



Development of Intelligent Sports Stadium System Based on Internet of Things Technology

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Abstract. With the acceleration of network data transmission speed, the Internet of Things technology has developed rapidly. The sports industry is constantly improving its commercial value. The development of intelligent stadium systems has sufficient conditions. The sports field also urgently needs intelligent stadium systems to improve the efficiency and service quality of stadium management. Based on the design requirements of the intelligent stadium system, this paper optimizes the design of the intelligent stadium system in terms of the structure, function and overall architecture of the system.

Keywords: Internet Of Things · Intelligent System · System Development · Stadiums

1 Introduction

Sports venues are an important part of the sports industry. Athletes will conduct sports training in venues, and sports competitions are also carried out in sports venues. Optimizing the management of sports venues plays an important role in the development of the sports industry. A large number of sports venues in China have problems such as poor operational efficiency, weak service capabilities, and low utilization levels. In China's 2015 survey of stadiums across the country, it was found that the number of stadiums in my country was about 1.8 million, of which 70% were in a state of loss. The intelligent stadium system can promote the interconnection of service information, reduce the management cost of stadiums, improve the network service and information management level of stadium operation, and enable the high-quality development of China's sports industry.

2 Description of Related Technologies

2.1 Iot Technology

The Internet of Things is all about extending the concept of the Internet to the connections between physical devices and everyday objects [9]. These devices are embedded with electronics, network connections, and other forms of hardware that can communicate and

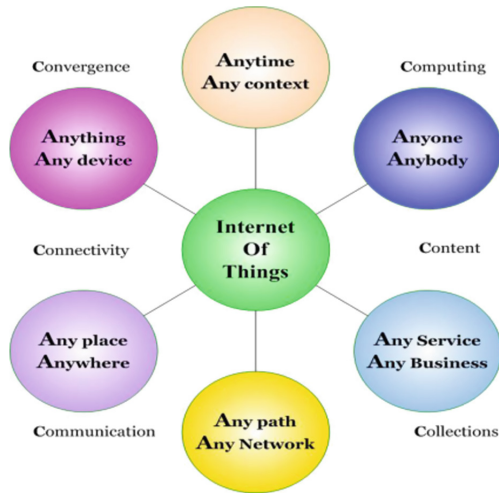


Fig. 1. The Internet of Things.

interact with others over a network, and can be monitored remotely. In general, the Internet of Things is a network that uses the Internet to connect various items. In the Internet of things technology, cloud computing technology can be used to integrate a variety of network operation software. In different network environments, cloud computing technology can connect big data information in Intranet, private network and Internet, and mine valuable information from data information. Cloud computing technology gives full play to the value of the big data era [3] (Fig. 1.).

The main notable trend in IoT in recent years has been the explosion of devices connected and controlled by the Internet. The widespread availability of IoT technology means that the specifics of different devices can vary widely, but most devices share basic characteristics [1]. The Internet of Things creates opportunities for more direct integration of the physical world into computer-based systems, resulting in increased efficiency, economic benefits, and reduced human and material resources. The use of intelligent stadium systems can achieve efficient management and control of stadiums [2].

2.2 Intelligent System

An intelligent system refers to a computer system that can generate human intelligent behavior. Intelligent systems are self-organizing and adaptive, so they can be applied in many fields. The objects processed by the intelligent system are data and knowledge. The main difference between intelligent systems and traditional systems is that intelligent systems can represent, acquire, access and process knowledge. Intelligent systems are systems based on knowledge processing and require knowledge representation language and knowledge organization tools. In the development of intelligent systems, methods and environments for establishing, maintaining and querying knowledge bases are required [5] (Fig. 2).

