Research of Serial Communication Based on STM32

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Abstract. Serial port is an important external interface of microprocessor. It can be used for communication and information exchange between microprocessor and computer, and between two microprocessors. It is also an important means of debugging programs. STM32 serial port resources are very rich, and the function is also very powerful. Up to 5 serial ports, to meet the needs of communication. In this paper, the serial communication between STM32 and computer is studied. The serial communication between 2 STM32 and several STM32 are connected by serial port to exchange information. It provides a new idea for short distance wired network construction and information exchange.

Introduction

Serial port, as an early serial communication, has been widely used because of its simple interface.

The serial port can support synchronous and asynchronous communication by proper setting. Communication rates can be set to 300, 600, 1200, 2400, 4800, 9600, 19200, 115200, and 460800 baud rate /S. Maximum speed up to 400K. supports full duplex and half duplex communication.

STM32 Serial Introduction

To achieve serial communication, it is necessary to open the serial port clock, set the corresponding I/O port mode, configure baud rate, data bit length, parity and other information. Here are some of the registers associated with the serial configuration.

Serial Clock Enable

The serial clock enable register is shown in figure 1. Because the serial port 1 to use PA9, PA10 pin, so you want to fig. 1 in the IOPARST set to 1; the same, because to use serial 1, to fig. 1, fourteenth bit USART1RST is 1., open the serial port 1 of the clock.

Figure 1. serial clock enable register

Serial Control

The serial port control register is shown in fig. 2. By setting up the serial control register, it can configure the receiving and sending function of the serial port, and the receiving and sending of the serial port are interrupted. If the RE=1 in the diagram, then allow the serial port to receive; if TE=1,

then allow serial transmission; if RXNEIE=1, then open the serial port to receive

interrupts.

Figure 2. serial port control register.

Data Send and Receive

The data receive and transmit registers are shown in fig. 3. When sending and receiving data by serial port, each time is one byte.

Figure 3. serial receive register

Serial State

The serial status register is shown in fig. 4. The register in the diagram indicates the working state of the serial port. For example, RXNE=1 means that the receive buffer is not empty, that is, the serial port receives the data. TXE=1, which indicates that the sending buffer is empty, that is, data that has been sent out.

Figure 4. serial status register

Software Program

In this design, under KEIL 5, programming with C language. Complete the initialization of the serial port, baud rate and interrupt settings. Some code is given below:

```
void uart_init(u32 pclk2,u32 bound)
{
    float temp;
    u16 mantissa;
    u16 fraction;
    temp=(float)(pclk2*1000000)
    mantissa=temp;
    fraction=(temp-mantissa)*16;
    mantissa<<=4;
    mantissa+=fraction;
    RCC->APB2ENR|=1<<2;
    RCC->APB2ENR|=1<<14;
```

```

GPIOA->CRH&=0xFFFFF00F;
GPIOA->CRH|=0X000008B0;
RCC->APB2RSTR|=1<<14;
RCC->APB2RSTR&=~(1<<14);
USART1->BRR=mantissa;
USART1->CR1|=0X200C;
#if EN_USART1_RX
    USART1->CR1|=1<<5;
    MY_NVIC_Init(3,3,USART1_IRQn,2);
#endif
}

```

The above code implements the initialization of the serial port 1, the function MY_NVIC_Init (3,3, USART1_IRQn, 2) to achieve the configuration of the serial interrupt, configured as second groups of interrupts, preemptive mode of 3, non preemptive mode is 3. The calling function uart_init (72115200) can configure the baud rate of the serial port to 115200.

Summary

This paper expounds the operation principle of STM32 serial port, and expounds the configuration of the serial port in detail. In the KEIL MDK development environment, the serial port has been programmed, and the communication between STM32 and computer has been realized. Part of the code is given and the code is called to realize the initialization of the serial port. If the code is properly modified, the baud rate of serial communication can be changed, and the dual computer communication and even the multi machine communication can be realized.

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