1. Description

1.1. Project

Project Name	batLearn
Board Name	batLearn
Generated with:	STM32CubeMX 4.24.0
Date	03/12/2018

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407VGTx
MCU Package	LQFP100
MCU Pin number	100

2. Pinout Configuration

STM32F407VGTx
LQFP100
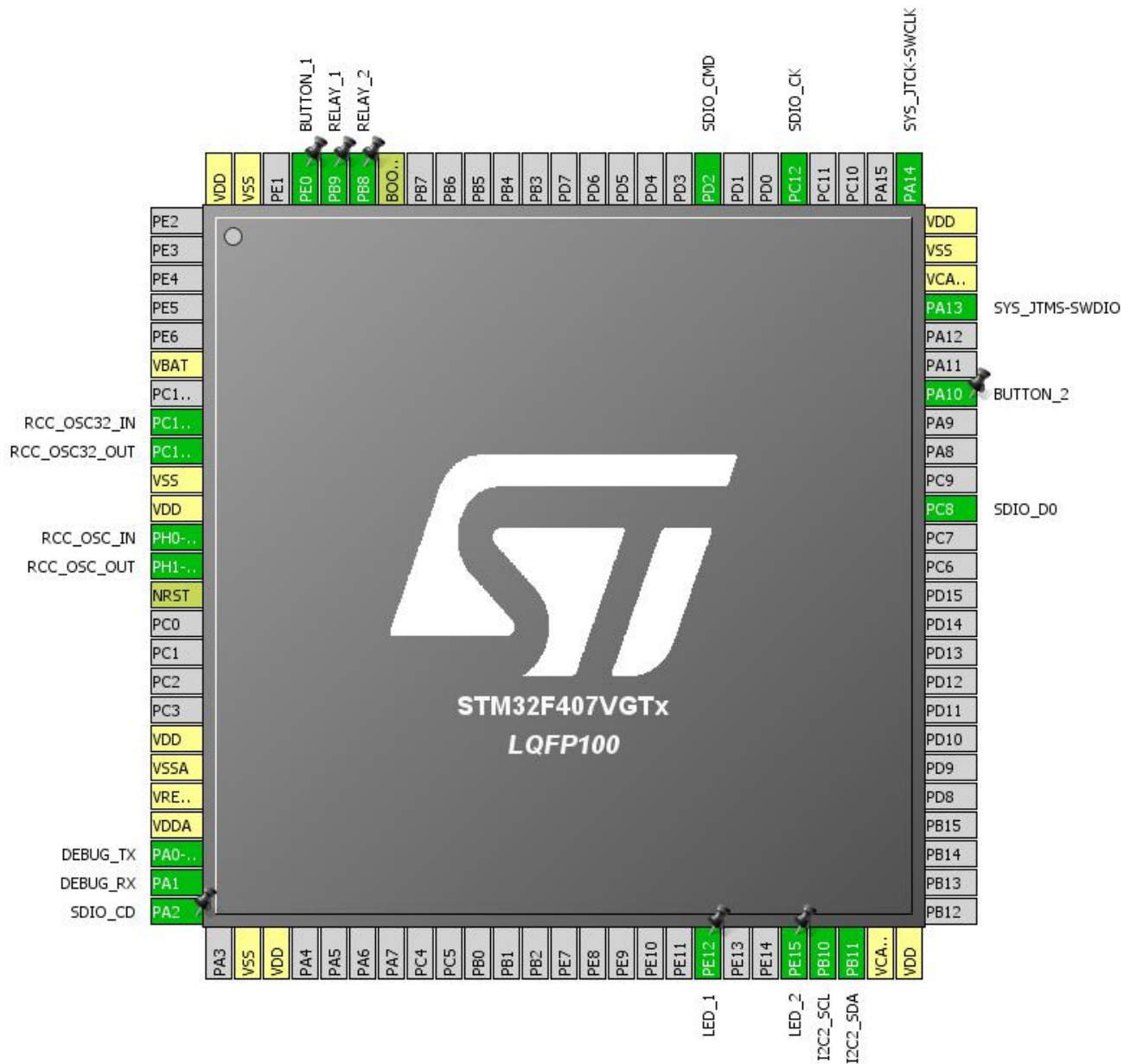
3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
8	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
9	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN	I/O	RCC_OSC_IN	
13	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
14	NRST	Reset		
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP	I/O	UART4_TX	DEBUG_TX
24	PA1	I/O	UART4_RX	DEBUG_RX
25	PA2 *	I/O	GPIO_Input	SDIO_CD
27	VSS	Power		
28	VDD	Power		
43	PE12 *	I/O	GPIO_Output	LED_1
46	PE15 *	I/O	GPIO_Output	LED_2
47	PB10	I/O	I2C2_SCL	
48	PB11	I/O	I2C2_SDA	
49	VCAP_1	Power		
50	VDD	Power		
65	PC8	I/O	SDIO_D0	
69	PA10	I/O	GPIO_EXTI10	BUTTON_2
72	PA13	I/O	SYS_JTMS-SWDIO	
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
76	PA14	I/O	SYS_JTCK-SWCLK	
80	PC12	I/O	SDIO_CK	
83	PD2	I/O	SDIO_CMD	
94	BOOT0	Boot		
95	PB8 *	I/O	GPIO_Output	RELAY_2
96	PB9 *	I/O	GPIO_Output	RELAY_1
97	PE0	I/O	GPIO_EXTI0	BUTTON_1

