

1. Description

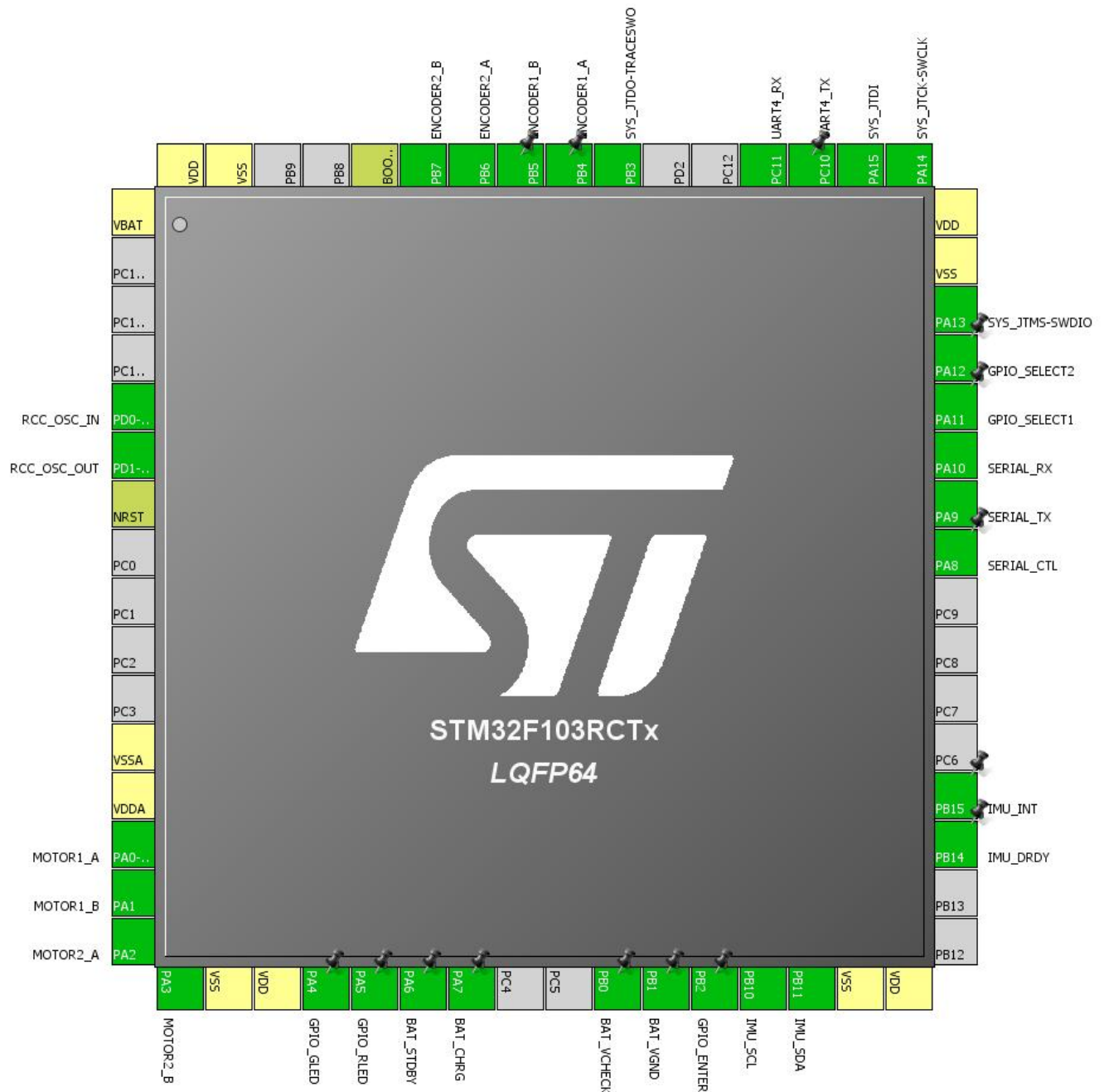
1.1. Project

Project Name	gait_check
Board Name	gait_check
Generated with:	STM32CubeMX 4.16.1
Date	11/02/2016

