Research on the Application of Cloud Computing Technology in Medical Internet of Things

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Abstract: Medical informatization is an important research direction in the current medical field, and new information technology is the key means to solve medical informatization. It integrates Internet of things, cloud computing and big data processing technology, feeling, knowing and doing are the core medical informatization, which aims to build an intelligent medical platform. This article analyzes the characteristics of the Internet of Things, proposes the architecture of the hospital Internet of Things, analyzes the advantages of the Internet of things in medical treatment, puts forward the Internet of things management as an important technical means, demonstrates the rationality and feasibility of improving medical quality and reducing medical risks, and then combines the current situation of hospital management to find a way that not only conforms to the actual situation of the hospital, but also keeps up with modern medicine From the perspective of practice, the new ideas of hospital development pace will make some useful discussions for the improvement of hospital management quality under the new situation.

Internet of Things is one of the greatest achievements of information technology in the 21st century, and it is a new technological revolution. The Internet of Things is the deepening and expanding of information technology, which will better serve the production and life of human beings, and has promising future. Most countries in the world attach great importance to the application of IoT, and China also places it on the priority of development. Premier Wen Jiabao has repeatedly stressed the application of Internet of things and decided to make the Internet the next strategic development of the information industry. In 2006, the health industry demonstrated how to apply the Internet of Things in hospital information construction and improve the quality of medical management. In 2008, the health system IC card application program was officially launched by the Ministry of health, which made an overall plan for the application of IC card, RFID and Internet of Things in the medical industry. In 2009, the Ministry of health held the Internet of Things application meeting, which made a useful discussion, communication and exchange on IoT application in outpatient infusion, patient identity verification, infant safety management, high-value consumables tracking, etc. The "notice on the implementation of drug electronic supervision" and "national drug code management" issued by the state food and drug administration clearly require the unified coding and certification of drugs and medical devices, which lays a solid policy and legal foundation for the implementation of the Internet of Things. In the new medical reform plan issued by the state, information system construction has become the most important part in medical reform. IoT, the latest development of hospital information system, will undoubtedly get significant development opportunities. There is no doubt that the Internet of Things is an unprecedented development opportunity in the medical industry.

1. The concept of Internet of Things

The definition of IoT given by the International Telecommunication Union is that the Internet of Things is used to deal with the issues of interconnection of things, interconnection of people, interconnection of people and other related issues.

What is completely different from the previous Internet is that H2T refers to the use of

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communication equipment to realize the connection between people and things, and simplifies the connection procedures and methods; H2H also means that the connection between people and people has been achieved without the computer. The Internet does not involve the connection of items, which leads to the concept of the Internet of Things. In short, the Internet of Things is a network that realizes the connection of objects. There is an M2M theory in the theoretical world, which means that human to human, human to machine, and machine to machine, which vividly explain the scope and concept of the Internet of Things. The IoT definition given by the China Internet of Things school-enterprise alliance, a non-governmental organization with wide influence in the Chinese Internet of Things, is that the Internet of Things combines computer technology, communication technology, and Internet technology to realize real-time connection, automatic collection, and transmission of surrounding objects, environments, and management. In a sense, this definition almost covers the current major information technologies and forms the concept of the Great Internet of Things. The IoT definition given by Ni Guangnan, academician of Chinese Academy of engineering and a famous computer expert, is to realize the interconnection between controlled objects and Internet, achieve the goal of intelligent monitoring, alarm, judgment and processing, and establish a complete network integrating the functions of "management, control and operation" by using the sensing technology and communication methods such as radio frequency identification technology, GPS technology, sensing technology and video monitoring technology.

2. Characteristics of the Internet of Things

2.1 Extensive use of various sensing technologies

Many types of sensing devices are installed on IOT, each of which is the source of information. Different types of sensing equipment lead to different types of sensing information. These sensing devices set different collection periods according to the needs, so that they can collect the surrounding environment data in real time and upload it to the network.

2.2 A widely used network

As the name implies, where there is something to monitor, there is the Internet of things. The foundation and core content of IoT technology is still the Internet, because the wireless and wired connection is established, the information of controlled items can be collected in real time. The amount of real-time data collected by the Internet of things is very large. In order to ensure accurate and timely transmission, it is necessary to match various heterogeneous networks and protocols.

2.3 Intelligent processing capability

IoT not only collects the information of surrounding environment and objects, but also has the ability to analyze and process the collected information, so as to realize the real-time intelligent processing and control of controlled objects. The Internet of things extracts available and effective data from the massive information to meet the needs of users and expand its service scope.

