

LedBlink

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Chapter 1

File Index

1.1 File List

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Chapter 2

File Documentation

2.1 inc/Aplication.h File Reference

: Functions used in main

```
#include "LPC845.h"
#include "GPIO_FW.h"
#include "GPIO_SW.h"
#include "SwitchMatrix_FW.h"
#include "SYSCON_FW.h"
#include "SysTick_FW.h"
```

Functions

- void [LPC_Init](#) (void)
: *Initialize the board*
- void [GPIO_Init](#) (void)
: *Initialize the GPIO*

2.1.1 Detailed Description

: Functions used in main

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.1.2 Function Documentation

2.1.2.1 GPIO_Init()

```
void GPIO_Init (
    void )
```

: Initialize the GPIO

: It depends on each project

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] void

Returns

: void

Definition at line 35 of file Aplication.c.

```
35     {
36         GPIO_SetDIR(LedRED, OUTPUT);
37         GPIO_SetDIR(LedGREEN, OUTPUT);
38         GPIO_SetDIR(LedBLUE, OUTPUT);
39         GPIO_SetDIR(UserKEY, INPUT);
40
41         GPIO_SetPIN(LedRED, LED_OFF);
42         GPIO_SetPIN(LedGREEN, LED_OFF);
43         GPIO_SetPIN(LedBLUE, LED_OFF);
44     }
```

2.1.2.2 LPC_Init()

```
void LPC_Init (
    void )
```

: Initialize the board

: It depends on each project

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 19 of file Aplication.c.

```

19      {
20          GPIO_Enable();
21          BoardClockRUN();
22          SysTick_Init();
23          GPIO_Init();
24      }
```

2.2 inc/GPIO_FW.h File Reference

: Firmware functions for GPIO

Macros

- #define **PORT0** 0
- #define **PORT1** 1
- #define **LedGREEN** PORT1 , 0
Led green in board.
- #define **LedBLUE** PORT1 , 1
Led blue in board.
- #define **LedRED** PORT1 , 2
Led red in board.
- #define **UserKEY** PORT0 , 4
Key in board.
- #define **INPUT** 0
- #define **OUTPUT** 1
- #define **LOW** 0
- #define **HIGH** 1
- #define **ACT_HIGH** 1
- #define **ACT_LOW** 0
- #define **LED_ON** 0
The led are active low.
- #define **LED_OFF** 1
The led are active low.
- #define **BOUNCE** 25
Times to check the bounce.
- #define **SYSAHBCLKCTRL** ((__RW uint32_t *) 0x40048080UL)
- #define **SYSAHBCLKCTRL0** SYSAHBCLKCTRL[0]
- #define **SYSAHBCLKCTRL1** SYSAHBCLKCTRL[1]
- #define **GPIO_PBYTE** ((__RW uint8_t *) 0xA0000000UL)
- #define **GPIO_PWORD** ((__RW uint32_t *) 0xA0001000UL)
- #define **GPIO_DIRP** ((__RW uint32_t *) 0xA0002000UL)
- #define **GPIO_PORT** ((__RW uint32_t *) 0xA0002100UL)

- #define **GPIO_SETP** ((__RW uint32_t *) 0xA0002200UL)
- #define **GPIO_CLRP** ((__RW uint32_t *) 0xA0002280UL)
- #define **GPIO_NOTP** ((__RW uint32_t *) 0xA0002300UL)
- #define **NO_PULL_UP_DOWN** 0x00
- #define **PULL_DOWN** 0x01
- #define **PULL_UP** 0x02
- #define **REPEATER** 0x03
- #define **HYS_EN** 0x01
- #define **HYS_DIS** 0x00
- #define **INV_INPUT** 0x01
- #define **NOT_INV_INPUT** 0x00
- #define **OD_EN** 0x01
- #define **OD_DIS** 0x00
- #define **BYPASS_FILTER** 0x00
- #define **CLK1_FILTER** 0x01
- #define **CLK2_FILTER** 0x02
- #define **CLK3_FILTER** 0x03
- #define **IOCONCLKDIV0** 0x00
- #define **IOCONCLKDIV1** 0x01
- #define **IOCONCLKDIV2** 0x02
- #define **IOCONCLKDIV3** 0x03
- #define **IOCONCLKDIV4** 0x04
- #define **IOCONCLKDIV5** 0x05
- #define **IOCONCLKDIV6** 0x06
- #define **DAC_EN** 0x01
- #define **DAC_DIS** 0x00
- #define **STD_MODE** 0x00
- #define **STD_GPIO** 0x01
- #define **FAST_MODE** 0x02
- #define **IOCON_** ((__RW uint32_t *) 0x40044000UL)

Functions

- void **GPIO_Enable** (void)
: Enable GPIO0 and GPIO1
- void **GPIO_Disable** (void)
: Disable GPIO0 and GPIO1
- void **GPIO_SetDIR** (uint8_t port, uint8_t pin, uint8_t dir)
: Choose GPIO as Input/Output
- void **GPIO_SetPIN** (uint8_t port, uint8_t pin, uint8_t state)
: Choose GPIO's output state
- uint8_t **GPIO_GetPIN** (uint8_t port, uint8_t pin, uint8_t state)
: Return GPIO's input state
- void **GPIO_SetOUT** (uint8_t port, uint8_t pin)
: Put GPIO's out to 1
- void **GPIO_ClearOUT** (uint8_t port, uint8_t pin)
: Put GPIO's out to 0
- void **GPIO_TooggleOUT** (uint8_t port, uint8_t pin)
: Invert GPIO's out
- void **GPIO_DebounceUserKEY** (void)
: Firmware debounce for user key in board
- void **GPIO_Debounce** (uint8_t port, uint8_t pin, uint8_t state)

- : Firmware debounce for a GPIO*
- void [IOCONEnable](#) (void)
 - : Enable IOCON*
- void [IOCONDisable](#) (void)
 - : Disable IOCON*
- uint8_t [GetOFFSET](#) (uint8_t port, uint8_t pin)
 - : Usefull for SetMode functions*
- void [GPIO_SetModeINPUT](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : on-chip pull-up/pull-down resistor*
- void [GPIO_SetModeHYS](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Hysteresis*
- void [GPIO_SetModeINV](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Invert input*
- void [GPIO_SetModeOD](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Open drain*
- void [GPIO_SetModeFILTER](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Digital filter sample mode*
- void [GPIO_SetModeCLKDIV](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Select peripheral clock divider for input filter sampling clock*
- void [GPIO_SetModeDAC](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Selects DAC mode*
- void [GPIO_SetModeI2C](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Selects I2C mode*

2.2.1 Detailed Description

: Firmware functions for GPIO

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.2.2 Function Documentation

2.2.2.1 GetOFFSET()

```
uint8_t GetOFFSET (
    uint8_t port,
    uint8_t pin )
```

: Usefull for SetMode functions

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31

Returns

: void

Definition at line 231 of file GPIO_FW.c.

```
231 {
232     uint8_t index;
233     index = port * 32 + pin;
234     return ((offset[index]) / 4);
235 }
```

2.2.2.2 GPIO_ClearOUT()

```
void GPIO_ClearOUT (
    uint8_t port,
    uint8_t pin )
```

: Put GPIO's out to 0

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31

Returns

: void

Definition at line 113 of file GPIO_FW.c.

```
113 {
114     GPIO_CLRP[port] |= (1 « pin);
115 }
```

2.2.2.3 GPIO_Debounce()

```
void GPIO_Debounce (
    uint8_t port,
    uint8_t pin,
    uint8_t state )
```

: Firmware debounce for a GPIO

: Use in SysTick_Handler or in some timer interrupt

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port	: PORT0,PORT1
[in] uint8_t pin	: 0,31
[in] uint8_t state	: ACT_LOW,ACT_HIGH

