1. Description

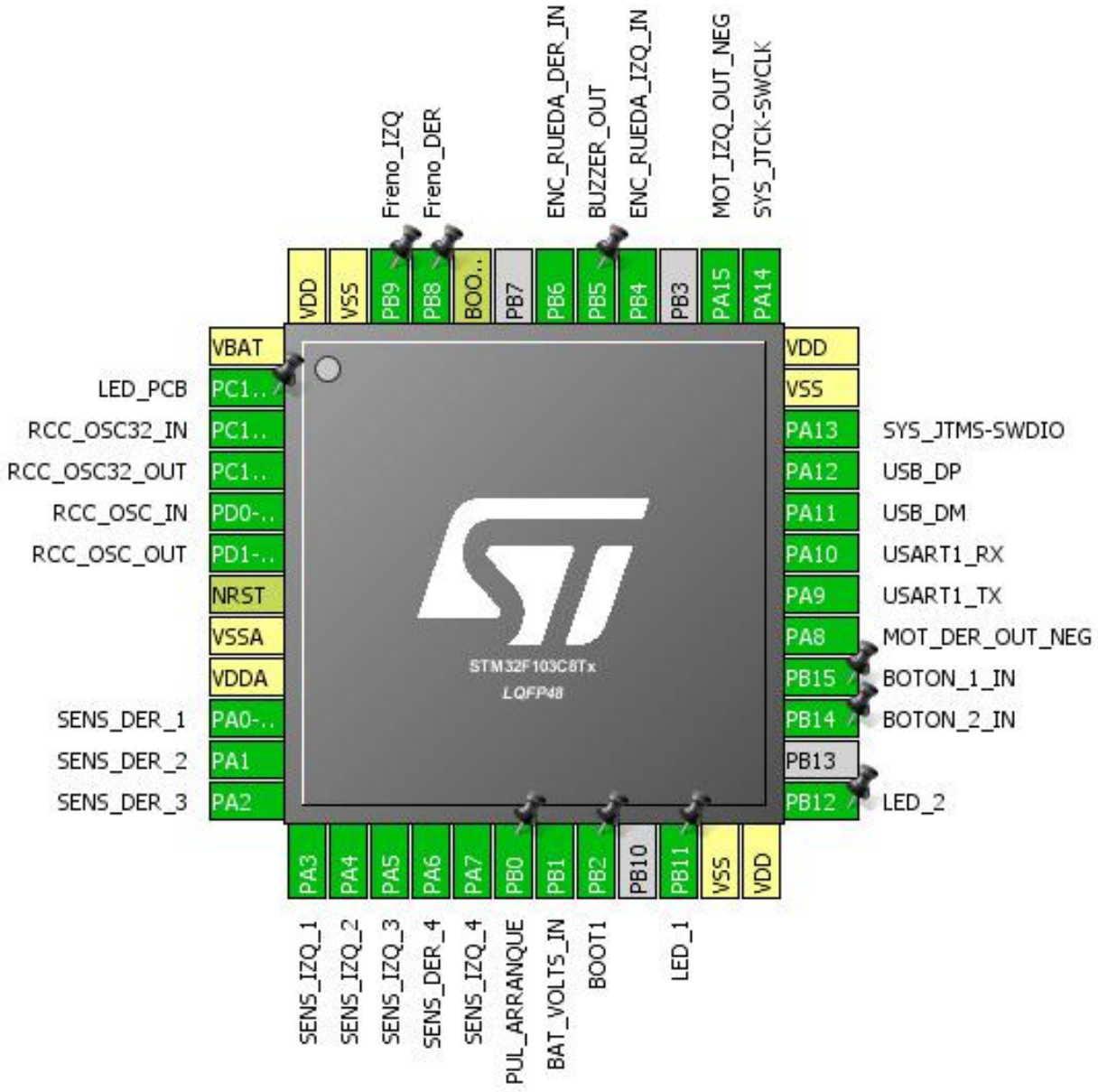
1.1. Project

Project Name	Robot_SL_V1
Board Name	custom
Generated with:	STM32CubeMX 4.26.1
Date	08/12/2018

1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103C8Tx
MCU Package	LQFP48
MCU Pin number	48

