1. Description

1.1. Project

Project Name	Car_control
Board Name	NUCLEO-F072RB
Generated with:	STM32CubeMX 6.10.0
Date	02/22/2024

1.2. MCU

MCU Series	STM32F0
MCU Line	STM32F0x2
MCU name	STM32F072RBTx
MCU Package	LQFP64
MCU Pin number	64

1.3. Core(s) information

Core(s)	Arm Cortex-M0

2. Pinout Configuration
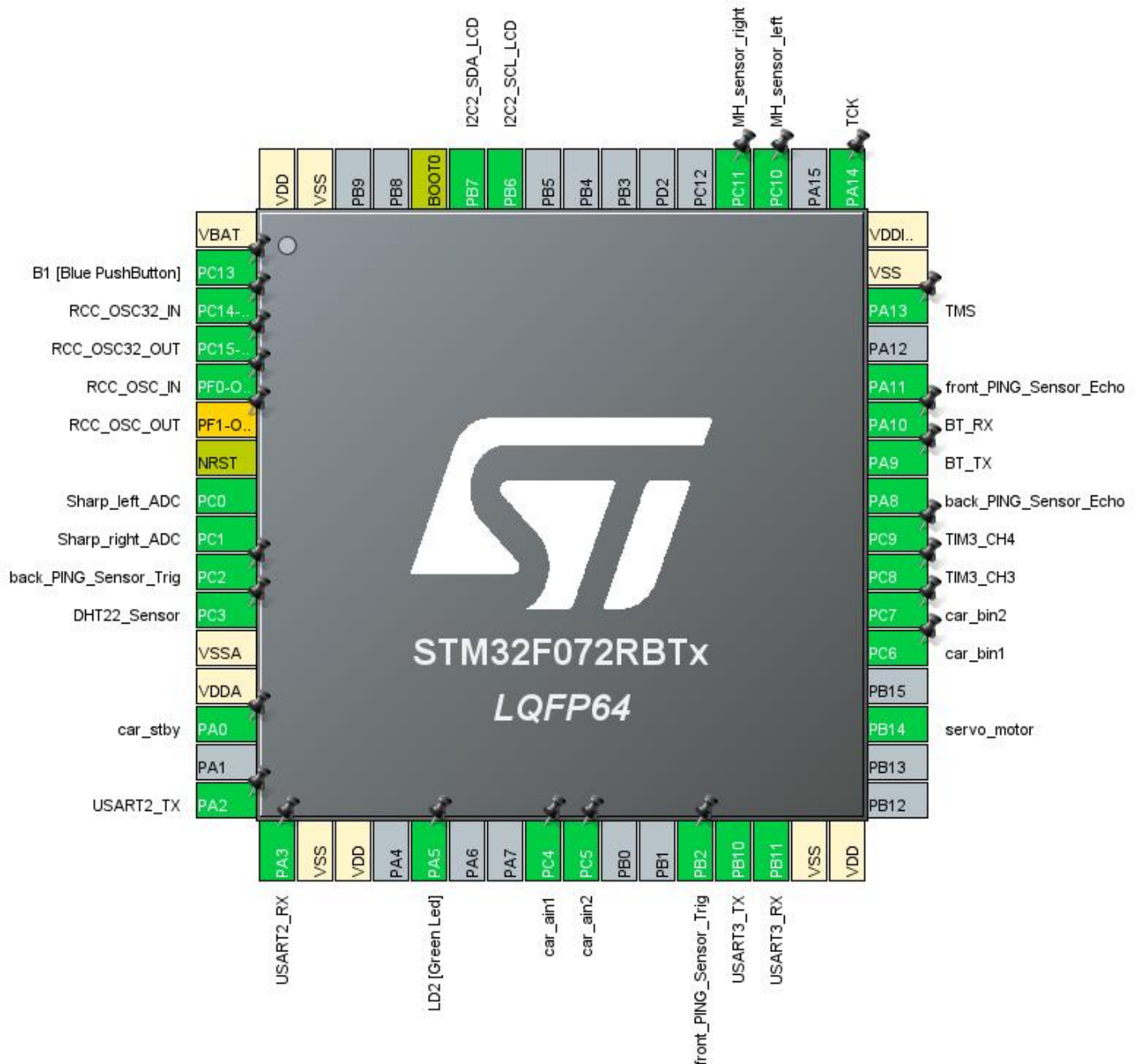
3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13	I/O	GPIO_EXTI13	B1 [Blue PushButton]
3	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
5	PF0-OSC_IN	I/O	RCC_OSC_IN	
6	PF1-OSC_OUT *	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	PC0	I/O	ADC_IN10	Sharp_left_ADC
9	PC1	I/O	ADC_IN11	Sharp_right_ADC
10	PC2 **	I/O	GPIO_Output	back_PING_Sensor_Trig
11	PC3 **	I/O	GPIO_Output	DHT22_Sensor
12	VSSA	Power		
13	VDDA	Power		
14	PA0 **	I/O	GPIO_Output	car_stby
16	PA2	I/O	USART2_TX	USART2_TX
17	PA3	I/O	USART2_RX	USART2_RX
18	VSS	Power		
19	VDD	Power		
21	PA5 **	I/O	GPIO_Output	LD2 [Green Led]
24	PC4 **	I/O	GPIO_Output	car_ain1
25	PC5 **	I/O	GPIO_Output	car_ain2
28	PB2 **	I/O	GPIO_Output	front_PING_Sensor_Trig
29	PB10	I/O	USART3_TX	
30	PB11	I/O	USART3_RX	
31	VSS	Power		
32	VDD	Power		
35	PB14	I/O	TIM15_CH1	servo_motor
37	PC6 **	I/O	GPIO_Output	car_bin1
38	PC7 **	I/O	GPIO_Output	car_bin2
39	PC8	I/O	TIM3_CH3	
40	PC9	I/O	TIM3_CH4	
41	PA8	I/O	TIM1_CH1	back_PING_Sensor_Echo
42	PA9	I/O	USART1_TX	BT_TX
43	PA10	I/O	USART1_RX	BT_RX
44	PA11	I/O	TIM1_CH4	front_PING_Sensor_Echo
46	PA13	I/O	SYS_SWDIO	TMS