1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103RCTx
MCU Package	LQFP64
MCU Pin number	64

2. Pinout Configuration



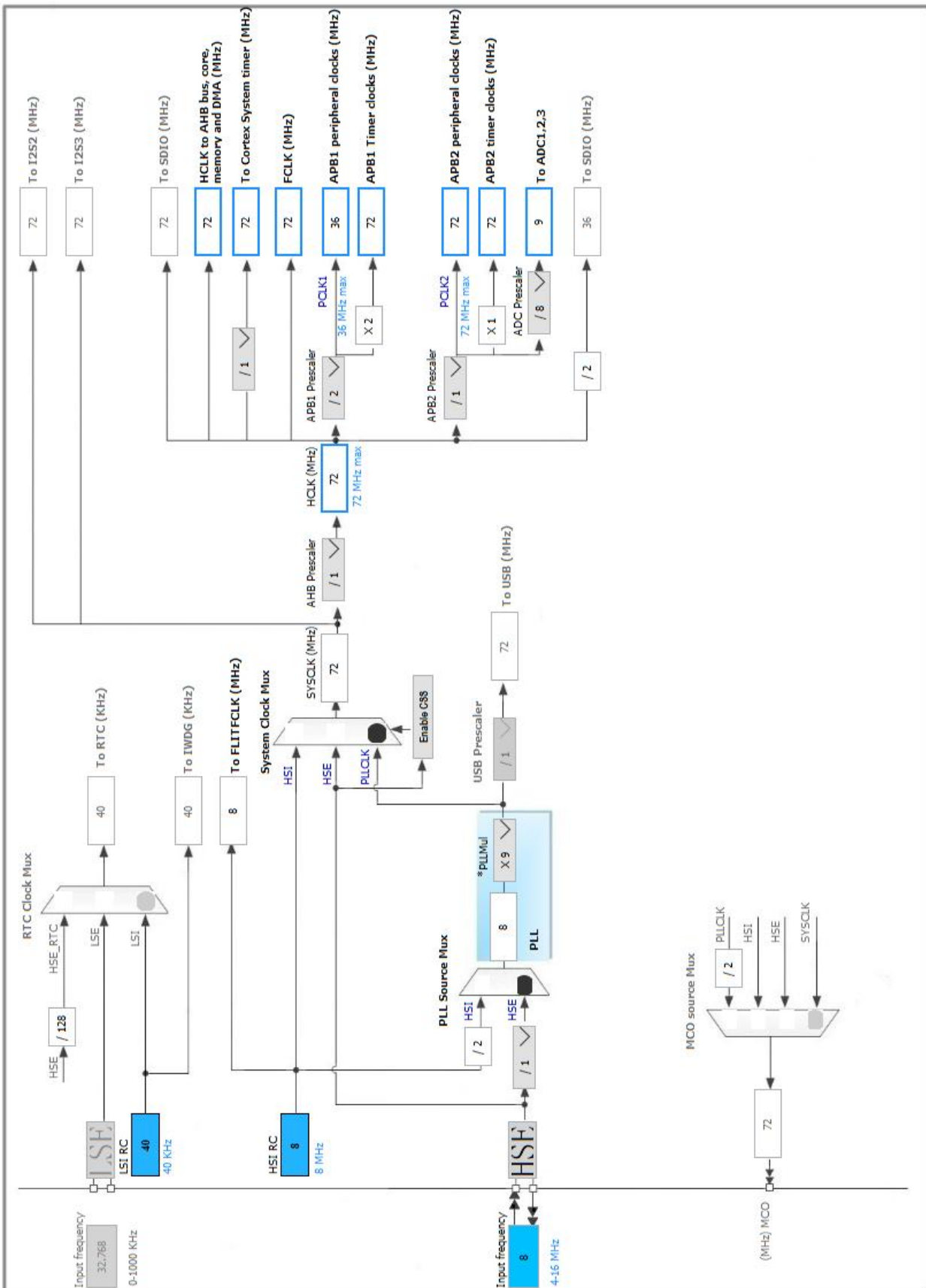
3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
5	PD0-OSC_IN	I/O	RCC_OSC_IN	
6	PD1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
12	VSSA	Power		
13	VDDA	Power		
14	PA0-WKUP	I/O	TIM2_CH1	MOTOR1_A
15	PA1	I/O	TIM2_CH2	MOTOR1_B
16	PA2	I/O	TIM2_CH3	MOTOR2_A
17	PA3	I/O	TIM2_CH4	MOTOR2_B
18	VSS	Power		
19	VDD	Power		
20	PA4 *	I/O	GPIO_Output	GPIO_GLED
21	PA5 *	I/O	GPIO_Output	GPIO_RLED
22	PA6 *	I/O	GPIO_Input	BAT_STDBY
23	PA7 *	I/O	GPIO_Input	BAT_CHRG
26	PB0	I/O	ADC1_IN8	BAT_VCHECK
27	PB1 *	I/O	GPIO_Output	BAT_VGND
28	PB2 *	I/O	GPIO_Input	GPIO_ENTER
29	PB10	I/O	I2C2_SCL	IMU_SCL
30	PB11	I/O	I2C2_SDA	IMU_SDA
31	VSS	Power		
32	VDD	Power		
35	PB14 *	I/O	GPIO_Input	IMU_DRDY
36	PB15 *	I/O	GPIO_Input	IMU_INT
41	PA8 *	I/O	GPIO_Output	SERIAL_CTL
42	PA9	I/O	USART1_TX	SERIAL_TX
43	PA10	I/O	USART1_RX	SERIAL_RX
44	PA11 *	I/O	GPIO_Input	GPIO_SELECT1
45	PA12 *	I/O	GPIO_Input	GPIO_SELECT2
46	PA13	I/O	SYS_JTMS-SWDIO	
47	VSS	Power		
48	VDD	Power		
49	PA14	I/O	SYS_JTCK-SWCLK	
50	PA15	I/O	SYS_JTDI	
51	PC10	I/O	UART4_TX	

