Information sensing and interactive technology of Internet of Things

To cite this article: Zhiliang Xiao 2017 IOP Conf. Ser.: Earth Environ. Sci. 94 012039

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Information sensing and interactive technology of Internet of Things

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Abstract: With the rapid development of economic, the Internet of Things based on Internet technology is more and more concerned by all circles of society, and the Internet of Things begins to penetrate into various fields of society. The Internet of things is an extension of the Internet, the difference between the Internet and the Internet of Things is that the purpose of things aims to achieve the exchange and exchange of information and data, contract the people and goods through a variety of technologies and equipment from items to items. Information perception and interaction technology are two very important technologies in the development of things, but also is the important technology in the history of the development of network technology. This paper briefly analyzes the characteristics of the original information perception, and the difference between the interactive technology of the Internet of Things and the human-computer interaction technology. On this basis, this paper mainly elaborates from the two aspects of information perception and interactive technology.

1. Introduction
Internet of things is based on the Internet, mainly use RFID identification technology for all entities in the world to identify the identification of objects to achieve the physical monitoring of physical items [1].The design and development of Internet objects system need to use a lot of technology, such as remote sensing technology, intelligent identification technology. If analyze the Internet of things from the information exchange level, it will mainly use two technologies, they are information perception and interaction technology, and do a comprehensive perception of information, as well as information exchange and communication through these two technologies. These two technologies are also the focus of the Internet research object, in the future there will be a great change in the field of information, which will bring a certain degree of impact to the other areas of society.

2. The Original Information Perception
Before we talk about the information of the Internet of Things, let's take a look at the original information at first. The original information is sensed by various types of sensors for acquisition and transmission. The original information perception mainly has the following two characteristics. First, the original information is perceived with uncertainty, such as the original information have different attributes and types when it obtained through the sensor, which leads to information perception is not uniform; for example, the information acquisition and transmission of the sensor is different and it the sensor also takes different methods to deal with the information, these cause the uncertainty of information perception; for example, the instability of network transmission leads to the imperfect and discontinuity of information perception. Second, the perceived redundancy of the original information is higher. Due to the temporal and spatial differences in the acquisition and transmission of the original information perception, there might be some repetitive perception of the perceived information, resulting in a higher degree of repetition and redundancy. Once the information becomes redundant, it
would cause great trouble to the information transmission, storage and processing. Based on the two characteristics of the original information perception, we need to optimize the information perception and improve the effectiveness of information perception. Such as cleaning up unnecessary redundant information, uncertain information, so that the final transmission, storage and processing of information are valid and certain. For example, we can through data compression and data fusion making the information perception becomes more efficient.

3. The Internet of Things Interactive Technology and Human-Computer Interaction Technology

The purpose of the Internet of Things is to connect the world's item entities with the virtual space, and then achieve the material connection mode, exchange the various information of the network and data, exchange goods entities and people closely. To exchange information, it is necessary to use the Internet of things interactive technology. There are some huge differences between the interactive technology which is based on the Internet of things and traditional human-computer interaction technology. First of all, the object or the user of the Internet of Things technology is extremely extensive, because the Internet of Things will connect goods in the world to the network, and then connect with the user, which means that the Internet of things interactive technology users are people or machine, goods and so on and they are all around the world. But human-computer interaction technology is different, its application object which also is the use of equipment users is fixed. Second, the Internet of Things interactive technology is an active interaction, that is, according to the application needs to carry out information exchange automatically, and do the perception of information. But human-computer interaction technology is a kind of response-type interaction [2], that is, passive information interactive mode. Third, the application of Internet of Things interactive technology is more complex. In the application process it needs to use a variety of different network nodes, these network nodes also have to cooperate with each other. Because there are a lot of information in the Internet of Things that need to be processed, the information is distributed, and the wireless network and the environment have greater uncertainty and instability, so the process is more complicated than human-computer interaction. Through comparison we can find that it is necessary to carry out in-depth research on the interactive technology of Internet of Things, and establish the relevant interactive model to achieve the validity and efficiency of information exchange.

