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Design of Intelligent Warehouse Management System Based on RFID Technology

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Abstract: **Aiming at the problems such as complicated wiring and low efficiency of traditional warehousing management system, this paper proposes a remote warehousing management system. RFID tag is used to automatically identify the warehousing and warehousing of goods. Wireless acquisition and storage of LAN warehousing environment are realized by using ZIGBEE technology Appropriate timely alarm, storage environment parameters can be used 4G network spread to the remote monitor or cell phone, hardware design and wiring structure is simple. The system composition of the system is introduced. The software and hardware design of the concentrator and the collector are analyzed. The test results show that the remote management system can accurately record the warehousing and warehousing environment and remote storage, and has a wide scope of application.**

Keywords: RFID technology; warehouse management; wireless sensor; 4G networks

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1. Introduction

Warehousing is a key part of supply chain management. The automation and informationization of warehousing system are related to the cost and efficiency of warehousing[1-3]. At the same time, the quality and longevity of warehousing items are also closely related to the warehousing environment. At present, the storage record in our country is basically in the manual registration, artificial supervision of the artificial processing stage and the first artificial into the computer semi-automatic management status, a small number of enterprises using bar code technology, bar code technology, there are many problems, for example, when the large quantities When the goods enter the warehouse at the same time, the barcodes can only be manually read in turn, and read the code easily affected by other factors; in the storage environment parameter monitoring is currently mainly used in artificial timing inspection and wired monitoring in two ways[4,5], artificial timed inspection wasting a lot of material and human resources, wired monitoring and wiring more complicated. In view of the above system deficiencies, the integration of 4G technology, RFID technology, ZigBee technology, designed a remote storage management system[6].

2. System design

By the 4G, RFID and ZigBee technology to build remote storage management system, the overall structure of the system consists of environmental parameters collection terminal, concentrator, server components, remote storage management system structure shown in Figure 1.

Environment collection terminal dispersedly installed in the warehouse, responsible for the collection of storage environment, and through ZigBee short-range LAN communication technology to accurately report to the concentrator, relay is responsible for forwarding information, data transfer, concentrator installed in the warehouse door, is responsible for The entire network of the establishment, management and RFID reader through the warehouse to monitor the situation of goods into and out of the warehouse, but also the entire ZigBee network data collection center, on the one hand, the concentrator through the 4G environment parameters collected by the environmental parameters and the goods into the warehouse uploading To the remote server, on the other hand the server sends a set of instructions, operating instructions and a series of instructions downloaded to the ZigBee network. The remote server can be used as a mobile phone to monitor the movement of data.

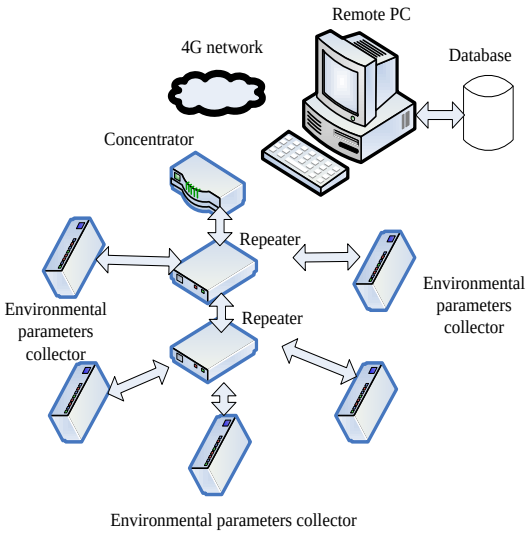

Figure 1. Remote warehouse management system overall structure.

3. System hardware design

3.1. Concentrator design

Remote storage management system has a concentrator, mainly to complete the ZigBee network

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and 4G network data exchange and goods into and out of the warehouse RFID monitoring. The concentrator is mainly composed of 4G module, RFID module, ZigBee RF communication module, power module, microprocessor module, storage module and clock module, and the structure diagram is shown in Figure 2.

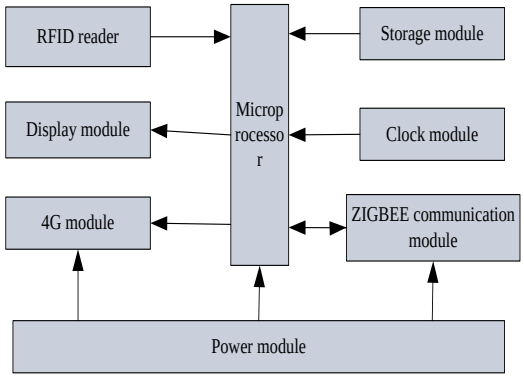

Figure 2. Concentrator structure.