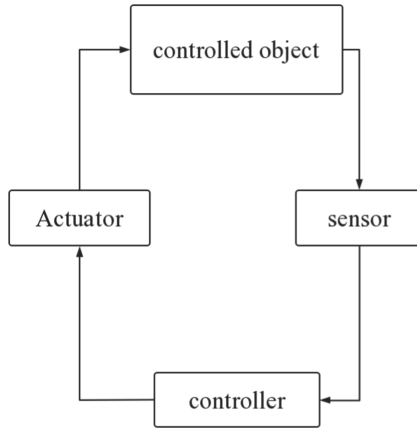


Fig. 2. The main structure of the intelligent system.

The intelligent system includes hardware and software. The hardware generally consists of a processor (CPU), memory (memory, hard disk, etc.), display devices (monitors, projectors, etc.), input devices (mouse, keyboard, etc.), sensing devices (sensors, etc.), sensors, scanners, etc.) and other components. The hardware equipment of the intelligent system can be adjusted according to the actual needs, and its adaptability is very strong [8]. In terms of software, developers can choose computer languages according to their own needs, such as C, C++, VB, JAVA, Delphi, etc. can be used to write intelligent systems [7]. Radio Frequency Identification Technology.

The RF recognition communication technology is the point-to-point radio-free or non-contact signal electronic data identification transmission and communication that can be directly exchanged between the RF reader and the wireless RF label receiver, which can achieve the specific technical purpose of automatically and accurately identifying the specific signal characteristics of the specific RF target signal. RF label recognition communication technology is actually one of the communication technologies without automatic RF identification. Wireless RF identification technology mainly refers to the computer using the principle of radio frequency radio to achieve a fast object contact without radio frequency radio information data access and exchange acquisition, identification, analysis and storage operation and other new technologies, By utilizing the principle of RF wireless RF communication technology and combining the information data access and exchange processing technology, The computer then stores the connection to the database system, To realize a long-distance contactless fast radio frequency and wireless bidirectional data acquisition and communication, Thus, which is to achieve the realization of a main function, For multiple data access and exchange, Such a system built in series is called an extremely sophisticated, large, complex and diverse label identification technology system. In the design idea of this kind of technical label identification system, the rapid automatic read and write detection conversion and communication with various electronic label readers can be directly realized by using radio frequency and electromagnetic waves. According to its actual communication and

transmission distance, respectively can be further divided into near and far field communication mode and near far field, for the reading transmitter/dictation device system and the data modulation exchange communication between electronic tag system equipment can be further divided into forward load modulation communication mode and reverse scattering modulation [6].

RFID technology has the characteristics of applicability, efficiency, uniqueness and simplicity [10]. The applicability of radio frequency identification technology is that this technology can establish a connection regardless of various obstacles and directly complete communication. Radio frequency identification technology has several pieces of reading and writing technology, and can identify and read the content of multiple tags, which improves the efficiency of information transmission. Each tag in the RFID technology is unique, and each tag can be in a one-to-one correspondence with a product, which facilitates the follow-up tracking of items. The tag structure of RFID technology is simple, and the required reading equipment is relatively simple. In the design of smart venues, RFID technology can be used for the management of staff in the venue, and it can also be used to identify the tickets of consumers [4].

3 Demands for the Development of Smart Stadiums

Intelligent sports venues can realize the modern development of sports venues. Intelligent stadiums should integrate automation, digitization and information management to meet the modern needs of intelligent stadiums. In the process of system design, consideration should be given to the development cost, technical feasibility, Internet of Things technology and other aspects to optimize the system decision. In smart stadiums, it is necessary to manage and control the resources in the stadium, such as water, electricity and other resources, and adhere to the principle of saving and environmental protection. In order to provide a healthy, efficient and applicable environment for the consumers of the venue and improve the quality and efficiency of the service, attention should be paid to the humanized design when designing the smart venue. At the same time, the design of smart venues should also increase the safety of the venues, enhance the equipment monitoring, fire alarm, intelligent security and other safety equipment in the venues.

