# *1. Description*

## 1.1. Project

| | |
|---|---|
| Project Name | STM32_V2.0 |
| Board Name | STM32_V2.0.3 |
| Generated with: | STM32CubeMX 4.22.1 |
| Date | 09/18/2017 |

## 1.2. MCU

| | |
|---|---|
| MCU Series | STM32F4 |
| MCU Line | STM32F411 |
| MCU name | STM32F411RETx |
| MCU Package | LQFP64 |
| MCU Pin number | 64 |

# 2. Pinout Configuration
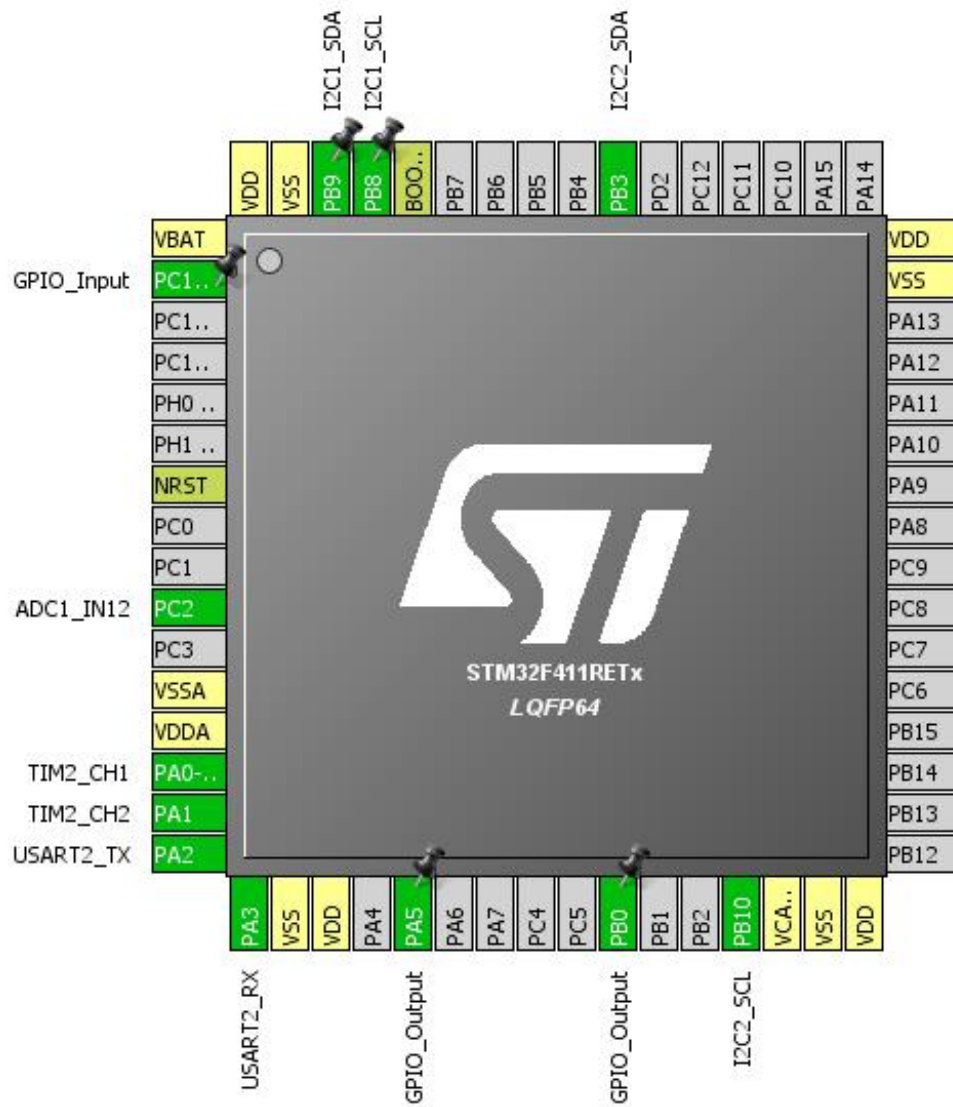
# 3. Pins Configuration

| Pin Number LQFP64 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|---|---|---|---|---|
| 1 | VBAT | Power | | |
| 2 | PC13-ANTI_TAMP  * | I/O | GPIO_Input | |
| 7 | NRST | Reset | | |
| 10 | PC2 | I/O | ADC1_IN12 | |
| 12 | VSSA | Power | | |
| 13 | VDDA | Power | | |
| 14 | PA0-WKUP | I/O | TIM2_CH1 | |
| 15 | PA1 | I/O | TIM2_CH2 | |
| 16 | PA2 | I/O | USART2_TX | |
| 17 | PA3 | I/O | USART2_RX | |
| 18 | VSS | Power | | |
| 19 | VDD | Power | | |
| 21 | PA5  * | I/O | GPIO_Output | |
| 26 | PB0  * | I/O | GPIO_Output | |
| 29 | PB10 | I/O | I2C2_SCL | |
| 30 | VCAP1 | Power | | |
| 31 | VSS | Power | | |
| 32 | VDD | Power | | |
| 47 | VSS | Power | | |
| 48 | VDD | Power | | |
| 55 | PB3 | I/O | I2C2_SDA | |
| 60 | BOOT0 | Boot | | |
| 61 | PB8 | I/O | I2C1_SCL | |
| 62 | PB9 | I/O | I2C1_SDA | |
| 63 | VSS | Power | | |
| 64 | VDD | Power | | |

