# Research on Wireless Data Acquisition Terminal Design of Embedded System

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**Abstract.** With the accelerated process of economic globalization, the modern logistics industry shows a steady growth trend, bar code technology in the cargo management has been widely used. The market for wireless bar code collection terminal needs increasingly prominent. For now, several wireless communication methods will be concentrated together bar code acquisition terminal is relatively small, and expensive. In addition, in the process of transmitting the bar code data, the bar code data to be transmitted is not effectively encrypted, and the bar code data is likely to be leaked. In this paper, we design and implement a wireless bar code acquisition terminal, which integrates GPRS and WiFi wireless transmission methods and encrypts the bar code data using DES algorithm to solve these two problems effectively.

## Introduction

Embedded system is application-centric, based on computer technology, and hardware and software can be cut, applicable to the function, reliability, cost, size, power consumption has strict requirements of the special computer system. Embedded systems are one of the most popular and promising IT applications behind computer networking. Its advantages continue to be affirmed in all walks of life, has been widely used in network communications, industrial control, consumer electronics and other fields. Embedded system development and application is a more and more important significance. Compared to personal computer systems, embedded systems have their own distinctive features. It is a computer with functional features but for a specific occasion of the system, it exists in order to allow the computer's processing power applied to a wider and more special occasions, to learn the advantages of general-purpose computer system high-strength processing, but to reduce its right Environmental requirements, so that the computer to replace people to complete some of their own can not complete the work. It is a combination of hardware and software composed of a specific function, for a specific environment of the independent system. Embedded system hardware is generally composed of microprocessors, memory and peripherals. Embedded system software generally includes embedded operating system and related modules of the application software.

Embedded system is the use of specific embedded software to complete the specific functions of the computer system, embedded operating system as an integral part of embedded software for the upper application software development and operation to provide a good environment. Embedded system in the personal computer system is on the basis of some of the functions of a certain extension. Embedded systems are typically composed of embedded hardware (embedded processors and peripheral expansion modules) and embedded software. Among them, the embedded processor can be a single chip, it can be a microprocessor, peripheral expansion module mainly includes storage media, communication chips and display devices (such as LCD, CRT display), etc .; embedded software includes embedded operating system and Application software section. Commonly used embedded operating systems are WindowsCE, VxWorks, embedded Linux, embedded applications include communication protocols, graphics interfaces, database systems and browsers. In short, the embedded system is a modern science and multi-disciplinary integration of the application of technology products as the core, based on computer technology to communication technology as the carrier to consumer products as the object, the introduction of various types of sensors can be connected to the Internet network, thus Adapt to the application of the environment products, embedded systems without additional software, software to solid state, hardware and no

 

excess memory, high reliability, low cost, small size, low power consumption, included in a variety of different types of equipment.

## Embedded Operating System Selection and System Hardware Composition

Windows CE support based on Win32 application program interface, for Windows program developers is very easy to use, the development of low difficulty, short cycle. Windows CE has nothing to do with the hardware platform processor, on the basis of the development of the application software has a good portability and versatility. It has good graphics, windows and multimedia features. In the Windows CE environment, developers can use a rich and flexible control library for embedded system development to create a variety of graphical user interface, support more than 1000 commonly used 32-bit Windows application interface functions. WindowsCE support true color, the user can set their own display resolution, support for touch screen, fully meet the requirements of human-computer interaction equipment. Windows CE has a good communication capability, the communication module for the operation of Windows CE system equipment provides a variety of communication hardware and data transmission protocols, such as serial/parallel data port, infrared data port and network communication protocol, support LAN, transmission control Protocol/Internet protocol (TCP/IP), remote access service, hypertext transfer protocol, file transfer protocol and other network protocols. Windows CE embedded operating system is the lack of system customization performance is not very good, the other because the source code is not open lead to higher costs. Since Microsoft released Windows CE1.0 in 1996, has experienced WinCE2.0, WinCE3.0, WinCE4.0, WinCE4.2, WinCE5.0, WinCE6.0 several versions. Considering all aspects, this paper chooses Windows CE 6.0 operating system as the software development platform.

