*使用：*

*1.接口在头文件中定义，直接根据使用来修改*

*2.硬件初始化函数需要在系统开始执行前调用*

*3.邮箱初始化函数是在RTX系统中使用才要用到的，必须在任务开始后再初始化，否则不能正常使用邮箱*

*4.用户调用函数，为该bsp中提供给用户使用的函数*

*5.定时执行函数，必须定时执行，如定时查询uart中FIFO是否有数据需要发送*

*6.优先级在priority.h（优先级头文件）中设置，在inc文件夹中*

Bsp\_led

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| bsp\_led | |
| 接口 | **#define RCC\_ALL\_LED (RCC\_AHB1Periph\_GPIOC | RCC\_AHB1Periph\_GPIOB )//LED1~LED4所处的总线 #define \_\_LED1 //使能LED1 #define GPIO\_PORT\_LED1 GPIOC //LED1的GPIO设置 #define GPIO\_PIN\_LED1 GPIO\_Pin\_6 //LED1的GPIO设置  #define \_\_LED2 //使能LED2 #define GPIO\_PORT\_LED2 GPIOB //LED2的GPIO设置 #define GPIO\_PIN\_LED2 GPIO\_Pin\_15 //LED2的GPIO设置  #define \_\_LED3 //使能LED3 #define GPIO\_PORT\_LED3 GPIOC //LED3的GPIO设置 #define GPIO\_PIN\_LED3 GPIO\_Pin\_13 //LED3的GPIO设置  //#define \_\_LED4 //使能LED4 #define GPIO\_PORT\_LED4 GPIOC //LED4的GPIO设置 #define GPIO\_PIN\_LED4 GPIO\_Pin\_14 //LED4的GPIO设置** |
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| 硬件初始化函数 | **void bsp\_InitLed(void);** |
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| 邮箱初始化函数 | **无** |
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| 用户调用函数 | **void bsp\_LedOn(uint8\_t \_no); //LED亮 void bsp\_LedOff(uint8\_t \_no); //LED灭 void bsp\_LedToggle(uint8\_t \_no); //LED翻转 uint8\_t bsp\_IsLedOn(uint8\_t \_no); //检查LED状态** |
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| 定时执行函数 | **无** |
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| 优先级 | **无** |
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bsp\_exti

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| bsp\_exti | |
| 接口 | **extern void TIM\_CallBack4(void); extern void TIM\_CallBack5(void); #define USE\_EXIT\_LINE\_5 //使能中断线5 #define EXIT\_LINE\_5\_PortSource EXTI\_PortSourceGPIOC #define EXIT\_LINE\_5\_Line EXTI\_Line5 #define EXIT\_LINE\_5\_Trigger EXTI\_Trigger\_Falling #define EXIT\_LINE\_5\_Mode ONCE\_MODE //1:只触发一次 0：连续可触发 #define EXIT\_LINE\_5\_CallBack (void \*)TIM\_CallBack5;  extern void TIM\_CallBack5(void); #define USE\_EXIT\_LINE\_4 //使能中断线4 #define EXIT\_LINE\_4\_PortSource EXTI\_PortSourceGPIOC #define EXIT\_LINE\_4\_Line EXTI\_Line4 #define EXIT\_LINE\_4\_Trigger EXTI\_Trigger\_Falling #define EXIT\_LINE\_4\_Mode ONCE\_MODE //1:只触发一次 0：连续可触发 #define EXIT\_LINE\_4\_CallBack (void \*)TIM\_CallBack4;** |
| 硬件初始化函数 | **void bsp\_InitEXTI(void);** |
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| 邮箱初始化函数 | **无** |
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| 用户调用函数 | **void EXTI\_Cmd(uint32\_t Linex,FunctionalState NewState);** |
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| 定时执行函数 | **无** |
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| 优先级 | **#define Priority\_EXTI0\_Pre 0 #define Priority\_EXTI0\_Sub 1  #define Priority\_EXTI1\_Pre 0 #define Priority\_EXTI1\_Sub 1  #define Priority\_EXTI2\_Pre 0 #define Priority\_EXTI2\_Sub 2  #define Priority\_EXTI3\_Pre 0 #define Priority\_EXTI3\_Sub 3  #define Priority\_EXTI4\_Pre 0 #define Priority\_EXTI4\_Sub 4  #define Priority\_EXTI9\_Pre 0 #define Priority\_EXTI9\_Sub 5  #define Priority\_EXTI15\_Pre 0 #define Priority\_EXTI15\_Sub 6** |
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Bsp\_uart\_fifo