* The pin is affected with an I/O function

# *4. Clock Tree Configuration*
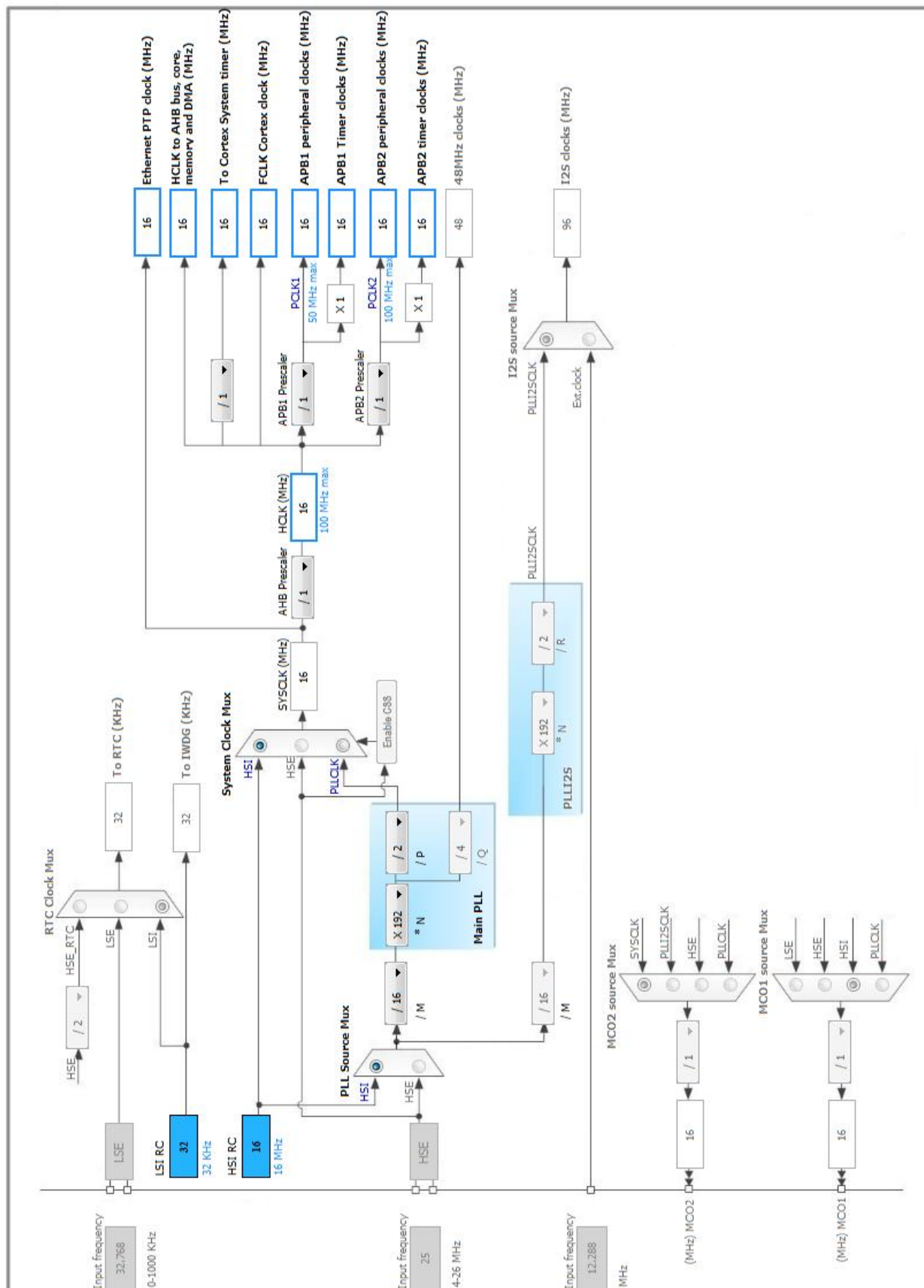
# 5. IPs and Middleware Configuration

## 5.1. ADC1
**mode: IN12**

### 5.1.1. Parameter Settings:

**ADC_Settings:**

| | |
|---|---|
| Clock Prescaler | PCLK2 divided by 2 |
| Resolution | 12 bits (15 ADC Clock cycles) |
| Data Alignment | Right alignment |
| Scan Conversion Mode | Disabled |
| Continuous Conversion Mode | Disabled |
| Discontinuous Conversion Mode | Disabled |
| DMA Continuous Requests | Disabled |
| End Of Conversion Selection | EOC flag at the end of single channel conversion |

**ADC_Regular_ConversionMode:**

| | |
|---|---|
| Number Of Conversion | 1 |
| External Trigger Conversion Source | Regular Conversion launched by software |
| External Trigger Conversion Edge | None |
| Rank | 1 |
| Channel | Channel 12 |
| Sampling Time | 3 Cycles |

**ADC_Injected_ConversionMode:**

| | |
|---|---|
| Number Of Conversions | 0 |

**WatchDog:**

| | |
|---|---|
| Enable Analog WatchDog Mode | false |

## 5.2. I2C1
**I2C: I2C**

### 5.2.1. Parameter Settings:

**Master Features:**

| | |
|---|---|
| I2C Speed Mode | Standard Mode |
| I2C Clock Speed (Hz) | 100000 |

**Slave Features:**

| | |
|---|---|
| Clock No Stretch Mode | Disabled |
| Primary Address Length selection | 7-bit |
| Dual Address Acknowledged | Disabled |
| Primary slave address | **0x20 *** |
| General Call address detection | Disabled |

## 5.3. I2C2
**I2C: I2C**

### 5.3.1. Parameter Settings:

**Master Features:**

| | |
|---|---|
| I2C Speed Mode | Standard Mode |
| I2C Clock Speed (Hz) | 100000 |

**Slave Features:**

| | |
|---|---|
| Clock No Stretch Mode | Disabled |
| Primary Address Length selection | 7-bit |
| Dual Address Acknowledged | Disabled |
| Primary slave address | **0x30 *** |
| General Call address detection | Disabled |

## 5.4. SYS
**Timebase Source: SysTick**

## 5.5. TIM2
**Channel1: PWM Generation CH1**
**Channel2: PWM Generation CH2**

### 5.5.1. Parameter Settings:

**Counter Settings:**

| | |
|---|---|
| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 32 bits value ) | 0 |
| Internal Clock Division (CKD) | No Division |