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
47	VSS	Power		
48	VDDIO2	Power		
49	PA14	I/O	SYS_SWCLK	TCK
51	PC10	I/O	GPIO_EXTI10	MH_sensor_left
52	PC11	I/O	GPIO_EXTI11	MH_sensor_right
58	PB6	I/O	I2C1_SCL	I2C2_SCL_LCD
59	PB7	I/O	I2C1_SDA	I2C2_SDA_LCD
60	BOOT0	Boot		
63	VSS	Power		
64	VDD	Power		

** The pin is affected with an I/O function
 * The pin is affected with a peripheral function but no peripheral mode is activated

4. Clock Tree Configuration
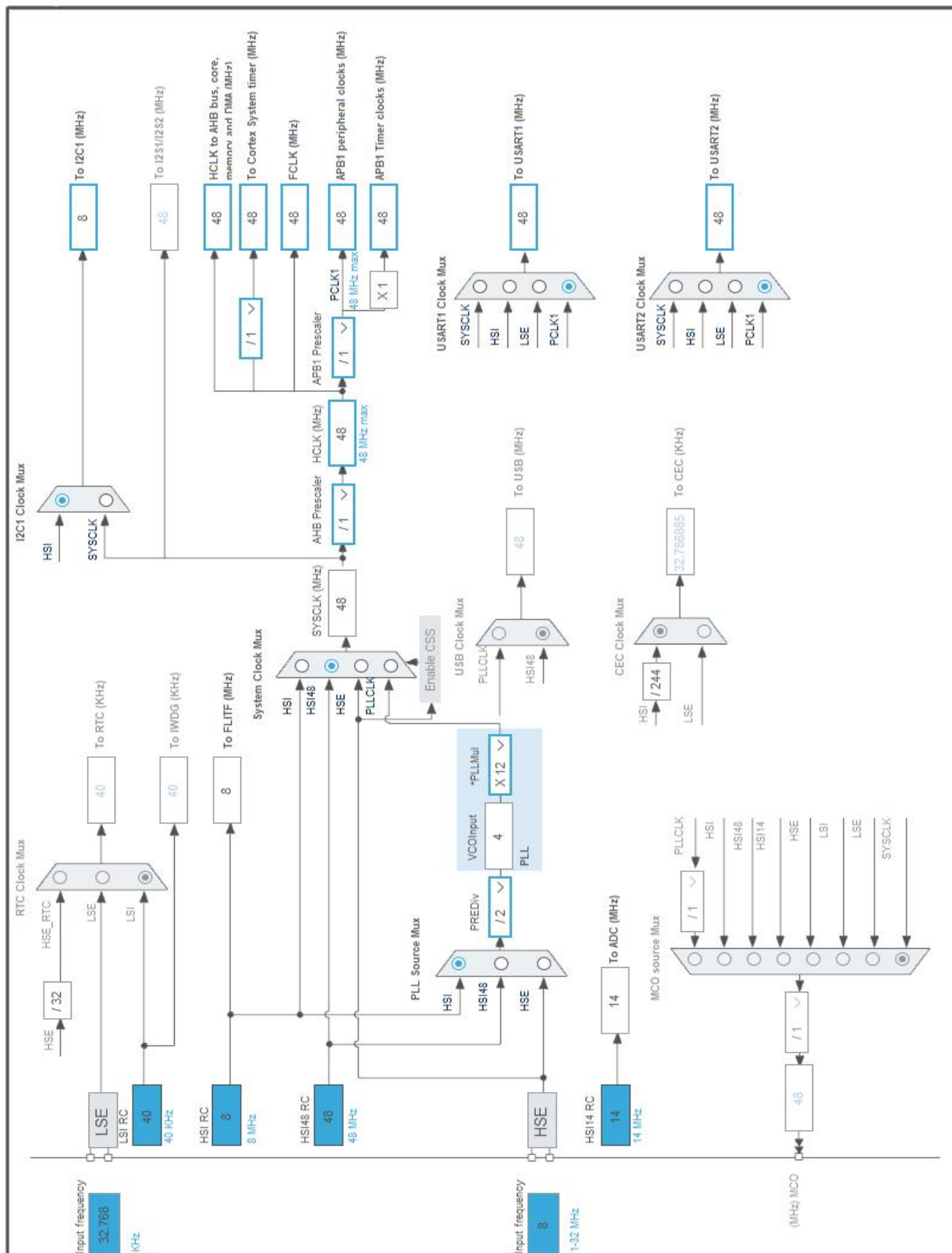
5. Software Project

5.1. Project Settings

Name	Value
Project Name	Car_control
Project Folder	D:\M0\M0_project\Car_control
Toolchain / IDE	MDK-ARM V5.32
Firmware Package Name and Version	STM32Cube FW_F0 V1.11.4
Application Structure	Advanced
Generate Under Root	No
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	Copy all used libraries into the project folder
Generate peripheral initialization as a pair of '.c/.h' files	No
Backup previously generated files when re-generating	No
Keep User Code when re-generating	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No
Enable Full Assert	No

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_TIM3_Init	TIM3