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| bsp\_uart\_fifo | |
| 接口 | **/\* 定义使能的串口, 0 表示不使能（不增加代码大小）， 1表示使能 \*/ #define USE\_UART1\_FIFO //#define USE\_UART2\_FIFO //#define USE\_UART3\_FIFO //#define USE\_UART4\_FIFO //#define USE\_UART5\_FIFO //#define USE\_UART6\_FIFO   #define USE\_UART1\_FIFO\_DMA 1 /\* 定义串口波特率和FIFO缓冲区大小，分为发送缓冲区和接收缓冲区, 支持全双工 \*/   #ifdef USE\_UART1\_FIFO  #define UART1\_PIN 0 //0:TX = PA9;RX = PA10 1:TX = PB6 RX = PB7  #define UART1\_BAUD 2000000  #define UART1\_TX\_BUF\_SIZE 1\*1024  #define UART1\_RX\_BUF\_SIZE 1\*1024 #endif  #ifdef USE\_UART2\_FIFO  #define UART2\_PIN 0 //0:TX = PD5;RX = PD6 1:TX = PA2 RX = PA3  #define UART2\_BAUD 9600  #define UART2\_TX\_BUF\_SIZE 1  #define UART2\_RX\_BUF\_SIZE 2\*1024 #endif  #ifdef USE\_UART3\_FIFO  #define UART3\_PIN 2 //0:TX = PB10;RX = PB11 1:TX = PD8 RX = PD9 2:TX = PC10 RX = PC11  #define UART3\_BAUD 9600  #define UART3\_TX\_BUF\_SIZE 1\*1024  #define UART3\_RX\_BUF\_SIZE 1\*1024 #endif  #ifdef USE\_UART4\_FIFO /\* 串口4 TX = PC10 RX = PC11 \*/  #define UART4\_BAUD 115200  #define UART4\_TX\_BUF\_SIZE 1\*1024  #define UART4\_RX\_BUF\_SIZE 1\*1024 #endif  #ifdef USE\_UART5\_FIFO /\* 串口5 TX = PC12 RX = PD2 \*/  #define UART5\_BAUD 115200  #define UART5\_TX\_BUF\_SIZE 1\*1024  #define UART5\_RX\_BUF\_SIZE 1\*1024 #endif  #ifdef USE\_UART6\_FIFO /\* PG14/USART6\_TX , PC7/USART6\_RX,PG8/USART6\_RTS, PG15/USART6\_CTS \*/  #define UART6\_BAUD 115200  #define UART6\_TX\_BUF\_SIZE 1\*1024  #define UART6\_RX\_BUF\_SIZE 1\*1024 #endif** |
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| 硬件初始化函数 | **void bsp\_InitUart(void);** |
| 邮箱初始化函数 | **无** |
| 用户调用函数 | **void comSendBuf(COM\_PORT\_E \_ucPort, uint8\_t \*\_ucaBuf, uint16\_t \_usLen); void comSendChar(COM\_PORT\_E \_ucPort, uint8\_t \_ucByte); void USART1\_DMA\_Send(uint8\_t \*pbuffer, uint32\_t size);** |
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| 定时执行函数 | **void UsartDMAIRQ(void);** |
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| 优先级 | **#define Priority\_UART1\_Pre 0 #define Priority\_UART1\_Sub 1  #define Priority\_UART2\_Pre 0 #define Priority\_UART2\_Sub 2  #define Priority\_UART3\_Pre 0 #define Priority\_UART3\_Sub 3  #define Priority\_UART4\_Pre 0 #define Priority\_UART4\_Sub 4  #define Priority\_UART5\_Pre 0 #define Priority\_UART5\_Sub 5  #define Priority\_UART6\_Pre 0 #define Priority\_UART6\_Sub 6** |
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Bsp\_can

