



1. Description

1.1. Project

Project Name	Lazuli2Sensor
Board Name	custom
Generated with:	STM32CubeMX 6.12.0
Date	08/06/2024

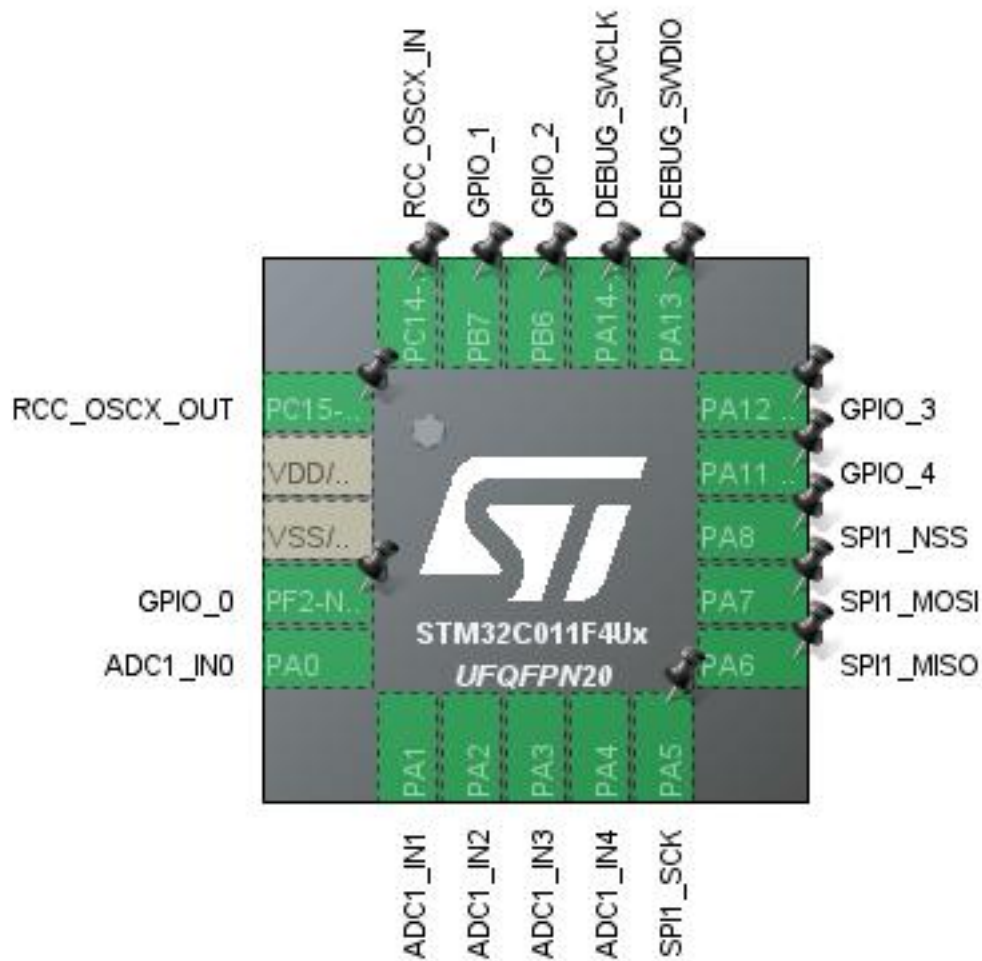
1.2. MCU

MCU Series	STM32C0
MCU Line	STM32C0x1
MCU name	STM32C011F4Ux
MCU Package	UFQFPN20
MCU Pin number	20

1.3. Core(s) information

Core(s)	ARM Cortex-M0+
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2. Pinout Configuration



