

Application Research of Open Operation Mode Based on Cloud Computing and Internet of Things Technology in Scientific Management Laboratory Equipment Materials

Cuicui Ji^{1,*}

¹College of Information Science and Engineering ,Qilu Normal University, Jinan, Shandong, China, 250013

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Abstract

For the Internet of Things technology, it is a technology that uses the Internet of Things as a carrier to realize virtual space information sharing. The important premise of this technology is the virtual space formed under the network protocol. In the current rapid development of the Internet of Things technology, the mobile Internet of Things has also emerged, which provides a reliable guarantee for the innovation and development of various advanced technologies. The intelligent laboratory management industry is the inevitable development of future laboratory management models. The trend, as a product of new technology, can not only affect people's lives, but also promote the development of the national economy. However, the current development of the intelligent laboratory management industry is not very sound and there are many problems that need to be solved in the development process: such as the incomplete system, the immature technology, etc. To solve these problems, the industry as a whole needs to be able to continue to develop On the basis of the Internet of Things technology, actively introduce advanced concepts and technologies, vigorously promote the concept of intelligent laboratory management, so as to enhance the development of the intelligent laboratory management industry.

Keywords: Cloud Computing; Internet of Things; Management;

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1. Introduction

Laboratory equipment materials are the core of laboratory management and their operating conditions directly affect the overall production process and economic benefits. Electromechanical equipment is an important part and one of the basic elements of laboratory management productivity and an important material wealth for the survival and development of laboratories. Production equipment occupies a considerable amount in terms of the share of laboratory assets and the content of management work. Large proportion and very important position. At the same time, the automation level of electromechanical equipment also directly reflects

the overall intelligence level of laboratory management. Therefore, it is very important to manage the production equipment well and improve the equipment management level to promote the development and progress of the laboratory. However, currently, the management of laboratory electromechanical equipment has problems such as low level of informationization, poor real-time performance and lack of data analysis capabilities. The Internet of Things condition monitoring system we analyzed. The intelligent embedded terminal of the system can realize real-time collection, timing transmission and storage of the operating parameters of electromechanical equipment. The system

monitoring center has a good human interaction interface to view and analyze equipment operating parameters. , Realize the real-time grasp of the equipment status by the management personnel, monitor the operation status, fault prediction, diagnosis and analysis of the mechanical and electrical equipment of the laboratory management, make full use of the advantages of the remote network, real-time remote fault diagnosis and maintenance, ensure the safe production of the laboratory and improve the equipment management work Efficiency and reliability.

2. Cloud Computing and Internet of Things Technology

2.1. Cloud computing

Cloud computing technology is a new technology that has developed relatively fast in the past ten years. It is mainly developed and applied in the Internet to realize the target application of resource utilization. Cloud computing technology can account for some low-cost computing systems after being connected through the network. At the same time, cloud computing has its own characteristics and strong technical reliability, especially in actual applications, which can effectively process and optimize data, so the reliability of data can be effectively guaranteed. In addition, the cost of cloud computing technology construction is relatively low, with a high cost performance, which will generate the greatest return through the smallest investment. In actual applications, cloud computing technology can also achieve diversified services and the realization of goals. Users have relatively large choices in service items and spaces and can obtain different levels and types of services. In addition, the programming convenience of cloud computing technology is also more prominent. It can be programmed according to your own needs. Compared with the efficiency of traditional data information processing, the data processing efficiency under the application of cloud computing technology is very high, not only that Cloud computing technology has a relatively strong ability

to process information and data and can automatically manage the implementation of related nodes, so that the safe operation of the system can be effectively guaranteed. The internet of things system is in the figure below.



Figure1. Internet of things system.

2.2. Internet of Things

At present, the management of the intelligent laboratory of the Internet of Things is developing rapidly, but due to various reasons, the development of my country is not advanced enough compared with the developed countries. Therefore, in the development process of my country's IoT intelligent laboratory management, we should actively introduce and learn advanced concepts and technologies to fundamentally accelerate the development of IoT intelligent laboratory management^[1]. With the development of science and technology, the management of the intelligent laboratory of the Internet of Things has begun to take shape. It is divided into different modes due to the different focus of its mode. First, the intelligent laboratory management mode based on digital transformation technology. The development and implementation of the intelligent laboratory management model mainly relies on digital home appliances and through advanced equipment and information sharing technology, the comfort of intelligent laboratory management has been greatly improved, but this kind of digital transformation technology Mode, because it mainly relies on equipment to improve comfort, its energy consumption will also increase. Second, the

large-scale production model and the large-scale intelligent laboratory management model use high-tech materials to meet the needs of users and achieve large-scale production, making the user's information sharing more reference and universal. So that the producer can provide users with more comprehensive functions and better services according to the data.