Returns

: void

Definition at line 169 of file GPIO_FW.c.

```
169
170     static uint8_t q = 0;    //Quantity of bounces
171     uint8_t j = 0;          //It captures changes
172
173     if (GPIO_GetPIN(port, pin, state))    // The key is pushed?
174         j = 0x01;                        //Something is happening, the key is been pushed
175
176     if (buff_In ^ j) {                  // If the key is pushed while q != BOUNCE
177         q++;                            // I change the buffer
178         if (q == BOUNCE) {
179             q = 0;
180             buff_In ^= 0x01;
181         }
182     } else
183         q = 0;
184 }
```

2.2.2.4 GPIO_DebounceUserKEY()

```
void GPIO_DebounceUserKEY (
    void )
```

: Firmware debounce for user key in board

: Use in SysTick_Handler or in some timer interrupt

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in]
--	------

Returns

: void

Definition at line 141 of file GPIO_FW.c.

```

141     {
142         static uint8_t q = 0;    //Quantity of bounces
143         uint8_t j = 0;          //It captures changes
144
145         if (GPIO_GetPIN(UserKEY, ACT_LOW))    // The key is pushed?
146             j = 0x01;                        //Something is happening, the key is been pushed
147
148         if (buff_UserKEY ^ j) {                // If the key is pushed while q != BOUNCE
149             q++;                               // I change the buffer
150             if (q == BOUNCE) {
151                 q = 0;
152                 buff_UserKEY ^= 0x01;
153             }
154         } else
155             q = 0;
156     }

```

2.2.2.5 GPIO_Disable()

```

void GPIO_Disable (
    void )

```

: Disable GPIO0 and GPIO1

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 32 of file GPIO_FW.c.

```

32     {
33         SYSAHBCLKCTRL0 &= (~ (1<<6));
34         SYSAHBCLKCTRL0 &= (~ (1<<20));
35     }

```

2.2.2.6 GPIO_Enable()

```

void GPIO_Enable (
    void )

```

: Enable GPIO0 and GPIO1

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 19 of file GPIO_FW.c.

```

19     {
20         SYSAHBCLKCTRL0 |= (1<<6);
21         SYSAHBCLKCTRL0 |= (1<<20);
22     }

```

2.2.2.7 GPIO_GetPIN()

```

uint8_t GPIO_GetPIN (
    uint8_t port,
    uint8_t pin,
    uint8_t state )

```

: Return GPIO's input state

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port	: PORT0,PORT1
[in] uint8_t pin	: 0,31
[in] uint8_t STATE	: ACT_LOW,ACT_HIGH

Returns

: uint8_t : 1 pin == [state] , 0 pin != [state]

Definition at line 81 of file GPIO_FW.c.

```

81                                     {
82     port = port * 32 + pin;
83     if ( GPIO_PBYTE[port] == state)
84         return 1;
85     else
86         return 0;
87 }
```

2.2.2.8 GPIO_SetDIR()

```

void GPIO_SetDIR (
    uint8_t port,
    uint8_t pin,
    uint8_t dir )
```

: Choose GPIO as Input/Output

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port	: PORT0,PORT1
[in] uint8_t pin	: 0,31
[in] uint8_t dir	: INPUT,OUTPUT

Returns

: void

Definition at line 48 of file GPIO_FW.c.

```

48                                     {
49     GPIO_DIRP[port] &= (~(1 « pin));
50     GPIO_DIRP[port] |= (dir « pin);
51 }
```

2.2.2.9 GPIO_SetModeCLKDIV()

```

void GPIO_SetModeCLKDIV (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Select peripheral clock divider for input filter sampling clock

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode: IOCONCLKDIV0 to IOCONCLKDIV6

Returns

: void

Definition at line 338 of file GPIO_FW.c.

```

338                                     {
339     uint8_t offset;
340     offset = GetOFFSET(port, pin);
341     IOCON_[offset] &= (~(0x07 « 13));
342     IOCON_[offset] |= (mode « 13);
343 }
```

2.2.2.10 GPIO_SetModeDAC()

```

void GPIO_SetModeDAC (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Selects DAC mode

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode: DAC_EN,DAC_DIS
--	---

Returns

: void

Definition at line 356 of file GPIO_FW.c.

```

356                                     {
357     uint8_t offset;
358     offset = GetOFFSET(port, pin);
359     IOCON_[offset] &= (~ (0x01 « 16));
360     IOCON_[offset] |= (mode « 16);
361 }
```

2.2.2.11 GPIO_SetModeFILTER()

```

void GPIO_SetModeFILTER (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Digital filter sample mode

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode: BYPASS_FILTER,CLK1_FILTER,CLK2_FILTER,CLK3_FILTER
--	--

Returns

: void

Definition at line 320 of file GPIO_FW.c.

```

320                                     {
321     uint8_t offset;
322     offset = GetOFFSET(port, pin);
323     IOCON_[offset] &= (~(0x03 « 11));
324     IOCON_[offset] |= (mode « 11);
325 }
```

2.2.2.12 GPIO_SetModeHYS()

```

void GPIO_SetModeHYS (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Hysteresis

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode:HYS_EN,HYS_DIS
--	--

Returns

: void

Definition at line 266 of file GPIO_FW.c.

```

266                                     {
267     uint8_t offset;
268     offset = GetOFFSET(port, pin);
269     IOCON_[offset] &= (~(0x01 « 5));
270     IOCON_[offset] |= (mode « 5);
271 }
```

2.2.2.13 GPIO_SetModeI2C()

```

void GPIO_SetModeI2C (
    uint8_t port,
```

```
uint8_t pin,
uint8_t mode )
```

: Selects I2C mode

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode:STD_MODE,STD_GPIO,FAST_MODE

Returns

: void

Definition at line 374 of file GPIO_FW.c.

```
374                                     {
375     uint8_t offset;
376     offset = GetOFFSET(port, pin);
377     IOCON[offset] &= (~(0x03 « 8));
378     IOCON[offset] |= (mode « 8);
379 }
```

2.2.2.14 GPIO_SetModeINPUT()

```
void GPIO_SetModeINPUT (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: on-chip pull-up/pull-down resistor

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode:NO_PULL_UP_DOWN,PULL_DOWN,PULL_UP,REPEATER
--

Returns

: void

Definition at line 248 of file GPIO_FW.c.

```

248                                     {
249     uint8_t offset;
250     offset = GetOFFSET(port, pin);
251     IOCON[offset] &= (~(0x03 « 3));
252     IOCON[offset] |= (mode « 3);
253 }
```

2.2.2.15 GPIO_SetModeINV()

```

void GPIO_SetModeINV (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Invert input

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode: INV_INPUT,NOT_INV_INPUT
--

Returns

: void

Definition at line 284 of file GPIO_FW.c.

```

284                                     {
285     uint8_t offset;
286     offset = GetOFFSET(port, pin);
287     IOCON[offset] &= (~(0x01 « 6));
288     IOCON[offset] |= (mode « 6);
289 }
```

2.2.2.16 GPIO_SetModeOD()

```
void GPIO_SetModeOD (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Open drain

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode: OD_EN,OD_DIS
--	---

Returns

: void

Definition at line 302 of file GPIO_FW.c.