The hardware platform is divided into a processor core module and a peripheral communication module. Processor core modules include Samsung S3C6410 processor, SDRAM memory, FLASH memory and power, reset and other auxiliary circuits. SDRAM memory selection of two Samsung's K4X51163PEL chip, DDR data transmission bus frequency up to 266MHz. FLASH memory selection of a Samsung K9G8G08U0A chip, mainly used to store program code, constant table and the system needs to protect the power of some of the data. In addition, the core module to the peripheral equipment to provide adequate interface, including USB interface, RS232 interface and SDIO interface. WiFi and GPRS wireless modules are mainly used to achieve network access and communication functions. Module has a high degree of integration, support the use of the network protocol. The core board reserved the interface for WiFi and GPRS modules. Here, the WiFi and GPRS communication module is designed as a separate module to facilitate the user to use. The WiFi module uses the WM-G-MR-09, which supports the SDIO and SPI interface. This paper chooses the SDIO port to communicate with the S3C6410. GPRS module selection SIMCOM company embedded TCP/IP protocol SIM300CGPRS wireless communication module, and S3C6410 chip between the use of serial communication.

## System Software Design and Implementation

The main function of the system client is to use the infrared bar code acquisition module for bar code information acquisition and transmission to the system through the serial port, then the user can choose to send the data through the GPRS module or through the WiFi module, before sending The data is encrypted by the DES encryption module.

The serial port is the data transmission channel between the system and the external serial device, because the serial communication is convenient, so the application is very extensive. In the Windows CE embedded system, the serial port is still an important way to communicate with external devices. For example, in this system, bar code acquisition module and GPRS module and the system is through the serial port to communicate. Serial communication is mainly through the operating system's file system application development interface (File System API) to access the serial device driver to complete the transmission, receive data and control of the serial device.

Windows CE supports the serial communication interface functions (APIs) provided by most Windows systems.

In the process of network communication, in order to protect the data to be transmitted from being intercepted by others, the transmitted data must be effectively encrypted, the original data into encrypted ciphertext, so that even if someone steals the transmission Data, because there is no key and can not be restored, thus ensuring the security of the data.

GPRS is a short form of General Packet Radio Service (GSM), which is a new bearer service developed on the existing Global System for Mobile (GSM). GSM system, the data transmission is in the form of dial-up circuit switching, and GPRS in the form of packet switching to the data transmission to the terminal. It has a high speed and always online and by the cost of billing, GPRS transmission rate can reach 56kb/s or even 114kb/s. GPRS has the following characteristics:

Real-time online users can always stay connected with the network state, compared with the GSM network, when there is no data to interact with the network can also keep in touch, without having to disconnect, when the data transmission, you can start PUSH Class business, do not have to disconnect after the re-dial to re-connect.

According to the amount of billing GSM network for data transmission, as long as it is in a connected state, with or without data exchange, will be due to exclusive channel costs, is charged on time. The GPRS system, when the user is only in the online data exchange without the time there is no cost, only when there is data transmission began billing, is the amount of billing. In this way, you can reduce the cost of the user to a large extent.

Fast login GPRS system and network attachment time is generally 3-5 seconds. Each time the use of GPRS data services, the need for an activation process, usually 1-3 seconds.

WiFi is the beginning of the "wireless fidelity" acronym, the English name for "wireless fidelity", and later in the wireless LAN is called "wireless compatibility certification", is to achieve a wireless networking technology certification. Compared with the previous wired connection, WiFi is through the way of wireless waves and local area network to connect. With this technology, data can be short-range wireless transmission, within a few hundred feet. There have been IEEE802.11a, IEEE 802.11b, IEEE 802.11g and IEEE 802.11n standards, all of these standards are collectively referred to as WiFi technology. Now, people usually WiFi specifically refers to the IEEE 802.11b standard, the biggest advantage of this standard is the transmission speed is high, can reach 11Mbps, and its effective transmission distance is longer. As with Bluetooth, this is a frequent use of short-range wireless communication technology, although in terms of security, Bluetooth technology is stronger, but in terms of network coverage, WiFi has an advantage, can reach 300 feet, that About 90 meters. In addition, WiFi transfer rate is also faster.

The basic equipment for setting up a wireless network is a wireless network card and a wireless access point device (AP). If only a few computers on the peer network, but also not AP, only need to have a computer with a wireless card. From the application level, to use WiFi, the user first have a WiFi-compatible client device. In this system, the selected WiFi module is WM-G-MR-09 wireless communication module. In the previous chapter has been built WiFi wireless network connection required hardware platform and design and development of the relevant driver, the system can automatically identify the wireless module after power, here to complete the module initialization and network work, after You can connect to the network for data transmission.

## Conclusion

This paper designs and implements the wireless bar code acquisition terminal based on ARM6410 processor, can realize the real-time acquisition of bar code data, send it to the remote server through GPRS or WiFi network. In the process of data transmission, the bar code information for effective data encryption, to ensure the safety of bar code data. In the modern logistics management has a good application prospects.

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