

Research on Optimization Technology of Internet of things

Menzexi Lyu, Chuansheng Wu

University of Science and Technology Liaoning, China

Abstract: In this paper, we conduct theoretical analysis and simulation on the structural optimization methodology and communication techniques for the internet of things and wireless sensor networks. The Internet of things is called after the computer and the Internet, the third wave of world information industry. Now many countries are spending a huge sum of money for further research, the Internet of things is composed of a number of information technology integration systems of new technology. Due to achieve in the Internet of things and things and communication of people and things, perception layer is required. The Internet of things the object according to their ability to function which could be separated into the following features. Internet of things on the Internet as a platform, the sensor nodes and radio tags together with functions of perception of information network, therefore we analyze the optimization for the network. Even with readily available sensor nodes, testing the network in the desired environment can be a time consuming and difficult task.

Keywords: Internet of things, Wireless sensor networks, Structural optimization, Communication and sensor signal transmission, Mathematical modeling, Space deployment

1. INTRODUCTION

During the past few years, with the rapid and fast development of computer and communication science and technology and in the area of wireless communications and networking, a novel paradigm denoted as the Internet of Things which was first introduced by Kevin Ashton in the year 1998, has gained great attention in the research community and industry [1]. The Internet of things is called after the computer and the Internet, the third wave of world information industry. We can think that the Internet of things is to point to will all kinds of information sensing equipment and system, such as sensor networks, global positioning system (GPS) and the other is based on a communication model of short distance wireless self-organized network, through a variety of access network and Internet combine to form a huge intelligent network. If the Internet has realized the communication between people, things can realize people and objects of communication and dialogue which can also realize object with the connection and interaction between each other. It could be seen and concluded from the above our understanding of the Internet of things [2], the Internet of things is the extension and expansion of the Internet to the physical world and the Internet can be used as

one of the important way of Internet information transmission, the sensor network based on self-organization network which belongs to a kind of important perception technology in Internet of things. Due to achieve in the Internet of things and things and communication of people and things, perception layer is required. Perceptual extension layer is mainly to realize information collection, capture and object recognition. Internet network layer of the main transmission of information is the core part. The network layer includes accessing network and core network [3]. The unity of the core network is based on the mouth, high performance and scalable network, support heterogeneous access and terminal mobility. Core network will be largely based on the existing telecommunication network and the Internet. The Internet of things the object according to their ability to function which could be separated into the following features. Internet of things on the Internet as a platform, the sensor nodes and radio tags together with functions of perception of information network, realizes the human society and the connectivity of a physical system [4].

The Internet of things by the sensor network, RF tags, bar code and QR code reading device equipment and Internet, etc. The current technical development is not balanced, RF label, bar code and QR code technology has been very mature, sensor network technology has great development space. Intelligent signal processing to the acquisition of equipment for all kinds of raw data will make the necessary processing in order to obtain information related to objective things. First of all to obtain measured values of various physical quantities, namely the original signal. After screening useful signals by signal extraction technology, through the conditioning to improve the SNR of signal; High SNR signal through all kinds of signal transformation, on the mapping space for signal feature extraction; By means of signal analysis techniques such as feature comparison, classification, can be all kinds of characteristic signal corresponding to a kind of physical events [5].

2. THE BASIC STRUCTURE OF IOT

Due to the current research on the Internet of things is not yet further, for the Internet of things technology connotation is the lack of professional research, some professional or non-professional reporting is usually the wireless sensor network as a IOT. We believe that only transfer data acquisition and wireless sensor network are not covered by the core control technology in the Internet of things which also don't have the GPS demands of high reliability. So, wireless sensor network is not the Internet of things and more likely is not a physical network system, the relevant technology of the wireless sensor network to a certain extent, may support the development of networking. The autonomous system structure adopts the independent communication technologies. Independent communication is a communication as the core and independent pieces in the middle of the end-to-end levels and nodes which perform network control surface known or new tasks, independent can ensure that communication systems that can be evolved characteristics. IOT holds the independent architecture includes a data plane, the control surfaces, the knowledge and management level,

the data surface is mainly used for the transmission of data packet. Control surface message sent to the data plane configuration, optimization of the data throughput and reliability and knowledge to provide a complete view of the whole network information and refining as the knowledge of the network system which is used to guide the control surface adaptive control. Management coordination and interaction management data plane will control plane and the range of knowledge to provide independent ability of Internet of things. Awareness is an important layer of interface control center, the main function of this layer is through a variety of types of sensor for material properties, environment status and behavior tendency of static/dynamic information on a large scale, distributed information retrieval and state recognition for specific cognitive tasks which often with the method of coordination treatment for multiple types and multiple perspectives, multi-scale information online calculation and control and through the access devices will get the information with other units in the network resource sharing and interaction. The Figure 1 shows the corresponding structure [6].

