1. Description

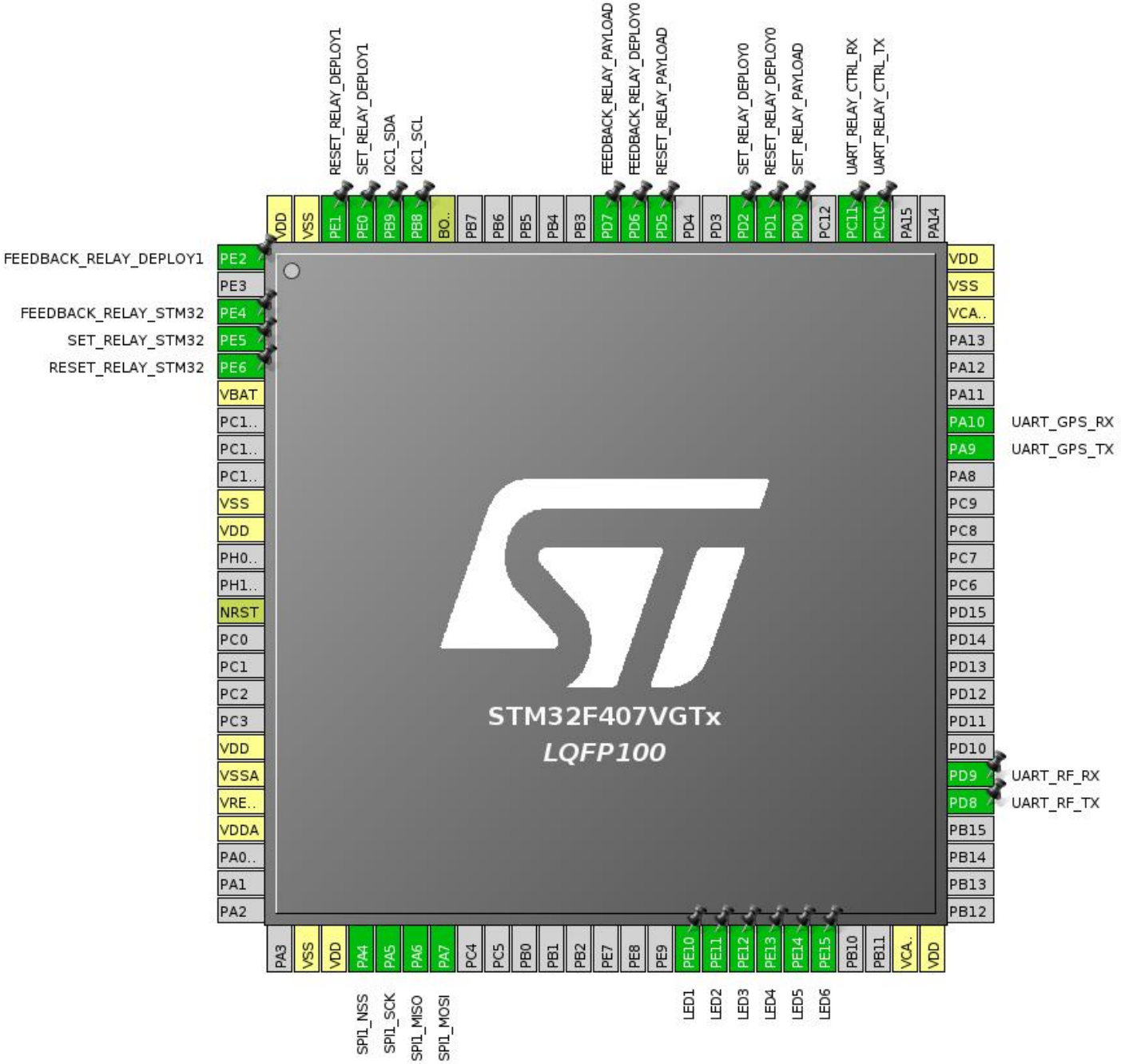
1.1. Project

Project Name	gaul_acquisition
Board Name	custom
Generated with:	STM32CubeMX 4.26.0
Date	06/30/2018

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407VGTx
MCU Package	LQFP100
MCU Pin number	100