```
302                                     {
303     uint8_t offset;
304     offset = GetOFFSET(port, pin);
305     IOCON_[offset] &= (~ (0x01 « 10));
306     IOCON_[offset] |= (mode « 10);
307 }
```

2.2.2.17 GPIO_SetOUT()

```
void GPIO_SetOUT (
    uint8_t port,
    uint8_t pin )
```

: Put GPIO's out to 1

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31

Returns

: void

Definition at line 99 of file GPIO_FW.c.

```
99                                     {
100     GPIO_SETP[port] |= (1 << pin);
101 }
```

2.2.2.18 GPIO_SetPIN()

```
void GPIO_SetPIN (
    uint8_t port,
    uint8_t pin,
    uint8_t state )
```

: Choose GPIO's output state

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31
	[in] uint8_t state : LOW,HIGH

Returns

: void

Definition at line 64 of file GPIO_FW.c.

```
64                                     {
65     port = port * 32 + pin;
66     GPIO_PBYTE[port] &= (~1);
67     GPIO_PBYTE[port] |= state;
68 }
```

2.2.2.19 GPIO_ToogleOUT()

```
void GPIO_ToogleOUT (
    uint8_t port,
    uint8_t pin )
```

: Invert GPIO's out

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31

Returns

: void

Definition at line 127 of file GPIO_FW.c.

```
127
128     GPIO_NOTP[port] |= (1 « pin);
129 }
```

2.2.2.20 IOCONDisable()

```
void IOCONDisable (
    void )
```

: Disable IOCON

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in]
--	------

Returns

: void

Definition at line 208 of file GPIO_FW.c.

```
208     {  
209         SYSAHBCLKCTRL0&= (~ (1<<18));  
210     }
```

2.2.2.21 IOCONEnable()

```
void IOCONEnable (  
    void )
```

: Enable IOCON

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in]
--	------

Returns

: void

Definition at line 195 of file GPIO_FW.c.

```
195     {  
196         SYSAHBCLKCTRL0|= (1<<18);  
197     }
```

2.3 inc/SwitchMatrix_FW.h File Reference

: Firmware functions for SWM

Macros

- #define **PINASSIGN** ((__RW uint32_t *) 0x4000C000UL)
- #define **PINENABLE** ((__RW uint32_t *) 0x4000C1C0UL)

Enumerations

- enum { **BYTE0** , **BYTE1** , **BYTE2** , **BYTE3** }
- enum {
UO_TXD , **UO_SCLK** , **U1_CTS** , **U2_RTS** ,
SPI0_MOSI , **SPI0_SSEL2** , **SPI1_MISO** , **SCT_IN1** ,
SCT_OUT1 , **SCT_OUT5** , **I2C2_SDA** , **COMP0_OUT** ,
UART3_RXD , **UART4_SCLK** , **T0_MAT3** }
- enum {
U0_RXD , **U1_TXD** , **U0_SCLK** , **U2_CTS** ,
SPI0_MISO , **SPI0_SSEL3** , **SPI1_SSEL0** , **SCT_IN2** ,
SCT_OUT2 , **SCT_OUT6** , **I2C2_SCL** , **CLKOUT** ,
UART3_SCLK , **T0_MAT0** , **T0_CAP0** }
- enum {
UO_RTS , **U1_RXD** , **U2_TXD** , **U2_SCLK** ,
SPI0_SSEL0 , **SPI1_SCK** , **SPI1_SSEL1** , **SCT_IN3** ,
SCT_OUT3 , **I2C1_SDA** , **I2C3_SDA** , **GPIO_INT_BMAT** ,
UART4_TXD , **T0_MAT1** , **T0_CAP1** }
- enum {
UO_CTS , **U1_RTS** , **U0_RXD** , **SPIO_SCK** ,
SPI0_SSEL1 , **SPI1_MOSI** , **SCT0_IN0** , **SCT_OUT0** ,
SCT_OUT4 , **I2C1_SCL** , **I2C3_SCL** , **UART3_TXD** ,
UART4_RXD , **T0_MAT2** , **T0_CAP2** }
- enum {
ADC_0 , **ADC_1** , **ADC_2** , **ADC_3** ,
ADC_4 , **ADC_5** , **ADC_6** , **ADC_7** ,
ADC_8 , **ADC_9** , **ADC_10** , **ADC_11** ,
DACOUT0 , **DACOUT1** , **CAPT_X0** , **CAPT_X1** ,
CAPT_X2 , **CAPT_X3** }
- enum {
CAPT_X4 , **CAPT_X5** , **CAPT_X6** , **CAPT_X7** ,
CAPT_X8 , **CAPT_YL** , **CAPT_YH** }

Functions

- void **SWM** (uint8_t port, uint8_t pin, uint8_t assign, uint8_t byte)
: Assign movable functions for pin
- void **SWM_PinEnable** (uint8_t port, uint8_t pin, uint8_t ena)
: Enable pin works as value passed in ena
- void **SWM_Enable** (void)
: Enable SWM
- void **SWM_Disable** (void)
: Disable SWM

2.3.1 Detailed Description

: Firmware functions for SWM

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.3.2 Enumeration Type Documentation

2.3.2.1 anonymous enum

anonymous enum

Enumerator

UO_TXD	Possible assign.
--------	------------------

Definition at line 38 of file SwitchMatrix_FW.h.

```
38     {  
39         UO_TXD,  
40         UO_SCLK,  
41         U1_CTS,  
42         U2_RTS,  
43         SPI0_MOSI,  
44         SPI0_SSEL2,  
45         SPI1_MISO,  
46         SCT_IN1,  
47         SCT_OUT1,  
48         SCT_OUT5,  
49         I2C2_SDA,  
50         COMP0_OUT,  
51         UART3_RXD,  
52         UART4_SCLK,  
53         T0_MAT3  
54     };
```

2.3.2.2 anonymous enum

anonymous enum

Enumerator

U0_RXD	Possible assign.
--------	------------------

Definition at line 56 of file SwitchMatrix_FW.h.

```

56     {
57         U0_RXD,
58         U1_TXD,
59         U0_SCLK,
60         U2_CTS,
61         SPI0_MISO,
62         SPI0_SSEL3,
63         SPI1_SSEL0,
64         SCT_IN2,
65         SCT_OUT2,
66         SCT_OUT6,
67         I2C2_SCL,
68         CLKOUT,
69         UART3_SCLK,
70         T0_MAT0,
71         T0_CAP0
72     };

```

2.3.2.3 anonymous enum

anonymous enum

Enumerator

UO_RTS	Possible assign.
--------	------------------

Definition at line 74 of file SwitchMatrix_FW.h.

```

74     {
75         UO_RTS,
76         U1_RXD,
77         U2_TXD,
78         U2_SCLK,
79         SPI0_SSEL0,
80         SPI1_SCK,
81         SPI1_SSEL1,
82         SCT_IN3,
83         SCT_OUT3,
84         I2C1_SDA,
85         I2C3_SDA,
86         GPIO_INT_BMAT,
87         UART4_TXD,
88         T0_MAT1,
89         T0_CAP1
90     };

```

2.3.2.4 anonymous enum

anonymous enum

Enumerator

UO_CTS	Possible assign.
--------	------------------

Definition at line 92 of file SwitchMatrix_FW.h.

```

92     {
93         UO_CTS,
94         U1_RTS,
95         UO_RXD,
96         SPI0_SCK,
97         SPI0_SSEL1,

```

```

98     SPI1_MOSI,
99     SCT0_IN0,
100    SCT_OUT0,
101    SCT_OUT4,
102    I2C1_SCL,
103    I2C3_SCL,
104    UART3_TXD,
105    UART4_RXD,
106    T0_MAT2,
107    T0_CAP2
108 };

```

2.3.3 Function Documentation

2.3.3.1 SWM()

```

void SWM (
    uint8_t port,
    uint8_t pin,
    uint8_t assign,
    uint8_t byte )

```

: Assign movable functions for pin

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port :	PORT0,PORT1
[in] uint8_t pin :	0,31
[in] uint8_t assign :	
[in] uint8_t byte :	BYTE0,BYTE1,BYTE2,BYTE3

Returns

: void

Definition at line 22 of file SwitchMatrix_FW.c.

