



Research Article

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Research on intelligent integrated management mode of laboratory based on Internet of things

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ABSTRACT

This paper discusses the existing problems in the management of university laboratory, introduced the Internet of Things technology and its development, and the system structure are introduced. On this basis, introduces the design of Laboratory of intelligent Internet of Things technology and comprehensive management system and implementation ideas based on. The system includes equipment management, laboratory management, security management and other related modules, each module has a corresponding sub module. To achieve a real-time and efficient supervision of the laboratory for a full range of. The operation of the system to improve the efficiency of the use of laboratory resources, reduce the energy consumption of the laboratory, greatly improve the management level and laboratory safety laboratory.

Key words: The Internet of things; Laboratory management; Smart Lab

INTRODUCTION

In recent years, the countries of laboratory construction in Colleges and universities very seriously, invested large amounts of funds, promote the opening experiment teaching, strengthening the opening experimental teaching reform in the modernization of management, open experimental teaching management is a part of the whole system engineering of university management, experimental teaching management is integrated in the whole process of open experimental teaching, from the student begins the appointment to experiment are finished, the open experimental teaching need to have high quality and efficient management, a rigorous logic management system and an intelligent control system. Its connotation is more complex, involves different, especially in the experimental teaching reform of our country is ceaseless deep person., the traditional management mode is difficult to complete the experiment teaching management, the mission, the traditional management methods and concepts has been hampered by the laboratory function of play, the intelligent open laboratory management and control is an inevitable trend.

INTERNET OF THINGS TECHNOLOGY AND ITS DEVELOPMENT

Internet of things is the Internet of things. This has two meanings: first, the core and foundation of the Internet of things is still the Internet, network is the extension and expansion on the basis of the Internet; second, the user terminal extension and expansion to any goods and articles, the exchange of information and communication is physical information. Internet of things through intelligent perception, recognition technology and ubiquitous computing, communication and sensing technology, widely used in network integration, therefore is also called following the third wave of the computer, the Internet world information industry development.

The idea of the Internet of things first appeared in Bill Gates in 1995, "the future of the road," a book, just at that time is limited by the development of wireless networks, hardware and sensing equipment, has not attracted the attention of the world. In 1998, Massachusetts Institute of Technology (MIT) creatively proposed the concept of "Internet of things", which was then called the EPC system. In 1999, the concept of "Internet of things" is first

proposed by the American AutoID Laboratory of Massachusetts Institute of Technology. The concept of things made by RFID technology and wireless sensor network as support.

In 2005, the International Telecommunications Union (ITU) released the ITU Internet Report 2005: Internet of things, the concept of the Internet of things. Report pointed out that the ubiquitous Internet of things communication era is coming. All the objects in the world can exchange information automatically through the Internet. Radio frequency identification technology, sensor technology, nano technology, intelligent embedded technology will be more widely used. In November 2008, IBM put forward the idea of "wisdom of the earth", from now on as the strategy of economic development.

THREE TIER ARCHITECTURE OF THE INTERNET OF THINGS

1. Perception layer

The perception layer is the bottom layer of the Internet of things architecture, which is the control of the physical world and the control of the remote network and application system. In the business operation platform system architecture of the Internet of things, things terminal the network universal wireless communication protocol module, through the mobile communication network connected to middleware platform for networking, networking applications required perceptual information, the network middleware platform and should be used between interactive services, to receive the instruction of management and control of terminal peripherals. Therefore, the Internet of things terminals in the network is an independent individual, the formation of a networking middleware platform for the center of the central networking architecture, while also does not rule out the Internet of things terminals also have direct communication capabilities.

2. Network layer

The task of the network layer is to provide a unified upper and lower protocol to the layer of the lower layer, and to provide a unified input and output interface to the upper layer application layer. The overall function of the whole network layer is to realize the transmission, routing and control of information. The network layer can be divided into three sub layers: access layer, load bearing layer and service layer. The access layer receives the information reported by the sensor and the device, and transmits the information in the bearing layer. Bearing layer is data networking transmission pipeline, provide network communication function, and receive information from the access layer and transferred to the business layer; business layer from the bearing layer terminal reports of original message receiving, message parse, restore the message content, reported to the application layer to achieve protocol conversion and operators the ability to direct calls.

3. Application layer

Provide networking industry applications by operators, system integrators, service providers and developers or individuals. The application layer interacts with the terminal device of the sensing layer through the network layer.

THE APPLICATION OF THE INTERNET OF THINGS TECHNOLOGY IN THE INTELLIGENT MANAGEMENT OF THE LABORATORY

Usually in the laboratory, the number of miscellaneous items, the use of manual labeling, and then enter the way of management. This approach is inefficient, error prone, and update the trouble, it is not easy to use network dynamic management. With the continuous progress of technology, laboratory equipment also need to be updated, its scale is bound to continue to expand, the number and species will increase, it is bound to increase the difficulty of management. If we can use the Internet of things radio frequency identification, wireless communication and Internet technology, information management, will greatly reduce the workload, and improve efficiency. There are some of the temperature, humidity and other experimental environment requires strict special laboratory needs real-time dynamic monitoring of the surrounding environment changes, can be resolved through the Internet of things technology.

