Application Research of Internet of Things Technology in Building Energy Saving

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Keywords: Internet of Things; Building Energy Saving; Energy Data Management

Abstract. Concepts, architecture, data analysis and processing methods and other technical requirements in the standard Internet of things systematically optimize and improve existing building energy consumption monitoring theory, network architecture and implementation of technology, the concept of building energy system of things, network architecture , hardware and software key technology and engineering application technology implementation, to facilitate things in the construction sector energy saving application development, improve building energy efficiency and building levels, and promote the development of industries of things, to promote China's construction development of energy-saving and emission reduction has important practical and long-term significance.

Introduction

IT applications in the construction sector not only to people's lives, work and study brought great convenience and safety, and has developed in order to improve building energy efficiency and reduce building environmental loads, improve the function of important building techniques. Through technological advances to achieve building energy conservation, low-carbon society will in the country to build a harmonious society and play an important role [1-2]. Internet of things in the construction application will greatly enhance the existing building automation technology's capabilities and effectiveness, is bound to monitor and control HVAC systems bring great changes, based on building energy conservation issues have also been incorporated into the country of urban construction and development planning [3].

With the advancement and development of building energy conservation work, the concept of Internet of things, standards and technology into the field of energy conservation building, research building energy systems of things were put on the agenda. Building water, electricity, gas, heat, coal, oil, energy supply systems and in building the body's distribution and consumption systems collectively referred to as building energy systems, energy efficient operation and its low carbon emissions is currently building a new energy saving hot and new direction. The emergence and mutual integration with awareness and intelligence for the characteristics of the new technology, making the development of information technology, human-oriented Internet information to things and things of the Internet was the future of networking information leading change. The development of networking technology will greatly enhance the ability of people to interact with the physical world, will have a revolutionary impact on human life and production. Especially with the development of communication and sensor technology, used to obtain the physical world information sensing technology matures, costs have been reduced to the sensor nodes can be large-scale application stage.

Network Architecture for Internet of Things

Internet of things combination with the intelligent building, fundamentally speaking, that is, in a variety of intelligent building integration of information, namely the integration of intelligent building systems up to networking application platform, to form a "system of systems" for government departments, business units and users, and provide related services. So, how to

integrate a variety of information on intelligent building networking applications platform that is becoming an urgent problem [4]. So, here Study of a networking application platform data access solutions for the subsequent study of intelligent buildings and achieve things with specific basis.

Three-tier network architecture of Internet of things was shown in Figure 1. Perception layer are as intelligent perception of the physical world and recognition, information acquisition and processing and automatic control, and then the physical entity via the communication module is connected to the network layer through the application layer. The network layer are transmitted, routing and control information, including the core network, access network and extend the network, the network layer can rely on the public telecommunications network and the Internet, also relying on the industry-specific communications network. Application layer include various networking applications and application infrastructure and middleware. Application infrastructure and middleware networking applications provide basic information processing, computing, common infrastructure services and resources call interface, as a basis for the development of various physical networking applications in many fields [5-6].

