1. Description

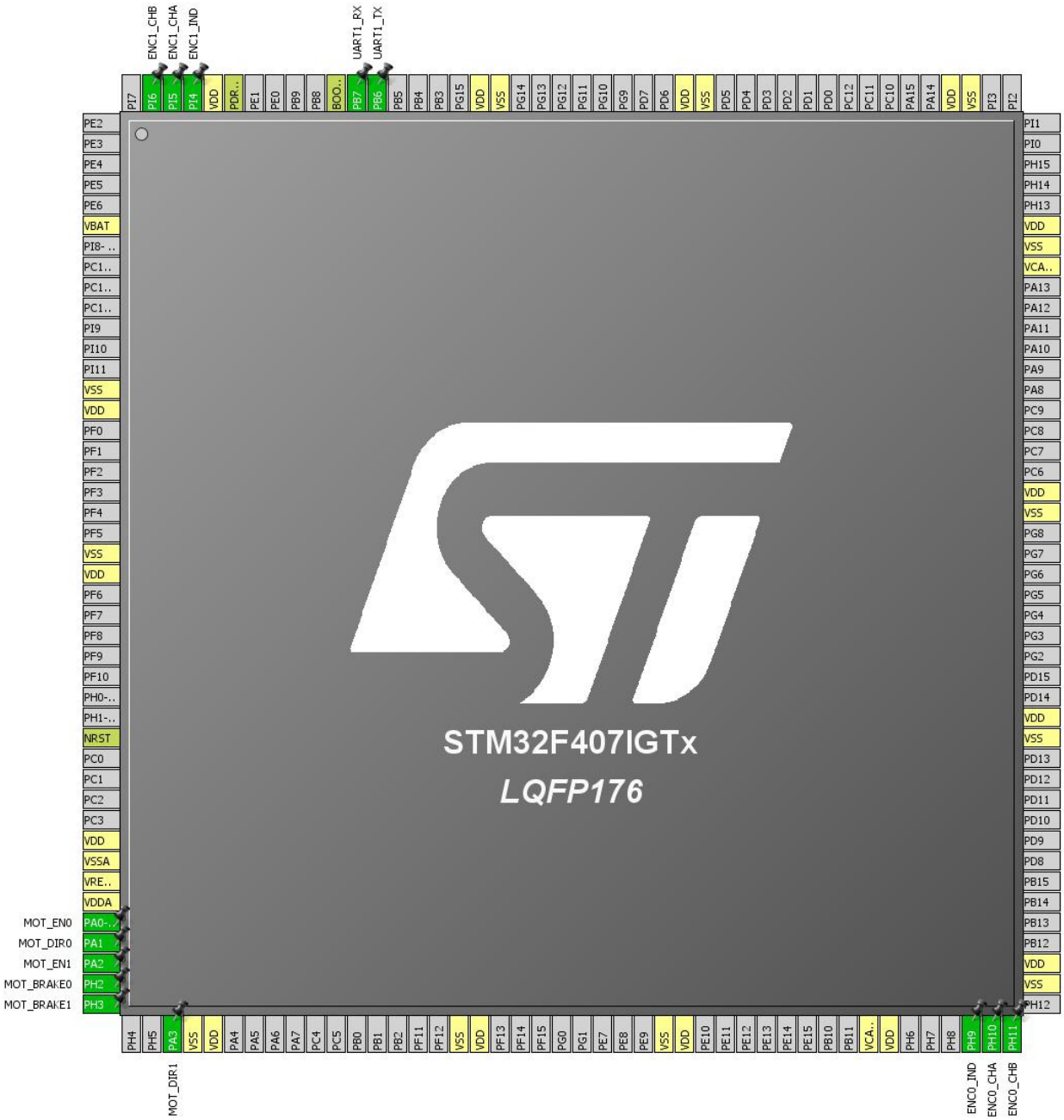
1.1. Project

Project Name	FirmwarePropulsion0
Board Name	FirmwarePropulsion0.0
Generated with:	STM32CubeMX 4.23.0
Date	12/03/2017

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407IGTx
MCU Package	LQFP176
MCU Pin number	176