```

22
23     pin = pin + 0x20 * port; //PIO0[0:31] 0x00 to 0x1F PIO1[0:21] 0x1F to 0x35
24     PINASSIGN[assign] |= (pin « byte);
25 }

```

2.3.3.2 SWM_Disable()

```
void SWM_Disable (
    void )
```

: Disable SWM

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 67 of file SwitchMatrix_FW.c.

```
67         {
68     SYSAHBCLKCTRL0&= (~ (1<<7));
69 }
```

2.3.3.3 SWM_Enable()

```
void SWM_Enable (
    void )
```

: Enable SWM

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 54 of file SwitchMatrix_FW.c.

```

54      {
55      SYSAHBCLKCTRL0|= (1<<7);
56  }
```

2.3.3.4 SWM_PinEnable()

```

void SWM_PinEnable (
    uint8_t port,
    uint8_t pin,
    uint8_t ena )
```

: Enable pin works as value passed in ena

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port : PORT0,PORT1
[in] uint8_t pin : 0,31
[in] uint8_t ena : READ Page 143 UserManual. There are multiple choices

Returns

: void

Definition at line 38 of file SwitchMatrix_FW.c.

```

38      {
39      if (port == PORT1)      //PIENABLE[0] -> PIO0_0 .... PIO1_2
40      if (pin < 3)           //PIENABLE10] -> PIO1_3 .... PIO1_21
41      port = PORT0;
42      PINENABLE[port] |= (1 << ena);
43  }
```

2.4 inc/SYSCON_FW.h File Reference

: Firmware functions for SYSCON

Macros

- `#define SYSCON_ADD ((__RW uint32_t *) 0x40048000UL)`
- `#define SYSMEMREMAP SYSCON_ADD [0]`
- `#define SYSPLLCTRL SYSCON_ADD [2]`
- `#define SYSPLLSTAT SYSCON_ADD [3]`
- `#define SYSOSCCTRL SYSCON_ADD [8]`
- `#define WDTOSCCTRL SYSCON_ADD [9]`
- `#define FROOSCCTRL SYSCON_ADD [10]`
- `#define FRODIRECTCLKUEN SYSCON_ADD [12]`
- `#define SYSRSTSTAT SYSCON_ADD [14]`
- `#define SYSPLLCLKSEL SYSCON_ADD [16]`
- `#define SYSPLLCLKUEN SYSCON_ADD [17]`
- `#define MAINCLKPLLSEL SYSCON_ADD [18]`
- `#define MAINCLKPLLUEN SYSCON_ADD [19]`
- `#define MAINCLKSEL SYSCON_ADD [20]`
- `#define MAINCLKUEN SYSCON_ADD [21]`
- `#define SYSAHBCLKDIV SYSCON_ADD [22]`
- `#define CAPTCLKSEL SYSCON_ADD [24]`
- `#define ADCCLKSEL SYSCON_ADD [25]`
- `#define ADCCLKDIV SYSCON_ADD [26]`
- `#define SCTCLKSEL SYSCON_ADD [27]`
- `#define SCTCLKDIV SYSCON_ADD [28]`
- `#define EXTCLKSEL SYSCON_ADD [29]`
- `#define _SYSAHBCLKCTRL0 SYSCON_ADD [32]`
- `#define _SYSAHBCLKCTRL1 SYSCON_ADD [33]`
- `#define PRESETCTRL0 SYSCON_ADD [34]`
- `#define PRESETCTRL1 SYSCON_ADD [35]`
- `#define UART0CLKSEL SYSCON_ADD [36]`
- `#define UART1CLKSEL SYSCON_ADD [37]`
- `#define UART2CLKSEL SYSCON_ADD [38]`
- `#define UART3CLKSEL SYSCON_ADD [39]`
- `#define UART4CLKSEL SYSCON_ADD [40]`
- `#define I2C0CLKSEL SYSCON_ADD [41]`
- `#define I2C1CLKSEL SYSCON_ADD [42]`
- `#define I2C2CLKSEL SYSCON_ADD [43]`
- `#define I2C3CLKSEL SYSCON_ADD [44]`
- `#define SPI0CLKSEL SYSCON_ADD [45]`
- `#define SPI1CLKSEL SYSCON_ADD [46]`
- `#define FRG0DIV SYSCON_ADD [52]`
- `#define FRG0MULT SYSCON_ADD [53]`
- `#define FRG0CLKSEL SYSCON_ADD [54]`
- `#define FRG1DIV SYSCON_ADD [56]`
- `#define FRG1MULT SYSCON_ADD [57]`
- `#define FRG1CLKSEL SYSCON_ADD [58]`
- `#define CLKOUTSEL SYSCON_ADD [60]`
- `#define CLKOUTDIV SYSCON_ADD [61]`
- `#define EXTTRACECMD SYSCON_ADD [63]`
- `#define PIOPORCAP0 SYSCON_ADD [64]`
- `#define PIOPORCAP1 SYSCON_ADD [65]`
- `#define _IOCONCLKDIV6 SYSCON_ADD [77]`
- `#define _IOCONCLKDIV5 SYSCON_ADD [78]`
- `#define _IOCONCLKDIV4 SYSCON_ADD [79]`
- `#define _IOCONCLKDIV3 SYSCON_ADD [80]`
- `#define _IOCONCLKDIV2 SYSCON_ADD [81]`

- #define **_IOCONCLKDIV1** SYSCON_ADD [82]
- #define **_IOCONCLKDIV0** SYSCON_ADD [83]
- #define **BODCTRL** SYSCON_ADD [84]
- #define **SYSTCKCAL** SYSCON_ADD [85]
- #define **IRQLATENCY** SYSCON_ADD [92]
- #define **NMISRC** SYSCON_ADD [93]
- #define **PINTSEL0** SYSCON_ADD [94]
- #define **PINTSEL1** SYSCON_ADD [95]
- #define **PINTSEL2** SYSCON_ADD [96]
- #define **PINTSEL3** SYSCON_ADD [97]
- #define **PINTSEL4** SYSCON_ADD [98]
- #define **PINTSEL5** SYSCON_ADD [99]
- #define **PINTSEL6** SYSCON_ADD [100]
- #define **PINTSEL7** SYSCON_ADD [101]
- #define **STARTERP0** SYSCON_ADD [129]
- #define **STARTERP1** SYSCON_ADD [133]
- #define **PDSLEEPCFG** SYSCON_ADD [140]
- #define **PDWAKECFG** SYSCON_ADD [141]
- #define **PDRUNCFG** SYSCON_ADD [142]
- #define **DEVICE_ID** SYSCON_ADD [254]
- #define **CLOCK_FRO_SETTING_API_ROM_ADDRESS** 0x0F0026F5U
- #define **F30MHz** 30000U
- #define **FRO_OUT_PowerDown** 1
- #define **FRO_PD** 2
- #define **SYSCON_FROOSCCTRL_FRO_DIRECT_MASK** (0x20000U)
- #define **SYSCON_FROOSCCTRL_FRO_DIRECT_SHIFT** (17U)
- #define **kCLOCK_FroSrcFroOsc** 1U << SYSCON_FROOSCCTRL_FRO_DIRECT_SHIFT
- #define **kPDRUNCFG_PD_SYSOSC** 0x20
- #define **CLK_FROM_SYS_OSC** 0x00
- #define **FREQ30MHz** 30000000U
- #define **CLK_SYS_PLLSRCFRODIV** 0x03
- #define **CLOCK_FAIM_BASE** 0x50010000U
- #define **SYSPLL_MIN_FCCO_FREQ_HZ** 156000000U
- #define **SYSCON_SYSPLLCTRL_MSEL_MASK** 0x1FU
- #define **SYSCON_SYSPLLCTRL_MSEL_SHIFT** (0U)
- #define **SYSCON_SYSPLLCTRL_PSEL_MASK** 0x60U
- #define **SYSCON_SYSPLLCTRL_PSEL_SHIFT** (5U)
- #define **SYSCON_SYSPLLCTRL_MSEL(x)** (((uint32_t)((uint32_t)(x)) << SYSCON_SYSPLLCTRL_MSEL_SHIFT)) & SYSCON_SYSPLLCTRL_MSEL_MASK
- #define **SYSCON_SYSPLLCTRL_PSEL(x)** (((uint32_t)((uint32_t)(x)) << SYSCON_SYSPLLCTRL_PSEL_SHIFT)) & SYSCON_SYSPLLCTRL_PSEL_MASK
- #define **CLK_MAIN_CLK_MUX_GET_MUX(x)** ((uint32_t)(x) & 0xFFU)
- #define **CLK_MAIN_CLK_MUX_GET_PRE_MUX(x)** (((uint32_t)(x) >> 8U) & 0xFFU)
- #define **SYSCON_MAINCLKSEL_SEL_MASK** 0x03U
- #define **SYSCON_MAINCLKSEL_SEL_SHIFT** (0U)
- #define **SYSCON_MAINCLKSEL_SEL(x)** (((uint32_t)((uint32_t)(x)) << SYSCON_MAINCLKSEL_SEL_SHIFT)) & SYSCON_MAINCLKSEL_SEL_MASK
- #define **SYSCON_MAINCLKPLLSEL_SEL_MASK** (0x3U)
- #define **SYSCON_MAINCLKPLLSEL_SEL_SHIFT** (0U)
- #define **SYSCON_MAINCLKPLLSEL_SEL(x)** (((uint32_t)((uint32_t)(x)) << SYSCON_MAINCLKPLLSEL_SEL_SHIFT)) & SYSCON_MAINCLKPLLSEL_SEL_MASK
- #define **kCLOCK_MainClkSrcFro** 0
- #define **SYSCON_SYSAHBCLKDIV_DIV(x)** (((uint32_t)((uint32_t)(x)) << SYSCON_SYSAHBCLKDIV_DIV_SHIFT)) & SYSCON_SYSAHBCLKDIV_DIV_MASK
- #define **SYSCON_SYSAHBCLKDIV_DIV_MASK** 0xFFU
- #define **SYSCON_SYSAHBCLKDIV_DIV_SHIFT** (0U)

Functions

- void **BoardClockRUN** ()
: *Runs clock at 30MHz*
- void **ClockSetFroOscFREQ** (uint32_t freq)
- void **PowerDisablePD** (uint8_t en)
- void **CLOCK_SetFroOutClkSrc** (uint32_t src)
- void **CLOCK_Select** (uint8_t sel)
- void **CLOCK_InitSystemPll** (uint32_t freq, uint8_t src)
- uint32_t **CLOCK_GetSystemPLLInClockRate** (void)
- uint32_t **CLOCK_GetFroFreq** (void)
- uint32_t **FindSystemPIIPsel** (uint32_t outFreq)
- void **CLOCK_SetMainClkSrc** (uint32_t src)
- void **CLOCK_SetCoreSysClkDiv** (uint32_t value)

2.4.1 Detailed Description

: Firmware functions for SYSCON

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.4.2 Function Documentation

2.4.2.1 BoardClockRUN()