4	MX_USART2_UART_Init	USART2
5	MX_USART1_UART_Init	USART1
6	MX_TIM6_Init	TIM6
7	MX_TIM7_Init	TIM7
8	MX_TIM16_Init	TIM16
9	MX_TIM1_Init	TIM1
10	MX_TIM15_Init	TIM15
11	MX_ADC_Init	ADC

Rank	Function Name	Peripheral Instance Name
12	MX_I2C1_Init	I2C1
13	MX_USART3_UART_Init	USART3

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32F0
Line	STM32F0x2
MCU	STM32F072RBTx
Datasheet	DS9826_Rev5

1.2. Parameter Selection

Temperature	25
Vdd	3.6

1.3. Battery Selection

Battery	Li-SOCL2(A3400)
Capacity	3400.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	100.0 mA
Max Pulse Current	200.0 mA
Cells in series	1
Cells in parallel	1

1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.6	3.6
Voltage Source	Battery	Battery
Range	No Scale	No Scale
Fetch Type	FLASH	n/a
CPU Frequency	48 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LP
Clock Source Frequency	8 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	13.66 mA	6.5 µA
Duration	0.1 ms	0.9 ms
DMIPS	0.0	0.0
Ta Max	102.84	105
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	1.37 mA
Battery Life	3 months, 11 days, 17 hours	Average DMIPS	0.0 DMIPS

