

Study on the Equipment Management System Based on Internet of Things

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Abstract—For the demands of unit equipment management under the new situation, equipment management system model was constructed based on Internet of Things, building programs of equipment information management system was put forward based on the system. Information sensing device are combined with inside LAN, which forms a comprehensive equipment information management network in the program, system software uses SQLserver as a database management tool and structure uses B/S architecture. The system is significant in improving the efficiency and level of equipment management.

Keywords—equipment; management; Internet of Things; RFID

I .INTRODUCTION

The type and quantity of units equipment increasing rapidly with modern and information technology to speed up the process, leading to greatly increase the complexity of equipment management, which requires a more flexible and feedback faster equipment management. So grasp the equipment state and strengthen equipment management is extremely important. A new form of the demand, highlighting the following aspects of the problem.

Information technology of equipment management system is limited to the part of the equipment, most equipment information yet to achieve integration and sharing. Various units equipment management information sharing and communication is poor. This limits the efficiency of the equipment used.

Due to our limitations, some of the equipment management related information recording is still limited in the paper medium. large amount of data and data updates difficulties will inevitably lead to errors generated because of human negligence.

Part of the equipment information exists in the form of test reports, minutes and daily records that finding relevant information needs to read a lot of information, which cause information to find difficult.

In order to further promote the regularization of equipment management, build a more efficient and speedy equipment management platform, using the Internet of Things technology to build equipment management system which RFID tags is affixed to each equipment, electronic information file is creating, management platform is provided for equip managers through the network. System is effective, accurate and intelligent to acquire and identify all equipment within the unit. managers can quickly query,

statistics and analysis equipment information. The establishment of the equipment management system based on Internet of Things technology for more accurate, comprehensive forecasting and analysis of equipment support needs, clearer grasping of the equipment resource status quo, improving the efficiency and level of units equipment management is of great significance.

II .EQUIPMENT INFORMATION MANAGEMENT SYSTEM BASED ON INTERNET OF THINGS

The realization of the Internet of things is mainly divided into three levels of perception layer[1-2], network layer, application layer, and the introduction of the concept of the Internet of Things to improve existing equipment management system, it can be divided into three layers as shown in Fig 1.

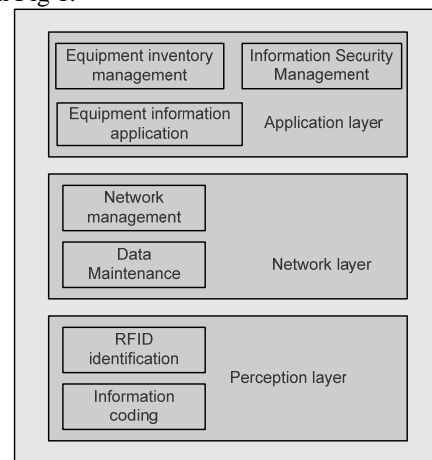


Figure 1 Equipment management system stratified

The application technology of perception layer is the RFID technology.

The main function of the network layer is network management and data maintenance. The main purpose of network management is to ensure the connectivity of the network link, network independence and network information security[3]. Data maintenance through the management and maintenance of server to ensure database security and stability, no loss of data in any case, error-free and at the same time to achieve data synchronization of the entire network.

Application layer reflects the three main applications of the whole system users. ①Equipment inventory

management: equipment storage in the database automatically leave a record and removal from the database when out of the library[4-5]. ② Equipment Information Application: equipment information is stored in each server in the network, which is easy to navigate the situation of equipment storage of certain warehouse and Statistics of equipment strength. ③ Information Security Management has three means: the strict classification of users, control of the inter-network access through the firewall and install security application software to prevent outside intrusion.

III .EQUIPMENT INFORMATION MANAGEMENT SYSTEM DESIGN AND IMPLEMENTATION

Equipment management system based on Internet of Things technology combined information sensing device such as radio frequency identification (RFID) devices and networks to form a comprehensive equipment information management network, and build corresponding equipment management database, which can achieve automatic equipment office, intelligent business management, scientific security and decision-making and Immediate security and defense, so as to solve the issues that original equipment manual management efficiency is low, query records is inconvenient, is hard to count and report and has low level of security and defense.

A. Hardware Design

Equipment management system based on Internet of Things consist of labels, barcode printers equipment materials (Affixed with electronic tags or bar codes), sensors, sensor reader (RFID or bar code), network equipment, RFID middleware, database servers, terminal computer. Label and barcode printers, equipment materials, sensors, readers are layer of information collection; the FRID middleware belong to information filtering layer; network device belong to information transport layer; database server and the terminal compute belong to information management layer. Its composition is shown in Fig 2.