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| bsp\_can | |
| 接口 | **#define USE\_CAN1 #define USE\_CAN2 #define CAN2\_StartBank 14 //CAN2Filter的起始存储区,  // #0 时，不会为 CAN1 分配任何筛选器。  // #28 时，可以使用 CAN1 的所有筛选器。  // #14 时CAN1(0~13),CAN2(14~27) #ifdef USE\_CAN1  /\* CAN1的引脚，时钟定义 \*/  #define CAN1\_RX\_PIN GPIO\_Pin\_11  #define CAN1\_RX\_SOURCE GPIO\_PinSource11  #define CAN1\_GPIO\_RX\_PORT GPIOA  #define CAN1\_GPIO\_RX\_CLK RCC\_AHB1Periph\_GPIOA   #define CAN1\_TX\_PIN GPIO\_Pin\_12  #define CAN1\_TX\_SOURCE GPIO\_PinSource12  #define CAN1\_GPIO\_TX\_PORT GPIOA  #define CAN1\_GPIO\_TX\_CLK RCC\_AHB1Periph\_GPIOA   #define \_CAN1\_TTCM\_ DISABLE /\* 禁止时间触发模式（不生成时间戳), T \*/  #define \_CAN1\_ABOM\_ ENABLE /\* 开启自动总线关闭管理 \*/  #define \_CAN1\_AWUM\_ DISABLE /\* 禁止自动唤醒模式 \*/  #define \_CAN1\_NART\_ ENABLE /\* 禁止仲裁丢失或出错后的自动重传功能 (禁止自动重发送寄存器，ENABLE为不重发)\*/  #define \_CAN1\_RFLM\_ DISABLE /\* 禁止接收FIFO加锁模式 \*/  #define \_CAN1\_TXFP\_ DISABLE /\* 禁止传输FIFO优先级 \*/  #define \_CAN1\_Mode\_ CAN\_Mode\_Normal /\* 设置CAN为正常工作模式 \*/ #endif #ifdef USE\_CAN2  /\* CAN2的引脚，时钟定义 \*/  #define CAN2\_RX\_PIN GPIO\_Pin\_12  #define CAN2\_RX\_SOURCE GPIO\_PinSource12  #define CAN2\_GPIO\_RX\_PORT GPIOB  #define CAN2\_GPIO\_RX\_CLK RCC\_AHB1Periph\_GPIOB   #define CAN2\_TX\_PIN GPIO\_Pin\_13  #define CAN2\_TX\_SOURCE GPIO\_PinSource13  #define CAN2\_GPIO\_TX\_PORT GPIOB  #define CAN2\_GPIO\_TX\_CLK RCC\_AHB1Periph\_GPIOB   #define \_CAN2\_TTCM\_ DISABLE /\* 禁止时间触发模式（不生成时间戳), T \*/  #define \_CAN2\_ABOM\_ ENABLE /\* 开启自动总线关闭管理 \*/  #define \_CAN2\_AWUM\_ DISABLE /\* 禁止自动唤醒模式 \*/  #define \_CAN2\_NART\_ ENABLE /\* 禁止仲裁丢失或出错后的自动重传功能 (禁止自动重发送寄存器，ENABLE为不重发)\*/  #define \_CAN2\_RFLM\_ DISABLE /\* 禁止接收FIFO加锁模式 \*/  #define \_CAN2\_TXFP\_ DISABLE /\* 禁止传输FIFO优先级 \*/  #define \_CAN2\_Mode\_ CAN\_Mode\_Normal /\* 设置CAN为正常工作模式 \*/ #endif** |
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| 硬件初始化函数 | **void bsp\_InitCAN(void);** |
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| 邮箱初始化函数 | **void CAN\_mailbox\_init(uint32\_t ctrl);** |
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| 用户调用函数 | **can\_filter\_Mask\_config(uint8\_t object\_para,uint32\_t Id,uint32\_t MaskId); 筛选器:|编号|FIFOx|ID类型|帧类型|ID|屏蔽位(0x3ff,0x1FFFFFFF)| uint8\_t CAN\_receive(uint32\_t ctrl, uint8\_t \_fifo,CanRxMsg \*\*msg, uint16\_t timeout);//CAN\_msg  uint8\_t CAN\_send(CAN\_TypeDef\* CANx,CanTxMsg \*Msgtemp);** |
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| 定时执行函数 | **void CAN\_FIFO\_IRQ(void);** |
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| 优先级 | **#define Priority\_CAN1\_T\_Pre 0 #define Priority\_CAN1\_T\_Sub 1  #define Priority\_CAN1\_R0\_Pre 0 #define Priority\_CAN1\_R0\_Sub 2  #define Priority\_CAN1\_R1\_Pre 0 #define Priority\_CAN1\_R1\_Sub 3  #define Priority\_CAN2\_T\_Pre 0 #define Priority\_CAN2\_T\_Sub 0  #define Priority\_CAN2\_R0\_Pre 0 #define Priority\_CAN2\_R0\_Sub 2  #define Priority\_CAN2\_R1\_Pre 0 #define Priority\_CAN2\_R1\_Sub 3** |
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Bsp\_hardtimer