```
void BoardClockRUN (
    void )
```

: Runs clock at 30MHz

: Select clock from fro

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 19 of file SYSCON_FW.c.

```

19      {
20      PowerDisablePD(FRO_OUT_PowerDown);
21      PowerDisablePD(FRO_PD);
22      ClockSetFroOscFREQ(F30MHz);
23      CLOCK_SetFroOutClkSrc(kCLOCK_FroSrcFroOsc);
24      PowerDisablePD(kPDRUNCFG_PD_SYSOSC);
25      CLOCK_Select(CLK_FROM_SYS_OSC);
26      CLOCK_InitSystemPll(FREQ30MHz, CLK_SYS_PLLSRCFRODIV);
27      CLOCK_SetMainClkSrc(kCLOCK_MainClkSrcFro);
28      CLOCK_SetCoreSysClkDiv(1U);
29  }
```

2.5 source/01-LedBlink.c File Reference

: Punto de entrada del programa

#include "Aplication.h"

Functions

- int [main](#) (void)
: *Main Function*

Variables

- uint32_t [tick](#) = TICK_OUT_1S
: *Var for SysTick_Handler.*

2.5.1 Detailed Description

: Punto de entrada del programa

: Toggle LedRED after 1SEC

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.5.2 Function Documentation

2.5.2.1 main()

```
:int main (
        void )
```

: Main Function

: initialize the system and stay in the while

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: int

Definition at line 22 of file 01-LedBlink.c.

```
22 {
23     LPC_Init();
24     while(1) {
25     }
26 }
27     return 0 ;
28 }
```

2.6 source/Aplication.c File Reference

: Functions used in main

```
#include "Aplication.h"
```

Functions

- void [LPC_Init](#) (void)
: Initialize the board
- void [GPIO_Init](#) (void)
: Initialize the GPIO

2.6.1 Detailed Description

: Functions used in main

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.6.2 Function Documentation

2.6.2.1 GPIO_Init()

```
:void GPIO_Init (
    void )
```

: Initialize the GPIO

: It depends on each proyect

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] void

Returns

: void

Definition at line 35 of file Application.c.

```
35     {
36         GPIO_SetDIR(LedRED, OUTPUT);
37         GPIO_SetDIR(LedGREEN, OUTPUT);
38         GPIO_SetDIR(LedBLUE, OUTPUT);
39         GPIO_SetDIR(UserKEY, INPUT);
40
41         GPIO_SetPIN(LedRED, LED_OFF);
```

```

42     GPIO_SetPIN(LedGREEN, LED_OFF);
43     GPIO_SetPIN(LedBLUE, LED_OFF);
44 }

```

2.6.2.2 LPC_Init()

```

: void LPC_Init (
        void )

```

: Initialize the board

: It depends on each project

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 19 of file Application.c.

