

Research on Problems and Countermeasures of the Application of Wireless Sensor Network Technology

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Abstract: With the comprehensive development of science and technology, wireless sensor networks have penetrated into our lives, and make our lives more convenient. Wireless sensor network has been widely used in all aspects of our society. As a new type of information acquisition and processing technology, it can create a more efficient and convenient living or working environment for people. It has an impact on people's lives all the time, making people improve in all aspects, thus making us enter a more efficient era. However, while wireless sensor network technology brings convenience to people, it also exposes many problems. Based on this, this paper analyzes the application and development status of wireless sensor network technology in detail, in order to find out the existing problems and propose corresponding countermeasures, so as to build a better wireless sensor network.

Keywords: Wireless sensor network, Smart agriculture, Sensing nodes.

1. Introduction

Today, with the continuous improvement of people's requirements for sensors and the rapid development of physical research in China, China has carried out more research and development work on wireless sensor network applications, allowing us to enter the era of wireless sensors in advance. In addition, due to the low price of sensors, almost everyone can access the network applications of wireless sensors. However, with the continuous development of technology, some defects of wireless sensors have also been exposed to people.

Worldwide, the research on WSN is mainly focused on the United States, and countries such as Canada, the United Kingdom, and Germany have also started researching WSN and invested a large amount of funds, most of which are jointly developed by major universities. The development of WSN in China began with the Chinese Academy of Sciences, and then, relying on the Chinese Academy of Sciences, it was successively carried out in scientific research institutions and universities all over the country, and has achieved certain results. Among them, Tsinghua University, Harbin Institute of Technology, and Beijing University of Posts and Telecommunications, represented by higher level schools in computer science, have made great progress.

After analyzing the problems existing in the application of wireless sensor networks, this paper proposes targeted solutions such as increasing the energy input to wireless sensor networks, further developing the computing power of sensors, and increasing the protection of sensor nodes. It is hoped that these solutions can help the application of wireless sensor networks in China in the future.

2. Overview of Wireless Sensor Networks

2.1. Basic concepts of wireless sensor networks

At present, wireless sensor network is a research field that attracts much attention of researchers in the world. It

integrates multiple disciplines and requires high professionalism. Wireless sensor network includes many technologies, such as sensor technology, embedded computing technology, modern network and wireless communication technology, distributed information processing technology, etc. The establishment of wireless sensor networks also needs a certain data base, and this task can be well completed through various integrated smart sensors. Sensors can perform real-time monitoring and collect and organize information about monitored objects. After the information is collected, it is transmitted wirelessly and finally transmitted to the user terminal through a self-organizing multi hop transmission path, thereby achieving connectivity between the real world, computing world, and human society. WSN sensor suction is currently the most widely used, requiring less investment and greater flexibility. It can be connected to different types of terminal devices for data collection and transmission tasks.

2.2. Basic principles of wireless sensor networks

WSN typically consists of a host or "gateway" that communicates with a large number of wireless sensors through a wireless communication link. The collection of data is carried out by WSN nodes, which are compressed and directly transmitted to the gateway, or when needed, other WSN nodes are used to transmit the data to the gateway. Afterwards, the gateway will ensure that this data is input into the system.

3. Problems in the Application of Wireless Sensor Network Technology

3.1. Energy limitation in wireless sensor networks

The energy constraint problem of wireless sensor networks is currently one of the biggest challenges faced by wireless

sensor networks, and it is also a common feature of wireless sensor networks. With the continuous expansion of the application range of sensors, their performance has been greatly limited. Existing wireless sensor networks generally use batteries with limited power and can not be replaced. Therefore, the energy of sensors is very limited. The power supply is often insufficient. Due to the power supply energy problem, some nodes are often abandoned, leading to the blocking or restriction of wireless sensor network applications. Power limitation is a bottleneck in the development of WSN, as node perception, data processing, and communication require a large amount of energy. However, currently, the power supply of wireless transceivers in China is far from meeting the needs of WSN, which brings many problems to the application of WSN. So, without affecting network work, how to save energy and maximize the lifespan of the network and nodes is another problem that WSN faces in the design and deployment process. Only by solving this problem can WSN better serve us.

