Study on the Intelligent Campus System of the Internet of Things

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Abstract. The Internet of things makes our material world digital and networked, and connects the world with sensors in the form of intelligence. The application of Internet of things technology in "Digital Campus" and "smart campus" provides teachers and students with a more comprehensive intelligent environment and integrated information service platform, and provides convenience for the school's intelligent management. This paper focuses on the construction of Internet of things and smart campus, First of all, it introduces the research background and significance, then introduces the definition and application of Internet of things, consider the connection between Internet of things and smart campus, introduces the shortcomings of traditional campus, at the same time, introduces the role of Internet of things in smart campus, and finally expounds its advantages around the system construction of smart campus.

1. Research Background and Significance

Many countries and governments attach great importance to the control and utilization of network information resources, and try to use network information resources as the main means of economic development and the establishment of international competitive advantage. In China, the Internet of things has become one of the five strategic emerging industries. The Internet of things technology combines the physical world with the virtual world to further promote the human society into the information age and provide an intelligent living environment for people. At the same time, the Internet of things takes "wisdom" as its purpose and has a wide range of uses, which can span multiple fields. At the same time of changing the traditional way of life and work, improving the utilization rate of resources and labor productivity, saving costs and improving the relationship between people and society.

2. Overview of Relevant Theoretical Knowledge

2.1. Concepts and Features of the Internet of Things

The Internet of Things refers to the use of a variety of information sensing devices, such as RFID, infrared sensors, GPS systems, laser scanning devices and the Internet combined to form a huge network, the purpose is to make all items connected to the network, identification and management is more convenient. Through the application of network technology, from the Internet between people to the connection between things, the Internet of things can effectively support human-computer interaction, people and commodities, people to people communication and interaction.

The Internet of Things has the following characteristics: (1) Devices and connections. The Internet of Things is based on the Internet, traditional telecommunications networks, and other information carriers, enabling all physical objects that can be processed independently to connect to each other. (2) service intelligence. The Internet of things makes people's material world realize digitalization and networking to a great extent, and makes the objects in the world connect with each other in the way of intelligent sensing,
and makes the network service intelligent. Through such networks, people can perceive and obtain the latest information, make great use of resources, and improve the quality of life and work.

2.2. The Capabilities of the Internet of Things

Based on usage, the capabilities of the Internet of Things can be summarized in three areas:

(1) Identify objects and obtain information. Through two-dimensional code, RFID and other intelligent marking technology, can be used for object recognition and target information acquisition, so that they have the ability to perceive the physical world. For example, Second-generation ID cards can also be seen as a hidden smart tag. Contactless IC card smart chips identify objects and obtain personal information through specific devices.

(2) Intelligent control and feedback of objects. Internet of Things technology is based on cloud computing platforms and smart networks. It can obtain information, make intelligent analysis and decision-making, and change and control object behavior. For example, the intelligent traffic light device can automatically measure and adjust the interval time of red light, green light and yellow light according to the traffic flow of vehicles, so as to provide convenient services for traffic.

(3) Environmental monitoring and target tracking. The Internet of things uses a variety of sensor devices and a wide range of sensor networks to realize the real-time collection of specific object status and the detection and monitoring of behavior. For example, the real-time monitoring of laboratory equipment ensures that the object is safe, and the remote control of the object is realized by GPS marking, tracking and determining the position of the object.

2.3. Overview of the Smart Campus

The integration of Internet of things and intelligent campus information technology is very high, which is the upgrading stage of digital campus. Smart campus through the deep integration of information technology, the construction of network information terminals can be widely perceived campus information.

Smart campus has three core characteristics:

(1) Provide a comprehensive intelligent environment and comprehensive information service platform for teachers and students, and provide role-based personalized services.

(2) The application of computer network information services, in the field of school services, to realize the interactive interconnection of resources and personnel.

(3) To provide an interface for the school and the external world to communicate and perceive each other. Network technology provides an open, interactive and intelligent comprehensive information service platform, which enables teachers and students to obtain intelligent learning, teaching, management and life services, and makes the school a perceptual, service-oriented, environmentally friendly, energy-saving, safe and stable intelligent campus.

3. The Proposal of the Smart Campus Based on the Internet of Things

3.1. The Deficiency of Traditional Digital Campus

Lack of overall planning, information island phenomenon is serious. The business system of each department of the college operates independently, and the communication between departments is not smooth. The degree of data standardization is low and the range of data application is narrow.