```

19     {
20         GPIO_Enable();
21         BoardClockRUN();
22         SysTick_Init();
23         GPIO_Init();
24     }

```

2.7 source/GPIO_FW.c File Reference

: Firmware functions for GPIO

```
#include "Application.h"
```

Functions

- void [GPIO_Enable](#) (void)
: Enable GPIO0 and GPIO1
- void [GPIO_Disable](#) (void)

- *: Disable GPIO0 and GPIO1*
- void [GPIO_SetDIR](#) (uint8_t port, uint8_t pin, uint8_t dir)
 - : Choose GPIO as Input/Output*
- void [GPIO_SetPIN](#) (uint8_t port, uint8_t pin, uint8_t state)
 - : Choose GPIO's output state*
- uint8_t [GPIO_GetPIN](#) (uint8_t port, uint8_t pin, uint8_t state)
 - : Return GPIO's input state*
- void [GPIO_SetOUT](#) (uint8_t port, uint8_t pin)
 - : Put GPIO's out to 1*
- void [GPIO_ClearOUT](#) (uint8_t port, uint8_t pin)
 - : Put GPIO's out to 0*
- void [GPIO_TooggleOUT](#) (uint8_t port, uint8_t pin)
 - : Invert GPIO's out*
- void [GPIO_DebounceUserKEY](#) (void)
 - : Firmware debounce for user key in board*
- void [GPIO_Debounce](#) (uint8_t port, uint8_t pin, uint8_t state)
 - : Firmware debounce for a GPIO*
- void [IOCONEnable](#) (void)
 - : Enable IOCON*
- void [IOCONDisable](#) (void)
 - : Disable IOCON*
- uint8_t [GetOFFSET](#) (uint8_t port, uint8_t pin)
 - : Usefull for SetMode functions*
- void [GPIO_SetModeINPUT](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : on-chip pull-up/pull-down resistor*
- void [GPIO_SetModeHYS](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Hysteresis*
- void [GPIO_SetModeINV](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Invert input*
- void [GPIO_SetModeOD](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Open drain*
- void [GPIO_SetModeFILTER](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Digital filter sample mode*
- void [GPIO_SetModeCLKDIV](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Select peripheral clock divider for input filter sampling clock*
- void [GPIO_SetModeDAC](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Selects DAC mode*
- void [GPIO_SetModeI2C](#) (uint8_t port, uint8_t pin, uint8_t mode)
 - : Selects I2C mode*

Variables

- __RW uint8_t **buff_UserKEY** = 0
- __RW uint8_t **buff_In** = 0
- uint8_t **offset** []

2.7.1 Detailed Description

: Firmware functions for GPIO

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.7.2 Function Documentation

2.7.2.1 GetOFFSET()

```
:uint8_t GetOFFSET (
    uint8_t port,
    uint8_t pin )
```

: Usefull for SetMode functions

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31

Returns

: void

Definition at line 231 of file GPIO_FW.c.

```
231
232     uint8_t index;
233     index = port * 32 + pin;
234     return ((offset[index]) / 4);
235 }
```

2.7.2.2 GPIO_ClearOUT()

```
:void GPIO_ClearOUT (
    uint8_t port,
    uint8_t pin )
```

: Put GPIO's out to 0

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port : PORT0,PORT1
[in] uint8_t pin : 0,31

Returns

: void

Definition at line 113 of file GPIO_FW.c.

```
113 {
114     GPIO_CLRP[port] |= (1 « pin);
115 }
```

2.7.2.3 GPIO_Debounce()

```
:void GPIO_Debounce (
    uint8_t port,
    uint8_t pin,
    uint8_t state )
```

: Firmware debounce for a GPIO

: Use in SysTick_Handler or in some timer interrupt

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31
	[in] uint8_t state : ACT_LOW,ACT_HIGH

Returns

: void

Definition at line 169 of file GPIO_FW.c.

```

169                                     {
170     static uint8_t q = 0;    //Quantity of bounces
171     uint8_t j = 0;          //It captures changes
172
173     if (GPIO_GetPIN(port, pin, state)) // The key is pushed?
174         j = 0x01;                //Something is happening, the key is been pushed
175
176     if (buff_In ^ j) {          // If the key is pushed while q != BOUNCE
177         q++;                    // I change the buffer
178         if (q == BOUNCE) {
179             q = 0;
180             buff_In ^= 0x01;
181         }
182     } else
183         q = 0;
184 }

```

2.7.2.4 GPIO_DebounceUserKEY()

```

: void GPIO_DebounceUserKEY (
    void )

```

: Firmware debounce for user key in board

: Use in SysTick_Handler or in some timer interrupt

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in]
--	------

Returns

: void

Definition at line 141 of file GPIO_FW.c.

```

141     {
142     static uint8_t q = 0;    //Quantity of bounces
143     uint8_t j = 0;          //It captures changes
144
145     if (GPIO_GetPIN(UserKEY, ACT_LOW))    // The key is pushed?
146         j = 0x01;                        //Something is happening, the key is been pushed
147
148     if (buff_UserKEY ^ j) {              // If the key is pushed while q != BOUNCE
149         q++;                             // I change the buffer
150         if (q == BOUNCE) {
151             q = 0;
152             buff_UserKEY ^= 0x01;
153         }
154     } else
155         q = 0;
156 }

```

2.7.2.5 GPIO_Disable()

```

: void GPIO_Disable (
    void )

```

: Disable GPIO0 and GPIO1

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 32 of file GPIO_FW.c.

```

32     {
33     SYSAHBCLKCTRL0 &= (~ (1<<6));
34     SYSAHBCLKCTRL0 &= (~ (1<<20));
35 }

```

2.7.2.6 GPIO_Enable()

```

: void GPIO_Enable (
    void )

```

: Enable GPIO0 and GPIO1

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 19 of file GPIO_FW.c.

```
19      {  
20          SYSAHBCLKCTRL0 |= (1<<6);  
21          SYSAHBCLKCTRL0 |= (1<<20);  
22      }
```

2.7.2.7 GPIO_GetPIN()

```
:uint8_t GPIO_GetPIN (  
    uint8_t port,  
    uint8_t pin,  
    uint8_t dir )
```

: Return GPIO's input state

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31
	[in] uint8_t STATE : ACT_LOW,ACT_HIGH

Returns

: uint8_t : 1 pin == [state] , 0 pin != [state]

Definition at line 81 of file GPIO_FW.c.

```

81                                     {
82     port = port * 32 + pin;
83     if ( GPIO_PBYTE[port] == state)
84         return 1;
85     else
86         return 0;
87 }
```

2.7.2.8 GPIO_SetDIR()

```

: void GPIO_SetDIR (
    uint8_t port,
    uint8_t pin,
    uint8_t dir )
```

: Choose GPIO as Input/Output

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31
	[in] uint8_t dir : INPUT,OUTPUT

Returns

: void

Definition at line 48 of file GPIO_FW.c.

```

48                                     {
49     GPIO_DIRP[port] &= (~(1 << pin));
50     GPIO_DIRP[port] |= (dir << pin);
51 }
```

2.7.2.9 GPIO_SetModeCLKDIV()

```

: void GPIO_SetModeCLKDIV (
    uint8_t port,
```

```
uint8_t pin,
uint8_t mode )
```

: Select peripheral clock divider for input filter sampling clock

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode: IOCONCLKDIV0 to IOCONCLKDIV6
--	---

Returns

: void

Definition at line 338 of file GPIO_FW.c.

```
338
339     uint8_t offset;
340     offset = GetOFFSET(port, pin);
341     IOCON_[offset] &= (~ (0x07 « 13));
342     IOCON_[offset] |= (mode « 13);
343 }
```

2.7.2.10 GPIO_SetModeDAC()

```
:void GPIO_SetModeDAC (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Selects DAC mode

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode: DAC_EN,DAC_DIS

Returns

: void

Definition at line 356 of file GPIO_FW.c.

```

356                                     {
357     uint8_t offset;
358     offset = GetOFFSET(port, pin);
359     IOCON_[offset] &= (~(0x01 « 16));
360     IOCON_[offset] |= (mode « 16);
361 }
```

2.7.2.11 GPIO_SetModeFILTER()

```

: void GPIO_SetModeFILTER (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Digital filter sample mode

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode: BYPASS_FILTER,CLK1_FILTER,CLK2_FILTER,CLK3_FILTER
--

Returns

: void

Definition at line 320 of file GPIO_FW.c.