2. Pinout Configuration



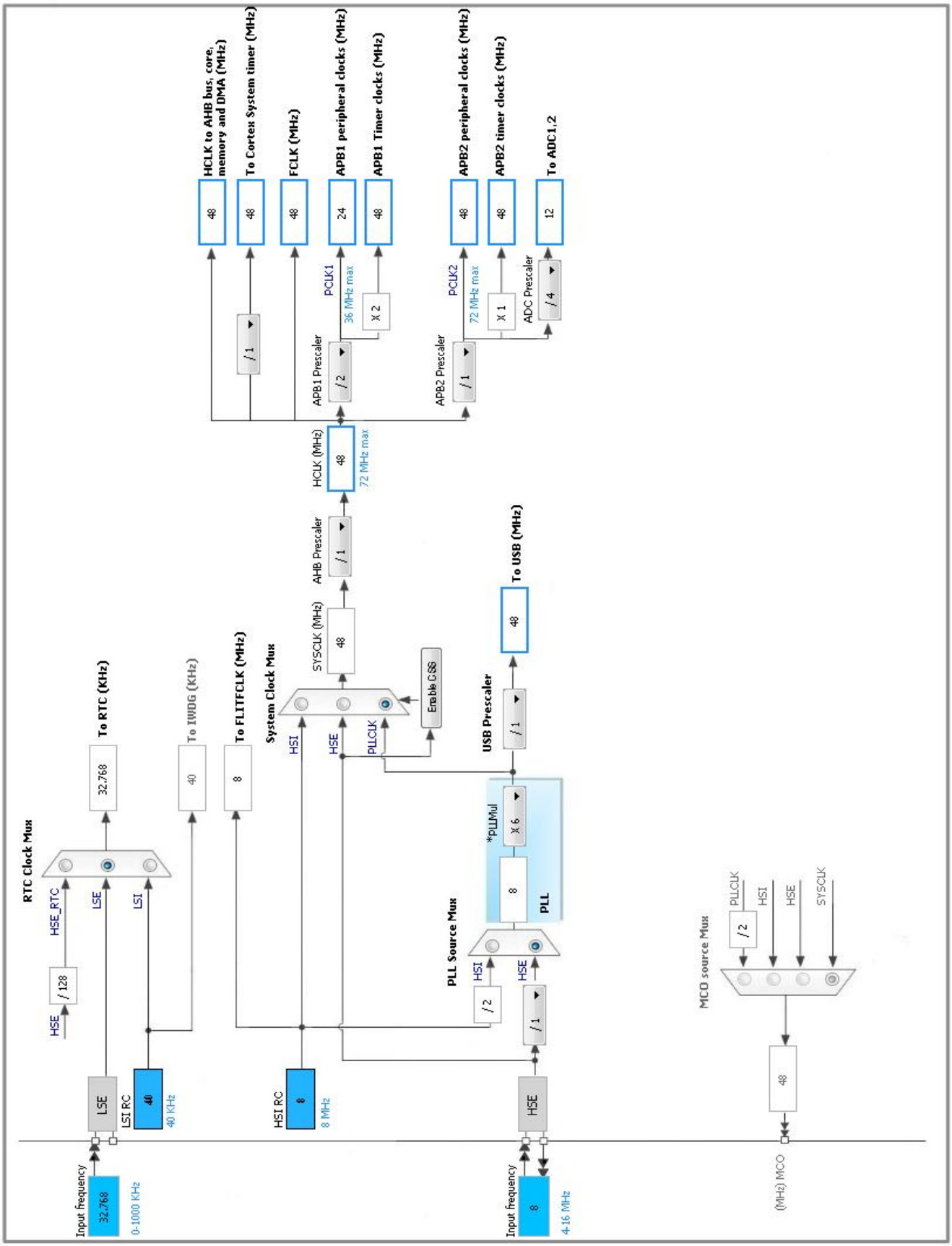
3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-TAMPER-RTC *	I/O	GPIO_Output	LED_PCB
3	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
5	PD0-OSC_IN	I/O	RCC_OSC_IN	
6	PD1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
10	PA0-WKUP	I/O	ADC1_IN0	SENS_DER_1
11	PA1	I/O	ADC1_IN1	SENS_DER_2
12	PA2	I/O	ADC1_IN2	SENS_DER_3
13	PA3	I/O	ADC2_IN3	SENS_IZQ_1
14	PA4	I/O	ADC2_IN4	SENS_IZQ_2
15	PA5	I/O	ADC2_IN5	SENS_IZQ_3
16	PA6	I/O	ADC2_IN6	SENS_DER_4
17	PA7	I/O	ADC2_IN7	SENS_IZQ_4
18	PB0 *	I/O	GPIO_Input	PUL_ARRANQUE
19	PB1	I/O	ADC1_IN9	BAT_VOLTS_IN
20	PB2 *	I/O	GPIO_Input	BOOT1
22	PB11 *	I/O	GPIO_Output	LED_1
23	VSS	Power		
24	VDD	Power		
25	PB12 *	I/O	GPIO_Output	LED_2
27	PB14 *	I/O	GPIO_Input	BOTON_2_IN
28	PB15 *	I/O	GPIO_Input	BOTON_1_IN
29	PA8	I/O	TIM1_CH1	MOT_DER_OUT_NEG
30	PA9	I/O	USART1_TX	
31	PA10	I/O	USART1_RX	
32	PA11	I/O	USB_DM	
33	PA12	I/O	USB_DP	
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		
37	PA14	I/O	SYS_JTCK-SWCLK	
38	PA15	I/O	TIM2_CH1	MOT_IZQ_OUT_NEG