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
52	PC11	I/O	UART4_RX	
55	PB3	I/O	SYS_JTDO-TRACESWO	
56	PB4	I/O	TIM3_CH1	ENCODER1_A
57	PB5	I/O	TIM3_CH2	ENCODER1_B
58	PB6	I/O	TIM4_CH1	ENCODER2_A
59	PB7	I/O	TIM4_CH2	ENCODER2_B
60	BOOT0	Boot		
63	VSS	Power		
64	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. ADC1

mode: IN8

5.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode Independent mode

ADC_Settings:

Data Alignment Left alignment *

Scan Conversion Mode Disabled

Continuous Conversion Mode Disabled

Discontinuous Conversion Mode Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions Enable

Number Of Conversion 1

External Trigger Conversion Edge None

Rank 1

Channel Channel 8

Sampling Time 239.5 Cycles *

ADC_Injected_ConversionMode:

Number Of Conversions 0

WatchDog:

Enable Analog WatchDog Mode false

5.2. I2C2

I2C: I2C

5.2.1. Parameter Settings:

Master Features:

I2C Speed Mode Standard Mode

I2C Clock Speed (Hz) 100000

Slave Features:

Clock No Stretch Mode Disabled

Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0
General Call address detection	Disabled

5.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Prefetch Buffer	Enabled
Flash Latency(WS)	2 WS (3 CPU cycle)

RCC Parameters:

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

5.4. SYS

Debug: JTAG (4 pins)

Timebase Source: SysTick

5.5. TIM2

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

5.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	7200 *

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 (16 bits value)	0
Fast Mode	Disable
CH Polarity	High
PWM Generation Channel 2:	
Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High
PWM Generation Channel 3:	
Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High
PWM Generation Channel 4:	
Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High

5.6. TIM3

Combined Channels: Encoder Mode

5.6.1. 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

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 and TI2 *
____ 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

5.7. TIM4

Combined Channels: Encoder Mode

5.7.1. 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

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 and TI2 *
____ 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

