Research on Internet of Things Construction based on Wireless Sensor Network

Jun Luo

Department of Electronic Engineering, Guangzhou College of Technology and Business, Guangzhou, Guangdong, 510850

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Abstract: With the rapid development of the Internet of Things industry, the number of devices connected to the Internet of Things has increased dramatically, which has largely met the needs of business systems, and has also caused great difficulties for business systems to access the underlying IoT devices. Due to the lack of a unified access platform, IoT applications need to implement multiple device access protocols in the development process to satisfy access to different devices. To this end, a unified IoT platform is needed to achieve unified access to business systems. The Internet of Things platform can shield the differences between the underlying devices of the Internet of Things and provide a unified access platform for the development of upper-layer applications, so that developers of the upper-layer business systems can access the devices without knowing the specific device information at the bottom of the Internet of Things. The purpose of separating the business logic from the underlying implementation is achieved.

1. Introduction

The Internet of Things is a rising industry in recent years. It is slowly changing people's lives and has gradually become an important development strategy of the country. It has a wide range of applications in the fields of intelligent transportation, smart home, agricultural monitoring, intelligent monitoring, and environmental monitoring. . The Internet of Things uses traditional networks to connect various devices to meet the business needs of upper-layer applications. However, the existing communication networks are relatively complicated, resulting in complex structure of the Internet of Things, high deployment and maintenance costs, and difficulty in realizing data and resource sharing among various business systems, which is not conducive to the further development of the Internet. To this end, it is necessary to build an efficient, robust, secure and easy-to-use wireless sensor network-based IoT application platform to reduce development costs, improve development efficiency, and reduce development risks. This is very important for the research and application of the Internet of Things. The key role.

2. Internet of Things and Wireless Sensor Network

At the end of the 20th century, Professor MIT Ash-ton first proposed the concept of “Internet of Things”. The Internet of Things (IoT) is the third revolution in the world information industry after computers and the Internet. From the perspective of Radio Frequency Identification (RFID), the Internet of Things is actually a network based on the development of Internet and RFID technology, which realizes the acquisition of information between “objects and things” and “people and things”. Convergence, dissemination and sharing. From the perspective of sensor network application, the Internet of Things is a wireless network composed of nodes such as sensors, data processing units and communication units through self-organization. In summary, the definition of the Internet of Things can be summarized as follows: All items are connected to the Internet through information sensing devices such as radio frequency identification to realize intelligent identification and management of the network. In the world of the Internet of Things, any object has a unique identifier that can be interconnected with any other object whenever and wherever. Compared with the Internet, the major breakthrough of the Internet of Things is that it can integrate the real physical world with the virtual information world. Although the Internet of Things and wireless sensor

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networks are all related to the network, they are two different concepts and have great differences. The application of the Internet of Things is a highly targeted practical application. One sentence is the application of the object and object. The fundamental difference between a wireless sensor network and the Internet of Things is that it is based on a ground-based wireless communication protocol and uses sensors as nodes. The wireless sensor network can be regarded as a small-scale Internet in terms of its function, which involves a means of detecting and transmitting physical signals, and the application is not particularly targeted. In order to achieve the purpose of object and object, while avoiding the cost and complexity of wiring, the Internet of Things must have the function of collecting and transmitting physical environment information, which requires the use of wireless sensor networks. The wireless sensor network is the main terminal docking form of the Internet of Things.

3. Basic structure of wireless sensor network

Wireless Sensor Networks (WSN) is mainly composed of three modules: sensor node, aggregation node and management node. The sensor node is the sensing unit of the terminal, which is used to collect various physical quantities. It is small in size and usually has a built-in micro operating system, but the data processing capability is very limited, and the node energy is provided by the battery; the function of the aggregation node is to carry out the entire network. Coordinated control, therefore requires strong data processing capabilities, the aggregation node not only has the function of the general sensor network node, but also integrates the universal serial interface module to complete the expansion function of the sensor network, and is responsible for the agreement between the wireless sensor network and the Internet. Conversion, complete communication and data transmission with the collection terminal; the management node can control and manage each sensor node, so that the entire network is in normal working state. There is a big difference between wireless sensor networks and traditional networks. First, the sensor nodes of wireless sensor networks are densely distributed, large in number, complex in topology, and working in open spaces. Secondly, wireless sensor networks mainly use wireless communication methods, broadcast communication systems and event-triggered working methods. Thirdly, the wireless sensor network has the characteristics of strong fault tolerance, good adaptability and high dynamics. Finally, each sensor node has a strong self-organization ability, which can be coordinated according to actual conditions, and the networking form is very flexible. Therefore, wireless sensor network systems are easier to automate data acquisition, control automation, and information release automation than traditional networks.