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
40	PB4	I/O	TIM3_CH1	ENC_RUEDA_IZQ_IN
41	PB5 *	I/O	GPIO_Output	BUZZER_OUT
42	PB6	I/O	TIM4_CH1	ENC_RUEDA_DER_IN
44	BOOT0	Boot		
45	PB8 *	I/O	GPIO_Output	Freno_DER
46	PB9 *	I/O	GPIO_Output	Freno_IZQ
47	VSS	Power		
48	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. ADC1

mode: IN0

mode: IN1

mode: IN2

mode: IN9

5.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Data Alignment	Right alignment
Scan Conversion Mode	Enabled
Continuous Conversion Mode	**Enabled ***
Discontinuous Conversion Mode	Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions	Enable
Number Of Conversion	**3 ***
External Trigger Conversion Source	Regular Conversion launched by software
Rank	1
Channel	**Channel 2 ***
Sampling Time	**7.5 Cycles ***
Rank	**2 ***
Channel	**Channel 1 ***
Sampling Time	**7.5 Cycles ***
Rank	**3 ***
Channel	Channel 0
Sampling Time	**7.5 Cycles ***

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

5.2. ADC2

mode: IN3

mode: IN4

mode: IN5

mode: IN6

mode: IN7

5.2.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Data Alignment	Right alignment
Scan Conversion Mode	Enabled
Continuous Conversion Mode	**Enabled ***
Discontinuous Conversion Mode	Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions	Enable
Number Of Conversion	**3 ***
External Trigger Conversion Source	Regular Conversion launched by software
Rank	1
Channel	Channel 3
Sampling Time	**7.5 Cycles ***
Rank	**2 ***
Channel	**Channel 4 ***
Sampling Time	**7.5 Cycles ***
Rank	**3 ***
Channel	**Channel 5 ***
Sampling Time	**7.5 Cycles ***

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

5.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : BYPASS Clock Source

5.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Prefetch Buffer	Enabled
Flash Latency(WS)	1 WS (2 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

5.4. RTC

mode: Activate Clock Source

5.4.1. Parameter Settings:

Calendar Time:

Data Format	BCD data format

General:

Auto Predivider Calculation	Enabled
Asynchronous Predivider value	Automatic Predivider Calculation Enabled
Output	Alarm pulse signal on the TAMPER pin

5.5. SYS

Debug: Serial Wire

Timebase Source: SysTick

5.6. TIM1

Channel1: PWM Generation CH1

5.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**24 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**MOTOR_PWM_STEPS ***
Internal Clock Division (CKD)	No Division

Repetition Counter (RCR - 8 bits value)	0
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High

Break And Dead Time management - Output Configuration:

Automatic Output State	Disable
Off State Selection for Run Mode (OSSR)	Disable
Off State Selection for Idle Mode (OSSI)	Disable
Lock Configuration	Off

PWM Generation Channel 1:

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

5.7. TIM2

Channel1: PWM Generation CH1

5.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**24 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**MOTOR_PWM_STEPS ***
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

PWM Generation Channel 1:

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

5.8. TIM3

mode: Clock Source

Channel1: Input Capture direct mode

5.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	0
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

Input Capture Channel 1:

Polarity Selection	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter (4 bits value)	0

5.9. TIM4

mode: Clock Source

Channel1: Input Capture direct mode

5.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	0
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

Input Capture Channel 1:

Polarity Selection	Rising Edge

IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter (4 bits value)	0

5.10. USART1

Mode: Asynchronous

5.10.1. 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

5.11. USB

mode: Device (FS)

5.11.1. Parameter Settings:

Basic Parameters:

Speed	Full Speed 12MBit/s
Endpoint 0 Max Packet size	8 Bytes

Power Parameters:

