# Smart Campus Building based on Big Data

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Abstract: Since smart campus has become the mainstream form of modern campus building. This paper first introduced the basic information of big data technology, secondly, analyzed the meaning of big data to smart campus on the two aspects of the smart campus's need for big data technology and value of big data in smart campus, on the basis of this, finally, comprehensively explored smart campus informatization building of colleges and universities from the perspective of big data. Hope this article can provide some references to relevant areas.

## 1 INTRODUCTION

At this stage, the science and technology has developed stably in our country, big data technology, cloud computing technology and internet of things technology have made great progress, under the influence of this environment, smart campus building also began to get the extensive attention of people. At present (Qi Y,2013), China's smart campus building is the up-grade based on Digital Campus, which can create a good learning atmosphere for teachers and students and benefit school's development. Next, we will give the further comprehensive exploration and analysis of smart campus building of big data (Yuejuan H,2014).

## 2 BIG DATA TECHNOLOGY

### 2.1 Sources of big data

At this stage, China's data annual growth rate has been as high as 50%, with the gradual increase of data content and unstructured form factor, original relational data management model has not been able to meet the management needs of modern amount. As the most widely used technology in our country, IT technology of big data will be able to provide more high quality and high value application data for researchers in China (Jun W,2015).

### 2.2 Meaning of big data

The so-called big data mainly refers to, based on that original software tools cannot be applied, on the data collation and analysis to extract the desired content. The data are mainly applied in four parts, first is design of technology; second is scientific research; third is decision analysis; fourth is check and testify. The main use of data is to obtain the corresponding information through the experiment, statistics, analysis and other ways. Through a complete, accurate measurement, data will be collated, recorded, classified and saved, after a series of strict process of statistics, detection and analysis, finally reach a persuade conclusion. The large amounts of data got from long time collation, research, analysis and statistics is called big data (Minsi L, Shaobo C,2015).

### 2.3 Big data features

Big data usually have three features, first is diverse, second is scale, the third is high speed. On the basis of these three features, after continuous experiments, relevant researchers added several features to big data, including timeliness, authenticity, intricacy and value.



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# 3 MEANING OF BIG DATA TO SMART CAMPUS

## 3.1 Smart campus's needs for big data technology

In order to realize the building of smart campus, it is necessary to comprehensively analyze unstructured data, so as to realize smart teaching and management. Smart campus building demands for strict data collation, statistics, analysis and capture. Traditional method of OLAP data analysis cannot meet the demand of modern smart campus, only applying the functions of path analysis, chart analysis, time series analysis and What-if analysis of big data technology to smart campus building, can meet the campus's growing smart application needs better. Because cloud computing has data sharing and knowledge service function, it has a comprehensive application in smart campus building.

## 3.2 Value of big data in smart campus

The building of smart campus has continuously expanded the scale of network entity, the original data frame has not been able to meet the needs of modern data processing, while big data technology can quickly analyze the valuable information in different forms of data, and provide convenient conditions to smart campus building. In the process of big data design, its design principle can improve the connection between different forms of data, and obtain the required data through applying and analyzing the data. In addition, big data technology can also comprehen-sively analyze data of area and mine its deep mean-ing comprehensively, through this analyze the future social value of campus, at the same time, compre-hensively show the characteristic value of smart campus (Changhong Y,2015).

Big data technology can analyze the changes of teaching methods, learning habits and thinking characteristics of teachers and students, estimate the future development tendency of the teachers and students, and adjust the teaching and management modes of teachers and students according to the estimation results. In addition, big data technology can also save a variety of information in school, in this way, provide convenient conditions to smart school building. Therefore, in smart campus building, the application of big data technology can not only realize the acquisition of data, but also process and analyze the data needed. As initial data, school's structured information, semi-structured and unstructured information can be collected, collated and analyzed to obtain the required data, and then to lay a solid foundation for campus's intelligent management.

# 4 SMART CAMPUS INFORMATIZATION BUILDING OF UNIVERSITY FROM BIG DATA PERSPECTIVE

In order to realize smart campus building, first we should comprehensively understand the design concept of smart campus, secondly, analyze the informa-tization building structure of smart campus, and on this basis, complete the smart campus informatiza-tion building from the perspective of big data.

## 4.1 Design concept of smart campus

Comparing with original "Digital Campus", smart campus is the product mainly composed of three kinds of technology, the first is big data technology; the second is cloud computing; the third is internet of things technology. The so-called design idea of smart campus, mainly based on the first generation of information technology, scientifically manages campus personnel, teachers and students with the help of more rigorous way. Sensors were installed in each building of school, such as heating system, water supply system and power supply system, through these sensors, smart campus can closely integrate the campus management and biological system. By combining internet of things and the Internet, school management system, learning system and work system and other equipment were connected to the campus network, by getting the data from time to time and comprehensive analysis to improve the efficiency of the decision-making basis, and then realize the smart campus building (Bo C,2016).