1.6. Chart

Consumption Profile by Step
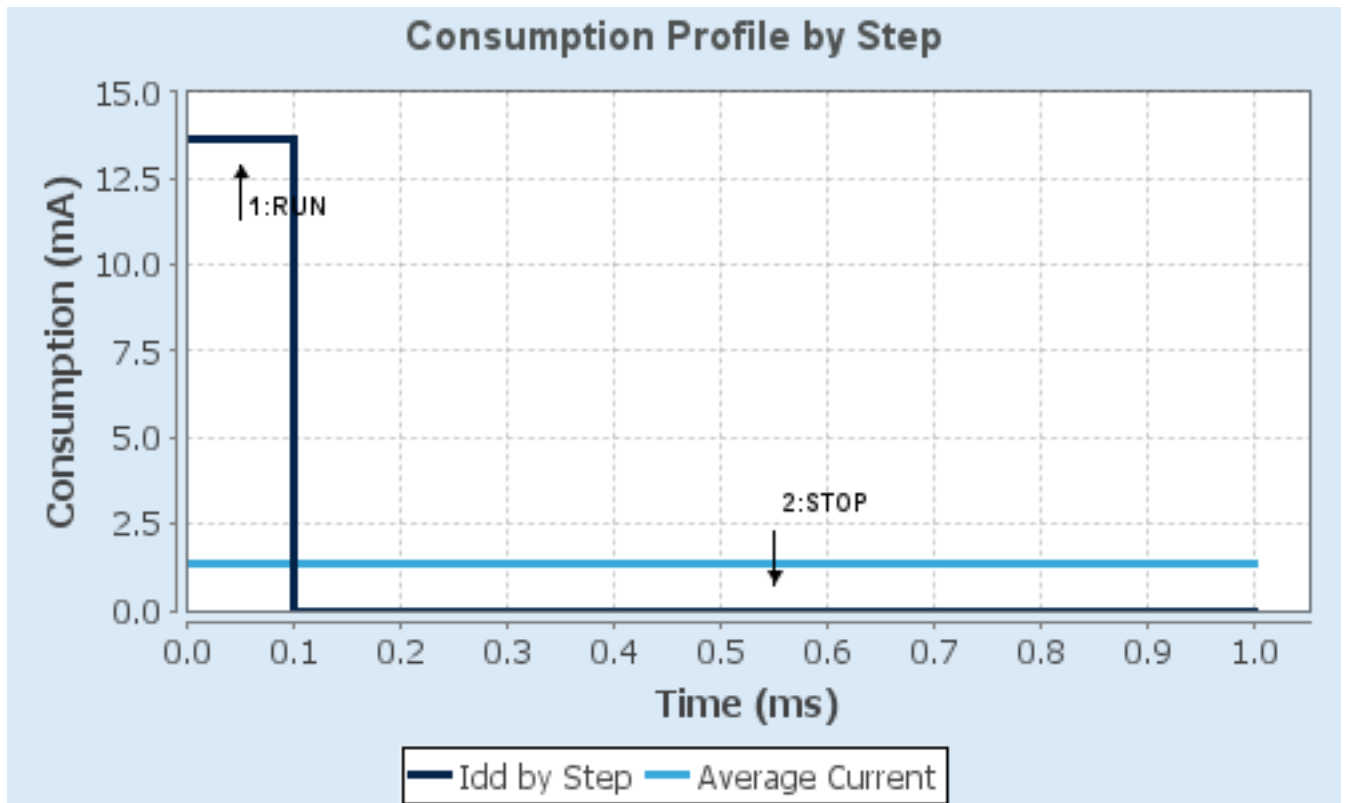
2. Peripherals and Middlewares Configuration

2.1. ADC

mode: IN10

mode: IN11

2.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	Asynchronous clock mode
Resolution	**ADC 10-bit resolution ***
Data Alignment	Right alignment
Scan Conversion Mode	Forward
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	Disabled
End Of Conversion Selection	End of single conversion
Overrun behaviour	Overrun data preserved
Low Power Auto Wait	Disabled
Low Power Auto Power Off	Disabled

ADC_Regular_ConversionMode:

Sampling Time	**7.5 Cycles ***
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None

WatchDog:

Enable Analog WatchDog Mode	false
Low Threshold	0

2.2. I2C1

I2C: I2C

2.2.1. Parameter Settings:

Timing configuration:

I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	0x2000090E

Slave Features:

Clock No Stretch Mode	Disabled
General Call Address Detection	Disabled
Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0

2.3. RCC
High Speed Clock (HSE): BYPASS Clock Source
Low Speed Clock (LSE) : Crystal/Ceramic Resonator
2.3.1. 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
HSI14 Calibration Value	16
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

2.4. SYS
mode: Debug Serial Wire
Timebase Source: SysTick

2.5. TIM1
Channel1: Input Capture direct mode
Channel4: Input Capture direct mode
2.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**48-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**65535-1 ***
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)

Input Capture Channel 1:

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

Input Capture Channel 4:

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

2.6. TIM3
Channel3: PWM Generation CH3
Channel4: PWM Generation CH4
2.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**480-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**100-1 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

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

Clear Input:

Clear Input Source	Disable

PWM Generation Channel 3:

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

PWM Generation Channel 4:

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

2.7. TIM6
mode: Activated
2.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**48-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**1000-1 ***
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)

2.8. TIM7
mode: Activated
2.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**4800-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**1000-1 ***
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)

2.9. TIM15
Channel1: PWM Generation CH1

2.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**960-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**1000-1 ***
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0
auto-reload preload	**Enable ***

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
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

2.10. TIM16
mode: Activated
2.10.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**48-1 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**10-1 ***
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0

auto-reload preload

Enable *

2.11. USART1
Mode: Asynchronous
2.11.1. 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
Single Sample	Disable

Advanced Features:

Auto Baudrate	Disable
TX Pin Active Level Inversion	Disable
RX Pin Active Level Inversion	Disable
Data Inversion	Disable
TX and RX Pins Swapping	Disable
Overrun	**Disable ***
DMA on RX Error	Enable
MSB First	Disable

2.12. USART2
Mode: Asynchronous
2.12.1. Parameter Settings:

Basic Parameters:

Baud Rate	**9600 ***
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples

Single Sample   Disable

Advanced Features:

Auto Baudrate   Disable

TX Pin Active Level Inversion   Disable

RX Pin Active Level Inversion   Disable

Data Inversion   Disable

TX and RX Pins Swapping   Disable

Overrun   Enable

DMA on RX Error   Enable

MSB First   Disable

2.13. USART3

Mode: Asynchronous

2.13.1. Parameter Settings:

Basic Parameters:

Baud Rate   **9600 ***

Word Length   8 Bits (including Parity)

Parity   None

Stop Bits   1

Advanced Parameters:

Data Direction   Receive and Transmit

Over Sampling   16 Samples

Single Sample   Disable

Advanced Features:

TX Pin Active Level Inversion   Disable

RX Pin Active Level Inversion   Disable

Data Inversion   Disable

TX and RX Pins Swapping   Disable

Overrun   Enable

DMA on RX Error   Enable

MSB First   Disable

* User modified value

3. System Configuration

3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC	PC0	ADC_IN10	Analog mode	No pull-up and no pull-down	n/a	Sharp_left_ADC
	PC1	ADC_IN11	Analog mode	No pull-up and no pull-down	n/a	Sharp_right_ADC
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	**High ***	I2C2_SCL_LCD
	PB7	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	**High ***	I2C2_SDA_LCD
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	
	PF0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
SYS	PA13	SYS_SWDIO	n/a	n/a	n/a	TMS
	PA14	SYS_SWCLK	n/a	n/a	n/a	TCK
TIM1	PA8	TIM1_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	back_PING_Sensor_Echo
	PA11	TIM1_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	front_PING_Sensor_Echo
TIM3	PC8	TIM3_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC9	TIM3_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM15	PB14	TIM15_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	servo_motor
USART1	PA9	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	BT_TX
	PA10	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	BT_RX
USART2	PA2	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	USART2_TX
	PA3	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	USART2_RX
USART3	PB10	USART3_TX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
	PB11	USART3_RX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
Single Mapped Signals	PF1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
GPIO	PC13	GPIO_EXTI13	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	B1 [Blue PushButton]
	PC2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	back_PING_Sensor_Trig
	PC3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DHT22_Sensor
	PA0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	car_stby
	PA5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD2 [Green Led]
	PC4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	car_ain1
	PC5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	car_ain2