5.8. UART4

Mode: Asynchronous

5.8.1. 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

5.9. USART1

Mode: Asynchronous

5.9.1. 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

* 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	PB0	ADC1_IN8	Analog mode	n/a	n/a	BAT_VCHECK
I2C2	PB10	I2C2_SCL	Alternate Function Open Drain	n/a	High *	IMU_SCL
	PB11	I2C2_SDA	Alternate Function Open Drain	n/a	High *	IMU_SDA
RCC	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	
	PA15	SYS_JTDI	n/a	n/a	n/a	
	PB3	SYS_JTDO-TRACESWO	n/a	n/a	n/a	
TIM2	PA0-WKUP	TIM2_CH1	Alternate Function Push Pull	n/a	Low	MOTOR1_A
	PA1	TIM2_CH2	Alternate Function Push Pull	n/a	Low	MOTOR1_B
	PA2	TIM2_CH3	Alternate Function Push Pull	n/a	Low	MOTOR2_A
	PA3	TIM2_CH4	Alternate Function Push Pull	n/a	Low	MOTOR2_B
TIM3	PB4	TIM3_CH1	Input mode	No pull-up and no pull-down	n/a	ENCODER1_A
	PB5	TIM3_CH2	Input mode	No pull-up and no pull-down	n/a	ENCODER1_B
TIM4	PB6	TIM4_CH1	Input mode	No pull-up and no pull-down	n/a	ENCODER2_A
	PB7	TIM4_CH2	Input mode	No pull-up and no pull-down	n/a	ENCODER2_B
UART4	PC10	UART4_TX	Alternate Function Push Pull	n/a	High *	
	PC11	UART4_RX	Input mode	No pull-up and no pull-down	n/a	
USART1	PA9	USART1_TX	Alternate Function Push Pull	n/a	High *	SERIAL_TX
	PA10	USART1_RX	Input mode	No pull-up and no pull-down	n/a	SERIAL_RX
GPIO	PA4	GPIO_Output	Output Push Pull	n/a	Low	GPIO_GLED
	PA5	GPIO_Output	Output Push Pull	n/a	Low	GPIO_RLED
	PA6	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BAT_STDBY
	PA7	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BAT_CHRG
	PB1	GPIO_Output	Output Open Drain *	n/a	Low	BAT_VGND
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPIO_ENTER

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	IMU_DRDY
	PB15	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	IMU_INT
	PA8	GPIO_Output	Output Push Pull	n/a	Low	SERIAL_CTL
	PA11	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPIO_SELECT1
	PA12	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPIO_SELECT2

6.2. DMA configuration

DMA request	Stream	Direction	Priority
USART1_RX	DMA1_Channel5	Peripheral To Memory	High *
USART1_TX	DMA1_Channel4	Memory To Peripheral	Medium *
MENTOMEM	DMA1_Channel1	Memory To Memory	Low

USART1_RX: DMA1_Channel5 DMA request Settings:

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

USART1_TX: DMA1_Channel4 DMA request Settings:

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

MENTOMEM: DMA1_Channel1 DMA request Settings:

Mode: Normal
 Src Memory Increment: **Enable ***
 Dst Memory Increment: **Enable ***
 Src Memory Data Width: Byte
 Dst Memory Data Width: Byte

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
DMA1 channel4 global interrupt	true	0	0
DMA1 channel5 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
DMA1 channel1 global interrupt	unused		
ADC1 and ADC2 global interrupts	unused		
TIM2 global interrupt	unused		
TIM3 global interrupt	unused		
TIM4 global interrupt	unused		
I2C2 event interrupt	unused		
I2C2 error interrupt	unused		
USART1 global interrupt	unused		
UART4 global interrupt	unused		

* User modified value

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103RCTx
Datasheet	14611_Rev12

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	gait_check
Project Folder	F:\learning\huake\gait_check\gait_check
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F1 V1.4.0

8.2. Code Generation Settings

Name	Value
STM32Cube Firmware Library Package	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
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No