## 4.2 Smart campus informatization building analysis

So-called smart campus informatization building is to integrate physical and virtual campus state with the help of five types of information technology, so as to realize intelligent management. Among them, the five kinds of information technology are: the first is cloud computing; the second is big data technol-ogy; the third is internet of things technology; the fourth is intelligent sensing


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technology; the fifth is Internet technology. It shows the mutual integration of physical space and digital space in Figure 1 (Dayang J., Qi Y,2016):

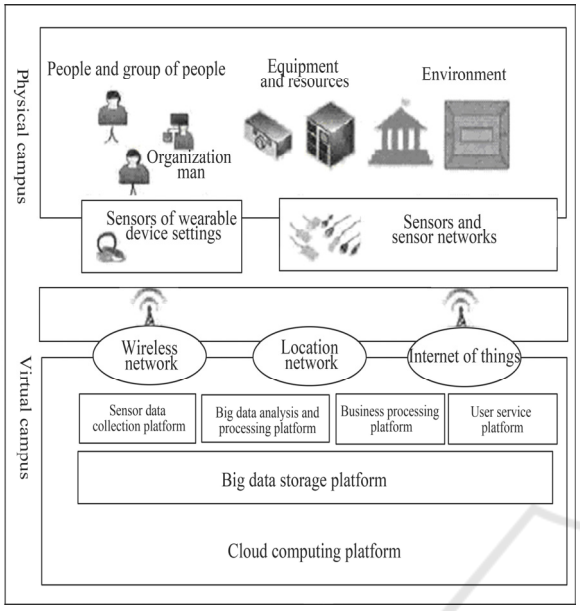


Figure 1: Diagram of mutual integration of physical space and digital space

In order to realize the close integration of physical space and digital space, big data should be as the in-tegration center, the Internet as the neural network of integration, and intelligent sensor as the nerve end-ings of integration. In order to realize the smart ap-plication, the integration criterion should be based on the interaction of self-adaption and personalized users, so as to realize the structure building of smart campus informatization.

#### 4.2.1 Intelligent sensing layer

The so-called intelligent sensing layer, realize the real-time data collection with the aid of a variety of sensor technology, at the same time sense the activ-ity situation of school teachers and students and the equipment working status by data collected, and then to provided material conditions for smart campus building.

#### 4.2.2 Network communication layer

The so-called network communication layer re-fers to achieve data transmission with the help of wired network technology and wireless network technology, and provide network technical support to smart campus building (Qiang D,2012).

#### 4.2.3 Big data layer

In intelligent school building, big data layer should be as the core standard, which mainly includes data collection and collation capabilities, data storage ca-pacity and data analysis ability. As the center link of all data links of intelligent campus, big data layer provides data help for smart campus building.

#### 4.2.4 Application layer

Application layer includes four job application of smart campus, first is the teaching; second is man-agement; third is the scientific research; fourth is service. The application layer plays a decisive role in the smart campus building, it is the center of the smart campus building.

#### 4.2.5 Self-adaption interactive platform

In addition to support different types of intelligent terminal equipment, self-adaption interactive plat-form provides school the interactive mode which is suitable for campus environment and terminal equipment, and then to provide more quality services for the school, improve the overall teaching quality of smart campus.

#### 4.2.6 Support security system

Support security system not only has the equipment maintenance service system, but also has the infor-mation security mechanism, so as to provide security for smart campus building.

## 5 GOAL OF SMART CAMPUS

### 5.1 Unimpeded teaching environment

Traditional way of teaching has four elements, first is blackboard; second is chalk; third is book; fourth are tables and chairs. For the intelligent teaching now, as long as using intelligent terminal equipment, it will collect and collate the teaching contents, and teach by knowledge push. Students can obtain the required learning materials through this way; teach-ers can grasp the learning situation of students by this way, and appropriately adjust teaching methods according to the students' learning status, thus achieving the purpose of enhancing the teaching quality.

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### 5.2 Collaborative research platform

The so-called smart laboratory mainly refers to connect the teaching, students, learning tools, teaching aids, teaching syllabus, teaching mode and other teaching elements, with the help of cloud computing, cloud storage and sensing technology to transmit and analyze the data which experimentation teaching needs, and develop reasonable experimentation teaching plan through the results analysis. In this way, it not only helps students to reduce much time spent on finding information, but also reduces the time that teachers spend on getting familiar with the teaching content and experiment tools, and provides a lot of time for experiment course. It intermingles the teachers with the students well, and provides the basic conditions for research results' inheritance and application.

### 5.3 Accurate decision support

The so-called accurate decision support is that comprehensively analyze of a number of data of our smart campus, including overall operation of school, actual income and expenditure of school, overall planning of school, professional introduction of school, teachers' comprehensive teaching ability, students' comprehensive quality, students' employment situation and research situation, the main purpose of these data analysis is to provide school leaders data support for making management decision of next step.

## 6 CONCLUSIONS:

Through this paper, we have a new understanding of smart campus building under big data. As the time goes by, big data technology provides favorable conditions for the construction of intelligent campus in China. The comprehensive analysis of intelligent decision and its depth in big data, will lay a solid foundation for the development of intelligent campus. However, according to the present situation, our big data technology research is still in its infancy, there are still many problems worthy of comprehensive analysis and discussion for our scientific research personnel. I believe, with its potential value and technical characteristics, big data will fully demonstrate in our smart campus construction, and promote the stabile and rapid development of China's smart campus.

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