3. Pins Configuration

Pin Number UFQFPN20	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PC15-OSCX_OUT (PC15)	I/O	RCC_OSCX_OUT	
2	VDD/VDDA	Power		
3	VSS/VSSA	Power		
4	PF2-NRST *	I/O	GPIO_Output	GPIO_0
5	PA0	I/O	ADC1_IN0	
6	PA1	I/O	ADC1_IN1	
7	PA2	I/O	ADC1_IN2	
8	PA3	I/O	ADC1_IN3	
9	PA4	I/O	ADC1_IN4	
10	PA5	I/O	SPI1_SCK	
11	PA6	I/O	SPI1_MISO	
12	PA7	I/O	SPI1_MOSI	
13	PA8	I/O	SPI1_NSS	
14	PA11 [PA9] *	I/O	GPIO_Output	GPIO_4
15	PA12 [PA10] *	I/O	GPIO_Output	GPIO_3
16	PA13	I/O	DEBUG_SWDIO	
17	PA14-BOOT0	I/O	DEBUG_SWCLK	
18	PB6 *	I/O	GPIO_Output	GPIO_2
19	PB7 *	I/O	GPIO_Output	GPIO_1
20	PC14-OSCX_IN (PC14)	I/O	RCC_OSCX_IN	

* The pin is affected with an I/O function

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32C0
Line	STM32C0x1
MCU	STM32C011F4Ux
Datasheet	DS00000_Rev0

1.2. Parameter Selection

Temperature	25
Vdd	3.0

1.3. Battery Selection

Battery	Li-SOCL2(AAA700)
Capacity	700.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	10.0 mA
Max Pulse Current	30.0 mA
Cells in series	1
Cells in parallel	1

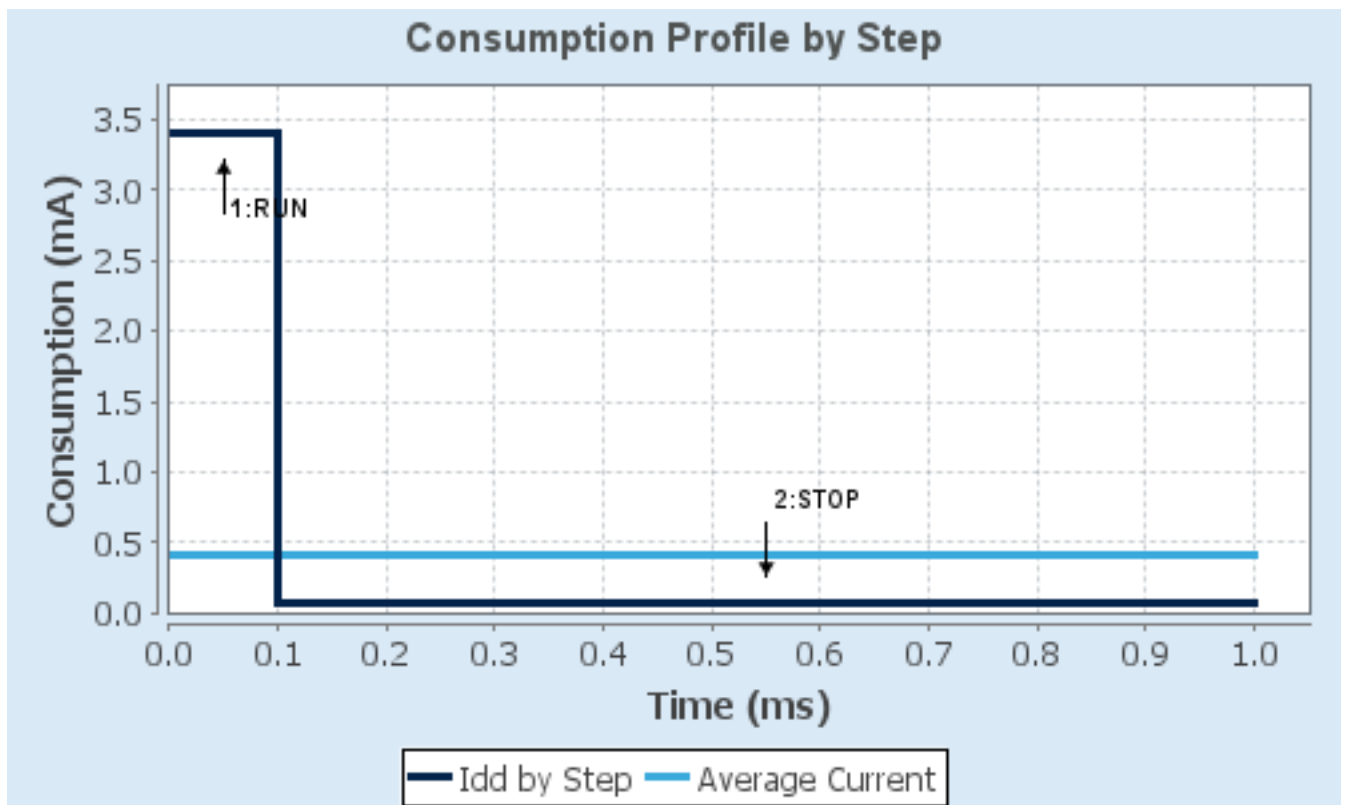
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	NaN/SMPS	NaN/SMPS
Fetch Type	FLASH/PREFETCH	Flash-PowerDownSleep
CPU Frequency	48 MHz	0 Hz
Clock Configuration	HSE	ALL CLOCKS OFF
Clock Source Frequency	48 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	3.4 mA	73.5 μ A
Duration	0.1 ms	0.9 ms
DMIPS	60.0	0.0
Ta Max	104.53	104.99
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	406.15 μ A
Battery Life	2 months, 10 days, 20 hours	Average DMIPS	60.0 DMIPS

