

IndInf03_Ampelsteuerung_Interrupts_Weinb_5BHIT

1.0

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Chapter 1

Module Index

1.1 Modules

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Data Structure Index

2.1 Data Structures

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--------------------------------	----

Chapter 3

File Index

3.1 File List

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

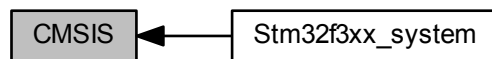
src/ ampel.h	Definition der States & Events	19
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Chapter 4

Module Documentation

4.1 CMSIS

Collaboration diagram for CMSIS:



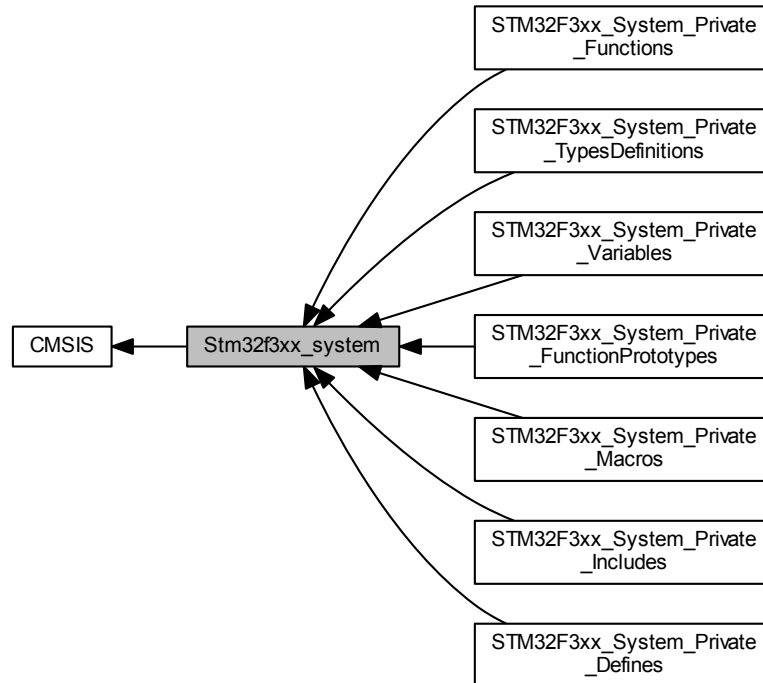
Modules

- [Stm32f3xx_system](#)

4.1.1 Detailed Description

4.2 Stm32f3xx_system

Collaboration diagram for Stm32f3xx_system:



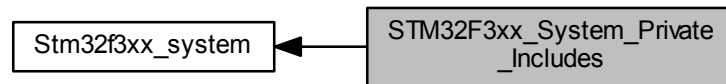
Modules

- [STM32F3xx_System_Private_Includes](#)
- [STM32F3xx_System_Private_TypesDefinitions](#)
- [STM32F3xx_System_Private_Defines](#)
- [STM32F3xx_System_Private_Macros](#)
- [STM32F3xx_System_Private_Variables](#)
- [STM32F3xx_System_Private_FunctionPrototypes](#)
- [STM32F3xx_System_Private_Functions](#)

4.2.1 Detailed Description

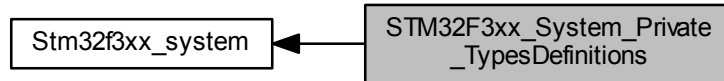
4.3 STM32F3xx_System_Private_Includes

Collaboration diagram for STM32F3xx_System_Private_Includes:



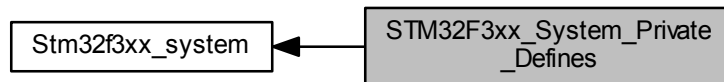
4.4 STM32F3xx_System_Private_TypesDefinitions

Collaboration diagram for STM32F3xx_System_Private_TypesDefinitions:



4.5 STM32F3xx_System_Private_Defines

Collaboration diagram for STM32F3xx_System_Private_Defines:



Macros

- `#define HSE_VALUE ((uint32_t)8000000)`
- `#define HSI_VALUE ((uint32_t)8000000)`
- `#define VECT_TAB_OFFSET 0x0`

4.5.1 Detailed Description

4.5.2 Macro Definition Documentation

4.5.2.1 `#define HSE_VALUE ((uint32_t)8000000)`

Default value of the External oscillator in Hz. This value can be provided and adapted by the user application.

