



1. Description

1.1. Project

Project Name	SmartDoorLock
Board Name	NUCLEO-C031C6
Generated with:	STM32CubeMX 6.14.0
Date	04/13/2025

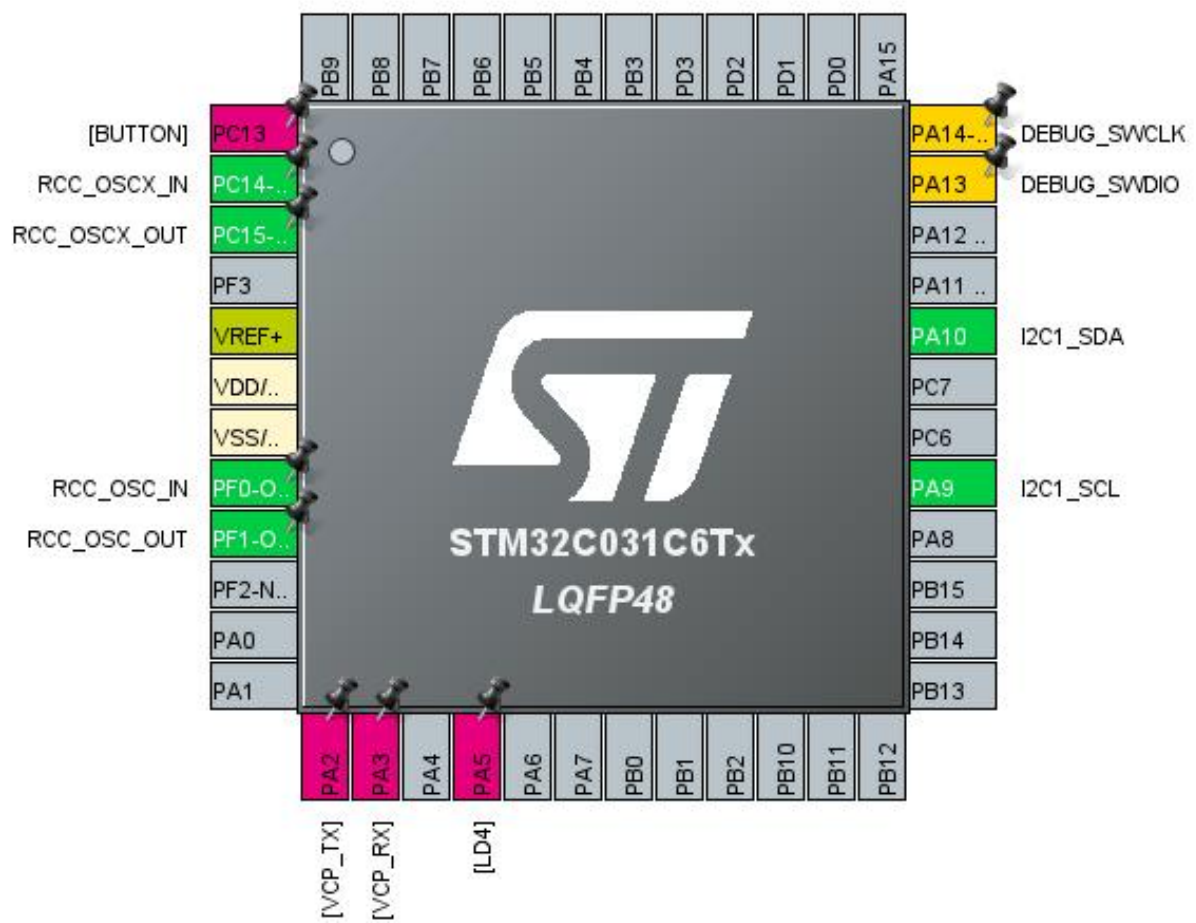
1.2. MCU

MCU Series	STM32C0
MCU Line	STM32C0x1
MCU name	STM32C031C6Tx
MCU Package	LQFP48
MCU Pin number	48

1.3. Core(s) information

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



3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PC13	I/O		
2	PC14-OSCX_IN (PC14)	I/O	RCC_OSCX_IN	RCC_OSCX_IN
3	PC15-OSCX_OUT (PC15)	I/O	RCC_OSCX_OUT	RCC_OSCX_OUT
5	VREF+	MonolO		
6	VDD/VDDA	Power		
7	VSS/VSSA	Power		
8	PF0-OSC_IN (PF0)	I/O	RCC_OSC_IN	RCC_OSC_IN
9	PF1-OSC_OUT (PF1)	I/O	RCC_OSC_OUT	RCC_OSC_OUT
13	PA2	I/O		
14	PA3	I/O		
16	PA5	I/O		
29	PA9	I/O	I2C1_SCL	
32	PA10	I/O	I2C1_SDA	
35	PA13 *	I/O	DEBUG_SWDIO	DEBUG_SWDIO
36	PA14-BOOT0 *	I/O	DEBUG_SWCLK	DEBUG_SWCLK