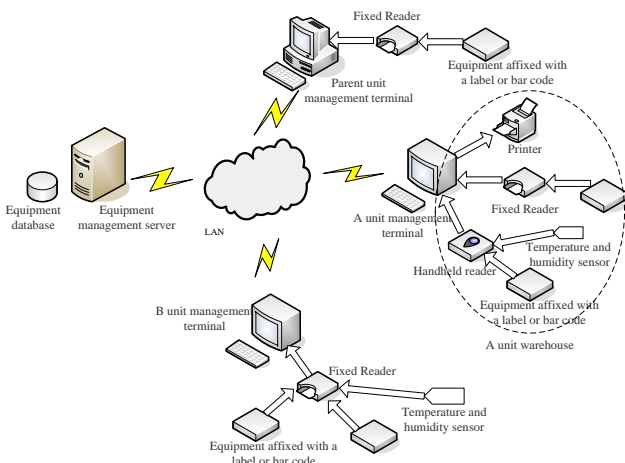


Figure 2 Equipment information management system based on Internet of Things schematic diagram

The equipment information collection system is a collection of RFID technology, bar code technology, RFID technology and long-range active RFID technology. The business processes of equipment information collection system can be divided into the following three steps:

First, using labels, bar code label printer to grade and input information for label and bar code. Electronic labels and barcode ID number as the only equipment entity number, and paste in the equipment entity, then entry original equipment information to the database according to the number[6]. Then the reader to read and write information, which RFID reader is installed at the location of the storage of materials (for example, warehouse entrance) and use a handheld RFID reader. When the equipment entities close to antenna coverage of the reader, the RFID system perform read and write operations to complete the data acquisition and change. Finally, use equipment management database to manage information. When information and matching database is readed, then automatically save the information in the system database, and application software system to perform data query, update, authorization, print and management.

When equipment storage, management system uses bar code label printers generate a single product barcode or label of goods that belong to warehouse internal management, according to each batch of goods information. RFID tag on the box contain supplies quantitative information in the box, the RFID tag contains the information of the goods on the shelf and shelf correspondence on the shelves. When storage testing, first barcode recognizer recognize items in the box through RFID tag information on the box, then management system process to generate the RFID tags, finally, fixed RFID reader to read, so it can guarantee RFID applications environment in the warehouse. Equipment out of the library, with a handheld PDA reader or fixed reader individually read out library items information, then the information is uploaded.

B. Software Design

The system uses B / S structure, background uses SQLserver database, through the RFID RF equipment realize storage, out of the library, inquiries, monitoring management and other work equipment of supporting documents.

1) *Equipment management information system of B / S structure:* The system with features of mature system, clear architecture and friendly interface is based on B / S structure, which is convenient for system development, maintenance, porting, extended. Server uses SQLserver, front-end interface is divided into user management, unit management, equipment management, environmental management, data maintenance, which is developed using Visual2008C # language. The software architecture was design as shown in Fig 3.

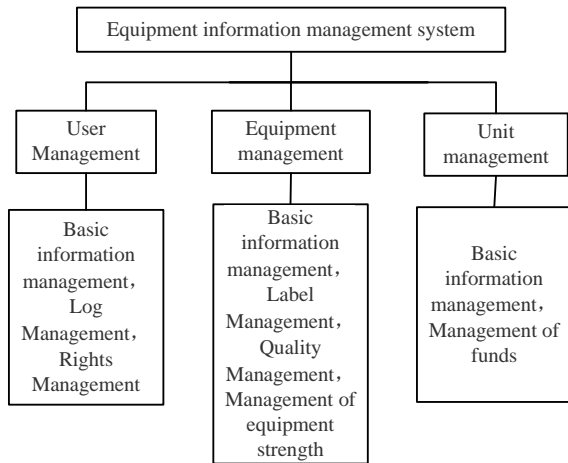


Figure 3 Software architecture of equipment information management system

2) *Database Design*: The database includes the following three main data table:

(1) ID Photography. Equipment information (name, model), equipment number, equipment serial number, equipment ID number[7].

(2) The user library. Permissions, user names, passwords, personal information (name, gender, identification number, etc.)

(3) Arsenal ID number. Equipment serial number, equipment number, equipment information (name, model number, manufacturer, date of creation, fitted out date, in charge of people, the unit used, status information, state in the tube.)

3) *Equipment storage write ID*: Fig 4 shows the write ID flowchart of equipment storage. Select the type of storage equipment in the terminal software when new equipment storage, then select a label type based on the categories of equipment, followed input number, name, model, equipment information, and generate the database sequence code. System software through the encryption algorithm to generate a unique ID code, and then write the ID tag, and update the system database to confirm equipment storage.

