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Design of artificial intelligence wireless data acquisition platform based on embedded operating system

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Abstract: *Design of artificial intelligence wireless data acquisition platform based on embedded operating system in this paper. Through this platform, data acquisition can be transmitted wirelessly and through USB interface, and centralized monitoring and management can be realized. Then, the concrete measures to realize the system are systematically discussed, especially the design of transmission system based on wireless system. Currently, Linux is developing steadily in the field of embedded development. Anyone interested in embedded Linux technology can download its kernel and application programs from the Internet for free, and start porting or development. Because the CPRS network supports the TCP/IP protocol, this makes wireless data transmission easier, and the relative price is much cheaper than SMS (short message). Therefore, integrating embedded Linux technology and GR smart network to realize wireless data collection and transmission has a very attractive prospect, and it will receive more and more attention.*

Keywords: *Embedded operation; Remote system; Wireless data acquisition*

1. Introduction

With the rapid development of industrialization, it is necessary to build a wireless remote data acquisition system to dynamically monitor related equipment. The wireless acquisition system effectively solves the limitations of wired acquisition and greatly improves the accuracy and timeliness of data transmission [1]. The data acquisition system is a system for real-time acquisition, detection, processing and control of various analog signals generated in the fields of data analysis systems, instrument detection, industrial real-time control, and medical equipment [2]. With the rapid development of microprocessor technology, the combination of low-cost, compact CPU and peripherals provides a stable and reliable hardware architecture for embedded systems, so the bottleneck restricting the development of embedded systems is prominent in software [3].GPRS is the English abbreviation of General Packet Radio Service, and it is a new bearer service developed on the existing CSM system. The most fundamental innovation of CPRS to the existing GSM system is in data transmission. GSM is a circuit-switched system, while CPRS is a packet-switched system [4]. The application range of wireless data collection and transmission is very wide. It can be combined with GPS (Global Satellite Positioning) technology to realize real-time collection and transmission of global positioning data from vehicle terminals or other mobile devices. There are many similar applications, such as urban environmental protection (collection and transmission of data such as noise and pollution index), hydrological monitoring, bank POS machines, logistics, air defense alarms, mobile ticketing, and so on [5]. This article is based on the design of an artificial intelligence wireless data acquisition platform based on an embedded operating system. It has a good application prospect in the main application areas of data acquisition such as industrial control and inventory management. Compared with similar wireless acquisition systems, it has better performance and price. Than [6].

2. Overall design of the system

2.1. System composition

Wireless remote data acquisition system is mainly based on GPRS technology to realize dynamic monitoring of the operation of related equipment. Wireless remote data acquisition system has incomparable advantages over wired data acquisition system. Wireless system can not break through the traditional data transmission which is limited by external factors such as weather, and can quickly

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transmit information to the system [7]. Figure 1 shows the schematic diagram of a typical embedded wireless data acquisition and transmission system structure. It can be seen from Figure 1 that the system can be divided into two parts: data collection and transmission terminal and service control center. The communication between the data collection and transmission terminal and the service control center is completely based on the TCP/IP protocol.

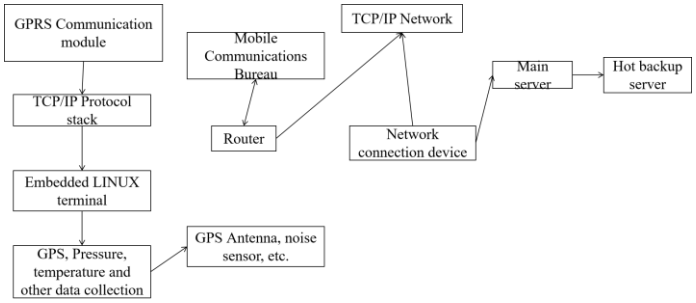

Figure 1 Schematic diagram of the embedded wireless data acquisition and transmission system

The hardware system is divided into two large chips, one is the data acquisition system and the other is the data transmission system. The two chips are connected with each other to form a complete wireless data acquisition system. Data acquisition system, data transmission system. In the wireless remote data acquisition system, each data acquisition terminal has a data acquisition module, a micro-control module, a data buffer and a wireless transceiver module. Specifically, the hardware composition in the system is mainly connected with the wireless data module through the single-chip microcomputer and the system interface, so as to realize the control of data communication. , The design of wireless data acquisition and transmission terminal can have two sets of programs: The first set of programs has lower hardware cost, that is, using single-chip computers such as TCP/IP to realize data acquisition and TCP/IP protocol stack. The second set of solutions is that this article will introduce the embedded JINUX solution. The second set of programs is described in detail below, and the schematic diagram of the composition of the program is shown in Figure 2.