1. Instrument and equipment management

The electronic tag is used to store the detailed information of the device in the chip, and the identification of the device is transmitted to the Internet and wireless terminal device. This is easy for data query and update, but also easy to unified management. Many experimental equipment and equipment often have to be borrowed and unauthorized use of the situation, often the time of return. Laboratory management personnel to master the flow of equipment, will reduce the management of chaos. In the laboratory management regulations, the scope and duration of the loan, and then in the laboratory equipment access to the premises of the installation of access control system network interface. The access control system can immediately put the test equipment in time and location and other information sent to the center of the Internet of things, to prevent accidental and unauthorized diversion. Through authentication, password information can be set and the use of the relevant information related to the use of. During the experiment, the management center can monitor the experimental data in real time, and send out the alarm signal

when the operation is used improperly or by mistake.

2. Daily management

Laboratory staff, teachers, management of the daily work of some of the work focused on management, such as application, audit, maintenance, reporting, etc., and the maintenance of the information of teachers and students. Let teachers to manage their own teaching plan and query, modification, assessment of student test scores, the system automatically according to all the teacher lesson plans to resolve conflicts, to teacher visual and humane course scheduling options; at the same time for students provide test report templates, teacher evaluation result and week schedule inquiries at any time; the teaching effect evaluation, teaching resources and upload, download, update; experimental teaching project setup, maintenance and so on.

Teachers in accordance with the requirements of the teaching course, in a specified time to the teacher's identity landing system, providing the number of people on the plane, the machine content, special requirements, etc.. When the scheduled end of the date, the system automatically arranged on the machine, the system administrator can also be manually adjusted, and can be printed on the corresponding arrangements for the report.

Teachers can also query. Check computer time, location, number, the guidance of teachers, the duty officer, machine use, view configuration and equipment, equipment, equipment maintenance, equipment scrapped missing etc.. Users can also be based on the need to achieve a combination of multi query, and print the corresponding statements. Depending on the identity of the user, the range of the contents of the query can be different. The reservation and inquiry two function modules can be accessed through the Internet of things.

3. Safety management

Laboratory safety monitoring and control system by the humidity monitoring smoke sensor, infrared sensor, toxic and harmful substances monitoring electrochemical sensor, mechanical and electrical current, voltage monitoring sensor, pressure sensor monitoring, laboratory safety monitoring device, sound and light alarm device, monitor system and access control systems. Can effectively manage the safety and defense work in the laboratory.

ADVANTAGES OF INTELLIGENT LABORATORY MANAGEMENT SYSTEM

Unified management, intelligent management and operation mode. The laboratory in time, resources, management and service and other aspects of all-round opening up. According to the school teaching scientific research program, sharing resources through the laboratory management system of unified arrangement of teaching experiment and scientific research plan, to maximize the effective utilization rate of laboratory.

Improve laboratory management level, using Networking Laboratory Management System Based on the realization of the flexible and open management, teachers and students can through the network at any time to browse the home page of the laboratory management system, each laboratory equipment and open time query, and and the management personnel to communicate, fully meet the needs of the majority of teachers and students experiment. At the same time, laboratory management system can according to need to authorize the corresponding high-end user, make the user can according to the teaching program of self use of the laboratory to make an appointment. In this way, it can ensure the smooth progress of the important experiment and research projects, and to the teachers and students to provide maximum convenience. The experiment management personnel can register the experiment equipment maintenance and the replacement through the computer room management system, the user can understand the operation condition of the experiment equipment in time. Users can also use the feedback on the system in the process of problems encountered, to facilitate the management of personnel in a timely manner to maintain and process, to ensure the normal operation of the laboratory.

To improve the security of the laboratory, the video monitoring system integration, even without the presence of the teacher also to ensure that the laboratory safety, since then, the phenomenon of mouse, wiring board, cable, and other development board lost no longer occur; through video surveillance, management personnel can also be in violation of operating rules or other prohibited acts promptly cut off the power supply so, through the video, but also on the instrument damage done well documented in order to make the normal damage or intentional damage judgment; through networking technology, acquisition system according to the human body infrared sensor, humidity sensor, smoke sensor, electrochemical gas sensor automatically starting fire anti-theft alarm system, exhaust gas and dehumidifying and cooling system. To ensure the safe operation of effective laboratory equipment management system; through the use of equipment, do Tracking, both to avoid the loss, while the chemical dose and the use of records to track, to ensure that the illegal use of.

CONCLUSION

In this paper, a solution for the management system of computer laboratory based on Internet of things is introduced. Completely changed the previous laboratory extensive mode of management, laboratory management concept has been changed to help laboratory management to better implementation of fine management of computer room equipment, provides effective support for the routine laboratory safety and efficient operation of the plant.

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