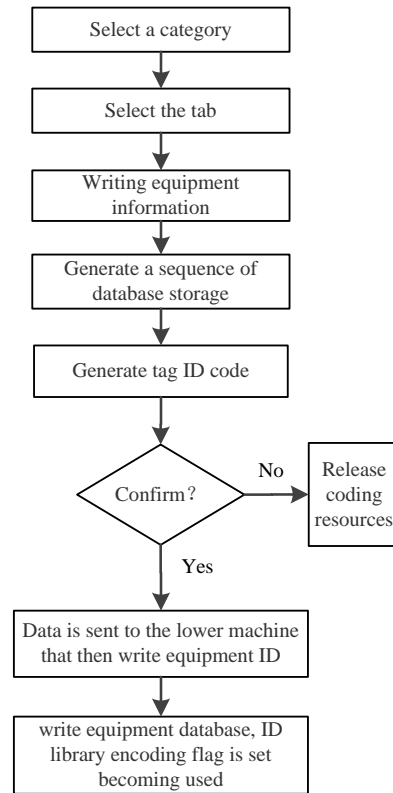


Figure 4 Write ID process

4) *Equipment monitoring, query and out of library*: Fig 5 shows the flowchart of system monitoring, equipment query and out of library.

There are four types of reading and writing equipment, including 0.01m of write equipment is only responsible for the ID written of tag, read-only tag is divided into three categories according to the read and write distances that are 10m, 1m, 0.1m. long distance 10m to achieve real-time monitoring and regular inspection of equipment; 1m to detect equipment out of the library at the door; 0.1m is handheld reader, which achieved check and verification of equipment as well as targeting[8].

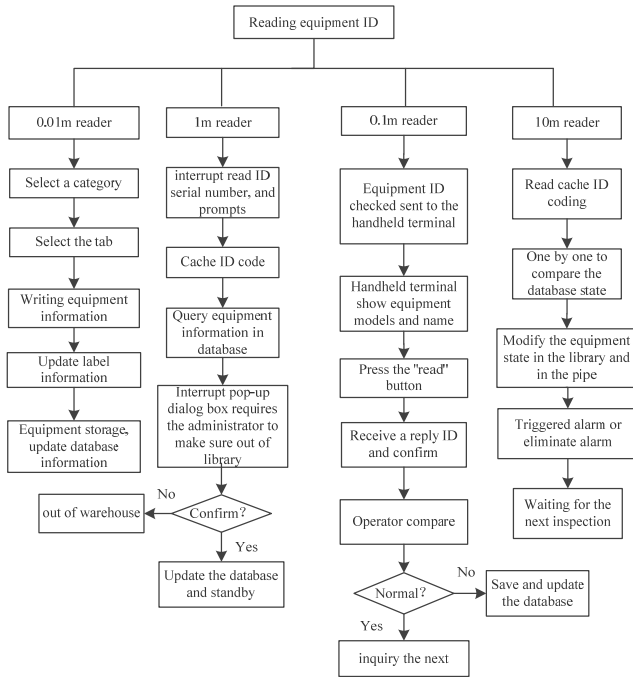


Figure 5. Equipment monitoring, query, out of warehouse flowchart

IV CONCLUSION

This paper analyze the equipment management status of the unit, for the present problem designed equipment management system software and hardware solutions using Internet of Things technology based on existing equipment management system of the unit, which achieved

information and intelligence of storage, out of library, query, management of equipment and further improve the management level and efficiency of the equipment. With the further development of the Internet of Things technology, radio frequency identification technology in the field of equipment management get a wider range of applications, and will further accelerate the intelligence process of equipment management.

REFERENCES

- [1] XU Peng, WANG Yu-jue, and LI Jian. Summarize of Internet of Things Technology, Software Guide, vol. 10, no. 5, 2012, pp. 50.
- [2] NIU Yu-xia and REN Wei, Study on Structure system of Internet of Things, Wireless Interconnection Science and Technology, no. 5, 2012, pp. 7-8.
- [3] QIU Xiao-ming, Study on the Architecture and Key Technologies for Internet of Things, Computer Knowledge and Technology, vol. 7, no. 28, 2011, pp. 6848- 6849.
- [4] HAO Yi-min, The Application of the Technology of the Internet of Things in the Telecommunication Equipment Management of People's Armed Police, SCI-TECH INFORMATION DEVELOPMENT & ECONOMY, vol. 21, no. 10, 2011, pp. 108.
- [5] Miao Li, Study on Hierarchical Management Model of Internet of Things, Computer And telecommunication, 2011, pp. 29.
- [6] CHEN Da-wen, Supply Chain Visibility Management Based on the Internet of Things, LOGISTICS ENGINEERING AND MANAGEMENT, vol. 33, no. 3, 2011, pp. 110-111.
- [7] ZHOU Xiang-yang, HEI Rui, and PENG Gang, Study of the Weaponry Equipment Management System Based on EPC Network, Fire Control & Command Control, vol. 37, no. 2, 2012, pp. 47-48.
- [8] HU Yi, IOT and Hospital Equipment Management System, SCIENCE&TECHNOLOGY INFORMATION, no. 13, 2011, pp. 466-467.