

# 《嵌入式系统原理与实践》作业

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# 第九次实验

## 端口修改

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## 端口设置如图。

STM32CubeMX esp9.ioc: STM32G473CBTx

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The diagram shows the pinout for the STM32G473CBTx LQFP48 package. The pins are arranged in a 48-pin package with the following labels:

- Top row: VDD, VSS, I2C3, I2C2, USART1\_TX, USART1\_RX, SPI1\_NSS, SPI1\_SCK, SPI1\_MISO, SPI1\_MOSI.
- Right side: VDD, VSS, PA12, PA11, PA10, PA9, PA8, PA7, PA6, PA5, PA4.
- Bottom row: PA4, PA5, PA6, PA7, PA8, PA9, PA10, PA11, PA12, VDD, VSS, I2C3, I2C2, USART1\_TX, USART1\_RX, SPI1\_NSS, SPI1\_SCK, SPI1\_MISO, SPI1\_MOSI.
- Left side: VBAT, TckClk\_LED, PC13, PC14, PC15, PE6, PE5, PE4, PE3, PE2, PE1, PE0, VSSA, VSEF, VDD, VSS, VDD, VSS.

Additional labels on the left side of the chip include: TckClk\_LED, ROC\_OSC\_IN, ROC\_OSC\_OUT, PC13, PC14, PC15, PE6, PE5, PE4, PE3, PE2, PE1, PE0, VSSA, VSEF, VDD, VSS, VDD, VSS.

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## 添加 usart.h:

```
21  #ifndef __USART_H__
22  #define __USART_H__
23
24  #ifdef __cplusplus
25  extern "C" {
26  #endif
27
28  /* Includes -----*/
29  #include "main.h"
30
31  /* USER CODE BEGIN Includes */
32
33  /* USER CODE END Includes */
34
35  extern UART_HandleTypeDef huart1;
36
37  /* USER CODE BEGIN Private defines */
38
39  /* USER CODE END Private defines */
40
41  void MX_USART1_UART_Init(void);
42
43  /* USER CODE BEGIN Prototypes */
44
45  /* USER CODE END Prototypes */
46
47  #ifdef __cplusplus
48  }
49  #endif
50
51  #endif /* __USART_H__ */
```

## 添加 usart.c:

```

20  /* Includes -----*/ 37
21  #include "usart.h" 38
22  39
23  /* USER CODE BEGIN 0 */ 40
24  41
25  /* USER CODE END 0 */ 42
26  43
27  UART_HandleTypeDef huart1; 44
28  45
29  /* USART1 init function */ 46
30  47
31  void MX_USART1_UART_Init(void) 48
32  { 49
33  50
34  /* USER CODE BEGIN USART1_Init 0 */ 51
35  51
36  /* USER CODE END USART1_Init 0 */

```

```

/* USER CODE BEGIN USART1_Init 1 */
/* USER CODE END USART1_Init 1 */
huart1.Instance = USART1;
huart1.Init.BaudRate = 115200;
huart1.Init.WordLength = UART_WORDLENGTH_8B;
huart1.Init.StopBits = UART_STOPBITS_1;
huart1.Init.Parity = UART_PARITY_NONE;
huart1.Init.Mode = UART_MODE_TX_RX;
huart1.Init.HwFlowCtl = UART_HWCONTROL_NONE;
huart1.Init.OverSampling = UART_OVERSAMPLING_16;
huart1.Init.OneBitSampling =
↳ UART_ONE_BIT_SAMPLE_DISABLE;
huart1.Init.ClockPrescaler = UART_PRESCALER_DIV1;
huart1.AdvancedInit.AdvFeatureInit =
↳ UART_ADVFEATURE_NO_INIT;

```

## 添加 usart.c:

```

52     if (HAL_UART_Init(&huart1) != HAL_OK)           73
53     {                                               74
54         Error_Handler();                             75
55     }                                               76
56     if (HAL_UARTEx_SetTxFifoThreshold(&huart1,      77
    ↪ UART_TXFIFO_THRESHOLD_1_8) != HAL_OK)          78
57     {                                               79
58         Error_Handler();                             80
59     }                                               81
60     if (HAL_UARTEx_SetRxFifoThreshold(&huart1,      82
    ↪ UART_RXFIFO_THRESHOLD_1_8) != HAL_OK)          83
61     {                                               84
62         Error_Handler();                             85
63     }                                               86
64     if (HAL_UARTEx_DisableFifoMode(&huart1) != HAL_OK) 87
65     {                                               88
66         Error_Handler();                             89
67     }                                               90
68     /* USER CODE BEGIN USART1_Init 2 */           91
69                                                     92
70     /* USER CODE END USART1_Init 2 */
71
72 }