Low Power	Disabled
Link Power Management	Disabled
Battery Charging	Disabled

5.12. USB_DEVICE

Class For FS IP: Communication Device Class (Virtual Port Com)

5.12.1. Parameter Settings:

Basic Parameters:

USBD_MAX_NUM_INTERFACES (Maximum number of supported interfaces)	1

USBD_MAX_NUM_CONFIGURATION (Maximum number of supported configuration)	1
USBD_MAX_STR_DESC_SIZ (Maximum size for the string descriptors)	512
USBD_SUPPORT_USER_STRING (Enable user string descriptor)	Disabled
USBD_SELF_POWERED (Enabled self power)	Enabled
USBD_DEBUG_LEVEL (USBD Debug Level)	0: No debug message

Class Parameters:

USB CDC Rx Buffer Size	1000
USB CDC Tx Buffer Size	1000

5.12.2. Device Descriptor:

Device Descriptor:

VID (Vendor IDentifier)	1155
LANGID_STRING (Language Identifier)	English(United States)
MANUFACTURER_STRING (Manufacturer Identifier)	STMicroelectronics

Device Descriptor FS:

PID (Product IDentifier)	22336
PRODUCT_STRING (Product Identifier)	STM32 Virtual ComPort
SERIALNUMBER_STRING (Serial number)	00000000001A
CONFIGURATION_STRING (Configuration Identifier)	CDC Config
INTERFACE_STRING (Interface Identifier)	CDC Interface

*** 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	PA0-WKUP	ADC1_IN0	Analog mode	n/a	n/a	SENS_DER_1
	PA1	ADC1_IN1	Analog mode	n/a	n/a	SENS_DER_2
	PA2	ADC1_IN2	Analog mode	n/a	n/a	SENS_DER_3
	PB1	ADC1_IN9	Analog mode	n/a	n/a	BAT_VOLTS_IN
ADC2	PA3	ADC2_IN3	Analog mode	n/a	n/a	SENS_IZQ_1
	PA4	ADC2_IN4	Analog mode	n/a	n/a	SENS_IZQ_2
	PA5	ADC2_IN5	Analog mode	n/a	n/a	SENS_IZQ_3
	PA6	ADC2_IN6	Analog mode	n/a	n/a	SENS_DER_4
	PA7	ADC2_IN7	Analog mode	n/a	n/a	SENS_IZQ_4
RCC	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PD0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PD1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
TIM1	PA8	TIM1_CH1	Alternate Function Push Pull	n/a	Low	MOT_DER_OUT_NEG
TIM2	PA15	TIM2_CH1	Alternate Function Push Pull	n/a	Low	MOT_IZQ_OUT_NEG
TIM3	PB4	TIM3_CH1	Input mode	No pull-up and no pull-down	n/a	ENC_RUEDA_IZQ_IN
TIM4	PB6	TIM4_CH1	Input mode	No pull-up and no pull-down	n/a	ENC_RUEDA_DER_IN
USART1	PA9	USART1_TX	Alternate Function Push Pull	n/a	**High ***	
	PA10	USART1_RX	Input mode	No pull-up and no pull-down	**n/a**	
USB	PA11	USB_DM	n/a	n/a	n/a	
	PA12	USB_DP	n/a	n/a	n/a	
GPIO	PC13-TAMPER-RTC	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_PCB
	PB0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	PUL_ARRANQUE
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BOOT1
	PB11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_1
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_2

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB14	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BOTON_2_IN
	PB15	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BOTON_1_IN
	PB5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	BUZZER_OUT
	PB8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Freno_DER
	PB9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Freno_IZQ

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
Prefetch 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	0	0
System tick timer	true	0	0
USB low priority or CAN RX0 interrupts	true	0	0
PVD interrupt through EXTI line 16	unused		
RTC global interrupt	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 and ADC2 global interrupts	unused		
USB high priority or CAN TX interrupts	unused		
TIM1 break interrupt	unused		
TIM1 update interrupt	unused		
TIM1 trigger and commutation interrupts	unused		
TIM1 capture compare interrupt	unused		
TIM2 global interrupt	unused		
TIM3 global interrupt	unused		
TIM4 global interrupt	unused		
USART1 global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103C8Tx
Datasheet	13587_Rev17

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	Robot_SL_V1
Project Folder	D:\Users\Cesar\git\SeguidorLinea\Robot_SL_V1
Toolchain / IDE	SW4STM32
Firmware Package Name and Version	STM32Cube FW_F1 V1.6.1

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