4. The Internet of Things Information Perception

Considering the above-mentioned characteristics of the original information perception, we need to study the information of the Internet of Things for further research, mainly from the status quo of the Internet of information perception, the awareness of the Internet of things information perception research and the problem of information networking research aspects. We know that the most basic way of information perception is the collection of information. Information collection refers to the transmission of perceived data to a network sink node and then collects the perceptual data. However, as we mentioned above, the original perception data has some uncertainty and redundancy, in order to avoid the subsequent problems in the transmission, storage and processing of perceived information, we need to clean up these sensory data in advance. The purpose of data cleanup is to obtain the information that the user really needs. In addition, because we do not need to use all the perceptual data, and too much data will cause the network paralysis, so we also need to use data compression, data aggregation and data fusion and other network data processing technology.

4.1 Data collection

The basic meaning of data collection refers to the reliable and secure transmission of perceptual data from the sensing node to the sink node. From this concept, we can know that data collection is to perceive the reliability and security of data transmission, that is, from the perceived node to the convergence node of the transmission process, the perception of data must be complete and there is no loss. At present, in order to ensure the reliability of perceived data transmission, wireless sensor
networks generally use multi-channel transmission and data retransmission [3]. Multi-path transmission is mainly to establish multiple transmission path in the sensing node and the convergence between nodes, in order to ensure the integrity of the perception of data. As the name suggests data retransmission that is in order to avoid the loss of perceived data arriving at the sink node, the transmitted data is backed up on the intermediate node of the transmission path. This approach needs to ensure that the node's capacity is large enough that there is room for data backup. However, these two methods may lead to perceived data uncertainty and redundancy. In addition, the multi-channel transmission process requires a lot of energy, and data retransmissions can also lead to energy imbalance, and because all the data are in a path, once the path is interrupted, we need to re-establish the routing. So we need to establish an effective transmission path to improve the transmission method. For example, in order to ensure the reliability of data transmission, and maintain the balance of energy in the transmission, you can transfer the data transmitted by the sensing node and the relevant data encoding cache to the middle of the transmission node, and then once the data is broken, the corresponding data is placed in the retransmission queue, and then the data is retransmitted by hop-by-hop backtracking. If the path is interrupted in the retransmission or the node fails, an end-to-end transmission mode can be used.

Second, another problem needs to be considered in data collection is network throughput. The network throughput of this control mechanism is different in different objects. In the Internet of things, the data transmission is based on the many-to-one transmission mode, the consequences of this model may cause the communication conflicts or data loss in the convergence node around, resulting in greatly reduced network throughput. Based on this situation, new MAC technologies and new protocols can be used to establish new transmission methods and improve the transmission rate of data transmission to improve network throughput. In addition, some applications have high requirements for data timeliness, in order to avoid the network delay which is caused by unreasonable transmission design, now the generally used technology is DMAC and STREE these two ways.

4.2 Data cleaning
Based on the above introduction, we know that the perceptual data transmitted to the sink node is not all valid, some is redundant data and even serious interference error data. The existence of these data not only increased the load on the network, but also is a big obstacle for the storage of information, transmission and processing. So we need to clean the data that some is wrong, invalid or uncertain and the redundant information to satisfy the needs of the application. These perceptual data can now be determined using outliers. Of course, in the process of determining and cleaning we need to pay more attention because that some data is missing, but it is useful or the application needs it, in this situation we cannot clean up blindly, we need to make up for these data. [4]

4.3 Data compression
Internet of things is a huge network system, in this system there must be a lot of data, if do the data transmission, storage and processing to the all data, it will inevitably have a serious impact on the network system, and it will also affect the stability of the network environment and transmission reliability. So we need to take data compression technology to compress the relevant data to enhance the stability of the transmission and network system communication capabilities. The traditional data compression methods are pipeline data compression and sequence data compression. Although these two methods have their great advantages, but in the situation that the network size is expanding, the development of information technology is rapid, we need to introduce new data compression technology, and combine it to the traditional data compression technology, compress the relevant data in different nodes, in order to improve the quality and efficiency of data compression. Such as distributed data compression which is a new type of data compression.