4.5.2.2 `#define HSI_VALUE ((uint32_t)8000000)`

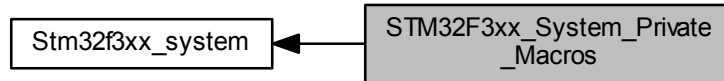
Default value of the Internal oscillator in Hz. This value can be provided and adapted by the user application.

4.5.2.3 `#define VECT_TAB_OFFSET 0x0`

< Uncomment the following line if you need to relocate your vector Table in Internal SRAM. Vector Table base offset field. This value must be a multiple of 0x200.

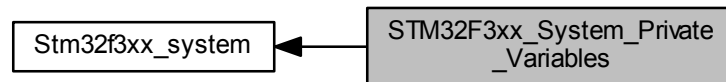
4.6 STM32F3xx_System_Private_Macros

Collaboration diagram for STM32F3xx_System_Private_Macros:



4.7 STM32F3xx_System_Private_Variables

Collaboration diagram for STM32F3xx_System_Private_Variables:



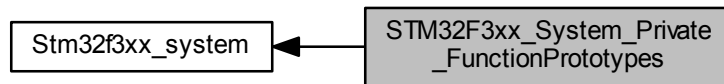
Variables

- uint32_t **SystemCoreClock** = 8000000
- __IO const uint8_t **AHBPrescTable** [16] = {0, 0, 0, 0, 0, 0, 0, 0, 1, 2, 3, 4, 6, 7, 8, 9}

4.7.1 Detailed Description

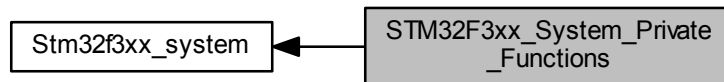
4.8 STM32F3xx_System_Private_FunctionPrototypes

Collaboration diagram for STM32F3xx_System_Private_FunctionPrototypes:



4.9 STM32F3xx_System_Private_Functions

Collaboration diagram for STM32F3xx_System_Private_Functions:



Functions

- void [SystemInit](#) (void)
Setup the microcontroller system Initialize the FPU setting, vector table location and the PLL configuration is reset.
- void [SystemCoreClockUpdate](#) (void)
Update SystemCoreClock variable according to Clock Register Values. The SystemCoreClock variable contains the core clock (HCLK), it can be used by the user application to setup the SysTick timer or configure other parameters.

4.9.1 Detailed Description

4.9.2 Function Documentation

4.9.2.1 void SystemCoreClockUpdate (void)

Update SystemCoreClock variable according to Clock Register Values. The SystemCoreClock variable contains the core clock (HCLK), it can be used by the user application to setup the SysTick timer or configure other parameters.

Note

Each time the core clock (HCLK) changes, this function must be called to update SystemCoreClock variable value. Otherwise, any configuration based on this variable will be incorrect.

- The system frequency computed by this function is not the real frequency in the chip. It is calculated based on the predefined constant and the selected clock source:

- If SYSCLK source is HSI, SystemCoreClock will contain the [HSI_VALUE\(*\)](#)
- If SYSCLK source is HSE, SystemCoreClock will contain the [HSE_VALUE\(**\)](#)
- If SYSCLK source is PLL, SystemCoreClock will contain the [HSE_VALUE\(**\)](#) or [HSI_VALUE\(*\)](#) multiplied/divided by the PLL factors.

(*) HSI_VALUE is a constant defined in stm32f3xx_hal.h file (default value 8 MHz) but the real value may vary depending on the variations in voltage and temperature.

(**) HSE_VALUE is a constant defined in stm32f3xx_hal.h file (default value 8 MHz), user has to ensure that HSE_VALUE is same as the real frequency of the crystal used. Otherwise, this function may have wrong result.

- The result of this function could be not correct when using fractional value for HSE crystal.

Parameters

<i>None</i>	
-------------	--

Return values

<i>None</i>	
-------------	--

4.9.2.2 void SystemInit (void)

Setup the microcontroller system Initialize the FPU setting, vector table location and the PLL configuration is reset.