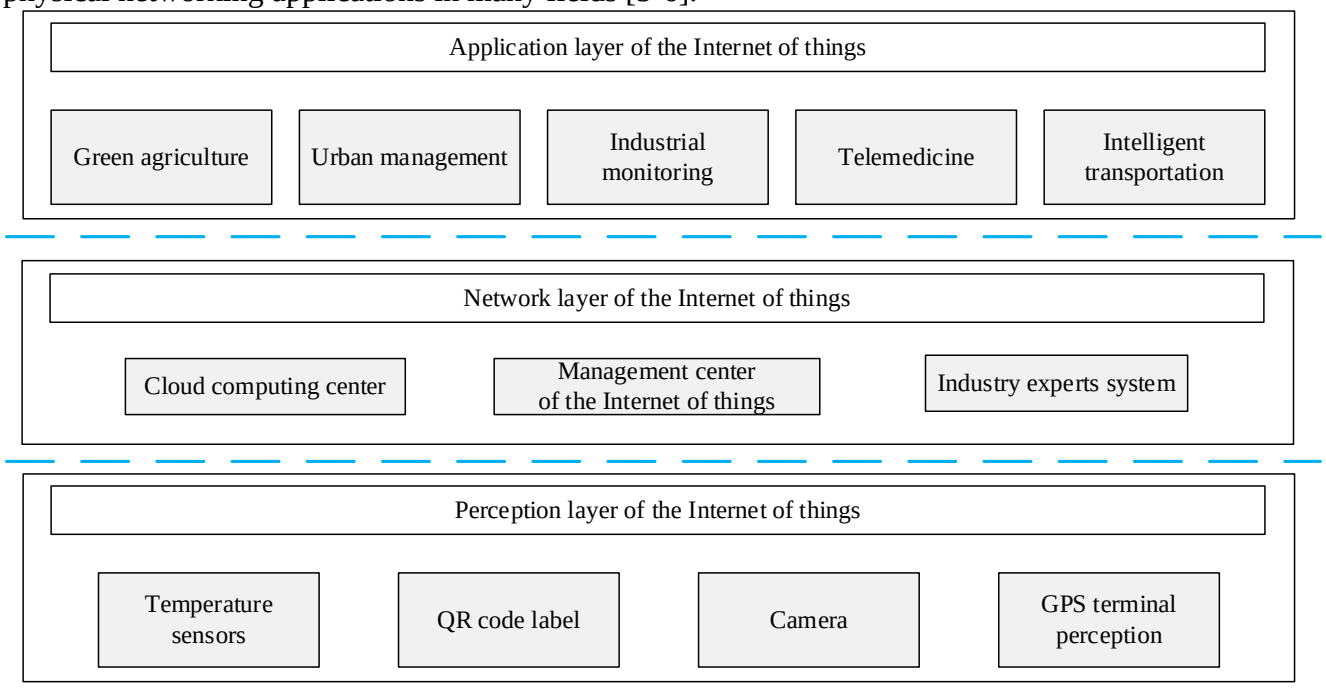

Figure 1.Technology architecture of Internet of things

Internet of things perception involves many technical fields, controls, computers, microelectronics, network communications, micro-electronics, software, embedded systems, etc. Therefore, the key technologies covered by things is also very much into simple perception layer, network layer key technologies and application-layer technology. Perception layer is the key to the development of things and the base portion. The main technique involves sensing layer comprises a resource addressing and EPC (Electronic Power Control) technology, RFID technology, sensor technology, wireless sensor technology. Things can be divided into the network layer aggregation network, access network and bearer network in three parts. Things application layer key technologies include middleware technologies, object name resolution services, embedded intelligence, cloud computing, service-oriented architecture technology, and other networking and security technology business platform. Integrated server and embedded devices perception layer, transport layer networking middleware in things, the perception of the data proofreading, filtration, collection, effectively reducing the application is sent to the data redundancy, in things It plays a very important role.

Application of Internet of Things in Building Energy Saving

Internet of things binding characteristics of the application in building energy management, perception layer mainly collect building energy consumption data collected from the field device or completed by intelligent systems, network layer mainly address how the building energy consumption data access networking platform, application layer is the development of energy management applications in the networking platform. Correspondence between the intelligent building energy-efficient systems architecture and networking between architecture shown in Figure 2.

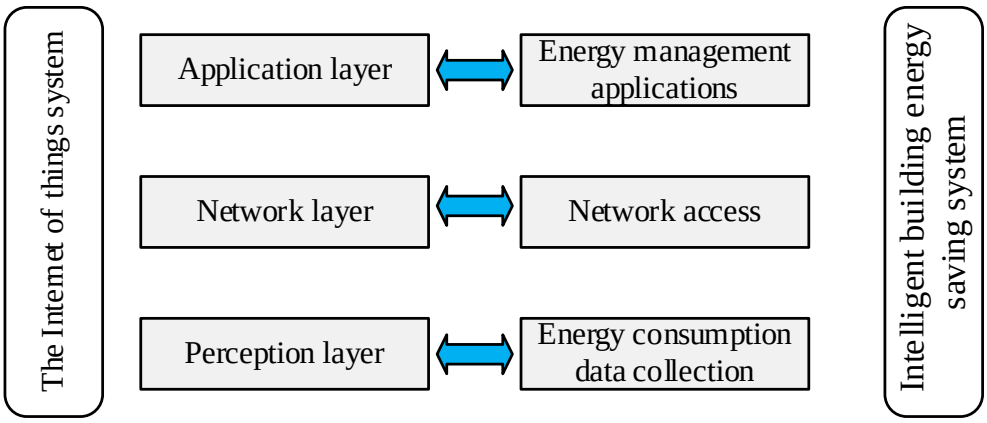

Figure 2. Corresponding relationship between intelligent building energy saving system and Internet of things

Building energy conservation, especially in low-carbon economy, circular economy and global social and economic sustainable development, sustainable use of energy resources, social development background, the networking and building energy saving combined with a significant prospect.

First, the state of things in the running of each subsystem building energy monitoring, security alarm and forecasting, energy-saving operation and scientific management, promotion and other aspects of the building function has an important role, it is to enhance the existing BAS and improvement of existing Building control technology and computer integrated control technology has an important role. Therefore, the research and development of physical network building energy systems will have broad application prospects.

Secondly, the things existing building energy consumption monitoring platform has direct technical support and features to enhance the role of existing building energy consumption monitoring technology upgrading and updating, to promote the development of such technology has important significance . So also will the building energy monitoring, energy statistics, energy audits and energy efficiency in public has broad application prospects.

Third, building energy management systems optimize the operation of Things for the construction of various energy systems, energy saving, reducing CO2 emissions and emissions architecture to provide a scientific basis for the measurement platforms and technical measures and energy savings considerations, will in our building energy efficiency emissions has broad application prospects.