**Trigger Output (TRGO) Parameters:**

| | |
|---|---|
| Master/Slave Mode | Disable (no sync between this TIM (Master) and its Slaves |
| Trigger Event Selection | Reset (UG bit from TIMx_EGR) |

**PWM Generation Channel 1:**

| | |
|---|---|
| Mode | PWM mode 1 |
| Pulse (32 bits value) | 0 |
| Fast Mode | Disable |
| CH Polarity | High |

**PWM Generation Channel 2:**

| | |
|---|---|
| Mode | PWM mode 1 |
| Pulse (32 bits value) | 0 |
| Fast Mode | Disable |
| CH Polarity | High |

## *5.6. USART2*

### Mode: Asynchronous

### 5.6.1. Parameter Settings:

**Basic Parameters:**

| | |
|---|---|
| Baud Rate | 115200 |
| Word Length | 8 Bits (including Parity) |
| Parity | None |
| Stop Bits | 1 |

**Advanced Parameters:**

| | |
|---|---|
| Data Direction | Receive and Transmit |
| Over Sampling | 16 Samples |

## *5.7. FREERTOS*

### mode: Enabled

### 5.7.1. Config parameters:

**Versions:**

| | |
|---|---|
| FreeRTOS version | 9.0.0 |
| CMSIS-RTOS version | 1.02 |

**Kernel settings:**

| | |
|---|---|
| USE_PREEMPTION | Enabled |
| CPU_CLOCK_HZ | SystemCoreClock |
| TICK_RATE_HZ | 1000 |
| MAX_PRIORITIES | 7 |
| MINIMAL_STACK_SIZE | 128 |
| MAX_TASK_NAME_LEN | 16 |
| USE_16_BIT_TICKS | Disabled |
| IDLE_SHOULD_YIELD | Enabled |
| USE_MUTEXES | Enabled |
| USE_RECURSIVE_MUTEXES | Disabled |
| USE_COUNTING_SEMAPHORES | Disabled |
| QUEUE_REGISTRY_SIZE | 8 |
| USE_APPLICATION_TASK_TAG | Disabled |
| ENABLE_BACKWARD_COMPATIBILITY | Enabled |
| USE_PORT_OPTIMISED_TASK_SELECTION | Enabled |
| USE_TICKLESS_IDLE | Disabled |
| USE_TASK_NOTIFICATIONS | Enabled |

**Memory management settings:**

| | |
|---|---|
| Memory Allocation | Dynamic |
| TOTAL_HEAP_SIZE | 15360 |
| Memory Management scheme | heap_4 |

**Hook function related definitions:**

| | |
|---|---|
| USE_IDLE_HOOK | Disabled |
| USE_TICK_HOOK | Disabled |
| USE_MALLOC_FAILED_HOOK | Disabled |
| USE_DAEMON_TASK_STARTUP_HOOK | Disabled |
| CHECK_FOR_STACK_OVERFLOW | Disabled |

**Run time and task stats gathering related definitions:**

| | |
|---|---|
| GENERATE_RUN_TIME_STATS | Disabled |
| USE_TRACE_FACILITY | Disabled |
| USE_STATS_FORMATTING_FUNCTIONS | Disabled |

**Co-routine related definitions:**

| | |
|---|---|
| USE_CO_ROUTINES | Disabled |
| MAX_CO_ROUTINE_PRIORITIES | 2 |

**Software timer definitions:**

| | |
|---|---|
| USE_TIMERS | Disabled |

**Interrupt nesting behaviour configuration:**

| | |
|---|---|
| LIBRARY_LOWEST_INTERRUPT_PRIORITY | 15 |
| LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY | 5 |