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration
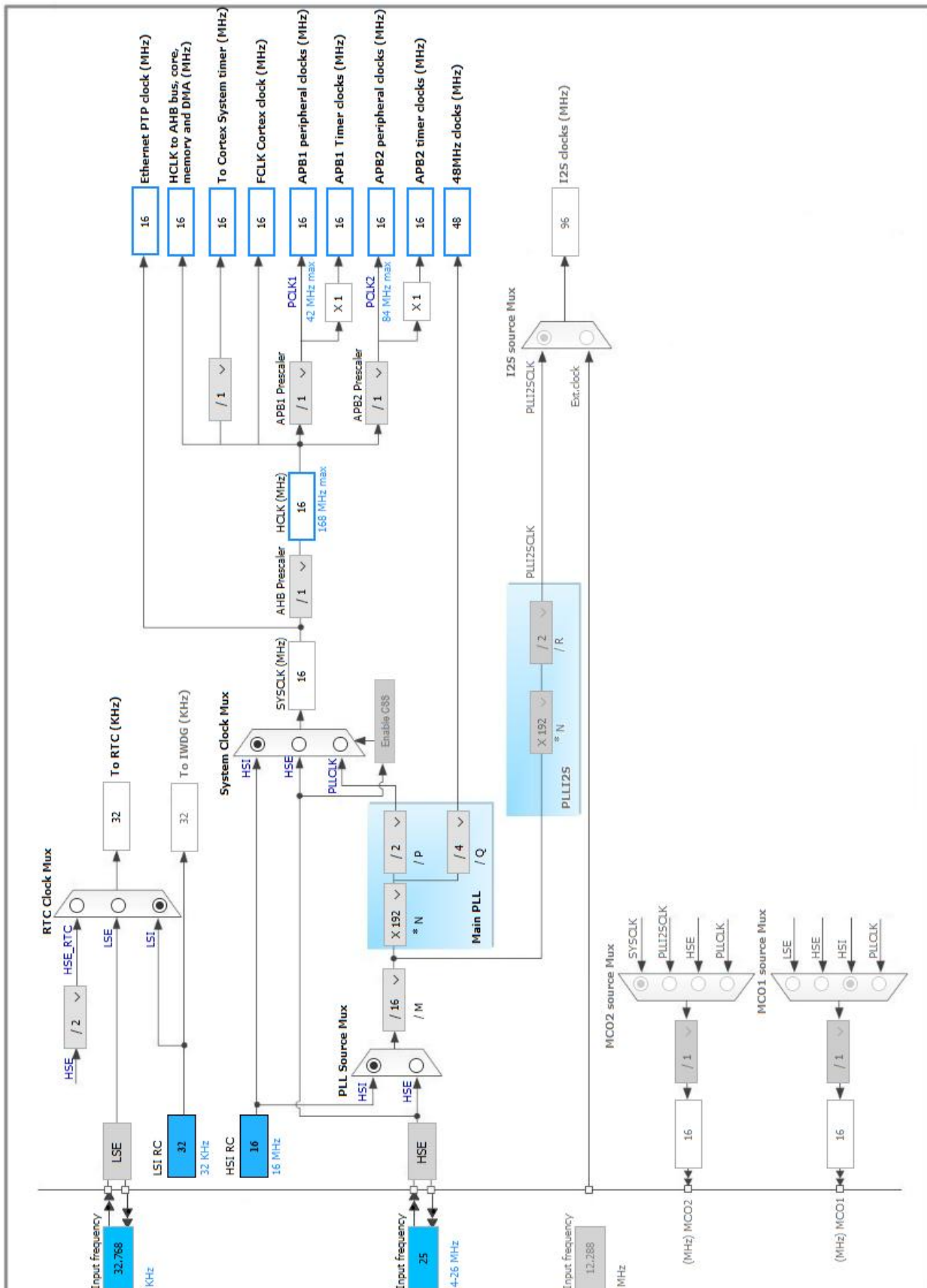
5. IPs and Middleware Configuration

5.1. I2C2
I2C: I2C

5.1.1. Parameter Settings:

Master Features:

I2C Speed Mode	**Fast Mode** *
I2C Clock Speed (Hz)	400000
Fast Mode Duty Cycle	Duty cycle Tlow/Thigh = 2