* The pin is affected with a peripheral function but no peripheral mode is activated

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32C0
Line	STM32C0x1
MCU	STM32C031C6Tx
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

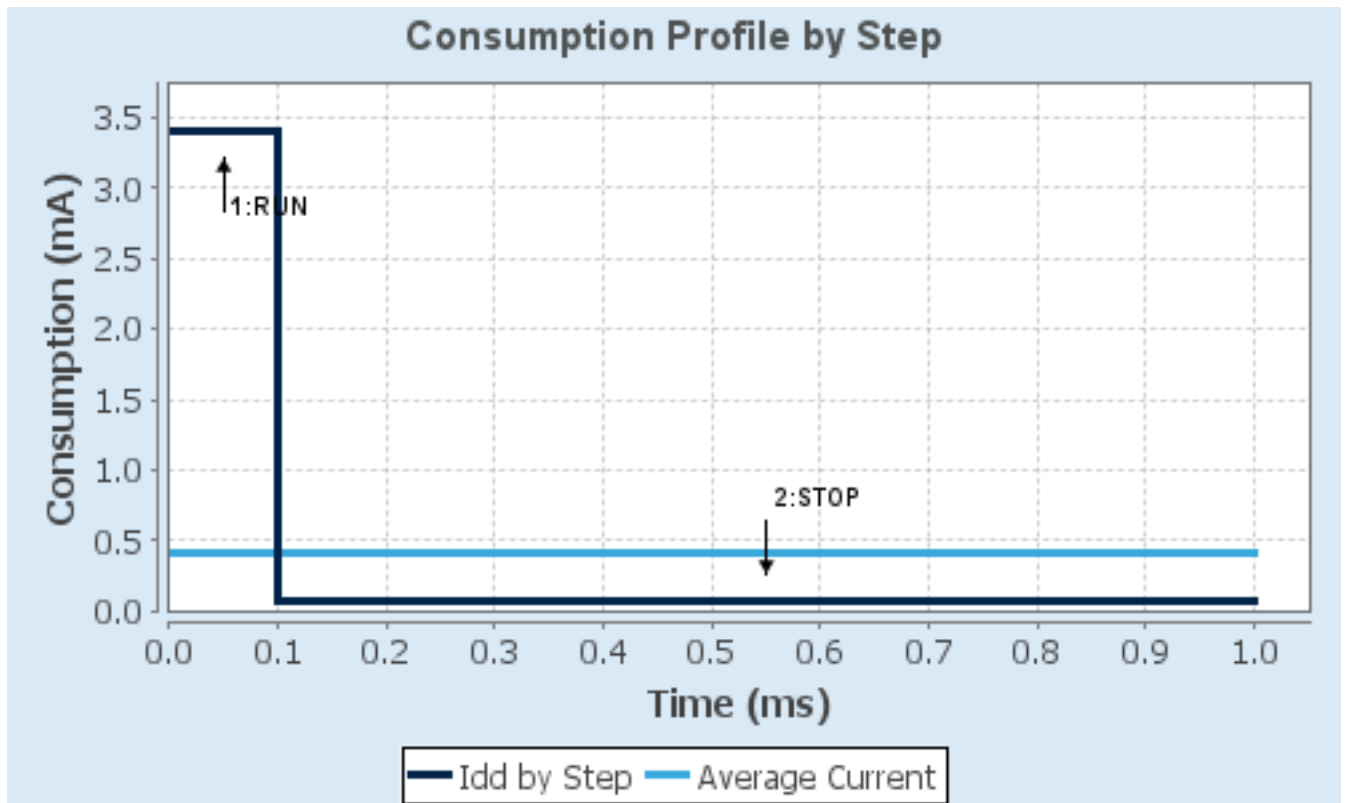
1.4. Sequence

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	SmartDoorLock
Project Folder	D:\School\SmartDoorLock
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_C0 V1.4.0
Application Structure	Advanced
Generate Under Root	Yes
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	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

2.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_I2C1_Init	I2C1

3. Peripherals and Middlewares Configuration

3.1. I2C1

I2C: I2C

3.1.1. Parameter Settings:

Timing configuration:

Custom Timing	Disabled
I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	100
Fall Time (ns)	100
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	0x10805D88 *