There is pressure to optimize and upgrade the basic network. With the development of multimedia teaching, online teaching and other new forms of education, the requirements for the construction and management of the school data center are becoming higher and higher. The foundation of the construction of the college data center is the stability and support ability of the network.
The standard of monitoring system is lower than that of "Sky net" of public security organ. Because of the particularity of campus, its monitoring system must cover the whole campus without dead space. Therefore, it is necessary to improve the consciousness of security defense and strengthen the construction of monitoring system on campus. At present, the monitoring system in most of our campuses is still at a low level.

School, parents and students have poor communication. When students go to school, their parents can't know their children's school situation in real time, and teachers can't know where the students are anytime, anywhere. The status of the students in school and the latest notice of the school can not be fed back to the parents in time.

The growth of students can not be grasped in time, lack of tracking records. Most of the students in the school are boarders. Most of the students spend their time in the school. The common campus digital system does not provide students with a platform for daily psychological activities. Without the accumulation of original data, it is difficult to carry out corresponding psychological tracking.

3.2. The Benefits of an Internet of Things-based Smart Campus

Based on the Internet of things in the campus environment, it can easily complete student identification and teacher attendance management. Sensors installed inside the school can sense, light, sound and temperature. Carry out teaching environment monitoring and visual monitoring. Through the connection with the network, the security system can intelligently control the security environment of the school.

Applying Internet of things technology to campus can realize the interconnection of physical space and digital information space, and effectively combine the real space and virtual learning environment. Students can understand nature and see the real scene in class, which effectively promotes human-computer interaction and strengthens the communication between teachers and students. At the same time, the integration of the Internet of things and the existing teaching platform provides a broad space and intelligent management services for distance practical teaching activities.

The balance of educational resources can be achieved through the Internet of things technology. For example, the use of shared network technology in regional schools can enable teachers and students to enjoy equal experimental equipment, resources of large libraries and other educational resources, and truly realize high-quality educational services under low-cost conditions.

Internet of things technology can expand learning space and provide ubiquitous education services. It can promote students to combine the theoretical knowledge and relevant examples in the classroom, and make up for the lack of theoretical knowledge and practice. The use of Internet of things technology can enable schools and related enterprises to establish strategic partnership, and achieve complementarity between schools and enterprises. It is of great significance to improve the teaching quality of the school and cultivate the students' innovative consciousness and application ability. The construction of smart campus provides ubiquitous resource management services for mobile learning.

4. Building a Smart Campus System Based on the Internet of Things

4.1. Smart Campus-Life

Feel the campus. In a certain area, the installation of sound or displacement sensor device can realize the intelligent control of light source. When the system senses the moving object, it judges the lighting condition according to the switch. If the object is not sensed within the set time range, the lighting information feedback system will be terminated. At the same time, using the Internet of things technology, the brightness of the light and the computer screen in the classroom can be monitored and adjusted regularly, and the height of the curtain can be adjusted according to the outdoor light intensity.
Convenient campus. At present, the campus card used in the campus can only realize partial payment within the campus. Compared with the traditional campus card based on RFID technology, the campus card based on NFC technology has the following advantages: first, NFC technology integrates the reader, electronic tag and their equivalent functions in RFID on a single chip, making NFC have the advantages of lower price and convenient use. For mobile phones with NFC function, we only need to use the NFC function film chip card and hand When the SIM card of the computer is combined with each other, students can carry their mobile phone as the campus card; secondly, NFC is a short-range wireless communication technology, which simplifies the identification process and makes mutual access between devices more direct and secure in the process of NFC payment; thirdly, NFC mobile phone used as the campus card can be used by students to query the balance of campus card and all transaction records at any time, which is convenient to use Convenient, high safety factor.

Safe campus. Campus safety is closely related to every teacher, student, parent and society. The construction of intelligent security system using Internet of things technology, including the realization of campus intelligent security system, campus intelligent traffic management system, environmental monitoring and target tracking, is helpful to strengthen the campus security management. We can attach QR code and GPS labels to important documents and articles, and be able to sense and track the location of articles to ensure safety management. The location monitoring of vehicles can ensure that vehicles enter the campus safely and ensure the traffic order on campus.

Smart Library. The information service platform realizes the integration of knowledge and information, intensive display, convenient access, barrier free transformation, cross time and space transmission, so as to transform the public library into the intelligent library.