```

320                                     {
321     uint8_t offset;
322     offset = GetOFFSET(port, pin);
323     IOCON_[offset] &= (~(0x03 « 11));
324     IOCON_[offset] |= (mode « 11);
325 }
```

2.7.2.12 GPIO_SetModeHYS()

```
:void GPIO_SetModeHYS (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Hysteresis

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode:HYS_EN,HYS_DIS
--	--

Returns

: void

Definition at line 266 of file GPIO_FW.c.

```
266                                     {
267     uint8_t offset;
268     offset = GetOFFSET(port, pin);
269     IOCON[offset] &= (~ (0x01 « 5));
270     IOCON[offset] |= (mode « 5);
271 }
```

2.7.2.13 GPIO_SetModeI2C()

```
:void GPIO_SetModeI2C (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Selects I2C mode

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode:STD_MODE,STD_GPIO,FAST_MODE

Returns

: void

Definition at line 374 of file GPIO_FW.c.

```

374                                     {
375     uint8_t offset;
376     offset = GetOFFSET(port, pin);
377     IOCON_[offset] &= (~(0x03 « 8));
378     IOCON_[offset] |= (mode « 8);
379 }
```

2.7.2.14 GPIO_SetModeINPUT()

```

: void GPIO_SetModeINPUT (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: on-chip pull-up/pull-down resistor

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode:NO_PULL_UP_DOWN,PULL_DOWN,PULL_UP,REPEATER
--

Returns

: void

Definition at line 248 of file GPIO_FW.c.

```

248                                     {
249     uint8_t offset;
250     offset = GetOFFSET(port, pin);
251     IOCON_[offset] &= (~(0x03 « 3));
252     IOCON_[offset] |= (mode « 3);
253 }
```

2.7.2.15 GPIO_SetModeINV()

```
:void GPIO_SetModeINV (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Invert input

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

[in] uint8_t port: PORT0,PORT1	[in] uint8_t pin: 0,31	[in] uint8_t mode: INV_INPUT,NOT_INV_INPUT
--------------------------------	------------------------	--

Returns

: void

Definition at line 284 of file GPIO_FW.c.

```
284                                     {
285     uint8_t offset;
286     offset = GetOFFSET(port, pin);
287     IOCON[offset] &= (~ (0x01 « 6));
288     IOCON[offset] |= (mode « 6);
289 }
```

2.7.2.16 GPIO_SetModeOD()

```
:void GPIO_SetModeOD (
    uint8_t port,
    uint8_t pin,
    uint8_t mode )
```

: Open drain

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port: PORT0,PORT1 : [in] uint8_t pin: 0,31 : [in] uint8_t mode: OD_EN,OD_DIS
--	---

Returns

: void

Definition at line 302 of file GPIO_FW.c.

```

302                                     {
303     uint8_t offset;
304     offset = GetOFFSET(port, pin);
305     IOCON[offset] &= (~(0x01 « 10));
306     IOCON[offset] |= (mode « 10);
307 }
```

2.7.2.17 GPIO_SetOUT()

```

: void GPIO_SetOUT (
    uint8_t port,
    uint8_t pin )
```

: Put GPIO's out to 1

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31

Returns

: void

Definition at line 99 of file GPIO_FW.c.

```

99                                     {
100     GPIO_SETP[port] |= (1 « pin);
101 }
```

2.7.2.18 GPIO_SetPIN()

```
:void GPIO_SetPIN (
    uint8_t port,
    uint8_t pin,
    uint8_t dir )
```

: Choose GPIO's output state

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31
	[in] uint8_t state : LOW,HIGH

Returns

: void

Definition at line 64 of file GPIO_FW.c.

```
64                                     {
65     port = port * 32 + pin;
66     GPIO_PBYTE[port] &= (~1);
67     GPIO_PBYTE[port] |= state;
68 }
```

2.7.2.19 GPIO_ToogleOUT()

```
:void GPIO_ToogleOUT (
    uint8_t port,
    uint8_t pin )
```

: Invert GPIO's out

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31

Returns

: void

Definition at line 127 of file GPIO_FW.c.

```

127
128     GPIO_NOTP[port] |= (1 << pin);
129 }
```

2.7.2.20 IOCONDisable()

```

: void IOCONDisable (
        void )
```

: Disable IOCON

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in]
--	------

Returns

: void

Definition at line 208 of file GPIO_FW.c.

```

208     {
209     SYSAHBCLKCTRL0&= (~ (1<<18));
210 }
```

2.7.2.21 IOCONEnable()

```

: void IOCONEnable (
        void )
```

: Enable IOCON

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in]
--	------

Returns

: void

Definition at line 195 of file GPIO_FW.c.

```

195     {
196         SYSAHBCLKCTRL0 |= (1<<18);
197     }

```

2.7.3 Variable Documentation

2.7.3.1 offset

uint8_t offset[]

Initial value:

```

= { 0x044, 0x02C, 0x018, 0x014, 0x010, 0x00C, 0x040, 0x03C,
    0x038, 0x034, 0x020, 0x01C, 0x008, 0x004, 0x048, 0x028, 0x024, 0x000,
    0x078, 0x074, 0x070, 0x06C, 0x068, 0x064, 0x060, 0x05C, 0x058, 0x054,
    0x050, 0x0C8, 0x0CC, 0x08C, 0x090, 0x094, 0x098, 0x0A4, 0x0A8, 0x0AC,
    0x0B8, 0x0C4, 0x07C, 0x080, 0x0DC, 0x0D8, 0x084, 0x088, 0x09C, 0x0A0,
    0x0B0, 0x0B4, 0x0BC, 0x0C0, 0x0D0, 0x0D4 }

```

Definition at line 214 of file GPIO_FW.c.

2.8 source/GPIO_SW.c File Reference

: Software functions for GPIO

#include "Aplication.h"

Functions

- uint8_t [GetUserKEY](#) (void)
: State of the user key in board
- uint8_t [GetInput](#) (void)
: State of the input

Variables

- uint8_t **buff_UserKEY**
- uint8_t **buff_In**

2.8.1 Detailed Description

: Software functions for GPIO

: These functions avoid bouncing. Both must be used w/ GPIO_DebounceUserKEY or GPIO_Debounce

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.8.2 Function Documentation

2.8.2.1 GetInput()

```
:uint8_t GetInput (  
    void )
```

: State of the input

: Is necessary using GPIO_Debounce

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: uint8_t 1 if input pressed, 0 if input pressed

Definition at line 46 of file GPIO_SW.c.

```

46      {
47      static uint8_t buff_before = 0x00;
48
49      if ( buff_In == 0x01 && buff_before == 0x00 ){
50          buff_before = 0x01;
51          return (1);
52      }
53      else if ( buff_In == 0x01 && buff_before == 0x01 )
54          return (0);
55      else if ( buff_In == 0x00 && buff_before == 0x01 ){
56          buff_before = 0x00;
57          return (0);
58      }
59      else
60          return (0);
61 }

```

2.8.2.2 GetUserKEY()

```

:uint8_t GetUserKEY (
    void )

```

: State of the user key in board

: Is necessary using GPIO_DebounceUserKEY

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: uint8_t 1 if user key pressed, 0 if user key not

Definition at line 21 of file GPIO_SW.c.

```

21      {
22      static uint8_t buff_before = 0x00;
23
24      if ( buff_UserKEY == 0x01 && buff_before == 0x00 ){
25          buff_before = 0x01;
26          return (1);
27      }
28      else if ( buff_UserKEY == 0x01 && buff_before == 0x01 )
29          return (0);
30      else if ( buff_UserKEY == 0x00 && buff_before == 0x01 )
31          return (0);
32      else
33          return (0);
34 }

```

2.9 source/mtb.c File Reference

MTB initialization file.