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

3.2. NUCLEO-C031C6

mode: Human Machine Interface

3.2.1. Human Machine Interface:

Led:

USER LED GREEN (LD4)	true *
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Button:

USER BUTTON	Mode EXTI *
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VCOM:

Virtual Com Port	true *
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Demonstration code:

Generate demonstration code	Enabled
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3.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

3.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Disabled
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. SYS

Timebase Source: SysTick

*** User modified value**

4. System Configuration

4.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C1	PA9	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	
	PA10	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	
RCC	PC14-OSCX_IN (PC14)	RCC_OSCX_IN	n/a	n/a	n/a	RCC_OSCX_IN
	PC15-OSCX_OUT (PC15)	RCC_OSCX_OUT	n/a	n/a	n/a	RCC_OSCX_OUT
	PF0-OSC_IN (PF0)	RCC_OSC_IN	n/a	n/a	n/a	RCC_OSC_IN
	PF1-OSC_OUT (PF1)	RCC_OSC_OUT	n/a	n/a	n/a	RCC_OSC_OUT
Single Mapped Signals	PA13	DEBUG_SWDIO	n/a	n/a	n/a	DEBUG_SWDIO
	PA14-BOOT0	DEBUG_SWCLK	n/a	n/a	n/a	DEBUG_SWCLK

4.2. DMA configuration

nothing configured in DMA service

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
EXTI line 4 to 15 interrupts	true	0	0
Flash global interrupt	unused		
RCC global interrupt	unused		
I2C1 interrupt (combined with EXTI 23)	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
EXTI line 4 to 15 interrupts	false	true	true

* User modified value

5. System Views

5.1. Category view

5.1.1. Current

Middlewares

System Core	Analog	Timers	Connectivity	Multimedia	Computing	Trace and Debug	Power and Thermal	Bsp
CORTEX_M0+ ✓			I2C1 ✓					NUCLEO-C031... ✓
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
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_software_development_tools.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32c0-series-overview.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-entry-level-graphics.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-graphics-solution-overview.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-graphics-solutions-detailed.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/fldpstpf11120.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32c0.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/an3126-audio-and-

waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf

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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/an4221-i2c-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf

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Application Notes https://www.st.com/resource/en/application_note/an4989-stm32-microcontroller-debug-toolbox-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an5027-interfacing-pdm-digital-microphones-using-stm32-mcus-and-mpus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4899-stm32-microcontroller-gpio-hardware-settings-and-lowpower-consumption-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an5612-esd-protection-of-stm32-mcus-and-mpus-stmicroelectronics.pdf

Application Notes https://www.st.com/resource/en/application_note/an4991-how-to-wake-up-an-stm32-microcontroller-from-lowpower-mode-with-the-usart-or-the-lpuart-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
- Application Notes https://www.st.com/resource/en/application_note/an4894-how-to-use-eeeprom-emulation-on-stm32-mcus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an5036-guidelines-for-thermal-management-on-stm32-applications-stmicroelectronics.pdf
- 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
- Application Notes https://www.st.com/resource/en/application_note/an4908-getting-started-with-uart-automatic-baud-rater-detection-for-stm32-mcus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an5156-introduction-to-security-for-stm32-mcus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an5224-introduction-to-dmamax-for-stm32-mcus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an5543-guidelines-for-enhanced-spi-communication-on-stm32-mcus-and-mpus-stmicroelectronics.pdf

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Datasheet	https://www.st.com/resource/en/datasheet/dm00836012.pdf
Programming Manuals	https://www.st.com/resource/en/programming_manual/pm0223-stm32-cortexm0-mcus-programming-manual-stmicroelectronics.pdf
Reference Manuals	https://www.st.com/resource/en/reference_manual/rm0490-stm32c0-series-advanced-armbased-32bit-mcus-stmicroelectronics.pdf
Technical Notes & Articles	https://www.st.com/resource/en/technical_note/tn1163-description-of-wlcsp-for-microcontrollers-and-recommendations-for-its-use-stmicroelectronics.pdf
Technical Notes & Articles	https://www.st.com/resource/en/technical_note/tn1204-tape-and-reel-shipping-media-for-stm32-microcontrollers-in-bga-packages-stmicroelectronics.pdf
Technical Notes & Articles	https://www.st.com/resource/en/technical_note/tn1205-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-fpn-packages-stmicroelectronics.pdf
Technical Notes & Articles	https://www.st.com/resource/en/technical_note/tn1206-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-qfp-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
User Manuals	https://www.st.com/resource/en/user_manual/um3066-stm32c0-series-safety-manual-stmicroelectronics.pdf
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