```

```

void HAL_UART_MspInit(UART_HandleTypeDef* uartHandle)
{
    GPIO_InitTypeDef GPIO_InitStructure = {0};
    RCC_PeriphCLKInitTypeDef PeriphClkInit = {0};
    if(uartHandle->Instance==USART1)
    {
        /* USER CODE BEGIN USART1_MspInit 0 */
        /* USER CODE END USART1_MspInit 0 */

        /** Initializes the peripherals clocks
        */
        PeriphClkInit.PeriphClockSelection =
        ↪ RCC_PERIPHCLK_USART1;
        PeriphClkInit.Usart1ClockSelection =
        ↪ RCC_USART1CLKSOURCE_PCLK2;
        if (HAL_RCCEx_PeriphCLKConfig(&PeriphClkInit) !=
        ↪ HAL_OK)
        {
            Error_Handler();
        }
    }
}

```



## 添加 usart.c:

```

94     /* USART1 clock enable */
95     __HAL_RCC_USART1_CLK_ENABLE();
96
97     __HAL_RCC_GPIOB_CLK_ENABLE();
98     /**USART1 GPIO Configuration
99     PB6      -----> USART1_TX
100    PB7      -----> USART1_RX
101    */
102    GPIO_InitStruct.Pin = GPIO_PIN_6|GPIO_PIN_7;
103    GPIO_InitStruct.Mode = GPIO_MODE_AF_PP;
104    GPIO_InitStruct.Pull = GPIO_NOPULL;
105    GPIO_InitStruct.Speed = GPIO_SPEED_FREQ_LOW;
106    GPIO_InitStruct.Alternate = GPIO_AF7_USART1;
107    HAL_GPIO_Init(GPIOB, &GPIO_InitStruct);
108
109    /* USART1 interrupt Init */
110    HAL_NVIC_SetPriority(USART1_IRQn, 0, 0);
111    HAL_NVIC_EnableIRQ(USART1_IRQn);
112    /* USER CODE BEGIN USART1_MspInit 1 */
113
114    /* USER CODE END USART1_MspInit 1 */
115    }
116 }
117

```

```

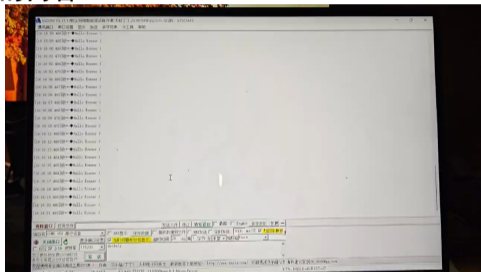
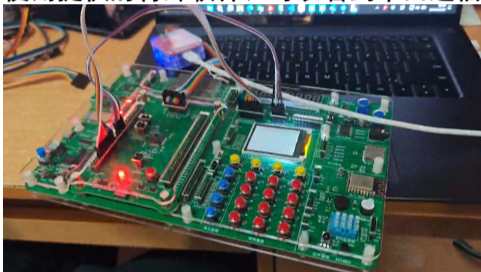
118 void HAL_UART_MspDeInit(UART_HandleTypeDef* uartHandle)
119 {
120
121     if(uartHandle->Instance==USART1)
122     {
123         /* USER CODE BEGIN USART1_MspDeInit 0 */
124
125         /* USER CODE END USART1_MspDeInit 0 */
126         /* Peripheral clock disable */
127         __HAL_RCC_USART1_CLK_DISABLE();
128
129         /**USART1 GPIO Configuration
130         PB6      -----> USART1_TX
131         PB7      -----> USART1_RX
132         */
133         HAL_GPIO_DeInit(GPIOB, GPIO_PIN_6|GPIO_PIN_7);
134
135         /* USART1 interrupt Deinit */
136         HAL_NVIC_DisableIRQ(USART1_IRQn);
137         /* USER CODE BEGIN USART1_MspDeInit 1 */
138
139         /* USER CODE END USART1_MspDeInit 1 */
140     }
141 }

```

# 第九次实验

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使用提供的特殊软件，可以看到串口通信的内容。



完整视频可以查看：

[https://gitea.librastalker.top/423A35C7/STM32CubeMX-Keil\\_uVision5](https://gitea.librastalker.top/423A35C7/STM32CubeMX-Keil_uVision5)