Due to the frequent management of school attendance, a lot of teaching time is wasted. The system can also automatically calculate the attendance of students and teachers, which brings convenience to the school's curriculum management and follow-up management.

4.2. Smart Campus-Teaching

Stimulate students' interest in learning. Intuitive experience and real feelings can stimulate students' interest in learning and broaden their knowledge space and vision. In the construction of the smart campus, the use of Internet of Things technology to combine textbook knowledge with real world and real life, to better promote students' understanding and mastery of knowledge, expand the teaching effect. The implementation of "perceived growth" of campus digital garden construction, is the Internet of Things technology in the optimization of teaching environment as an example. The digital campus of agricultural plantations is a digital planting system established using Internet of Things technology, which can obtain real-time data on reproduction and growth. Students can observe and record the growth of plants.

Make up for the limitations of traditional teaching. Internet of things technology makes objects in physical environment digital and networked, students can remote control experimental equipment to complete learning activities. At the same time, the system can intelligently realize the collection, storage and analysis of information, record the learning process, and send resources to the teaching platform through the network, providing a safe and shared learning environment for teachers and students. Therefore, in the smart campus, the classroom teachers and students can operate in the laboratory and research experimental instruments. It can also be observed repeatedly through the network platform.

Guide scientific inquiry-based learning. Schools can build classrooms where natural, virtual, real, personal and community connectivity share a research environment based on Internet of things-aware classrooms. Through visual digital recording, comparison, calculation and analysis of problems, students will gain more knowledge, skills and experience, which is conducive to the transformation of learning styles and the cultivation of scientific literacy, and the ability of students to think independently, to
cooperate in inquiry, observe and analyze data. The smart campus has unparalleled advantages in guiding students to construct knowledge, discuss problems, solve problems and improve their scientific research ability.

4.3. Smart Campus- Extend

Internet of things technology provides support for students to share resources, and remote experiments and practical courses in schools can be implemented through an online platform to enable interregional and inter-school collaboration. Students choose the content of activities according to their interests, meet learning needs, improve students' initiative and participation, and be conducive to the formation of dialogue and interaction. In such an e-learning environment, students will build partnerships for collaboration and innovation to gain knowledge and skills in interaction and practice through discussion, division of labor, and collaboration. For example, the pigeon egg hatching test, through the network to monitor the whole process of egg hatching, students remote operation of temperature control equipment and camera equipment, at any time for incubation environment correction, real-time recording of image data. Through reproduction, experiments, observation of experimental phenomena, recording and analysis of photography, writing research reports, students have a deep understanding of light, temperature, humidity and other environmental factors affecting the formation of life.

The function of the Internet of things perceived environment is more in line with the actual situation, which provides the condition for students to think independently, explore practice and solve problems. Smart campus network technology can also realize the communication between schools and society and the complementarity of resources through "school-enterprise alliance construction", and effectively expand and share high-quality resources of schools and society. This enables learning activities to develop effectively in the classroom and interact with the environment and other environments. At the same time, people not only through practice to learn, more importantly, to use technology learning to expand their activities, broaden their horizons, so that classroom teaching activities more real and effective.

5. Summary and Prospect

The intelligent campus based on the Internet of Things realizes the visual management of the school, which has the characteristics of science, humanity and intelligence. At the same time, the teaching environment of intelligent campus construction, so that the classroom extends to the real scene, the school, society and nature are directly connected together, building a bridge between theory and practice. It is of great significance to cultivate students' scientific literacy and research ability, stimulate students' interest in learning, and strengthen the interaction between teachers and students. The establishment and development of intelligent campus is an important way to optimize the teaching environment and deepen the educational reform, and it is the direction of the future educational development. It has a broad application prospects, will face more challenges, including educational concepts, application methods, security and privacy, data protection, resource control, information sharing, standard settings and so on.

Therefore, the development of education cannot be achieved overnight. Correctly understand the role and significance of "smart campus" and actively carry out "practical exploration" activities. We should realize that technology promotes school improvement, carries on the construction and development of the intelligent campus of top-level design, does not blindly follow the trend, and cultivates talents according to local conditions is the fundamental purpose of the construction of the intelligent campus. Teachers should renew their ideas and learn new technologies, and schools should effectively use smart campuses to provide high-quality services and effective technical support. Students should be happy to learn, actively explore and actively master the intelligent campus learning technology and scientific methods, to develop innovative quality and learning ability.
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