Based on the present situation of Internet of things especially for sensor network complexity and the maturity of technology, the core technology of sensor network is researched. Future is expected to further promote the chip design, sensors, on the basis of gradually develop perception layer of network and IP network integration, extend the service management of information resources explore business model, and on the basis of several typical demonstration application promote the general IOT applications in various industries. At the same time, at all levels to carry out the relevant standards. For the Internet of things, the wireless communication mode is multi-level, the system complexity and overhead cost will be very big, it's need to optimize the protocol to ensure that its low power consumption and high efficiency [7]. As a result, the adaptive optimization of communication protocol design becomes important, the challenge is to consider data fusion, such as clustering and routing optimization problem and as far as possible to reduce the data traffic and repeat. Because of the Internet of things terminal sensing network of private property, so safety is a must face the problem. In IOT sensor nodes usually needs to be deployed in the unattended, uncontrolled environment, aside from general wireless network of information disclosure, tampering, replay attack, denial of service and other threats are also facing sensor nodes are easy to be an attacker to obtain through physical means to get all the information stored in the node, thus the threat of invasion, control network. From the Angle of safety technology, related technologies, including ensure the safety of the user identity authentication technology as the core, to ensure the safe transport of key establishment and distribution mechanism and ensure the safety of data itself data security technology such as data encryption and data security protocol.

3. WIRELESS SENSOR NETWORK COMMUNICATION

Communication technology enables the use of the Internet of things perceived information data between different terminals for efficient transmission and exchange, exchange and sharing, information resources is the key to the functions of things. A sensor node is mainly used for

data acquisition and equipment control; Peripheral also known as access network including the gathering node and access gateway, it is mainly used for peripheral sensor node of the network control and data gathering, etc. Core carrying network is the general basis of the Internet communication network, mainly used in access network and the communication between the information service systems. Hardware part of the information service system is mainly used in information processing and decision support. Software subsystem is generated by data-aware system, middleware, network operating system and management information system. Among them, the data sensing system is mainly used for identification and items code acquisition and processing. Middleware system is data between sensors and backend application software systems and it is mainly used for the collection of data capture, filtering, gathering, calculation, data proofreading, demodulation, data transfer, data storage, and task management. Network operating system is mainly used for the Internet of things in the system hardware and software resource scheduling and management and support the operation of a variety of application service. The Figure 2 shows the general structure.

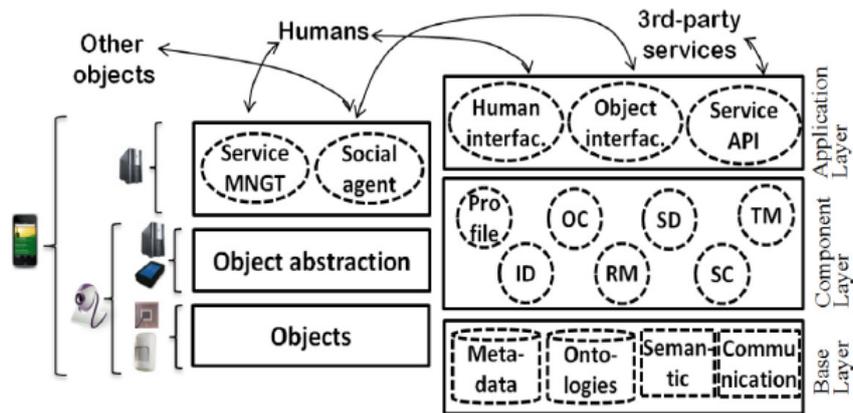


Figure 1. The corresponding structure of IOT system.