4.4 Data aggregation
In the Internet of things, the collection of different data has a different role, different application
requirements also have different data requirements. And there are many data types which are collected in the Internet of things, but not every kind of data has its effectiveness, so in order to achieve the effectiveness of the data and play the practical use of the data, we need to aggregate the relevant data then do the data transfer according to different practical application needs, according to our own interest. This method of reducing the amount of data transmitted can improve the quality of data transmission to ensure the stability and reliability of data transmission in the Internet of Things system.

4.5 Data fusion
Finally, because the data in the Internet of things is very much, and the content is also very different. There are a lot of heterogeneous data and duplicate data, in order to improve the stability and efficiency of the Internet of things system, we need to adopt a fusion of the relevant data fusion, mainly fuse for some of the duplication or conflict data. In data fusion, the most commonly used is drift mean filtering, this way can eliminate redundant and noise data, and then transmit part of the useful data to the convergence node, thereby reducing the conflict and repeat data of the Internet of things.

5. The Interactive Technology of The Internet of Things
Internet interaction technology also is an important point in the study of Internet of things, we compare the differences between the Internet of things interactive technology and human-computer interaction technology in the above, according to the characteristics of Internet of things interactive technology, we mainly discuss from the user interaction with the content, users and network Interaction and content and network interaction these three aspects (see Table 1).

5.1 The User Interacts With The Content
First, the interaction between the user and the content. In the Internet of Things, the core of the Internet of Things system is the production of content, such as the data information of variety transmission exchange. The service object of the Internet of things has different types and the users have different needs. On the one hand the user wants to get the information from the Internet of Things, when the user's demand instruction has not yet entered the system, the system will excite all the data, until the system receives instructions, that is, search for what the user wants according to the keywords that the user. On the other hand the user is the manufacturer of the content, that is, users in the Internet of Things system can upload content to the system, the simplest example is a variety of logistics information, the logistics entry staff need to input the logistics information which is related to the content timely into the logistics system, and then other users who want to get this information content can query from other ends.

5.2 Users Interact With The Network
The Internet of Things as an extension of the Internet, it is necessary to talk about the interaction of the user and the network. First of all, we know that the Internet of Things system is huge, connected to the world, so the user is certainly different, not only there is a big difference in the demand, but also has a large discrepancy in the behavior of the habit. Based on this situation, users and network interaction is more difficult, but it still is a focus of research. Second, when users interact with the network, we need to take the human nature into account. That is to say in the provision of services for users, must be considered from the user needs, so that the network system will be accepted and support by the user. In addition, the user interaction with the network also needs to take the security issues into account, because no matter the Internet of Things or the Internet, where the storage and transmission of various types of information may be related to the user's information security, so you can use these methods, such as encryption key, dynamic verification, certificates and so on. [5]

5.3 Content and network interaction
Finally, the Internet of Things interactive technology is the interaction between content and the network. In the Internet of things, the content is the basis and the core of the Internet of things, and the network is the carrier and the trunk of things. The purpose of the interaction between the two is to serve the user, through the interaction can provide users with more efficient and useful information. In the content and network interaction the main content we need to consider is the timeliness and integrity, the current content and network interaction research is focused on the contents of the Internet through the upload and download, for other parts, such as that there is no deep discussion about the content through the network storage, processing and others, so the latter part should consider the content and the network interaction from these links.

| Table 1 User, Content and Network |
|----------------------------------|
| **user** | Man - machine interaction user, sink node, general node | User and content: query, upload |
| **content** | Perceived data, network status information | Content and network: storage, processing |
| **network** | Information sensing, computing and storage, and network systems | Network and user: control information transmission, interactive object selection |

6. Conclusion
To sum up, with the development of science and technology, the Internet of Things began to affect the various fields, so we need to study the Internet of things information perception and interaction technology, to understand their research status and the problems of the research, and explore the future development direction.

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