3.2. Environmental parameters collector design

The structure of the environmental parameter collector is shown in Figure 3. Each remote storage management system environmental parameter collector control center adopts the CC2530 chip. The CC2530 not only has the ZigBee function, but also includes an enhanced 8051MCU, which is a true system-on-chip (SOC) Solution, and CC2530 lower power consumption, the working current is only a dozen milliamperes, the environmental parameters of the collector with mobile placement, inconvenient wiring, so the power supply using battery-powered, low power consumption to meet the long-term requirements, Through the 2.4GHZ RF signal and concentrator communication, the system environment parameter collector contains a variety of sensors (temperature and humidity sensors, smoke sensors, flame sensors, etc.), the collector timely parameters collected by a variety of sensors through the ZigBee upload to the concentrator. Humidity and temperature sensor selection of new intelligent sensor DHT11, the sensor output signal is calibrated digital signal, with long-term stability and reliability, the use of MQ-X smoke sensor sensor, the smoke has a high sensitivity.

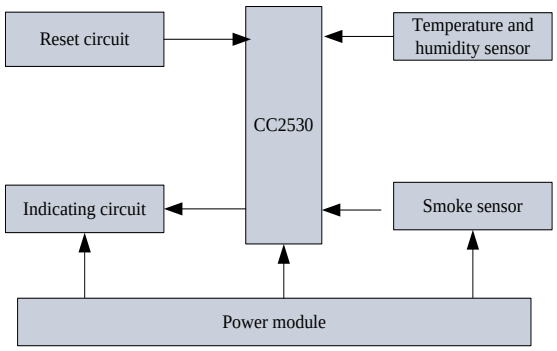

Figure 3. Environmental parameters collector structure

4. Software design

4.1. Concentrator software

Concentrator is the host computer and ZigBee LAN bridge. Concentrator need to keep up with the machine to keep in touch at any time, keep in touch with the computer at regular intervals, that is, to maintain a certain "heartbeat" time. If both handshake for a period of time unsuccessful, you need to re-establish the connection. Enter the goods in and out of the library, the host computer orders, regular reports, etc. timely contact with the server. Concentrator flow chart shown in Figure 4.

The system starts to work and is initialized. The initialization process includes the following steps: Configuring serial port baud rate, configuring serial port baud rate by timer counter, setting certain timing time 4G module and ZigBee module were initialized, followed by LCD12864 display initialization, to ensure the normal liquid crystal display.

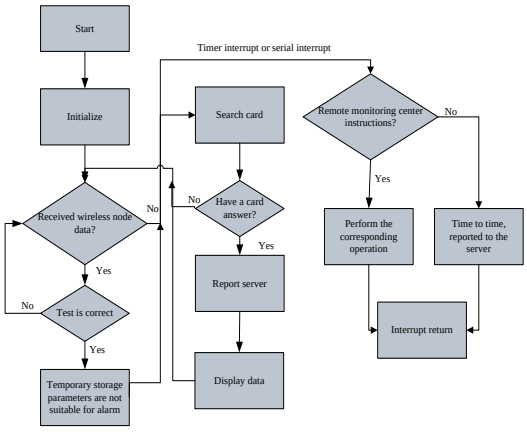

Figure 4. Concentrator key flow chart.

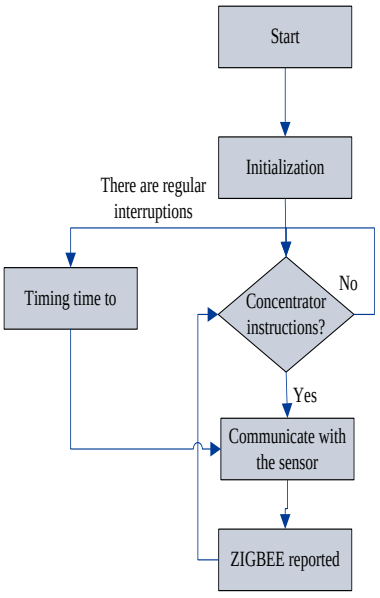

Figure 5. Collector flow chart.

4.2 . Collector software design

Collector flow shown in Figure 5, after power on

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initialization, including a variety of sensors and timing of the initialization time, ZigBee network initialization, then the collector in the instructions of the concentrator or timing to timely reporting.

5. Concluding remarks

Fusion 4G technology, RFID Internet of Things technology, ZigBee network technology, the design of a remote storage management system that enables the automatic entry of goods into the warehouse and wireless storage environment, the hardware structure and wiring is simple and convenient, improve the manager Manage the efficiency of enterprises and reduce the cost of enterprises, the overall system uses a modular design, according to business needs with the freedom of system functions, will bring significant effects to the management of enterprises. At the same time, with the release of 5G licenses, the use of 5G networks will further increase the system transmission rate and the system will surely be more widely used.

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