4 Development of Smart Stadiums

Based on modern building technology, modern Internet of Things communication technology, and modern remote monitoring and control technology, three main modules are constructed in the design of intelligent stadiums. The main structure is shown in Fig. 3.

Based on the modern Internet of Things technology, the intelligent stadium system must have management functions corresponding to the actual application to ensure the normal operation of the stadium management. Smart sports knowledge function.

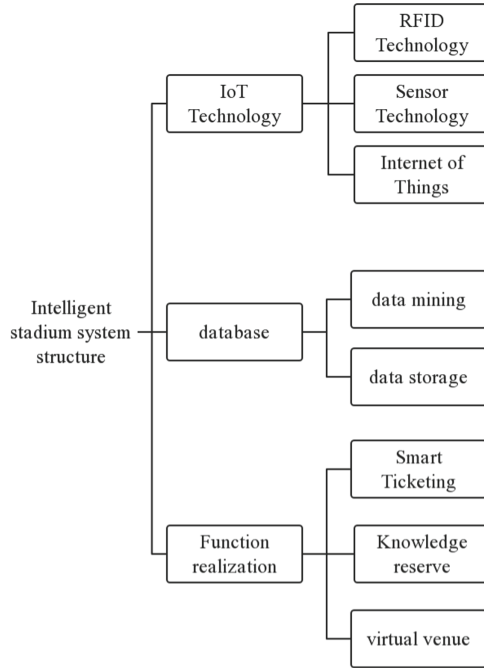


Fig. 3. Overall system structure.

The intelligent ticketing function allows users to obtain game information on the network terminal, ensuring that users can arrange their own time through the ticketing query function. In the intelligent ticketing system, RFID technology and barcodes are used to identify electronic bills and improve system data security. The system’s ticket inspection service mainly uses RFID card readers and barcode scanners to identify electronic ticketing information and intelligentize the security work of stadiums.

The virtual stadium management function can use the Internet of Things technology to allow people to log in to the system through smart terminal devices and obtain stadium information in the system. The virtual stadium management function of the system also includes the monitoring of security information for smart stadiums.

The intelligent sports knowledge reserve system stores a lot of sports-related knowledge, including physical education, sports athlete information, sports training experience and other information. Users can inquire on demand in the system (Fig. 4).

The Internet of Things technology used in the system can use sensing equipment and communication protocols to connect many devices in the stadium to realize identification, positioning, tracking, monitoring and management within the system, so that sports information can be exchanged within the system.

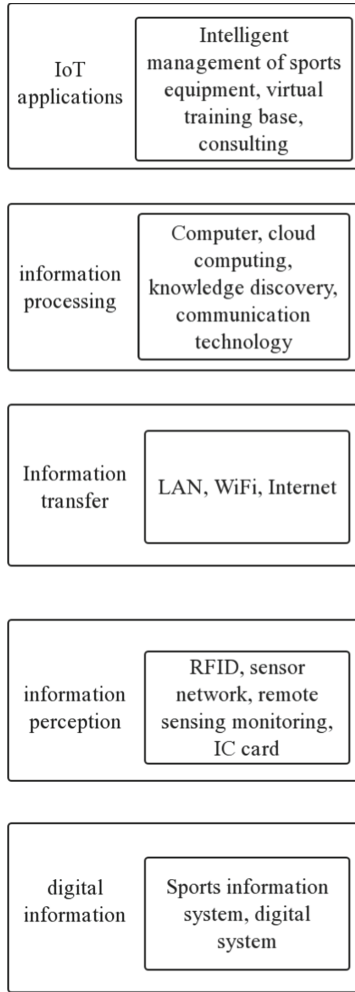


Fig. 4. System IoT architecture system

5 Conclusion

Only the stadium system supported by the Internet of Things technology can intelligently control the stadium, improve the application performance of the stadium system, and exert a positive impact. The system constructed in this paper still has problems such as low response efficiency and disruptions system in practical application, which needs to be further improved and applied.

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