3.2. Capacity limitations in calculations

Sensors are an emerging information collection and processing technology that requires processing a large amount of diverse information from different locations, which requires the use of the computing power of sensors. This type of sensor has strong computing power and can perform a certain amount of signal processing. However, the computing power and capacity of embedded processors and memory are limited. Nowadays, the application of sensors has further developed, and in order to adapt to this highly informationized era, the computing power of sensors has also been continuously enhanced. Therefore, in this situation, the limited computing power of sensors often cannot meet the demand. During peak periods or busy periods, some erroneous phenomena may occur, which can cause significant losses and are often unavoidable. So, for WSN, how to process batch data is another issue it faces.

3.3. Problems in sensor nodes

Sensor nodes are an important component of WSN, but due to their relatively high risk, they are generally placed in idle environments. There are many risks involved. When the deployment area of the sensor node is close to or directly in a hostile environment, it is highly likely to be captured by the enemy. Once the sensing node is captured, the other party will effortlessly obtain the encryption key of the node and launch attacks such as replication attacks, tampering attacks, etc. The ability of sensing nodes is relatively limited, making it difficult to achieve protective measures such as self destruction. Even if they can, the cost is very expensive. So, only through physical camouflage can the possibility of being captured be reduced. In addition, due to the inability to distinguish between normal nodes and captured nodes, the credibility of nodes is also a significant issue.

4. Countermeasures for the Application of Wireless Sensor Network Technology

4.1. Increase the energy input of wireless sensor networks

For the energy issue in wireless sensors, the first thing we need to address is the issue of capacity. At this point, we can develop some excellent batteries, which requires improving

the physical and chemical properties of some batteries. In chemistry, some chemical batteries can be utilized to provide energy by utilizing the concentration difference of certain ions. On the one hand, this can provide more energy, and on the other hand, it can also save resources and protect the environment. Physically speaking, advanced materials can be used to reduce the resistance we encounter in energy transmission, thereby improving energy transmission efficiency and extending the service life of energy; Advanced wireless receivers can also be utilized to effectively transmit energy, ensuring better utilization of our energy.

4.2. Further development of sensor computing power

We can only achieve network applications of wireless sensors by ensuring their computing power, which is a prerequisite for wireless sensors. Regarding computing power, we need to develop some new computing modes and use new computing programs to meet our computing requirements. This requires us to cultivate a group of technical personnel for computing programs. In the West, computer technology is relatively developed, which can introduce advanced computer theory from Western countries and integrate it with computer theory in China. Based on this, innovation can be carried out to develop new computing programs that match the rapidly developing information processing era. When conditions permit, we can collaborate with some higher education institutions to provide funding for their computing programs, and also dispatch technical personnel to study abroad to further improve our research and development capabilities. Only by developing better computing programs can we fundamentally solve the problem of sensor computing power and make sensors work better. On the other hand, it is also possible to increase the speed of computation by adding embedded processors and memory, ensuring fast computation during peak network periods, and enabling faster information transmission to users.

4.3. Increase the protection of sensor nodes

Regarding the protection measures for sensor nodes, it is first necessary to establish a clear protection system using tracking protection. After building the node, it cannot be placed in a free environment. Instead, it is necessary to track and protect the node, check the node at any time, and avoid being invaded by other software, resulting in necessary information loss. At the same time, it is necessary to strengthen the confidentiality construction of nodes, so that even if the other party obtains our sensor nodes, they cannot view or invade because they do not have a password, which increases the intensity of protection. In addition, to expand the scope of protection, not only the safety of sensor nodes should be protected, but also other parts of the sensor should be protected. This can provide a good atmosphere for sensor work on the one hand; On the other hand, it can also increase the difficulty of others invading sensor nodes. In addition to protecting it, regular maintenance and inspections are also necessary to check for potential threats. Only by continuously checking it can we ensure that our sensors are in a secure network environment and complete a series of tasks such as information transmission.

5. Conclusion

At present, the application of WSN is becoming

increasingly widespread, and its influence is also expanding. In this paper, we briefly introduce some problems in the application of wireless sensor networks in China. As a carrier for transmitting information, wireless sensors have now achieved great success. They can also save us a lot of manpower and material resources, making our lives more efficient. However, in exploring the application process of WSN, we have also seen the problems existing in WSN. Therefore, after analyzing the problems existing in the application of wireless sensor networks, this paper proposes targeted solutions such as increasing the energy investment in wireless sensor networks, further developing the computing capacity of sensors, and increasing the protection of sensor nodes.

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