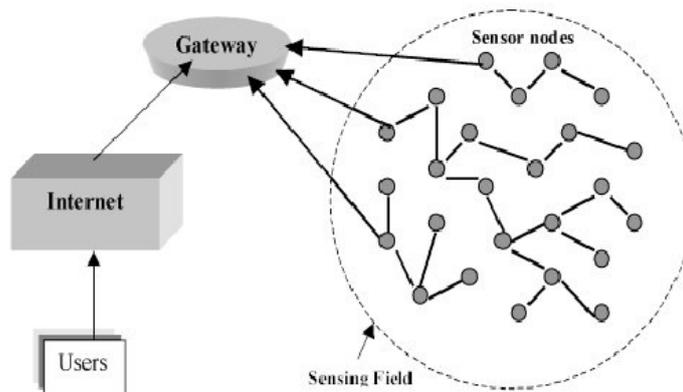


Figure 2. The general structure of sensor networks.

This is especially true in sensor networks, where hardware may have to be purchased in large quantities and at high cost. Even with readily available sensor nodes, testing the network in the

desired environment can be a time consuming and difficult task. Bluetooth devices rely on a dedicated Bluetooth chip making equipment in short range send radio signals to look for another Bluetooth device, find a Bluetooth device, mutual exchange of information between Bluetooth devices. UWB technology is a kind of carrier communication technology, do not use sinusoidal carrier, but the communication signals directly to the pulse width modulation for nanosecond pulse, form a spread spectrum ultra wideband signal transmission of information. The future is the era of big data, the scale of the Internet of things will be more and bigger which will produce large amounts of data. Big data acquisition, preprocessing, storage, retrieval, analysis, visualization, the key techniques such as well as the concentration of cloud computing data processing and distributed computing technology for large-scale data processing provides the support of the Internet of things. , therefore, must develop broad support for cloud computing and big data technology of Internet communication technology, solve for IOT scale increasing demand for communication speed, bandwidth, etc.

4. NETWORK STRUCTURAL OPTIMIZATION

In wireless sensor network for example are generally composed of multiple wireless communication channels and computing power of low power consumption, small volume of sensor node; Sensor node has data acquisition, processing, wireless communication and the organization ability and the coordination of large-scale and complex monitoring task; In the network is usually only a small amount of gathering node is responsible for the command and collect data, realize and Internet communication; Sensor nodes only perceived signal, does not emphasize on the identity of the object; Only provide local and small scale of signal acquisition and data transfer, has not been given to the items of connectivity. In the Figure 3, we illustrate the popular network structure.

The measurement factor is expressed below:

$$t_i = \sum_{j \in N(i)} g_{ij} b_j, \quad (i \in N) \quad (1)$$

IOT development quick, access to large scale and in the growing speed of data transmission, high bandwidth requirements, but the current communication technology can not completely meet the demand of the growing Internet scale. The optimal is shown below.

$$F = \sum_{j=1}^k \sum_{i=1}^{n_j} \left(d_{ij}^2 + \frac{D_j^2}{n_j} \right) \quad (2)$$

The safety of Internet communication technology is posed the great concern. Mainly wireless Internet communication technology, foreign is developed; Many of the wireless

communication technology is still in evolution, there is a security protocol security issues such as not complete, simple safe mode. The following expressions illustrate the optimized structure for the safety concern and consideration.

$$f_1 = \max_{k=1,2,\dots,K} \left\{ \sum_{n_i \in C_p^k} \frac{d(n_i, CH_{p,k})}{|C_{p,k}|} \right\} \quad (3)$$

$$f_2 = \sum_{i=1}^N E(n_i) / \sum_{k=1}^K E(CH_{p,k}) \quad (4)$$

With the development of information technology, in the evolution of the Internet of things, developed a variety of support at close range wireless communication system of sensor networks and support the distance wireless communication system of the network. The mentioned optimization technique will enhance the current pattern.