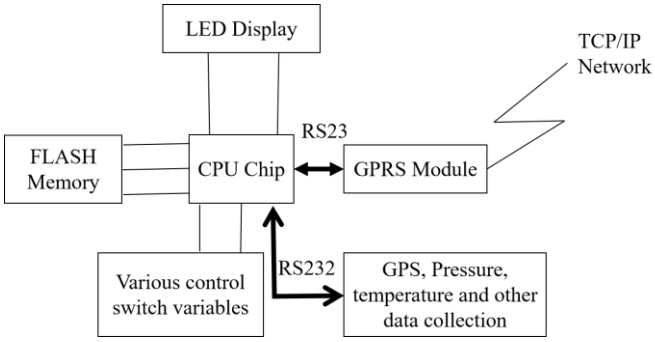

Figure 2 Tomb in the embedded LJNUX data acquisition terminal composition principle diagram

CPRS module mainly completes the function of wireless Internet access. Now there are many mature CPRS modules in the market, such as Siemens M3C5 chip. All collected data can be sent to any host with public IP address through TCP/IP channel, so as to realize wireless transmission of collected data.

2.2. Related technologies

The main operating mode of the wireless remote data acquisition system is to adopt wireless communication. Therefore, the wireless data transmission system mainly has the characteristics of a star network, which means that the wireless remote data acquisition system has the characteristics of "multi-channel" and "wireless." According to this feature, the key to system control is to realize and meet the actual needs of multi-channel wireless communication. The key technologies of remote wireless remote data acquisition system mainly include: First, short-distance wireless data transmission technology. Short-distance wireless remote technology is mainly infrared data organization and frequency band radio frequency communication technology. The second is GPRS data communication technology. GPRS is a high-speed packet data exchange technology, which can quickly transfer relevant data to the system to achieve rapid data processing. UBS development in the traditional sense is only the development of uBS peripherals. Both the UBS bottom layer driver and the UBS main

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controller driver are provided by wjndow and other operating systems. To design the UBS host, it is necessary to design these two parts of the driver. On the realization of wireless transceiver, the development process is similar to that of UBSOGT, which is divided into Firmware and hardware. Similarly, in the development environment of embedded system, C language is used to realize wireless transceiver of 802.llb.

3. Implementation of wireless remote data acquisition system

3.1. Data transmission

The key to the design of a remote wireless data acquisition system is data transmission. First, during wireless data transmission, the wireless device sends the collected data to the wireless data transmission module through the serial port. And the relevant data is transmitted by the wireless transmission module, and the wireless remote master control system obtains the corresponding data from the wireless data transmission module, and then reads it out from the serial port. The data acquisition and storage system is mainly composed of A/D acquisition board, system board, single-chip microcomputer and PC upper computer. The hardware schematic diagram of the wireless data acquisition terminal is shown in Figure 3.