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| bsp\_hardtimer | |
| 接口 | **定义用于硬件定时器的TIM， 可以使 TIM2 - TIM5  TIM3 和TIM4 是16位  TIM2 和TIM5 是32位 \*/ //#define USE\_TIM2 #define TIM2\_Prescaler 84 - 1 #define TIM2\_Period 0xFFFFFFFF  #define USE\_TIM3 #define TIM3\_Prescaler 84 - 1 #define TIM3\_Period 0xFFFF  //#define USE\_TIM4 #define TIM4\_Prescaler 84 - 1 #define TIM4\_Period 0xFFFF  //#define USE\_TIM5 #define TIM5\_Prescaler 84 - 1 #define TIM5\_Period 0xFFFFFFFF** |
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| 硬件初始化函数 | **void bsp\_InitHardTimer(void);** |
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| 邮箱初始化函数 | **无** |
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| 用户调用函数 | **void bsp\_StartHardTimer(TIM\_TypeDef \*TIMx,uint8\_t \_CC, uint32\_t \_uiTimeOut, void \* \_pCallBack,MODE\_T \_mode);** |
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| 定时执行函数 | **无** |
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| 优先级 | **#define Priority\_TIM2\_Pre 0 #define Priority\_TIM2\_Sub 2  #define Priority\_TIM3\_Pre 0 #define Priority\_TIM3\_Sub 3  #define Priority\_TIM4\_Pre 0 #define Priority\_TIM4\_Sub 4  #define Priority\_TIM5\_Pre 0 #define Priority\_TIM5\_Sub 5** |
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Bsp\_dr16

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| bsp\_dr16 | |
| 接口 | **#define RCC\_DR16 RCC\_AHB1Periph\_GPIOA| RCC\_AHB1Periph\_DMA1 #define RCC\_Periph\_DR16 RCC\_APB1Periph\_USART2 #define GPIO\_AF\_DR16 GPIO\_AF\_USART2 #define USART\_DR16 USART2 #define GPIO\_PinSource\_DR16 GPIO\_PinSource3 #define GPIO\_Pin\_DR16 GPIO\_Pin\_3 #define GPIO\_PORT\_DR16 GPIOA  #define DMA\_Stream\_DR16 DMA1\_Stream5 #define DMA\_Channel\_DR16 DMA\_Channel\_4  #define DMA\_IRQn\_DR16 DMA1\_Stream5\_IRQn #define DMA\_IRQHandler\_DR16 DMA1\_Stream5\_IRQHandler** |
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| 硬件初始化函数 | **void bsp\_RC\_Init(void);** |
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| 邮箱初始化函数 | **CAN\_ERROR CAN\_mailbox\_init(U32 ctrl);** |
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| 用户调用函数 | **uint8\_t DR16\_receive(RC\_Ctl\_t \*\*ptrmsg, uint16\_t timeout);** |
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| 定时执行函数 | **无** |
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| 优先级 | **#define Priority\_DR16\_DMA\_Pre 1 #define Priority\_DR16\_DMA\_Sub 1** |
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