STM32F401 Guide

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2.1 File List

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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)

This file is part of STM32F401 Guide

Date

07/2020

Licence :

Robotronik Phelma

Author

PhenixRobotik NPXav Benano Trukbidule

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

ms	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

This file is part of STM32F401 Guide

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Robotronik Phelma

Author

NPXav Benano Trukbidule

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

clken	the clock of the port to enable
port	the port to enable
pin	the pint to enable
mode	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

rcc_clken	reset clock control for the pin (usualy RCC_X with X the gpio_port)
gpio_port	port of the selected pin
gpio_pin	number of the selected pin
gpio_altfun	identifier for the alternate function (usualy 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.

This file is part of STM32F401 Guide

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Robotronik Phelma

Author

NPXav

4.4 lowlevel/include/pwm.h File Reference

PWM.

```
#include <libopencm3/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.

This file is part of STM32F401REGuide

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Author

NPXav roborenar

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

This file is part of cdfr2020BaseRoulanteRework

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Licence :

Robotronik Phelma

Author

NPXav Benano Trukbidule

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

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

timer_peripheral	selected timer
oc_id	selected channel of the output comparator
oc_mode	different mode used for the timer
oc_value	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

timer_peripheral	selected timer

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