```
#include <cr_mtb_buffer.h>
```

Macros

- `#define __MTB_BUFFER_SIZE 128`

Functions

- `__CR_MTB_BUFFER (__MTB_BUFFER_SIZE)`

2.9.1 Detailed Description

MTB initialization file.

Symbols controlling behavior of this code... `__MTB_DISABLE` If this symbol is defined, then the buffer array for the MTB will not be created.

`__MTB_BUFFER_SIZE` Symbol specifying the size of the buffer array for the MTB. This must be a power of 2 in size, and fit into the available RAM. The MTB buffer will also be aligned to its 'size' boundary and be placed at the start of a RAM bank (which should ensure minimal or zero padding due to alignment).

`__MTB_RAM_BANK` Allows MTB Buffer to be placed into specific RAM bank. When this is not defined, the "default" (first if there are several) RAM bank is used.

2.10 source/SwitchMatrix_FW.c File Reference

: Firmware functions for SWM

```
#include "Aplication.h"
```

Functions

- void `SWM` (uint8_t port, uint8_t pin, uint8_t assign, uint8_t byte)
: Assign movable functions for pin
- void `SWM_PinEnable` (uint8_t port, uint8_t pin, uint8_t ena)
: Enable pin works as value passed in ena
- void `SWM_Enable` (void)
: Enable SWM
- void `SWM_Disable` (void)
: Disable SWM

2.10.1 Detailed Description

: Firmware functions for SWM

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.10.2 Function Documentation

2.10.2.1 SWM()

```
:void SWM (  
    uint8_t port,  
    uint8_t pin,  
    uint8_t assign,  
    uint8_t byte )
```

: Assign movable functions for pin

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31
	[in] uint8_t assign :
	[in] uint8_t byte : BYTE0,BYTE1,BYTE2,BYTE3

Returns

: void

Definition at line 22 of file SwitchMatrix_FW.c.

```

22                                     {
23     pin = pin + 0x20 * port; //PIO0[0:31] 0x00 to 0x1F PIO1[0:21] 0x1F to 0x35
24     PINASSIGN[assign] |= (pin << byte);
25 }
```

2.10.2.2 SWM_Disable()

```

: void SWM_Disable (
    void )
```

: Disable SWM

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 67 of file SwitchMatrix_FW.c.

```

67                                     {
68     SYSAHBCLKCTRL0&= (~ (1<<7));
69 }
```

2.10.2.3 SWM_Enable()

```

: void SWM_Enable (
    void )
```

: Enable SWM

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 54 of file SwitchMatrix_FW.c.

```
54      {
55          SYSAHBCLKCTRL0|= (1<<7);
56      }
```

2.10.2.4 SWM_PinEnable()

```
:void SWM_PinEnable (
    uint8_t port,
    uint8_t pin,
    uint8_t ena )
```

: Enable pin works as value passed in ena

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint8_t port : PORT0,PORT1
	[in] uint8_t pin : 0,31
	[in] uint8_t ena : READ Page 143 UserManual. There are multiple choices

Returns

: void

Definition at line 38 of file SwitchMatrix_FW.c.

```
38      {
39          if (port == PORT1)          //PIENABLE[0] -> PIO0_0 .... PIO1_2
40              if (pin < 3)            //PIENABLE10] -> PIO1_3 .... PIO1_21
41                  port = PORT0;
42          PINENABLE[port] |= (1 << ena);
43      }
```

2.11 source/SYSCON_FW.c File Reference

: Firmware functions for SYSCON

```
#include "Aplication.h"
```

Functions

- void **BoardClockRUN** (void)
: *Runs clock at 30MHz*
- void **ClockSetFroOscFREQ** (uint32_t freq)
- void **PowerDisablePD** (uint8_t en)
- void **CLOCK_SetFroOutClkSrc** (uint32_t src)
- void **CLOCK_Select** (uint8_t sel)
- void **CLOCK_InitSystemPII** (uint32_t freq, uint8_t src)
- uint32_t **CLOCK_GetSystemPLLInClockRate** (void)
- uint32_t **CLOCK_GetFroFreq** (void)
- uint32_t **FindSystemPIIPsel** (uint32_t outFreq)
- void **CLOCK_SetMainClkSrc** (uint32_t src)
- void **CLOCK_SetCoreSysClkDiv** (uint32_t value)

2.11.1 Detailed Description

: Firmware functions for SYSCON

: Only starts the board at 30MHz

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.11.2 Function Documentation

2.11.2.1 BoardClockRUN()

```
:void BoardClockRUN (  
    void )
```

: Runs clock at 30MHz

: Select clock from fro

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 19 of file SYSCON_FW.c.

```

19      {
20      PowerDisablePD (FRO_OUT_PowerDown);
21      PowerDisablePD (FRO_PD);
22      ClockSetFroOscFREQ (F30MHz);
23      CLOCK_SetFroOutClkSrc (kCLOCK_FroSrcFroOsc);
24      PowerDisablePD (kPDRUNCFG_PD_SYSSOSC);
25      CLOCK_Select (CLK_FROM_SYS_OSC);
26      CLOCK_InitSystemPll (FREQ30MHz, CLK_SYS_PLLSRCFRODIV);
27      CLOCK_SetMainClkSrc (kCLOCK_MainClkSrcFro);
28      CLOCK_SetCoreSysClkDiv (1U);
29  }
```

2.12 source/SysTick_FW.c File Reference

: Firmware functions for SysTick

#include "Aplication.h"

Functions

- void [SysTick_Init](#) (void)
: Initialize the systick
- void [SysTick_Off](#) (void)
: Stops the systick
- void [SysTick_Set](#) (uint32_t freq)
: Set the counter as freq* 10mS -1
- void [SysTick_Handler](#) (void)
: Interrupt each 10mS

Variables

- uint32_t [tick](#)
Var for SysTick_Handler.

2.12.1 Detailed Description

: Firmware functions for SysTick

: Only develop for 30MHz

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

:

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

2.12.2 Function Documentation

2.12.2.1 SysTick_Handler()

```
:void SysTick_Handler (  
    void )
```

: Interrupt each 10mS

: when the tick is out i know that happend time = tick*10mS

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 61 of file SysTick_FW.c.

```

62 {
63     if (tick != 0U)
64         tick--;
65     else{
66         tick = TICK_OUT_1S;
67         GPIO_ToogleOUT(LedRED);
68     }
69 }

```

2.12.2.2 SysTick_Init()

```

: void SysTick_Init (
    void )

```

: Initialize the systick

: Enable SysTick, enable interrupt and set the counter

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 19 of file SysTick_FW.c.

```

19     {
20         SysTick_Set(FRE30MHz);
21         SYST_CSR = SYSTICK_ENABLE_INTERRUPT_CLK;
22         SYST_CVR = 0;
23     }

```

2.12.2.3 SysTick_Off()

```

: SysTick_Off (
    void )

```

: Stops the systick

: disable SysTick, disable interrupt

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] void
--	-----------

Returns

: void

Definition at line 34 of file SysTick_FW.c.

```
34      {  
35          SYST_CSR = SYSTICK_DISABLE;  
36      }
```

2.12.2.4 SysTick_Set()

```
:void SysTick_Set (  
    uint32_t freq )
```

: Set the counter as freq*10mS -1

: Always use at 30MHz

Author

: Tobias Bavasso Piizzi

Date

: 04/01/2021

Parameters

	[in] uint32_t freq: FRE30MHz
--	------------------------------

Returns

: void

Definition at line 47 of file SysTick_FW.c.

```
47      {  
48          SYST_RVR = freq*10 - 1; // 30MHz*10mS-1  
49      }
```


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