5. EXPERIMENTAL ANALYSIS AND SIMULATION

With the rapid development of information and network technology, Internet has been widely applied and popularized and also communication technology of the Internet of things put forward higher requirements. With the rapid development of information technology and network technology, more and more the number of devices connected to the Internet of things, the structure of the sensor network and access network is varied, the introduction of communication technology and the protocol is more and more complex, formed the situation of coexistence of different communication network structure which will largely influence the interconnectivity and interoperability performance of the Internet of things. Need to be a variety of different wireless communication network fuses in together, forming a heterogeneous wireless communication network, for users at all levels to provide seamless switching and high quality based pattern of communication services.

The necessity of research on the model of Internet of things is the result of the particularity of the Internet of things, and the lack of content networking architecture reference model. From the development of the Internet to the Internet of things one of the key change is that: the Internet of things need to deal directly with the objective world, which requires the Internet from pure information storage, transmission and computer network development become the information provided by the independent acquisition, storage, transmission, processing, and the information provided by the network. In the Figure 4, we show the performance of transmission.

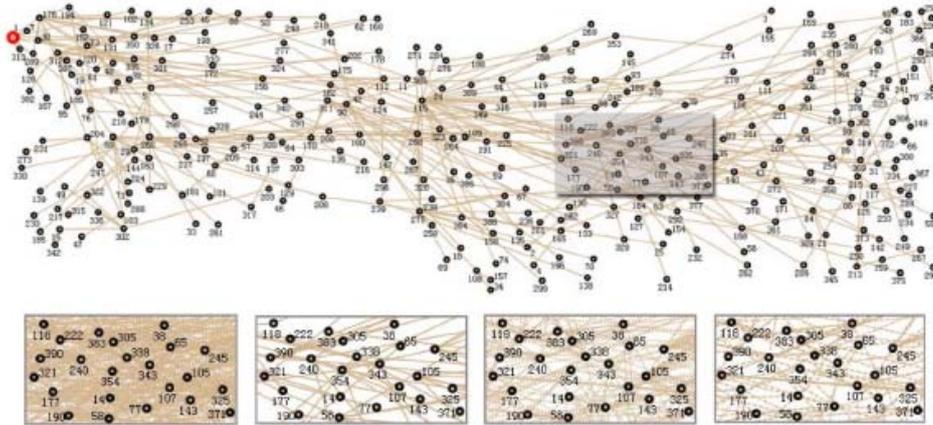


Figure 3. The structure of the network for analysis.

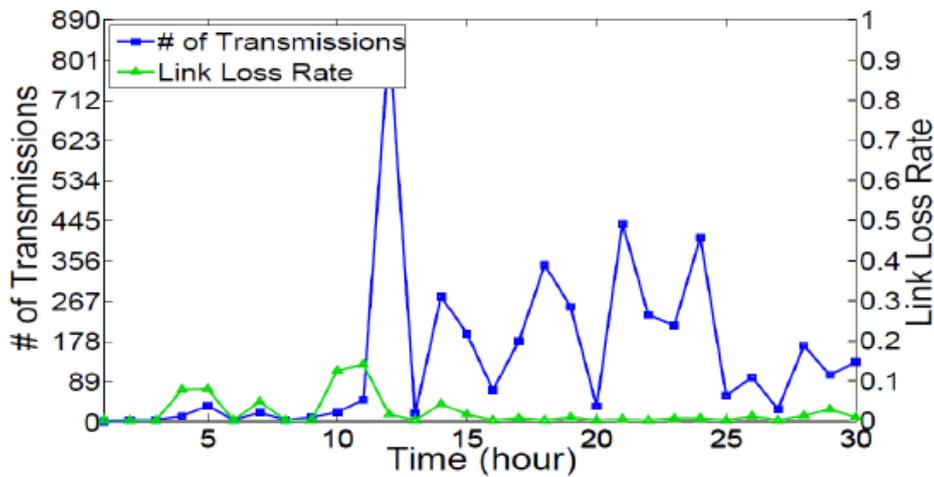


Figure 4. The performance of data transmission.

6. SUMMARY

In this paper, we conduct theoretical analysis and simulation on the structural optimization methodology and communication techniques for the internet of things and wireless sensor networks. Now many countries are spending a huge sum of money for further research, the Internet of things is composed of a number of information technology integration systems of new technology. We can think that the Internet of things is to point to will all kinds of information sensing equipment and system. The experimental result proves that the optimization for the network and structure is necessary for the data transmit rate and other standards.

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