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	front_PING_Sensor_Trig
	PC6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	car_bin1
	PC7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	car_bin2
	PC10	GPIO_EXTI10	**External Interrupt Mode with Falling edge trigger detection**	**Pull-up ***	n/a	MH_sensor_left
	PC11	GPIO_EXTI11	**External Interrupt Mode with Falling edge trigger detection**	**Pull-up ***	n/a	MH_sensor_right

3.2. DMA configuration

nothing configured in DMA service

3.3. NVIC configuration

3.3.1. NVIC

Interrupt Table	Enable	Preenmption Priority	SubPriority
Non maskable interrupt	true	0	0
Hard fault interrupt	true	0	0
System service call via SWI instruction	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	0	0
EXTI line 4 to 15 interrupts	true	3	0
TIM1 capture compare interrupt	true	0	0
TIM6 global and DAC channel underrun error interrupts	true	1	0
TIM7 global interrupt	true	2	0
TIM16 global interrupt	true	1	0
USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25	true	3	0
PVD and VDDIO2 supply comparator interrupts through EXTI lines 16 and 31	unused		
Flash global interrupt	unused		
RCC and CRS global interrupts	unused		
ADC and COMP interrupts (COMP interrupts through EXTI lines 21 and 22)	unused		
TIM1 break, update, trigger and commutation interrupts	unused		
TIM3 global interrupt	unused		
TIM15 global interrupt	unused		
I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23	unused		
USART2 global interrupt / USART2 wake-up interrupt through EXTI line 26	unused		
USART3 and USART4 global interrupts	unused		

3.3.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false
Hard fault interrupt	false	true	false
System service call via SWI instruction	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
EXTI line 4 to 15 interrupts	false	true	false

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
TIM1 capture compare interrupt	false	true	true
TIM6 global and DAC channel underrun error interrupts	false	true	false
TIM7 global interrupt	false	true	false
TIM16 global interrupt	false	true	false
USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25	false	true	false

* User modified value

4. System Views

4.1. Category view

4.1.1. Current

5. Docs & Resources

Type	Link
IBIS models	https://www.st.com/resource/en/ibis_model/stm32f0_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32f0_svd.zip
Presentations	https://www.st.com/resource/en/product_presentation/gt_stm32f0-l0.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_eval-tools_portfolio.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_stm8_functional-safety-packages.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-usb-c-pd-solutions-presentation.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stsw-stusb010-quick-start.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stsw-stusb014-quick-start-v1.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf
Brochures	https://www.st.com/resource/en/brochure/breveco0518.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32f0.pdf
Brochures	https://www.st.com/resource/en/brochure/products-and-solutions-for-plcs-and-smart-i-os.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Flyers	https://www.st.com/resource/en/flyer/flstmcsuite.pdf
Flyers	https://www.st.com/resource/en/flyer/fldpstpfc11120.pdf
Product Certifications	https://www.st.com/resource/en/certification_document/stm32_authentication_can.pdf

Application Notes https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-and-mpus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an2945-stm8s-and-stm32-mcus-a-consistent-832bit-product-line-for-painless-migration-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3070-managing-the-driver-enable-signal-for-rs485-and-iolink-communications-with-the-stm32s-usart-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3155-usart-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3156-usb-dfu-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3236-increase-the-number-of-touchkeys-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3364-migration-and-compatibility-guidelines-for-stm32-microcontroller-applications-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3371-using-the-hardware-realtime-clock-rtc-in-stm32-f0-f2-f3-f4-and-l1-series-of-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an3960-esd-considerations-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4013-stm32-crossseries-timer-overview-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4067-calibrating-stm32f0x1-stm32f0x2-and-stm32f0x8-lines-internal-rc-oscillators-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4080-getting-started-with-stm32f0x1x2x8-hardware-development-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4088-migrating-between-stm32f1-and-stm32f0-series-microcontrollers-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4099-implementation-of-transmitters-and-receivers-for-infrared-remote-control-protocols-with-mcus-of-the-stm32f0-and-stm32f3-series-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4221-i2c-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4229-how-to-implement-a-vocoder-solution-using-stm32-microcontrollers-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4277-using-stm32-device-pwm-shutdown-features-for-motor-control-and-digital-power-conversion-stmicroelectronics.pdf

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