3. Application mode of cloud computing IoT technology

3.1. Set up network firewall

Database network firewall technology can effectively prevent illegal personnel from intruding data. Network firewall can effectively prevent external network users from accessing and connecting to the internal network. This can effectively strengthen network security and prevent criminals from conducting network attacks from external networks, thereby ensuring protection. The database runs stably in the internal network. There are many types and types of network firewall technology. From a technical point of view, it can be divided into the following monitoring types, address translation types and packet filtering types^[2]. Among them, the proxy firewall is mainly between the server and the client. It can monitor the data interaction between the client and the server, so that the client must pass the firewall when accessing the server, thereby ensuring the legitimacy of the access. The working principle of the address translation firewall is mainly to hide and disguise the internal IP address to a certain extent, so as to prevent illegal elements from attacking the IP address, so as to protect the network. The internet of things system firewall is in the figure below.

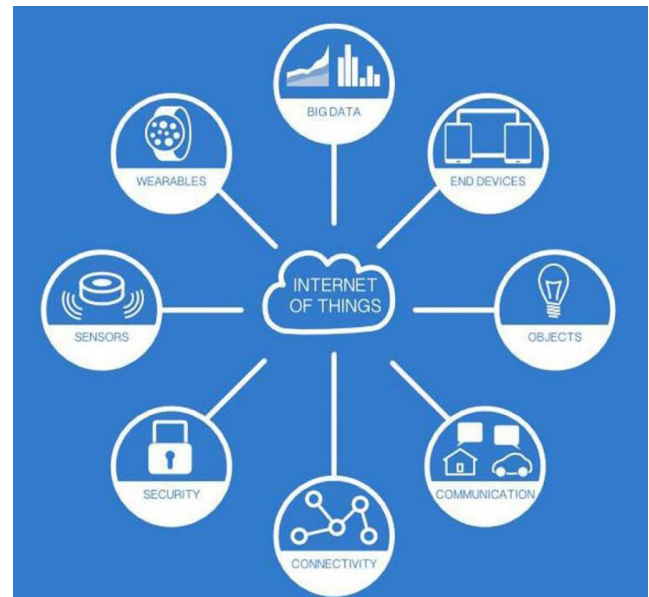


Figure2. Internet of things firewall system.

3.2. Digital signature technology

The security of computer networks can be protected by digital signature technology. It completes the protection of data by completing the verification and identification of electronic files. This technology plays a great role in ensuring the security and reliability of the database. Digital signature technology can mainly include the following forms, which are DSS signature, RSA signature and hash signature. The specific implementation technology is as follows: First, the sender A sends a message M to B as needed and the A party uses a single hash function to form the message digest MD when sending the message and then signs it^[3]. This link can guarantee the reliability of the information and the source of the information. In general, the encryption key and decryption key that are generally guaranteed for technical feasibility are the same. However, the security is generally not high. Asymmetric encryption algorithms are used in many occasions, but another can be derived from the encryption key or decryption key and this algorithm is easier to implement. The digital signature technology based on time stamp technology has a new improvement in the technical level, which greatly reduces the time required for data decryption and encryption. At the same time, the degree of data confidentiality has also been greatly improved and it

is widely used in high data transmission. The internet of things system digital signature is in the figure below.

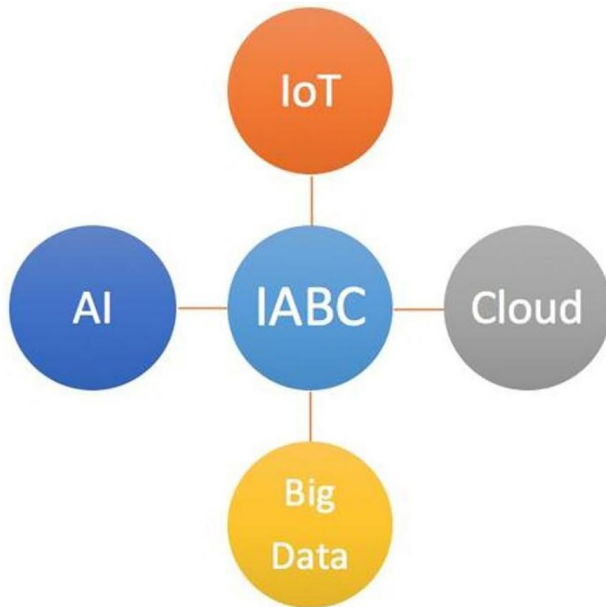


Figure3.Internet of things digital signature system.

3.3. File encryption technology

File encryption technology can effectively guarantee the security and reliability of information. In the encryption process, modern advanced technologies, such as artificial intelligence technology and machine learning-related technologies, can be used. The relevant algorithms can effectively supervise the various data entering and exiting the database, thereby preventing the intrusion of illegal external data. File encryption technology is mainly divided into statistical analysis methods and signature analysis methods^[4]. The wide application of file encryption technology can effectively guarantee the stability and security of the database and ensure that the data inside the database is difficult to be stolen and destroyed. The internet of things file encryption system is in the figure below.