1.6. Chart



2. Software Project

2.1. Project Settings

Name	Value
Project Name	Lazuli2Sensor
Project Folder	S:\nextcloud\MicroMouse2\Project\lazuli\STM32CubeMX\Lazuli2Sensor\Lazuli2S
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_C0 V1.2.0
Application Structure	Advanced
Generate Under Root	No
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

2.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	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
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

2.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_DMA_Init	DMA
4	MX_SPI1_Init	SPI1
5	MX_ADC1_Init	ADC1
6	MX_TIM3_Init	TIM3

3. *Peripherals and Middlewares Configuration*

3.1. ADC1

mode: IN0

mode: IN1

mode: IN2

mode: IN3

mode: IN4

3.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	Synchronous clock mode divided by 2
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Sequencer	Sequencer set to not fully configurable
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
Auto Off	Disabled
Oversampling Mode	Disabled

ADC_Regular_ConversionMode:

SamplingTime Common 1	1.5 Cycles
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Trigger Frequency	High frequency

Analog Watchdog 1:

Enable Analog WatchDog1 Mode	false
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Analog Watchdog 2:

1st Channel	None
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Analog Watchdog 3:

1st Channel	None
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3.2. DEBUG

mode: Debug

3.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

3.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.0 *
Instruction Cache	Enabled
Prefetch Buffer	Enabled *
Data Cache	Enabled
Flash Latency(WS)	1 WS (2 CPU cycle)

RCC Parameters:

HSI Calibration Value	64
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

3.4. SPI1

Mode: Full-Duplex Slave

Hardware NSS Signal: Hardware NSS Input Signal

3.4.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Clock Polarity (CPOL)	High *
Clock Phase (CPHA)	2 Edge *

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Input Hardware

3.5. SYS

Timebase Source: SysTick

3.6. TIM3

Clock Source : Internal Clock

3.6.1. 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
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

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

*** User modified value**

4. System Configuration

4.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PA0	ADC1_IN0	Analog mode	No pull-up and no pull-down	n/a	
	PA1	ADC1_IN1	Analog mode	No pull-up and no pull-down	n/a	
	PA2	ADC1_IN2	Analog mode	No pull-up and no pull-down	n/a	
	PA3	ADC1_IN3	Analog mode	No pull-up and no pull-down	n/a	
	PA4	ADC1_IN4	Analog mode	No pull-up and no pull-down	n/a	
DEBUG	PA13	DEBUG_SWDIO	n/a	n/a	n/a	
	PA14-BOOT0	DEBUG_SWCLK	n/a	n/a	n/a	
RCC	PC15-OSCX_OUT (PC15)	RCC_OSCX_OUT T	n/a	n/a	n/a	
	PC14-OSCX_IN (PC14)	RCC_OSCX_IN	n/a	n/a	n/a	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA6	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA8	SPI1_NSS	Alternate Function Push Pull	No pull-up and no pull-down	Low	
GPIO	PF2-NRST	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_0
	PA11 [PA9]	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_4
	PA12 [PA10]	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_3
	PB6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_2
	PB7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPIO_1