Parameters

<i>None</i>	
-------------	--

Return values

<i>None</i>	
-------------	--

Chapter 5

Data Structure Documentation

5.1 ampelparameter Struct Reference

```
#include <ampel.h>
```

Data Fields

- bool **modus**
- [ampelzustand](#) **zustand**
- [ampelevent](#) **event**

5.1.1 Detailed Description

Auflistung der ges. Parameter inkl. Wert zur Bestimmung der Schaltung

The documentation for this struct was generated from the following file:

- src/[ampel.h](#)

Chapter 6

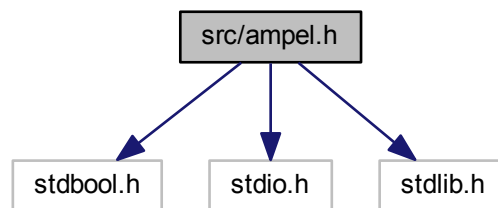
File Documentation

6.1 src/ampel.h File Reference

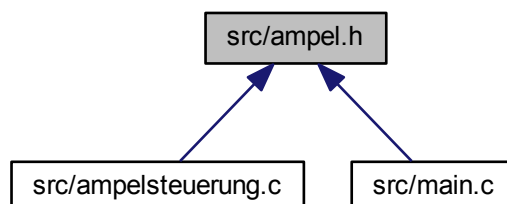
Definition der States & Events.

```
#include <stdbool.h>
#include <stdio.h>
#include <stdlib.h>
```

Include dependency graph for ampel.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct [ampelparameter](#)

Enumerations

- enum [ampelzustand](#) {
 ROT, ROT_GELB, GRUEN, GRUEN_BLINKEN,
 GELB, GELB_BLINKEN }
- enum [ampelevent](#) {
 FAHREN, HALT, VORBEREITUNG_FAHREN, VORBEREITUNG_HALT,
 ACHTUNG, FALSE, NACHTSCHALTUNG_AN, NACHTSCHALTUNG_AUS }

Functions

- void **ampel** ([ampelparameter](#) *ampel)

6.1.1 Detailed Description

Definition der States & Events.

Author

Michael Weinberger

Version

1.0

Date

20.11.2015

6.1.2 Enumeration Type Documentation

6.1.2.1 enum ampelevent

Auflistung der Events inklusive Nachtschaltung

6.1.2.2 enum ampelzustand

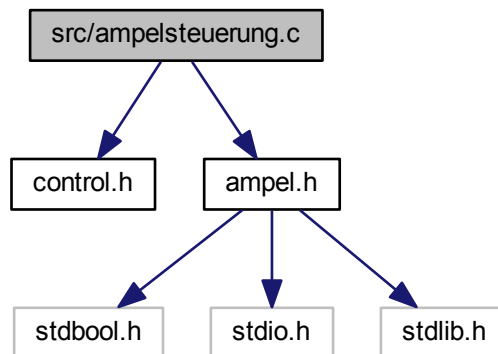
Auflistung der Zustaende inklusive der Komponente fuer die Nachtschaltung

6.2 src/ampelsteuerung.c File Reference

Implementierung einer Event Centric State Machine zur Steuerung einer Ampel.

```
#include "control.h"  
#include "ampel.h"
```

Include dependency graph for ampelsteuerung.c:



Functions

- void `ampelsteuerung` (`ampelparameter *repr`)
Implementierung einer Event Centric State Machine zur Steuerung einer Ampel.

Variables

- int `blink` = 0

6.2.1 Detailed Description

Implementierung einer Event Centric State Machine zur Steuerung einer Ampel.

Author

Michael Weinberger

Version

1.0

Date

20.11.2015

6.2.2 Function Documentation

6.2.2.1 void `ampelsteuerung` (`ampelparameter * repr`)

Implementierung einer Event Centric State Machine zur Steuerung einer Ampel.

Parameters

<i>none</i>	
-------------	--

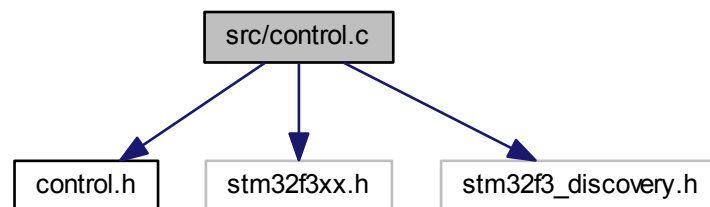
Return values

<i>none</i>	
-------------	--

6.3 src/control.c File Reference

Steuern der benoetigten LEDs am Board.

```
#include "control.h"
#include "stm32f3xx.h"
#include "stm32f3_discovery.h"
Include dependency graph for control.c:
```



Functions

- void [led_init](#) ()
Initialisiert die LEDs.
- void [led_off](#) ()
Schaltet die LEDs aus.
- void [led_rot](#) ()
Die Rot-Phase der Ampel, 3 Sekunden.
- void [led_gelb](#) ()
Die Gelb-Phase der Ampel, 1.5 Sekunden.
- void [led_gruen](#) ()
Die Gruen-Phase der Ampel, 3 Sekunden.
- void [led_rot_gelb](#) ()
Die Uebergangsphase der Ampel (rot, gelb), 1 Sekunde.
- void [led_gruen_blinken](#) ()
3x gruen blinken, 0.5 Sekunden Delay
- void [led_gelb_blinken](#) ()

6.3.1 Detailed Description

Steuern der benoetigten LEDs am Board.