Figure4.Internet of things file encryption system.

4. Laboratory equipment material management based on cloud computing IoT technology

4.1. Application of laboratory equipment material service life management

In the current application of laboratory equipment materials, through the application of Internet of Things technology, more effective life cycle management can be carried out. The full life of an asset refers to the period of use of the equipment. By taking the long-term benefits of the asset as the starting point, a comprehensive consideration of the operation of the asset, including the design, planning, construction, maintenance and purchase of the asset, can be better. While ensuring benefits, it reduces the cycle management costs of the entire life of the asset, thereby realizing the improvement of laboratory equipment material management efficiency. In the asset management for the life of the power grid, a management model that combines cost management, safety management and efficiency management is adopted^[5]. In the process of power grid construction and management, it is necessary to proceed from the actual situation and through the power plant technology and characteristics. Conduct a comprehensive analysis to better improve the level of power grid asset management. By applying the physical network to the service life management of laboratory equipment materials, the advantages of various sensors can be used to monitor the panoramic state information of laboratory equipment materials. At the same time, it is related to the

equipment's own attributes and the equipment status and service life Carry out accurate assessments to provide convenient conditions for cycle cost optimization. In the process of constructing the life cycle management of laboratory equipment and material assets, the accuracy of equipment diagnosis and evaluation can be improved, so as to provide reliable guarantee for subsequent links. The internet of things equipment system is in the figure below.



Figure5.Internet of things equipment System.

4.2. Laboratory equipment material asset management

In the current application of Internet of Things technology in laboratory equipment materials, laboratory equipment material asset management is mainly reflected in three aspects. First, the small monitoring module. For this module, it is mainly by setting the sensor to the target position to have an accurate grasp of the operation of laboratory equipment and materials and at the same time to form a systematic understanding of the operation of the equipment^[6]. At that time, wireless network technology can be used to transmit information using small monitoring modules. This ensures that the staff of the monitoring center can give timely feedback to the staff who manage the equipment and take corresponding improvement and preventive measures. Second, the transmission network module. The existence of the transmission network module can ensure the effective timeliness of the

information transmission of different sensors. By replacing the wired network, the advantages of the wireless network can be reasonably brought into play and the information can be transmitted better, which realizes the timeliness of information transmission and saves Related costs. The internet of things management system is in the figure below.

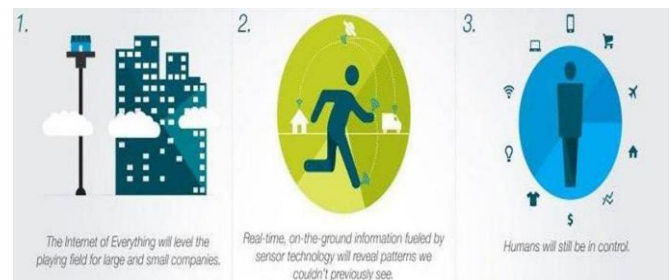


Figure6.Internet of things management system.

5. Conclusion

We also need to explore the realization of multiple functions on one device, so that the device can be streamlined, with more functions in a limited space and play a role in freeing up space. The development of smart laboratory management in my country is relatively late and has not formed a sufficient scale or system. However, under the dual promotion of the government's continuous increase in investment and the increasing demand of the people, the development of smart laboratory management in China is also constantly advancing.

References

- [1] Shuo Li. Research on the application of internet of things technology in packaging intelligent design[J]. International Core Journal of Engineering,2020,6(9).
- [2] Zheng Xie. The symmetries in film and television production areas based on virtual reality and internet of things technology[J]. Symmetry,2020,12(8).
- [3] Hui Yuan,Yuan Hui,Zhuang Yan,Hu Yaodong,Liang Yuan,Xu Ning,Zhu Guowei,Gao Hang,Zhang Yintie. Research on substation comprehensive information automation system based on ubiquitous power internet of things technology[J]. IOP Conference Series: Earth and 5348

- Environmental Science,2020,558(5).
- [4] Engineering; Studies from hebei agricultural university update current data on engineering (internet of things technology in ecological security assessment system of intelligent land)[J]. Energy & Ecology,2020.
- [5] Machine Learning; Recent findings from southwest minzu university has provided new information about machine learning (Application of Data Mining Methods In Internet of Things Technology for the Translation Systems In Traditional Ethnic Books)[J]. Computers, Networks & Communications,2020.
- [6] Gordana Garda š evi ć ,Konstantinos Katzis,Dragana Baji ć ,Lazar Berbakov. Emerging wireless sensor networks and internet of things technologies — foundations of smart healthcare[J]. Sensors,2020,20(13).