2. Pinout Configuration



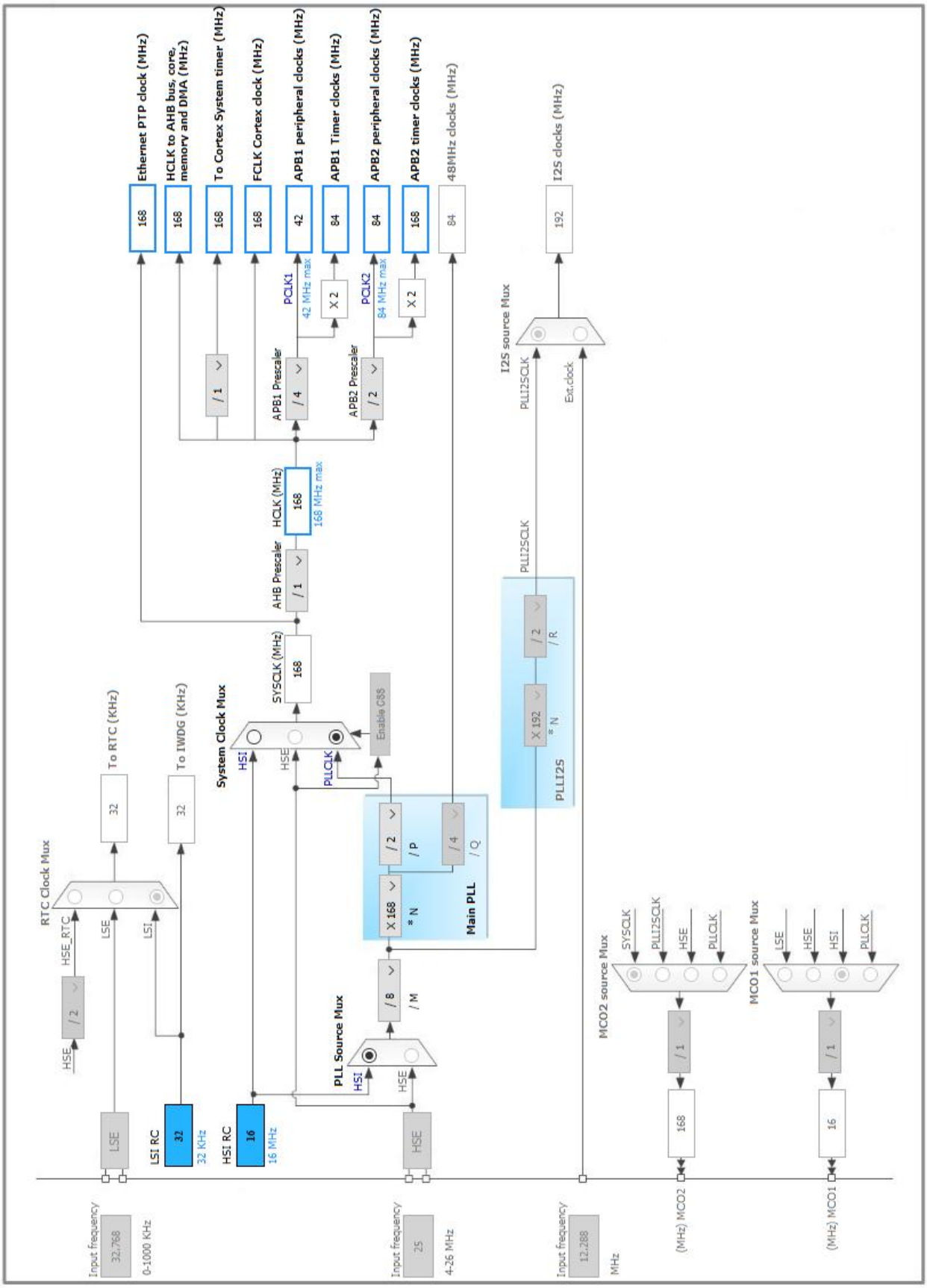
3. Pins Configuration

Pin Number LQFP176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
14	VSS	Power		
15	VDD	Power		
22	VSS	Power		
23	VDD	Power		
31	NRST	Reset		
36	VDD	Power		
37	VSSA	Power		
38	VREF+	Power		
39	VDDA	Power		
40	PA0-WKUP	I/O	TIM2_CH1	MOT_EN0
41	PA1 *	I/O	GPIO_Output	MOT_DIR0
42	PA2	I/O	TIM9_CH1	MOT_EN1
43	PH2 *	I/O	GPIO_Output	MOT_BRAKE0
44	PH3 *	I/O	GPIO_Output	MOT_BRAKE1
47	PA3 *	I/O	GPIO_Output	MOT_DIR1
48	VSS	Power		
49	VDD	Power		
61	VSS	Power		
62	VDD	Power		
71	VSS	Power		
72	VDD	Power		
81	VCAP_1	Power		
82	VDD	Power		
86	PH9 *	I/O	GPIO_Input	ENC0_IND
87	PH10	I/O	TIM5_CH1	ENC0_CHA
88	PH11	I/O	TIM5_CH2	ENC0_CHB
90	VSS	Power		
91	VDD	Power		
102	VSS	Power		
103	VDD	Power		
113	VSS	Power		
114	VDD	Power		
125	VCAP_2	Power		
126	VSS	Power		
127	VDD	Power		

Pin Number LQFP176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
135	VSS	Power		
136	VDD	Power		
148	VSS	Power		
149	VDD	Power		
158	VSS	Power		
159	VDD	Power		
164	PB6	I/O	USART1_TX	UART1_TX
165	PB7	I/O	USART1_RX	UART1_RX
166	BOOT0	Boot		
171	PDR_ON	Reset		
172	VDD	Power		
173	PI4 *	I/O	GPIO_Input	ENC1_IND
174	PI5	I/O	TIM8_CH1	ENC1_CHA
175	PI6	I/O	TIM8_CH2	ENC1_CHB

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. SYS

Timebase Source: TIM1

5.2. TIM2

Channel1: PWM Generation CH1

5.2.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**65535 ***
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

5.3. TIM5

Combined Channels: Encoder Mode

5.3.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**4294967295 ***
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)

Encoder:

Encoder Mode	Encoder Mode TI1
____ Parameters for Channel 1 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0
____ Parameters for Channel 2 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0

5.4. TIM8

Combined Channels: Encoder Mode

5.4.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**32767 ***
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0

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)

Encoder:

Encoder Mode	Encoder Mode TI1
____ Parameters for Channel 1 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0
____ Parameters for Channel 2 ____	
Polarity	Rising Edge