Author

Michael Weinberger

Version

1.0

Date

20.11.2015

6.3.2 Function Documentation**6.3.2.1 void led_gelb ()**

Die Gelb-Phase der Ampel, 1.5 Sekunden.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.3.2.2 void led_gruen ()

Die Gruen-Phase der Ampel, 3 Sekunden.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.3.2.3 void led_gruen_blinken ()

3x gruen blinken, 0.5 Sekunden Delay

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.3.2.4 void led_init ()

Initialisiert die LEDs.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.3.2.5 void led_off ()

Schaltet die LEDs aus.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.3.2.6 void led_rot ()

Die Rot-Phase der Ampel, 3 Sekunden.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.3.2.7 void led_rot_gelb ()

Die Uebergangsphase der Ampel (rot, gelb), 1 Sekunde.

Parameters

<i>none</i>	
-------------	--

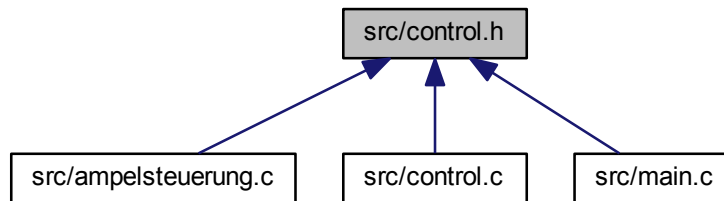
Return values

<i>none</i>	
-------------	--

6.4 src/control.h File Reference

Definition der Funktionen.

This graph shows which files directly or indirectly include this file:



Functions

- void `led_rot()`
Die Rot-Phase der Ampel, 3 Sekunden.
- void `led_gelb()`
Die Gelb-Phase der Ampel, 1.5 Sekunden.
- void `led_gruen()`
Die Gruen-Phase der Ampel, 3 Sekunden.
- void `led_rot_gelb()`
Die Uebergangsphase der Ampel (rot, gelb), 1 Sekunde.
- void `led_gruen_blinken()`
3x gruen blinken, 0.5 Sekunden Delay
- void `led_init()`
Initialisiert die LEDs.
- void `led_off()`
Schaltet die LEDs aus.

6.4.1 Detailed Description

Definition der Funktionen.

Author

Michael Weinberger

Version

1.0

Date

20.11.2015

6.4.2 Function Documentation

6.4.2.1 void `led_gelb()`

Die Gelb-Phase der Ampel, 1.5 Sekunden.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.4.2.2 void led_gruen ()

Die Gruen-Phase der Ampel, 3 Sekunden.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.4.2.3 void led_gruen_blinken ()

3x gruen blinken, 0.5 Sekunden Delay

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.4.2.4 void led_init ()

Initialisiert die LEDs.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.4.2.5 void led_off ()

Schaltet die LEDs aus.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.4.2.6 void led_rot ()

Die Rot-Phase der Ampel, 3 Sekunden.

Parameters

<i>none</i>	
-------------	--

Return values

<i>none</i>	
-------------	--

6.4.2.7 void led_rot_gelb ()

Die Uebergangsphase der Ampel (rot, gelb), 1 Sekunde.

Parameters

<i>none</i>	
-------------	--

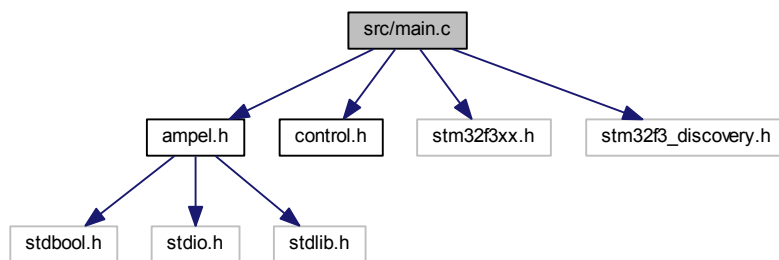
Return values

<i>none</i>	
-------------	--

6.5 src/main.c File Reference

Hauptklasse.

```
#include "ampel.h"
#include "control.h"
#include "stm32f3xx.h"
#include "stm32f3_discovery.h"
Include dependency graph for main.c:
```



Functions

- void [EXTIO_Config](#) ()
- void [HAL_GPIO_EXTI_Callback](#) (uint16_t)
- void [HAL_SYSTICK_Callback](#) (void)
- int **main** (void)

Variables

- [ampelparameter](#) repr
- [ampelparameter](#) * val = &repr

6.5.1 Detailed Description

Hauptklasse.