2. Pinout Configuration



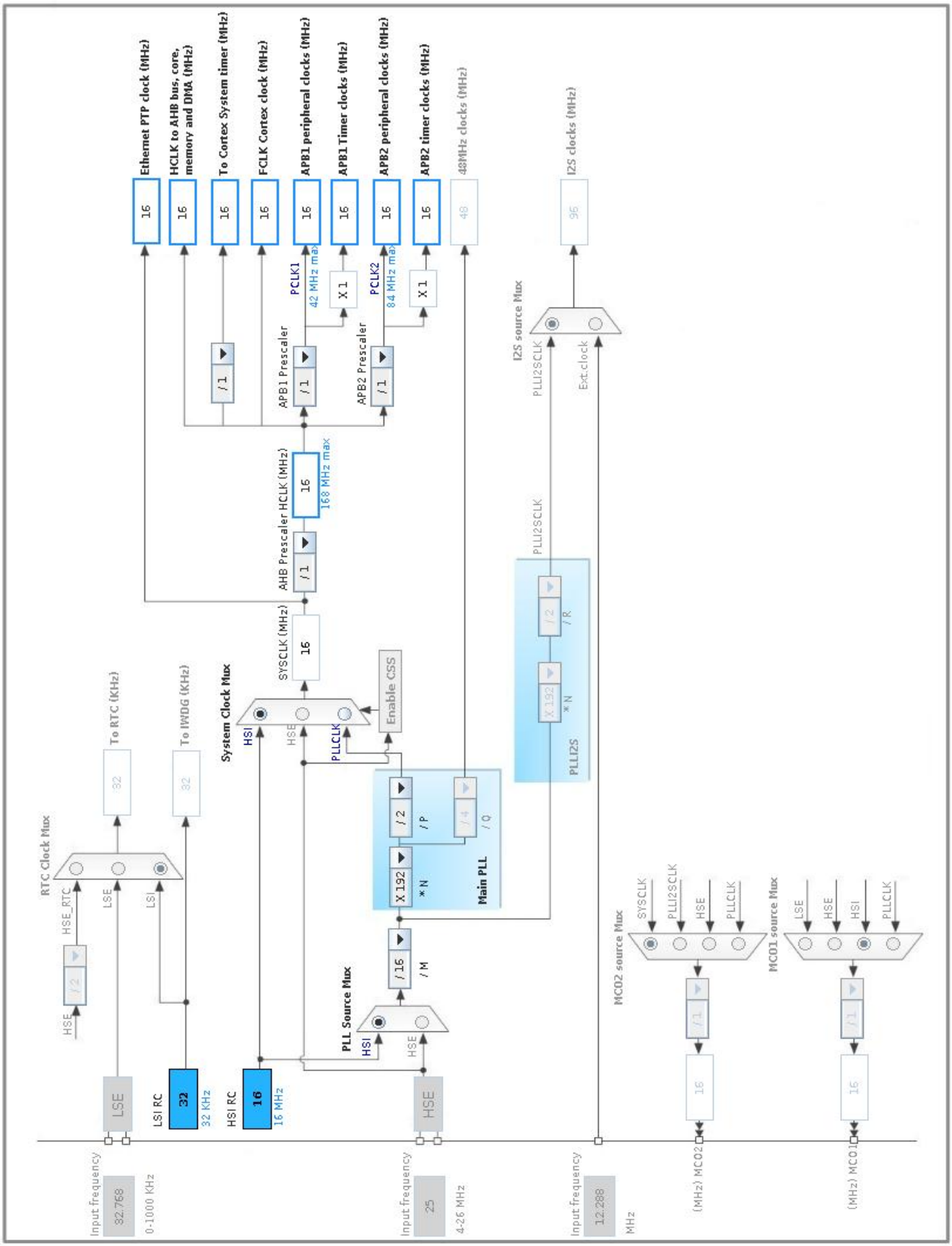
3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2 *	I/O	GPIO_Input	FEEDBACK_RELAY_DEPLOY1
3	PE4 *	I/O	GPIO_Input	FEEDBACK_RELAY_STM32
4	PE5 *	I/O	GPIO_Output	SET_RELAY_STM32
5	PE6 *	I/O	GPIO_Output	RESET_RELAY_STM32
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
14	NRST	Reset		
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
27	VSS	Power		
28	VDD	Power		
29	PA4	I/O	SPI1_NSS	
30	PA5	I/O	SPI1_SCK	
31	PA6	I/O	SPI1_MISO	
32	PA7	I/O	SPI1_MOSI	
41	PE10 *	I/O	GPIO_Output	LED1
42	PE11 *	I/O	GPIO_Output	LED2
43	PE12 *	I/O	GPIO_Output	LED3
44	PE13 *	I/O	GPIO_Output	LED4
45	PE14 *	I/O	GPIO_Output	LED5
46	PE15 *	I/O	GPIO_Output	LED6
49	VCAP_1	Power		
50	VDD	Power		
55	PD8	I/O	USART3_TX	UART_RF_TX
56	PD9	I/O	USART3_RX	UART_RF_RX
68	PA9	I/O	USART1_TX	UART_GPS_TX
69	PA10	I/O	USART1_RX	UART_GPS_RX
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
78	PC10	I/O	UART4_TX	UART_RELAY_CTRL_TX

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
79	PC11	I/O	UART4_RX	UART_RELAY_CTRL_RX
81	PD0 *	I/O	GPIO_Output	SET_RELAY_PAYLOAD
82	PD1 *	I/O	GPIO_Output	RESET_RELAY_DEPLOY0
83	PD2 *	I/O	GPIO_Output	SET_RELAY_DEPLOY0
86	PD5 *	I/O	GPIO_Output	RESET_RELAY_PAYLOAD
87	PD6 *	I/O	GPIO_Input	FEEDBACK_RELAY_DEPLOY0
88	PD7 *	I/O	GPIO_Input	FEEDBACK_RELAY_PAYLOAD
94	BOOT0	Boot		
95	PB8	I/O	I2C1_SCL	
96	PB9	I/O	I2C1_SDA	
97	PE0 *	I/O	GPIO_Output	SET_RELAY_DEPLOY1
98	PE1 *	I/O	GPIO_Output	RESET_RELAY_DEPLOY1
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. I2C1

