</i>	the port to enable
<i>pin</i>	the pint to enable
<i>mode</i>	the mode of your GPIO (GPIO_MODE_OUTPUT,GPIO_MODE_OUTPUT)

4.2.2.2 `_gpio_setup_pin_af()`

```
void _gpio_setup_pin_af (
    enum rcc_periph_clken rcc_clken,
    uint32_t gpio_port,
    uint16_t gpio_pin,
    uint8_t gpio_altfun )
```

This function setup a pin for an alternate function.

Parameters

<i>rcc_clken</i>	reset clock control for the pin (usually RCC_X with X the gpio_port)
<i>gpio_port</i>	port of the selected pin
<i>gpio_pin</i>	number of the selected pin
<i>gpio_altfun</i>	identifier for the alternate function (usually GPIO_AFX with X the number for altfun)

4.3 lowlevel/include/led.h File Reference

This implements the onboard LED GPIO.

```
#include "gpio.h"
```

Macros

- #define **LED_GPIO_RCC** RCC_GPIOA
- #define **LED_PORT** GPIOA
- #define **LED_PIN** GPIO5

Functions

- void **led_setup** ()
Setup GPIO on pin.
- void **led_blink** ()
toggle LED state

4.3.1 Detailed Description

This implements the onboard LED GPIO.

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4.4 lowlevel/include/pwm.h File Reference

PWM.

```
#include <libopenm3/stm32/timer.h>
#include "timer.h"
#include "gpio.h"
```

Macros

- #define **PWM_PRESCALE** (84)
- #define **PWM_PERIOD** (20000)
- #define **PWM_TIM** TIM1
- #define **PWM_TIM_RCC** RCC_TIM1
- #define **PWM_GPIO_RCC_EN** RCC_GPIOA
- #define **PWM_PORT_EN** GPIOA
- #define **PWM_PIN_EN** GPIO10
- #define **PWM_AF** GPIO_AF1
- #define **PWM_OC_ID** TIM_OC3
- #define **PWM_OC_MODE** TIM_OCM_PWM1

Functions

- void `pwm_setup` ()
Setup PWM on pin.
- void `pwm_set_pulse_width` (uint32_t timer_peripheral, enum tim_oc_id oc_id, uint32_t pulse_width)
Setup PWM pulse width.

4.4.1 Detailed Description

PWM.

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4.5 lowlevel/include/timer.h File Reference

This implements the functions required setup a timer and its output channel

```
#include <stdint.h>
#include <libopencm3/stm32/timer.h>
#include <libopencm3/stm32/rcc.h>
```

Functions

- void `_timer_setup` (enum rcc_periph_clken rcc_clken, uint32_t timer_peripheral, uint32_t prescaler, uint32_t period)
This function setup an internal timer with the given parameters.
- void `_timer_setup_output_c` (uint32_t timer_peripheral, enum tim_oc_id oc_id, enum tim_oc_mode oc_mode, uint32_t oc_value)
This function configure the output comparator of a channel for the timer specified.
- void `_timer_start` (uint32_t timer_peripheral)
This function starts the given timer.

4.5.1 Detailed Description

This implements the functions required setup a timer and its output channel

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4.5.2 Function Documentation

4.5.2.1 `_timer_setup()`

```
void _timer_setup (
    enum rcc_periph_clken rcc_clken,
    uint32_t timer_peripheral,
    uint32_t prescaler,
    uint32_t period )
```

This function setup an internal timer with the given parameters.

Parameters

<i>rcc_clken</i>	reset and clock control enable for the timer (clock tree)
<i>timer_peripheral</i>	timer selected
<i>prescaler</i>	the input frequency of the timer (sys_clk) is divided by this factor
<i>period</i>	period of the timer in us

4.5.2.2 `_timer_setup_output_c()`

```
void _timer_setup_output_c (
    uint32_t timer_peripheral,
    enum tim_oc_id oc_id,
```



```
enum tim_oc_mode oc_mode,  
uint32_t oc_value )
```

This function configure the output comparator of a channel for the timer specified.

Parameters

<i>timer_peripheral</i>	selected timer
<i>oc_id</i>	selected channel of the output comparator
<i>oc_mode</i>	different mode used for the timer
<i>oc_value</i>	initial value of the duty cycle

4.5.2.3 `_timer_start()`

```
void _timer_start (  
    uint32_t timer_peripheral )
```

This function starts the given timer.

Parameters

<i>timer_peripheral</i>	selected timer
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