## 5.7.2. Include parameters:

**Include definitions:**

| | |
|---|---|
| vTaskPrioritySet | Enabled |
| uxTaskPriorityGet | Enabled |
| vTaskDelete | Enabled |
| vTaskCleanUpResources | Disabled |
| vTaskSuspend | Enabled |
| vTaskDelayUntil | Disabled |
| vTaskDelay | Enabled |
| xTaskGetSchedulerState | Enabled |
| xTaskResumeFromISR | Enabled |
| xQueueGetMutexHolder | Disabled |
| xSemaphoreGetMutexHolder | Disabled |
| pcTaskGetTaskName | Disabled |
| uxTaskGetStackHighWaterMark | Disabled |
| xTaskGetCurrentTaskHandle | Disabled |
| eTaskGetState | Disabled |
| xEventGroupSetBitFromISR | Disabled |
| xTimerPendFunctionCall | Disabled |
| xTaskAbortDelay | Disabled |
| xTaskGetHandle | Disabled |

**\* User modified value**

# 6. System Configuration

## 6.1. GPIO configuration

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|---|---|---|---|---|---|---|
| ADC1 | PC2 | ADC1_IN12 | Analog mode | No pull-up and no pull-down | n/a | |
| I2C1 | PB8 | I2C1_SCL | Alternate Function Open Drain | Pull-up | **Very High** * | |
| | PB9 | I2C1_SDA | Alternate Function Open Drain | Pull-up | **Very High** * | |
| I2C2 | PB10 | I2C2_SCL | Alternate Function Open Drain | Pull-up | **Very High** * | |
| | PB3 | I2C2_SDA | Alternate Function Open Drain | Pull-up | **Very High** * | |
| TIM2 | PA0-WKUP | TIM2_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PA1 | TIM2_CH2 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| USART2 | PA2 | USART2_TX | Alternate Function Push Pull | Pull-up | **Very High** * | |
| | PA3 | USART2_RX | Alternate Function Push Pull | Pull-up | **Very High** * | |
| GPIO | PC13-ANTI_TAMP | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | |
| | PA5 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | |
| | PB0 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | |

## 6.2. DMA configuration

nothing configured in DMA service

## 6.3. NVIC configuration

| Interrupt Table | Enable | Preenmption Priority | SubPriority |
|---|---|---|---|
| Non maskable interrupt | true | 0 | 0 |
| Hard fault interrupt | true | 0 | 0 |
| Memory management fault | true | 0 | 0 |
| Pre-fetch fault, memory access fault | true | 0 | 0 |
| Undefined instruction or illegal state | true | 0 | 0 |
| System service call via SWI instruction | true | 0 | 0 |
| Debug monitor | true | 0 | 0 |
| Pendable request for system service | true | 15 | 0 |
| System tick timer | true | 15 | 0 |
| I2C1 event interrupt | true | 5 | 0 |
| I2C2 event interrupt | true | 0 | 0 |
| PVD interrupt through EXTI line 16 | unused | | |
| Flash global interrupt | unused | | |
| RCC global interrupt | unused | | |
| ADC1 global interrupt | unused | | |
| TIM2 global interrupt | unused | | |
| I2C1 error interrupt | unused | | |
| I2C2 error interrupt | unused | | |
| USART2 global interrupt | unused | | |
| FPU global interrupt | unused | | |

**\* User modified value**

# 7. Power Consumption Calculator report

7.1. Microcontroller Selection

| Series | STM32F4 |
|---|---|
| Line | STM32F411 |
| MCU | STM32F411RETx |
| Datasheet | 026289_Rev6 |

7.2. Parameter Selection

| Temperature | 25 |
|---|---|
| Vdd | 3.6 |

# *8. Software Project*

## 8.1. Project Settings

| Name | Value |
|---|---|
| Project Name | STM32_V2.0.3 |
| Project Folder | C:\Users\Benoit\Documents\Cours\3A\S5\Projet |
| Toolchain / IDE | SW4STM32 |
| Firmware Package Name and Version | STM32Cube FW_F4 V1.16.0 |

## 8.2. Code Generation Settings

| Name | Value |
|---|---|
| STM32Cube Firmware Library Package | Copy only the necessary library files |
| Generate peripheral initialization as a pair of '.c/.h' files | No |
| Backup previously generated files when re-generating | No |
| Delete previously generated files when not re-generated | Yes |
| Set all free pins as analog (to optimize the power consumption) | No |