

## **Design of intelligent reservation system of university library based on Internet of things technology**

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**Key words:** Internet of things technology; Library; reservation system.

**Abstract:** As a public resource, the self-repair room of university library is favored by its comfortable and quiet learning environment and convenient and convenient access to learning resources. However, there is a widespread phenomenon that library seats are occupied. In this paper, a kind of university library's reservation system is designed using the rapid development of Internet technology in recent years, not only effectively eliminate the problems of city, and make full and effective use of the library of public resources, but also saves time for the students.

### **1. Introduction**

At present, a variety of different methods have been tried to solve the problem of library seats occupied, such as Tsinghua University humanities and social science library adopts intelligent management system of access control card into the pavilion, Jilin Normal University library and management of access control linkage system. The method makes a library of truly get very good solve, but at the entrance to the library entrance guard card requires use of campus id card is selected. A large number of students were stranded in the peak in the library at the gate queuing phenomenon, waste everyone's time. Therefore, how to get the most efficient use of the limited seats and bring convenience to students, it is imperative to make a reservation system for university libraries.

In recent years, the increasing maturity of Internet of things technology has brought about new technological means and management methods [1]. The Internet of things is called the third wave of the world's information industry after computers and the Internet. From an understanding point of view, the EU believes that the Internet of things has its own communication function and operational standards [2]. The Internet of things refers to the combination of various information sensing devices with the Internet to form a huge network, such as radio frequency identification (RFID) devices, infrared sensors, global positioning systems, laser scanners, etc. Objects are endowed with intelligence by the Internet of things, not only realizes the person and the object of communication and dialogue, and also realizes the object and object of communication and dialogue between each other, by setting the electronic tags on the objects, sensors, qr code, etc., and through the interface connected to the wireless network [3]. The Internet of things is composed of RFID system, middleware Savant system and Internet. Its network architecture can be divided into three layers: perception layer, network layer and application layer [1].

### **2.A design system for intelligent reservation**

Intelligent reservation system by means of intelligent mobile phone APP, all kinds of processing and to people, things, awareness and control of the physical world and virtual world using the Internet of things technology, prevention from the source of problems, from the management on the ease of problem, prevent from the results of a problem. The system of interconnected people up to the size of the object through the sensor technology, to realize the interconnection of things (including people), save human resources, to implement active information exchange and communication between all things. Furthermore, the problem of occupying the seat in university library is solved. Finally the intelligent management of library is realized [4].

## 2.1 The composition of the reservation system

This design consists of four parts: real-time monitoring module, PC terminal server, client server and mobile APP, as shown in the figure.1.

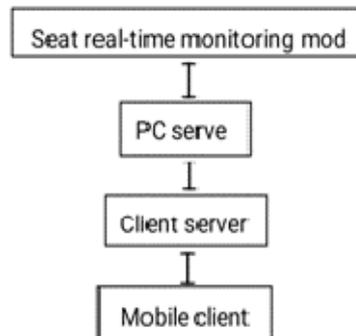


Figure.1. Library reservation system

## 2.2 The basic architecture of the reservation system

The basic architecture of the reservation system of intelligent library is based on the basic architecture of Internet of things. The PC terminal server is connected to the client server, which is suitable for the effective management of the seat data in the library. The seat data of the library is sent to the mobile client via the client server, and the students can complete the seat reservation, seat selection, reseating, cancellation and other operations through the mobile APP.

### 2.2.1 The perception layer

Perception layer design of the reservation system real-time monitoring module contains seat section, concrete by RFID electronic tag, composition and cameras, wireless sensors, wireless communication system, wireless communication system contains the clock unit, data feedback device, etc. The appropriate placement of the seat to install the RFID electronic tag, students sit the RFID electronic tag read automatically after campus student identity card recognition, the transmission of information through the wireless sensor to the PC server, at the same time clock unit records students sit time effectively; When students from city, the RFID electronic tag can't read the campus card information, wireless sensor to transmit this information to the clock unit, clock unit records students' time away and through the data feedback device to transmit information to the PC server, the clock unit more than the clock set time (can be uniformly set by the administrator), the clock will automatically reset, this seat is open again for business. System Settings SMS alerts function, when the time is more than the clock away students set a time when there will be a mobile phone SMS alerts, students can be seated or using a mobile phone APP to contract as soon as possible, limit contract only once a day. For students who need to leave the library, they can finish the use of the seats in two forms by using the mobile APP or the students out of the library, and the seats will be re-developed.