Author

Michael Weinberger

Version

1.0

Date

20.11.2015

6.5.2 Function Documentation

6.5.2.1 void EXTI0_Config (void)

Enablen der Clock, User-Button konfigurieren, External Interrupt auf Rising Edge Trigger stellen

6.5.2.2 void HAL_GPIO_EXTI_Callback (uint16_t *GPIO_Pin*)

Der EXTI-Callback fuer die Ampel

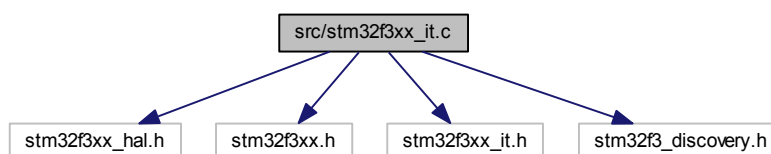
6.5.2.3 void HAL_SYSTICK_Callback (void)

Der Systick-Callback fuer die Ampel

6.6 src/stm32f3xx_it.c File Reference

Default Interrupt Service Routines.

```
#include "stm32f3xx_hal.h"
#include "stm32f3xx.h"
#include "stm32f3xx_it.h"
#include "stm32f3_discovery.h"
Include dependency graph for stm32f3xx_it.c:
```



Functions

- void [SysTick_Handler](#) (void)
This function handles SysTick Handler.
- void **EXTIO_IRQHandler** (void)

6.6.1 Detailed Description

Default Interrupt Service Routines.

Author

Ac6

Version

V1.0

Date

02-Feb-2015

6.6.2 Function Documentation

6.6.2.1 void SysTick_Handler (void)

This function handles SysTick Handler.

Parameters

<i>None</i>	
-------------	--

Return values

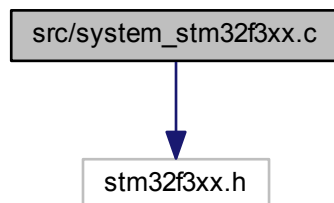
<i>None</i>	
-------------	--

6.7 src/system_stm32f3xx.c File Reference

CMSIS Cortex-M4 Device Peripheral Access Layer System Source File.

```
#include "stm32f3xx.h"
```

Include dependency graph for system_stm32f3xx.c:



Macros

- #define `HSE_VALUE` ((uint32_t)8000000)
- #define `HSI_VALUE` ((uint32_t)8000000)
- #define `VECT_TAB_OFFSET` 0x0

Functions

- void `SystemInit` (void)
Setup the microcontroller system Initialize the FPU setting, vector table location and the PLL configuration is reset.
- void `SystemCoreClockUpdate` (void)
Update SystemCoreClock variable according to Clock Register Values. The SystemCoreClock variable contains the core clock (HCLK), it can be used by the user application to setup the SysTick timer or configure other parameters.

Variables

- uint32_t `SystemCoreClock` = 8000000
- __IO const uint8_t `AHBPrescTable` [16] = {0, 0, 0, 0, 0, 0, 0, 1, 2, 3, 4, 6, 7, 8, 9}

6.7.1 Detailed Description

CMSIS Cortex-M4 Device Peripheral Access Layer System Source File.

Author

MCD Application Team

Version

V1.2.0

Date

19-June-2015

1. This file provides two functions and one global variable to be called from user application:
 - `SystemInit()`: This function is called at startup just after reset and before branch to main program. This call is made inside the "startup_stm32f3xx.s" file.
 - `SystemCoreClock` variable: Contains the core clock (HCLK), it can be used by the user application to setup the SysTick timer or configure other parameters.
 - `SystemCoreClockUpdate()`: Updates the variable `SystemCoreClock` and must be called whenever the core clock is changed during program execution.
2. After each device reset the HSI (8 MHz) is used as system clock source. Then `SystemInit()` function is called, in "startup_stm32f3xx.s" file, to configure the system clock before to branch to main program.

3. This file configures the system clock as follows:

Supported STM32F3xx device

System Clock source | HSI

SYSCLK(Hz) | 8000000

HCLK(Hz) | 8000000

AHB Prescaler | 1

APB2 Prescaler | 1

APB1 Prescaler | 1

USB Clock | DISABLE

=====

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