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

5.2. RCC
High Speed Clock (HSE): Crystal/Ceramic Resonator
Low Speed Clock (LSE) : Crystal/Ceramic Resonator

5.2.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	0 WS (1 CPU cycle)

RCC Parameters:

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

Power Parameters:

Power Regulatror Voltage Scale	Power Regulator Voltage Scale 1

5.3. RTC

mode: Activate Clock Source

5.3.1. Parameter Settings:

General:

Hour Format	Hourformat 24
Asynchronous Predivider value	127
Synchronous Predivider value	255

5.4. SDIO

Mode: SD 1 bit

5.4.1. Parameter Settings:

SDIO parameters:

Clock transition on which the bit capture is made	Rising transition
SDIO Clock divider bypass	Disable
SDIO Clock output enable when the bus is idle	Disable the power save for the clock
SDIO hardware flow control	The hardware control flow is disabled
SDIOCLK clock divide factor	0

5.5. SYS

Debug: Serial Wire
Timebase Source: SysTick

5.6. TIM6

mode: Activated

5.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)

15999 *

Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**999 ***

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)

5.7. TIM7

mode: Activated

5.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**159 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**99 ***

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)

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. FATFS

mode: SD Card

5.9.1. Set Defines:

Version:

FATFS version	R0.12c

Function Parameters:

FS_READONLY (Read-only mode)	Disabled
FS_MINIMIZE (Minimization level)	Disabled
USE_STRFUNC (String functions)	Enabled with LF -> CRLF conversion
USE_FIND (Find functions)	Disabled
USE_MKFS (Make filesystem function)	Enabled
USE_FASTSEEK (Fast seek function)	Enabled
USE_EXPAND (Use f_expand function)	Disabled
USE_CHMOD (Change attributes function)	Disabled
USE_LABEL (Volume label functions)	**Enabled ***
USE_FORWARD (Forward function)	Disabled

Locale and Namespace Parameters:

CODE_PAGE (Code page on target)	Latin 1
USE_LFN (Use Long Filename)	Disabled
MAX_LFN (Max Long Filename)	255
LFN_UNICODE (Enable Unicode)	ANSI/OEM
STRF_ENCODE (Character encoding)	UTF-8
FS_RPATH (Relative Path)	Disabled

Physical Drive Parameters:

VOLUMES (Logical drives)	1
MAX_SS (Maximum Sector Size)	512
MIN_SS (Minimum Sector Size)	512
MULTI_PARTITION (Volume partitions feature)	Disabled
USE_TRIM (Erase feature)	Disabled
FS_NOFSINFO (Force full FAT scan)	0

System Parameters:

FS_TINY (Tiny mode)	Disabled
FS_EXFAT (Support of exFAT file system)	Disabled
FS_NORTC (Timestamp feature)	Dynamic timestamp
NORTC_YEAR (Year for timestamp)	2015
NORTC_MON (Month for timestamp)	6
NORTC_MDAY (Day for timestamp)	4
FS_REENTRANT (Re-Entrancy)	Disabled
FS_TIMEOUT (Timeout ticks)	1000
SYNC_t (O/S sync object)	osSemaphoreId

FS_LOCK (Number of files opened simultaneously)   2

5.9.2. IPs instances:

SDIO/SDMMC:

SDIO instance   SDIO

Use dma template   Enabled

* User modified value

6. System Configuration

6.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C2	PB10	I2C2_SCL	Alternate Function Open Drain	Pull-up	**Very High** *	
	PB11	I2C2_SDA	Alternate Function Open Drain	Pull-up	**Very High** *	
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	
	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SDIO	PC8	SDIO_D0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC12	SDIO_CK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD2	SDIO_CMD	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
UART4	PA0-WKUP	UART4_TX	Alternate Function Push Pull	Pull-up	**Very High** *	DEBUG_TX
	PA1	UART4_RX	Alternate Function Push Pull	Pull-up	**Very High** *	DEBUG_RX
GPIO	PA2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SDIO_CD
	PE12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_1
	PE15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_2
	PA10	GPIO_EXTI10	**External Interrupt Mode with Rising/Falling edge**	No pull-up and no pull-down	n/a	BUTTON_2
	PB8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RELAY_2
	PB9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RELAY_1
	PE0	GPIO_EXTI0	**External Interrupt Mode with**	No pull-up and no pull-down	n/a	BUTTON_1

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
			Rising/Falling edge			

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
Pre-fetch 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
SDIO global interrupt	true	0	0
UART4 global interrupt	true	0	0
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	0	0
TIM7 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
EXTI line0 interrupt	unused		
I2C2 event interrupt	unused		
I2C2 error interrupt	unused		
EXTI line[15:10] interrupts	unused		
FPU global interrupt	unused		

* User modified value

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	022152_Rev8

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	batLearn
Project Folder	C:\Users\svcgu\OneDrive\Documents\STM\batLearn
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_F4 V1.19.0

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	Yes
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