The camera is installed in each self-repair room to collect indoor conditions in real time. In order to obtain a panoramic view of the monitoring area, the installation height, installation position and incident Angle of the camera should be appropriate. Indoor administrator can through camera real-time seat usage information, and whether the seat is effective use, if found that students who use limited public resources to sleep or play a game, the administrator can come forward to stop, convenient management.

RFID, sensors, cameras, wireless communication was used to construct reservations system perception layer, use of campus card to the student identity authentication, the camera can real-time understand indoor study [1], has realized the library comprehensive "real-time sensing, dynamic control and wisdom", let the library "hard seat" "seat for a long time to effectively solve the phenomenon of", while easing students sleep problems.

### 2.2.2 The network layer

The network layer includes the host network of various communication networks and the Internet of

things. The host network is mainly the current 4G network, or mobile communication network, private network, computer Internet, etc [5].At present, most web applications using IPv4, IPv4 addresses consumption more serious, the optimization of IPv6 is based on IPv4 updates, can produce high-quality service efficiency in the campus network construction, but also can realize high quality calculation based on the network, highly efficient point-to-point communications, Internet applications, wireless transmission [6].Next generation Internet built for intelligent wireless campus network library construction to provide a more powerful safeguard, it with the support of Internet technology, the development of the information processing platform, the huge amounts of information processing, data mining, and realize the scientific data representation, data filtering and data analysis [7].Using network to the control rooms to the school library telephone landline, mobile phones, mobile phone between teachers and students, and the stadiums administrator of the total control room to monitor computer connect organically, so as to realize the intelligent management of the library [1].

### *2.2.3 The application layer*

The application layer is composed of a variety of application server (including their respective room equipment monitoring and management, mobile phone APP, etc.), the application layer to complete instructions generated and distributed control, Internet of things application UI interface for administrators, students, including equipment such as mobile phone APP [5].Application layer architecture design using cloud computing technology, because of the cloud computing resources such as computing, storage platform and service virtualization technology is adopted, at the same time support for users to share hardware and software resources, cloud computing can speak traditional scattered in the vast region of computing resources integration as a virtual, can be unified scheduling, use of computing resources on demand, so the use of cloud computing services library reservation system, make use of resource optimization [1].

Real-time PC server to the client server sends the library stadium seats, students through the phone APP into different venues real-time seat information, at the same time use mobile phone APP to realize remote reserve seats, seat selection, follow-up and cancel the reservation, etc., effectively alleviate the entrance guard card of bridge, a large number of students were stranded in front of the library phenomena, save everyone's time, management is more human.

## **2.3 Perfect background management**

The library reservation system has perfect background management functions, such as venue discipline maintenance, statistics of seat use, current use of seats, historical usage report and other functions [8].Cloud computing platform to make an appointment, the renewal of timeout before the student to carry on the statistics, more than three times the timeout before the students will do some punishment, such as cancel its two days or longer online reservation privileges, etc.

In current Internet of things technology booming era background, the adoption of new technologies for staff put forward higher quality requirements, the library staff need to transform the idea, change ideas, change the traditional working mode, gradually by learning and training to master new technology, explore new methods, will focus from the traditional books management to information discovery, information consulting services, and other fields.

## **3. Conclusion**

The system makes use of the sensor layer, network layer and application layer of iot technology.The system is the largest and the most convenient and convenient library reservation method.The intelligent reservation system designed in this paper has realized the scientific and effective management of university library, and it has been solved very well.

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