Realization Research of Single Chip Microcomputer and Computer Remote Communication

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Abstract. In recent years, with the development of computer technology, the integration of computer remote communication technology with single-chip microcomputer is the main research direction. This research will greatly promote the development of related fields. This paper mainly focuses on the construction principle of remote communication between single-chip microcomputer and computer, at the same time, it also summarizes the realization of remote communication between single-chip microcomputer and computer.

Keywords: Single Chip Microcomputer, Computer, Remote Communication, POS Machine

1. Introduction
In the remote electronic control system, the single-chip microcomputer is an important executor of electronic terminal information collection and control interaction. The main function of the computer is to receive and process data, it will analyzes, integrates and saves the data to the database. This can promote the realization of the function. This technology has been fully used in various fields of social production [1].

2. Introduction to MCU
The single-chip microcomputer is an integrated circuit chip developed on the basis of modern computer technology; the single-chip microcomputer integrates CPU, RAM, ROM, word counters, timers, multiple IO ports, interrupt systems, etc., into a single silicon chip through modern technical means. A microcomputer system built in. In practical applications, the single-chip microcomputer can be soldered on the circuit board or used in the form of a slot. The flexibility and practicality of the single-chip microcomputer have further promoted the speed of the single-chip research and development. At present, single-chip microcomputers mostly use embedded chips with rich interfaces, high processing frequency, and powerful functions; and the communication interfaces of single-chip microcomputers are mostly completed by serial communication methods such as RS232, RS485 and RS422: these communication interfaces are in accordance with the control requirements of the master MCU [2]. And follow different protocols to effectively realize the communication connection with the computer; finally use the network information system to further realize the remote control function.
3. The construction principle of remote communication between single chip microcomputer and computer

3.1. Single-chip remote communication control system
The single-chip remote communication control system consists of two parts: hardware and software. The hardware is the basis for the entire single-chip computer to realize remote communication. The hardware is mainly to construct a complete and effective digital signal and analog signal conversion device. For example, the main control of the POS machine uses the TCP/IP interface provided by the MCU [3].

3.2. Software programming
The commonly used single-chip microcomputer is the 51 series, and the application program also mostly adopts C language, assembly language and so on.

3.3. Working principle
Both wired and wireless POS machines use the Internet and financial system computers to realize remote communication and complete corresponding data management and control. For example, wireless POS uses a wireless communication module to complete the remote communication with a computer; while a wired POS machine uses a wired data interface to complete [4].

4. Realization of remote communication between single-chip computer and computer
Remote communication is not communication carried out locally. Remote communication can be divided into wired communication and wireless communication. In addition to the computer terminal of the local area network or wide area network as the computer connected to it, the single computer terminal used in the test can also be used as the computer for remote communication.

4.1. SCM related knowledge
With the continuous development of single-chip microcomputers, it has derived a lot of types, such as 51 series and 128 series, etc. Among them, the ARM series is a series with integrated operating system functions. RS232 serial communication interface is a more commonly used communication interface in single-chip microcomputers, and there are many other types of communication interfaces. The first MCU used was a four-bit microcontroller, but with the continuous development of this industry, the ARM embedded chips currently used have more communication interfaces, and the ARM embedded chips used can handle higher frequencies [5]. The schematic diagram of the communication between the microcontroller and the computer is shown in Figure 1.

![Figure 1](image)

**Figure 1.** Schematic diagram of the communication between the microcontroller and the computer

These communication interfaces comply with their own communication protocols and are connected to the computer's communication according to the control requirements of the master MCU, so that the purpose of remote communication can be achieved through the information of the network system.

4.2. Application examples
Remote technology is very common in life. For example, on a university campus, the campus card that we use for eating, borrowing books, etc., uses this theory to work, and what it uses is limited to the
intra-campus LAN. Our campus card terminal is controlled by a single-chip microcomputer. Normally, the campus card management center will use a computer to manage it uniformly. Another example is the transportation card we use for commuting. The transportation card uses the same working principle. When we recharge the transportation card, we use the relevant computer software to achieve this. Both of these are wireless remote communication [6].

5. **Wireless system for remote communication between single-chip microcomputer and computer**

5.1. **System composition**
The composition of the single-chip microcomputer and computer remote communication system can be briefly described with the following schematic diagram, as shown in Figure 2:

![Figure 2. POS machine system simulation diagram](image)

5.2. **Working principle**
Whether it is a wired POS machine or a wireless POS machine, it realizes transactions through the remote communication between the microcontroller and the computer inside. The difference between them is that the latter is equipped with a wireless module, while the former realizes data communication through a data line interface. They have the same data interaction mode and implementation mechanism, but the implementation principles of the two are different. The specific consumption process is that the POS terminal now sends the data to the wireless receiving device of the remote computer, and then the background computer of the system processes the packaged data, and then the confirmed information is fed back to the customer, and finally the consumption receipt is printed come out [7].

6. **Design of wireless communication system**

6.1. **Communication model**
China Unicom and China Mobile are the main domestic wireless networks, and the wireless communication modules of POS machines can be used under these two networks, but most wireless
POS opportunities choose mobile networks with relatively mature technologies. The POS machine must comply with the Internet communication protocol to successfully operate the wireless communication connection, because the wireless communication module of the POS machine is connected to the hardware interface of the wireless network. In order to facilitate implementation, most systems will use KCU with embedded TCP/IP protocol stack [8].

6.2. Characteristics of wireless communication systems
GPRS technology is a technology often used in wireless POS machines, and it is also often used in fast financial services. Wired POS machines are difficult to implement functions such as automatic authorization services and automatic transfer services, while wireless POS machines can provide convenience for customers to handle business, all thanks to its advantages of being able to rely on wireless mobile networks. It has the following characteristics:
1. Mobility. Just as mobile phones can be popularized in a short period of time, the use of wireless POS machines can also exceed that of wired POS machines. Because it can be used as long as there is network coverage, it will not be affected by other factors such as telephone lines. In addition, it is easy to carry and users can use it at any time, which provides users with more user-friendly services;
2. Fast connection and transmission. The connection is successful within 2s, and online services can be provided for a long time. In addition, its transmission speed is extremely fast, much higher than the transmission speed of wired telephones;
3. Convenient operation, no need to install. The user interface of the wireless POS machine is simple and clear, no special technical training is required before use, and no wiring is required for installation, which is extremely convenient [9].

6.3. Control software
The control software of wireless POS machine mainly has the following types:
1. Host computer programming. The so-called host computer programming refers to the computer interface communication program. VB.VC can be used as the interface communication program to develop the required modules. MSComm control is a serial communication commonly used by developers to realize data input and output control;
2. MCU programming. Under normal circumstances, C language is used for programming. When the situation is complex, it will be used with embedded.
3. Embedded operating system MCU. In this case, the program framework of the standard kernel provided by the manufacturer will be used, so that the user only needs to modify a small amount of pin configuration information [10].

7. Conclusion
With the development of computer technology and network information, the remote communication system between single-chip microcomputer and computer has been widely used. And the system can not only ensure reliable data transmission, but also ensure the user’s personal data information. Therefore, the application of single-chip microcomputer and computer remote communication makes the developmental prospects of related fields more broad.

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