I2C: I2C

5.1.1. 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	0
General Call address detection	Disabled

5.2. SPI1

Mode: Full-Duplex Master

Hardware NSS Signal: Hardware NSS Output Signal

5.2.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**8.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Output Hardware

5.3. SYS

Timebase Source: TIM1

5.4. UART4

Mode: Asynchronous

5.4.1. 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

5.5. USART1

Mode: Asynchronous

5.5.1. 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

5.6. USART3

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. FATFS

mode: User-defined

5.7.1. Set Defines:

Version:

FATFS version	R0.12c

Function Parameters:

FS_READONLY (Read-only mode)	Disabled
FS_MINIMIZE (Minimization level)	Disabled
USE_STRFUNC (String functions)	Enabled with LF -> CRLF conversion
USE_FIND (Find functions)	Disabled
USE_MKFS (Make filesystem function)	Enabled
USE_FASTSEEK (Fast seek function)	Enabled
USE_EXPAND (Use f_expand function)	Disabled
USE_CHMOD (Change attributes function)	Disabled
USE_LABEL (Volume label functions)	Disabled
USE_FORWARD (Forward function)	Disabled

Locale and Namespace Parameters:

CODE_PAGE (Code page on target)	Latin 1
USE_LFN (Use Long Filename)	Disabled
MAX_LFN (Max Long Filename)	255
LFN_UNICODE (Enable Unicode)	ANSI/OEM
STRF_ENCODE (Character encoding)	UTF-8
FS_RPATH (Relative Path)	Disabled

Physical Drive Parameters:

VOLUMES (Logical drives)	1
MAX_SS (Maximum Sector Size)	512
MIN_SS (Minimum Sector Size)	512
MULTI_PARTITION (Volume partitions feature)	Disabled
USE_TRIM (Erase feature)	Disabled
FS_NOFSINFO (Force full FAT scan)	0

System Parameters:

FS_TINY (Tiny mode)	Disabled
FS_EXFAT (Support of exFAT file system)	Disabled

FS_NORTC (Timestamp feature)	Dynamic timestamp
NORTC_YEAR (Year for timestamp)	2015
NORTC_MON (Month for timestamp)	6
NORTC_MDAY (Day for timestamp)	4
FS_REENTRANT (Re-Entrancy)	Enabled
FS_TIMEOUT (Timeout ticks)	1000
SYNC_t (O/S sync object)	osSemaphoreId
FS_LOCK (Number of files opened simultaneously)	2

5.8. FREERTOS

mode: Enabled

5.8.1. 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

5.8.2. 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
I2C1	PB8	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	
SPI1	PA4	SPI1_NSS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA6	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
UART4	PC10	UART4_TX	Alternate Function Push Pull	Pull-up	**Very High ***	UART_RELAY_CTRL_TX
	PC11	UART4_RX	Alternate Function Push Pull	Pull-up	**Very High ***	UART_RELAY_CTRL_RX
USART1	PA9	USART1_TX	Alternate Function Push Pull	Pull-up	**Very High ***	UART_GPS_TX
	PA10	USART1_RX	Alternate Function Push Pull	Pull-up	**Very High ***	UART_GPS_RX
USART3	PD8	USART3_TX	Alternate Function Push Pull	Pull-up	**Very High ***	UART_RF_TX
	PD9	USART3_RX	Alternate Function Push Pull	Pull-up	**Very High ***	UART_RF_RX
GPIO	PE2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	FEEDBACK_RELAY_DEPLOY1
	PE4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	FEEDBACK_RELAY_STM32
	PE5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SET_RELAY_STM32
	PE6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RESET_RELAY_STM32
	PE10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED1
	PE11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED2
	PE12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED3
	PE13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED4

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PE14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED5
	PE15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED6
	PD0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SET_RELAY_PAYLOAD
	PD1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RESET_RELAY_DEPLOY0
	PD2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SET_RELAY_DEPLOY0
	PD5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RESET_RELAY_PAYLOAD
	PD6	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	FEEDBACK_RELAY_DEPLOY0
	PD7	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	FEEDBACK_RELAY_PAYLOAD
	PE0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SET_RELAY_DEPLOY1
	PE1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RESET_RELAY_DEPLOY1

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
TIM1 update interrupt and TIM10 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI1 global interrupt	unused		
USART1 global interrupt	unused		
USART3 global interrupt	unused		
UART4 global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	022152_Rev8

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	gaul_acquisition
Project Folder	/home/laplace/gaul/acquisition/project
Toolchain / IDE	TrueSTUDIO
Firmware Package Name and Version	STM32Cube FW_F4 V1.21.0

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

9. Software Pack Report