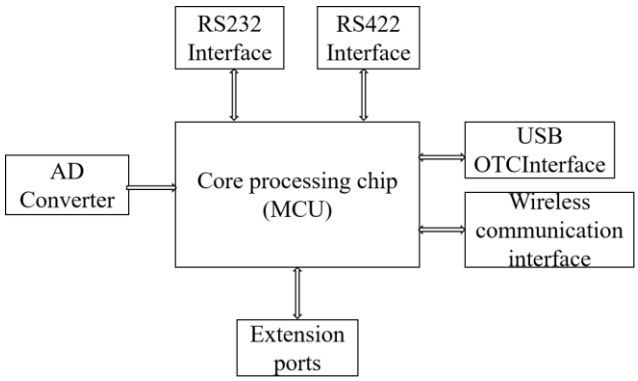

Figure 3 The hardware principle diagram of the wireless data collection terminal

The user interface mainly uses the function of MCU in the system to realize the design of the system. The function of MCU is mainly to provide information such as user operation input interface and system status indicator. When the embedded CPU board collects and stores at high speed, it can asynchronously receive commands from different systems and process the commands. Wireless local area network can provide all the functions of traditional LAN technology (such as Ethernet, token network) without being restricted by cables. In actual use, network administrators can quickly add new data collection points to the existing network, without having to lay the network or increase equipment for new transmissions, and easily realize data collection. Embedded operating system can run on different types of microprocessors with good compatibility. Operating system kernel is small, efficient, and highly modular and extensible. The system has the functions of file and directory management, equipment support, multi-tasking, network support, graphical window and user interface, etc., and has a large number of application program interfaces (API), which makes it easy to develop applications and rich in software.

3.2. Realization of data acquisition system

The GPRS remote transmission system mainly consists of three parts: GPRS terminal, GSM network and remote control center. The on-site master station is connected to the GPRS terminal through serial communication, and the GPRS terminal communicates with the GSM base station. GPRS data packets are stored and forwarded from the base station where the on-site master station is located via SMSC to the base station where the remote master control center is located, and sent by the base station to the destination GPRS The terminal is thus delivered to the remote control center. Although the stability of wireless data acquisition is not as good as wired data acquisition, the anti-interference ability is also relatively poor. However, with its advantages of convenient use and relatively low cost, it gradually occupies an important position in the health monitoring system, and develops very fast. Talents of various disciplines use their own advantages to start the research work in this area, and have made some achievements. But generally speaking, it is still in the initial stage, and

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many problems and difficulties need to be solved. However, with the comprehensive application of various technologies, wireless data acquisition will have more room for development.

4. Conclusions

With the opening of the GIP network, applications based on wireless Internet will develop rapidly. Just as mobile phone voice services are much larger than fixed telephone voice services, wireless interconnection services will inevitably exceed fixed Internet services. The combination of wireless interconnection technology and embedded Linux can really provide users with a very easy to implement wireless interconnection platform. GPRS terminal cooperates with data control center to collect and monitor the data of each instrument on site. GPRS network is responsible for the networking mode of the system. Wireless sensor network can realize data acquisition, quantification, processing, fusion and transmission, which is a new field in information technology. GPRS network is responsible for the networking mode of the system. Wireless sensor network can realize data acquisition, quantification, processing, fusion and transmission, which is a new field in information technology. The main way to realize the system is to realize the control and transmission of signaling through the transmission of information between GPRS equipment in remote control center and GPRS equipment on site. Therefore, under the existing technical conditions, it is a very promising choice to integrate embedded LINUX technology and GPRS network to realize wireless data acquisition and transmission in specific occasions.

References

[1] Li Kui, Zhang Cu, Wu Juan, et al. Design and implementation of an embedded GNSS data acquisition system. Surveying and Mapping Science and Engineering, vpl. 39, np. 6, pp. 69-74, 2019.
[2] Jin Xinxin. Implementation and application of wireless data transmission system based on embedded GPRS. Journal of Xi'an University of Arts and Science (Natural Science Edition), vol. 20, no. 3, pp. 33-37, 2017.
[3] Yao Jing. Research on real-time data acquisition of embedded control system. Automation Technology and Application, vol. 39, no. 9, pp. 65-67+95, 2020.
[4] Zhou Qiusheng. Network realization of remote data acquisition system based on embedded Web Server. Computer and Telecom, no. 12, pp. 82-84, 2017.
[5] Fang Chongxin, Zhang Zhenghua, Xu Jie, et al. Design and implementation of remote data transmission system based on cloud services. Radio Engineering, vol. 49, no. 8, pp. 661-665, 2019.
[6] Bao Shangdong, Hong Zhen. Design of Embedded GPRS Data Acquisition Module. Yinshan Academic Journal (Natural Science Edition), vol. 32, no. 4, pp. 65-67, 2018.
[7] Yuan Shicheng, Cao Yudong. Based on embedded remote wireless network system design. New Education Era Electronic Magazine: Teacher Edition, no. 47, pp. 272-273, 2017.