4. Application Status of Wireless Sensor Network in Internet of Things

Due to the many advantages of wireless sensor networks, their status in the Internet of Things is increasingly reflected. Relevant scholars, engineers and scientific research units have also invested in research. So far, the application of wireless sensor network in the Internet of Things has achieved a lot of results in China, and has been widely used in network access, agricultural monitoring, energy balance, medical monitoring, smart home and so on. In order to realize the ubiquitous access requirements of the Internet of Things, East China Normal University proposed an Internet of Things based on the convergence of cellular networks and wireless sensor networks. The literature believes that among the existing access technologies, only cellular networks can achieve ubiquitous access, and some common functions in the convergence technology of cellular networks and wireless sensor networks are proposed, which provides a reference for the convergence of cellular networks and wireless sensor networks. Shared function module.

Kunming University of Science and Technology has developed a farming monitoring system based on Internet of Things and wireless sensor network technology, which integrates related technologies such as geographic information system, remote sensing and satellite positioning system to achieve all-weather monitoring and remote data transmission of environmental indicators. Precision agriculture provides an important and effective means, with important market value and

application prospects. Dalian University of Technology, based on the energy-constrained problem of sensor nodes in the Internet of Things, based on the magnetic resonance coupled wireless energy transmission technology, proposes an energy-balanced routing algorithm based on wireless energy transmission, and studies the energy balance of the Internet of Things from a new direction. Question. Inner Mongolia University of Science and Technology proposed a wireless medical monitoring system design based on Internet of Things technology, using high-precision, portable medical sensing equipment to monitor the patient's physical condition in real time, and proposed a fuzzy hyperbolic positioning algorithm in medical aspects. Has a broad application prospects. Xi'an Engineering University put forward the concept of intelligent home monitoring system based on wireless Internet of Things, and combined various IoT related technologies such as Zigbee, embedded and GPRS, and proposed a new intelligent Internet of Things solution.

5. Overall design of the Internet of Things application platform

The Internet of Things application platform provides monitoring and data analysis for various devices in the wireless sensor network, helping IoT managers understand the operating status of the entire network and control each network device. The platform also provides an open interface for developers to deliver wireless sensor network-based applications based on specific business logic.

From the overall architecture diagram, the system can be divided into six parts: Server: The application server is the core of the entire system hardware and software, responsible for the management of all devices, as well as the monitoring of device status and control of the device. Data Middleware Server: The Data Middleware Server is responsible for receiving and temporarily storing data sent by each sensor node, which can be extracted from the middleware server when the server needs data. Database: responsible for storing basic information and monitoring information of all devices, in addition to storing data collected by each node. Collaboration node: Also known as the gateway, it is responsible for the conversion of wireless network data and network data. Routing node: The Lushan node plays the role of routing in the wireless sensor network. The routing node can collect data and forward data. Terminal node: The terminal node is responsible for collecting data and transmitting the data to the routing node or the collaboration node. The terminal node cannot forward data.

The Internet of Things application platform is divided into the Internet of Things platform layer and the Internet of Things platform call interface layer. The IoT platform layer provides core functions such as device management, data analysis, data acquisition and node monitoring of the wireless sensor network in the wireless sensor network; the IoT platform calls the interface layer to provide a unified service layer application to the upper layer service system. Access to the wireless sensor network can be achieved indirectly through these. Therefore, the Internet of Things platform has realized the shielding of the specific implementation of the underlying wireless sensor network.

The business layer is not part of the IoT application platform. The business layer focuses on implementing functions related to specific IoT management systems, such as agricultural IoT management and vehicle location systems. The application layer of the business layer interacts with the IoT application platform to indirectly access the wireless sensor network. The Internet of Things platform calls the interface layer to provide a unified calling interface to the upper layer business system, which is the bridge between the upper layer business system and the Internet of Things platform. The IoT platform layer mainly implements functions that are not related to specific IoT applications, such as device management, data management and analysis, data middleware services, and basic functions. Among them, the basic functions include rights management, portal management, software modeling and other functions. The basic functions are the functional modules that have been implemented in the early stage, and the Internet of Things platform uses some of them.

6. Conclusion

The system adopts wireless sensor network technology in the wireless network layer, and

encapsulates various sensor data and transmits it to the IoT gateway by the aggregation node. The IoT gateway uses the TQ6410 embedded development board to receive and send data from the aggregation node to the server. The data transmission uses the GPRS communication protocol. The entire system realizes diversification of environmental data and real-time wireless transmission. After three months of trial operation, the system designed in this paper has normal working status, complete data and reliable data transmission. It basically completes various design functions and has a good user experience. This shows that the design of this paper is reasonable. The application of wireless sensor networks in the Internet of Things can provide excellent conditions for performance improvement and architecture optimization of the entire system. This system has broad application prospects. The Internet of Things has improved human life and promoted the national information infrastructure, which has effectively promoted the pace of national informationization. With the further development of the Internet of Things technology, the future of the Internet of Things will also face numerous opportunities and challenges. It is not difficult to predict that the research focus of the Internet of Things will be to solve the problems of short communication distance, large external environment impact, heterogeneous network compatibility, data security transmission, and large network management, and gradually form a complete standard system.

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