3. Architecture of hospital Internet of Things

3.1 The perceptual layer

The perceptual layer is divided into two sub layers, data acquisition sub layer and access sub layer. The data collection sub layer collects infant information, patient information, medical staff information, material information, drug information, equipment information, medical waste information related to the hospital, perceives changes in the surrounding environment, and collects and uploads them in real time. The required equipment includes inductive tags, laser scanners, video cameras, sensors, etc., through which controlled objects can be transformed into information nodes for easy identification and processing. IoT includes three different nodes, namely passive CPS, active CPS and Internet CPS. For example, outpatient, medicine, equipment, medical waste use passive CPS nodes (including wrist strap, RFID medical card, RFID Tags, etc.). Inpatients need

to be equipped with active CPS nodes, so that inpatients need to collect more information. It is recommended to use Internet CPS nodes for basic facilities such as buildings, rooms, stairs in the hospital, which can fix location definition and realizing real-time monitoring. The access sub layer transfers the data from the data collection layer upward, connects to the backbone network, and forms the global Internet of things. Various access methods such as mobile network, wireless network, fixed network and cable TV network can be used for connection. Which one will be chosen should be determined according to the actual situation of the hospital. Because of the advantages of convenient mobile network installation, low cost, short construction period and convenient mobile, it has become the main access method of IoT in the hospital.

3.2 The network layer

The network layer is also divided into two sub layers, namely network transmission platform and application platform. The network transmission platform is a highway to transmit the data collected by the perceptual layer. It uses LAN technology, communication technology and M2M technology to gain the high-speed and reliable information transmission. Before the implementation of the Internet of Things, the hospital has built a variety of wired networks, in order to reduce costs, we should fully explore the network heterogeneous technology in line with the actual situation of the hospital. Application platform is a service platform with data standardization, consistency and integration. It completes data standardization and storage, develops and retains data interface for the third party, and facilitates the use of hospital staff, patients and relevant personnel.

3.3 The application layer

The application layer mainly includes two aspects, namely hospital digital construction support and decision support. Hospital digitalization refers to charge management, PACS system, outpatient doctor station, inpatient doctor station, drug management, equipment management, fixed assets management, etc. Decision support mainly provides data support for hospital managers, such as Bi system, single disease information statistics, patient disease classification, full cost accounting, statistical analysis of patient source distribution, drug composition proportion analysis, etc.

4. Advantages of Internet of Things

4.1 Real time monitoring for the whole process of medical quality

Medical quality management based on Internet of things technology is a kind of real-time control technology. It makes full use of the basic theory of cybernetics and information technology theory, and uses decision-making technology, prediction technology and simulation technology to combine medical quality management with wireless technology, sensor technology and computer technology, forming an unprecedented means of medical quality control. This method forms a closed-loop real-time control system of medical quality through the joint action of quality control, feedback control and on-site control. The grass-roots executive team, middle management team and upper decision-making team of the hospital can carry out dynamic and implemented detection and control of medical quality. Different from the traditional medical quality management which only emphasizes treatment, this innovative quality management mode can not only realize treatment, but also realize prevention, and take prevention as the key point to realize the forward movement of medical quality control point and the correction of quality management defects in advance.

4.2 Innovation of medical quality management mode

Internet of Things technology is the latest development of hospital information construction, which plays an active role in medical quality management. The application of the Internet of Things technology has subverted the traditional medical quality monitoring mode of the hospital, and realized the seamless real-time monitoring of the whole process. With the continuous expansion of the application scope, while improving the work efficiency of QC personnel, it also greatly expanded the monitoring space and scope. Quality control can be in any networked computer and PDA intelligent mobile terminal in the hospital to carry out quality monitoring.

Standardizing the information system construction and scientific management of medical quality is helpful for the inspection and implementation of various rules and regulations of the hospital, and provides massive quality control data for quality control personnel, which is convenient for them to make a full perspective quality analysis, improves the scientific of the analysis report, reduces blindness, lays a data foundation for the refined management of medical quality, and ensures the management at all levels. The scientific decision-making is more conducive to the improvement of the medical quality of the hospital. The establishment of medical quality control mode based on the Internet of Things is a comprehensive project involving all departments and personnel of the hospital. It is a perfect integration of the latest development achievements of information technology and the innovation of hospital management theory. We cannot only emphasize technology one-sidedly while ignoring supporting management innovation, system innovation and process optimization. Only the combination of them can ensure the optimization of advanced technology and the maximization of improving medical quality.

In recent years, IoT has been gradually recognized by hospitals, and many beneficial attempts have been made in some large hospitals in China, especially in the south China. The medical model in Internet of Things is various. Different hospitals and different units have different situations and needs. Different modules and different design standards must be adopted. The change of the model is bound to conflict with the old model of the hospital. Different departments in the hospital must make necessary adjustment according to the change of the mode, and establish a set of process, system, and standard to adapt to it, so as to ensure the Internet of Things to make the best use of its advantages and truly gain the improvement of medical management. The application of Internet of Things technology in modern hospitals will change the data collection mode, diagnosis, treatment mode and management mode of hospitals, and will bring in-depth and comprehensive changes to the development of the medical industry. Through the establishment of intelligent nursing system, management system and service system, the service level of the hospital is improved, the resource allocation of the hospital is optimized, and the working efficiency and medical quality of the hospital are improved. From the perspective of patients, they are eager for more comprehensive information collection, more accurate diagnosis, more effective treatment and more personalized service.

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