4.2. DMA configuration

DMA request	Stream	Direction	Priority
SPI1_RX	DMA1_Channel1	Peripheral To Memory	Very High *
SPI1_TX	DMA1_Channel2	Memory To Peripheral	High *
ADC1	DMA1_Channel3	Peripheral To Memory	Medium *

SPI1_RX: DMA1_Channel1 DMA request Settings:

Mode: Normal
Peripheral Increment: Disable
Memory Increment: **Enable ***
Peripheral Data Width: Byte
Memory Data Width: Byte

SPI1_TX: DMA1_Channel2 DMA request Settings:

Mode: Normal
Peripheral Increment: Disable
Memory Increment: **Enable ***
Peripheral Data Width: Byte
Memory Data Width: Byte

ADC1: DMA1_Channel3 DMA request Settings:

Mode: Normal
Peripheral Increment: Disable
Memory Increment: **Enable ***
Peripheral Data Width: Half Word
Memory Data Width: Half Word

4.3. NVIC configuration

4.3.1. 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	3	0
DMA1 channel 1 interrupt	true	0	0
DMA1 channel 2 and channel 3 interrupts	true	0	0
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 interrupt	unused		
TIM3 global interrupt	unused		
SPI1 interrupt	unused		

4.3.2. 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
DMA1 channel 1 interrupt	false	true	true
DMA1 channel 2 and channel 3 interrupts	false	true	true

* User modified value

5. System Views

5.1. Category view

5.1.1. Current

Middleware							
System Core	Analog	Timers	Connectivity	Multimedia	Computing	Trace and Debug	Power and Thermal
CORTEX_M0+ ✓	ADC1 ✓	TIM3 ✓	SPH ✓			DEBUG ✓	
DMA ✓							
GPIO ✓							
IIVIC ✓							
RCC ✓							
SYS ✓							

6. Docs & Resources

Type	Link
IBIS models	https://www.st.com/resource/en/ibis_model/stm32c0-ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32c0-svd.zip
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf
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Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-entry-level-graphics.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/fldpstpfc11120.pdf
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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
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Application Notes https://www.st.com/resource/en/application_note/an5775-migration-of-applications-from-the-stm8l-and-stm8s-series-to-the-stm32c0-series-microcontrollers-stmicroelectronics.pdf

- Application Notes https://www.st.com/resource/en/application_note/an5673-getting-started-with-stm32c0-series-hardware-development-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an5780-migration-of-applications-from-atmega328-family-to-stm32c0-series-microcontrollers-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an5857-using-xcuberccalib-software-to-calibrate-stm32c0-series-internal-rc-oscillator-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4838-introduction-to-memory-protection-unit-management-on-stm32-mcus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an5225-introduction-to-usb-typec-power-delivery-for-stm32-mcus-and-mpus-stmicroelectronics.pdf
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- Application Notes https://www.st.com/resource/en/application_note/an2548-introduction-to-dma-controller-for-stm32-mcus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4013-introduction-to-timers-for-stm32-mcus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4277-how-to-use-pwm-shutdown-for-motor-control-and-digital-power-conversion-on-stm32-mcus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4759-introduction-to-using-the-hardware-realtime-clock-rtc-and-the-tamper-management-unit-tamp-with-stm32-mcus-stmicroelectronics.pdf
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Technical Notes & Articles	https://www.st.com/resource/en/technical_note/tn1208-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-tssop-and-ssop-packages-stmicroelectronics.pdf
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User Manuals	https://www.st.com/resource/en/user_manual/um3119-stm32c0-series-iec-60730-selftest-library-user-guide-stmicroelectronics.pdf
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