In short, the set of things and building energy-saving technologies in one of the building energy systems and energy-saving regulation of Things technology, will become a new direction of development in the field of building energy efficiency, to promote the development of building energy efficiency, promote the development of networking technology have important industry value and significance of social development, which also indicates that the application of research and development and demonstration of this project will have broad application prospects.

Building Energy System Design Based on Internet of Things

As shown in Figure 3 architecture-based system of building energy-saving system of things, the use of a hierarchical structure form. It contains a total of six layers, namely: perceived control layer and network transport layer, information aggregation layer, data processing layer, a diagnostic decision-making and information output layer. Things between building energy systems architecture system independent layers, either layer does not know how it's adjacent layers are implemented only provide information exchange through layer interface between the layers. Since the implementation only a single function, independent of each layer, and therefore can be a complex problem into several sub-problems easier to handle, reducing the complexity of the problem. When any one architecture system changes (such as changes in the function of a detail of implementation techniques), as long as the relationship between the layer of the interface remains the same, the overall function of the architecture of the system is not affected. Structural architecture system both loose and close contact, as a result of large systems, it is difficult using a single means to achieve all the features of a technology architecture systems, the layers may be the most appropriate technology to achieve.

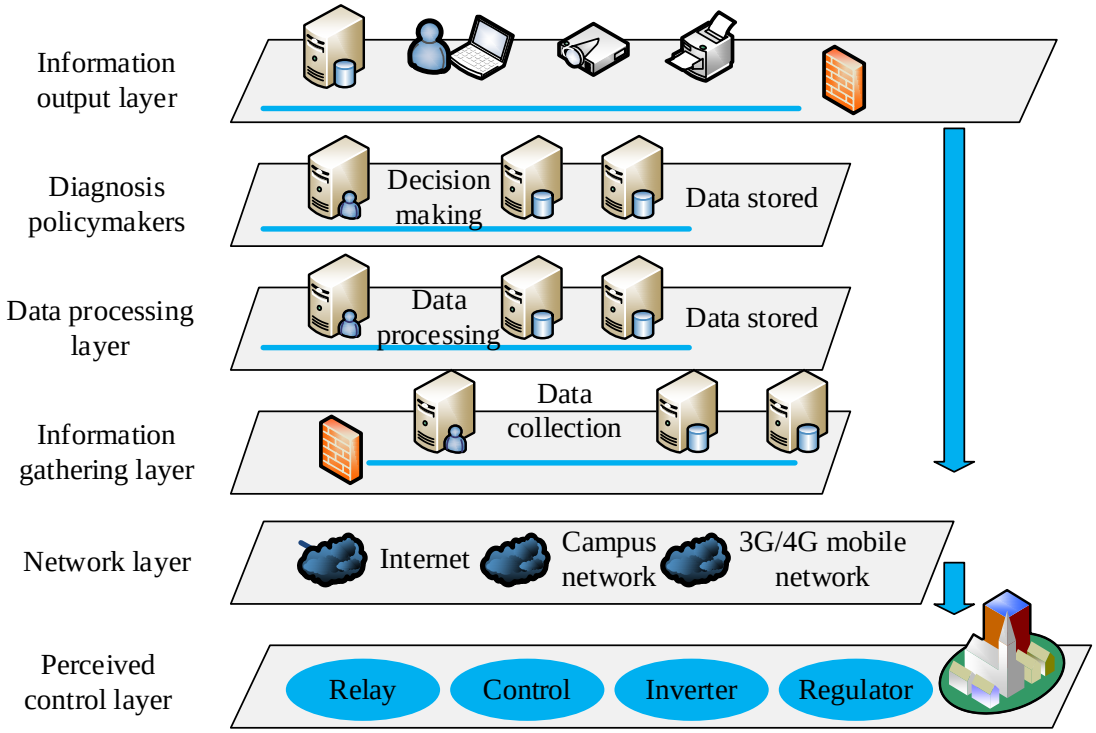

Figure 3. Architecture of the building energy systems based on Internet of things

Building energy systems research focuses on networking in sensing control layer, information gathering and diagnostic decision-making. Building energy systems Things feedback control in two ways, one is perceived internal small cycles feedback control of the control layer, the second is monitoring data via the data center large loop feedback control after diagnosis decision.

Conclusion

In the field of building energy efficiency, application networking technology acquisition, transfer and integration of data processing, to improve the intelligence level of the building, to achieve fine-grained monitoring of building energy consumption, promote energy conservation and emission reduction is important. Firstly, in a systematic analysis of the current urgent requirement of building energy conservation and presentation on the concept of things, the concept and architecture of the building energy systems of things, reviews the building automation system, building energy consumption monitoring platform and Things overview of research and

development, pointed out the existing problems of energy consumption monitoring platform, defined the research content and research ideas. Then describes the building energy consumption structure, according to building energy system operation characteristic information sources and applications, especially in energy-saving construction and future energy-optimized operation control purposes, the establishment of a single building evaluation index system of energy consumption.

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