IC Selection	Direct

Prescaler Division Ratio	No division
Input Filter	0

5.5. TIM9

Channel1: PWM Generation CH1

5.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**65535 ***
Internal Clock Division (CKD)	No Division

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High

5.6. USART1

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	**100 ***
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
TIM2	PA0-WKUP	TIM2_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOT_EN0
TIM5	PH10	TIM5_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	ENC0_CHA
	PH11	TIM5_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	ENC0_CHB
TIM8	PI5	TIM8_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	ENC1_CHA
	PI6	TIM8_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	ENC1_CHB
TIM9	PA2	TIM9_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	MOT_EN1
USART1	PB6	USART1_TX	Alternate Function Push Pull	Pull-up	**Very High ***	UART1_TX
	PB7	USART1_RX	Alternate Function Push Pull	Pull-up	**Very High ***	UART1_RX
GPIO	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MOT_DIR0
	PH2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MOT_BRAKE0
	PH3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MOT_BRAKE1
	PA3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MOT_DIR1
	PH9	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	ENC0_IND
	PI4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	ENC1_IND

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		
TIM1 break interrupt and TIM9 global interrupt	unused		
TIM2 global interrupt	unused		
USART1 global interrupt	unused		
TIM8 break interrupt and TIM12 global interrupt	unused		
TIM8 update interrupt and TIM13 global interrupt	unused		
TIM8 trigger and commutation interrupts and TIM14 global interrupt	unused		
TIM8 capture compare interrupt	unused		
TIM5 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	STM32F407IGTx
Datasheet	022152_Rev8

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	FirmwarePropulsion0.0
Project Folder	C:\CBot\workspace\FirmwarePropulsion2018\FirmwarePropulsion0.0
Toolchain / IDE	SW4STM32
Firmware Package Name and Version	STM32Cube FW_F4 V1.17.0

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	Yes
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