Journal of Artificial Intelligence Practice (2021) Vol. 4: 8-13
Clausius Scientific Press, Canada

DOI: 10.23977/jaip.2020.040203
ISSN 2371-8412

Research on the Application of Internet of Things Technology in Industrial Automation

Yang Hongshuai

Heilongjiang Vocational College, Harbin, Heilongjiang, 150080, China

Keywords: Internet of things technology, Industrial automation, Application research

Abstract: With the advancement of society and the improvement of the science and technology, people's lives have undergone huge changes. Today's society has become a networked society. The Internet of Things technology is widely used and has become more and more closely related to human production and life. It has become necessity in life. According to the inherent advantages of the Internet of Things technology, it plays an important role in the field of industrial automation. Through the application of the Internet of Things technology, the level of industrial automation has been greatly improved, and productivity and production efficiency have been improved accordingly. This article is based on the Internet of Things technology to study its application in industrial automation, aiming to provide valuable experience for the application of Internet of Things technology and the improvement of industrial automation.

1. Introduction

In today's society, the level of science and technology is constantly improving and the Internet of Things technology has also made breakthroughs. It has become more and more widely used and has become an indispensable part of production and life. The Internet of Things technology cannot be simply regarded as a link between the Internet and specific objects. After the two are connected, they will extend the technology to promote the innovation of Internet products, optimize the industrial structure, and upgrade the industrial chain. Modern Internet of Things technology not only has strong adaptability, but also greater tolerance. And the scope of application covers almost all smart devices, especially in information transmission equipment. Based on this, this article takes the field of industrial automation as the research object and studies the application of Internet of Things technology in this field.

2. The Basic Connotation and Application Status of Internet of Things Technology

2.1 The Basic Connotation of Internet of Things Technology

Fundamentally speaking, the Internet of Things technology is a relatively advanced network technology. Therefore, it needs to rely on Internet technology and use the positioning, scanning, identification, uploading and other functions on the device to integrate the agreed protocols that have been set in the Internet of Things system. It use the Internet as a platform to realize the

interactive functions of these devices and transfer the acquired information to each other, thereby realizing unified online control and management. From a vertical perspective, the Internet of Things technology is based on Internet technology, and it can be regarded as an extension of Internet technology. Internet technology is deconstructed, and the network and application are redesigned and structured to make the Internet of Things. The systems where the technology can be realized mainly include wireless communication networks, wireless sensor networks, and online operation systems. These technologies are widely used, covering internal and external application areas. The interior mainly includes industrial systems, mobile terminals, smart sensors, CNC systems and other equipment, while the outside is intelligent equipment, such as smart speakers, smart refrigerators, and smart robots. Analyzing the Internet of Things technology from the perspective of performance, its safety, stability, energy saving, environmental protection, etc. are relatively stable, and the level is high. What's more, when running the Internet of Things technology, the utilization rate and work efficiency are relatively high.

2.2 Development Status of Internet of Things Technology

With the advancement of science and technology, the Internet of Things technology has been further improved. From the present of the Internet of Things technology to the present, due to its powerful functionality, the Internet of Things technology have been widely used in various fields and achieved more significant results. For example, IoT technologies play an irreplaceable role in industrial production, safety prevention and control, logistics and transportation, garbage disposal, and medical fields. Especially in the medical field, the relationship between doctors and patients in modern society is tense and the operation of hospitals is heavy. Through the Internet of Things technology, the hospital improves the timeliness of information transmission within the hospital and between the hospital and the patient. It can greatly improve the efficiency of the hospital's operation and relieve the tension between doctors and patients and reduce the pressure of doctors at work. At the same time, the Internet of Things technology can also help to better detect the patient's vital signs and disease changes, provide more detailed data and facilitate doctors to formulate more scientific and reasonable treatment plans. It also can help solve some problems that have not been overcome in the medical field. In the field of security prevention and control, the Internet of Things technology is widely used in protective equipment. Taking aviation safety as an example, the anti-intrusion system in our civil aviation airport needs the support of the Internet of Things technology. In addition, Internet networking technology has certain applications in waste treatment and sewage treatment. Modern waste sorting and treatment stations and sewage treatment platforms need to be based on the Internet of Things technology, operate and manage equipment, and control each link reasonably to achieve pollution. Not only that, but the monitored data content can also be processed and exchanged through sensors and the Internet to optimize resource allocation.

3. Overview of the Industrial Automation Process

3.1 Overview of Industrial Automation

Industrial automation is one of the achievements of scientific and technological progress. As a more advanced operation method, the manual operation and control of equipment is continuously reduced during the operation of industrial automation. The automation system is used to realize the fully automatic production and operation of these mechanical equipment. Industrial automation also needs corresponding technical support, mainly mechanical manufacturing technology, mechanical vision technology, and microelectronics technology, etc. At present, the application fields are relatively wide, mainly in the field of electric power, manufacturing, construction and information

technology. By studying the development process of industrial automation, the author has achieved an all-round upgrade of automation with the optimization of industrial structure. However, there is a certain gap in the degree of industrial automation in the world.

3.2 The Status of Industrial Automation Process

From the perspective of the longitudinal development of industrial automation, industrial automation can be divided into three stages, from stand-alone automation to production line automation to today's full-line automation of machinery and equipment. The degree of automation continues to increase and manual operations are gradually reduced. Divided according to the timeline, the first stage is from the 1940s to the early 1960s. In this stage, industrial technology has been improved to a certain extent, but industrial automation is mainly a device can be automatically produced or processed according to the set instructions. The second stage was from the mid 1960s to the early 1970s. On the basis of stand-alone automation, relying on the development of science and technology at that time, the automation equipment was connected in series to form a complete production line automation, requiring very little manual monitoring. The third stage is from the mid-1970s to the present. With market changes and technological reforms, an automated operation and work model based on communication technology has been formed and unit automation technology has been integrated.

4. The Key Technologies of the Internet of Things

With the development of industrial automation and higher technical requirements, the Internet of Things technology has been widely used. In the development of industrial automation, the key technologies of the Internet of Things mainly include signal, data processing technology, architecture technology, and identification technology. Data signal processing technology is mainly used in industrial production and sales, while architecture technology and recognition technology are used in enterprise data analysis and processing.

4.1 Sensing Technology

Sensing technology is the most critical technology in the computer system, and it is also the most important in the Internet of Things technology. It occupies a dominant position and has an irreplaceable role. The Internet of Things technology is an extension of the Internet technology. Both of them need to use sensors as the medium to connect the network and smart devices in series to realize the interactive transmission of information and data. For example, in the application of RFID tags, this is a specific manifestation of RFID technology, which is presented after the integration of embedded technology and unlimited radio frequency technology. This technology has a wide applications in item logistics management and item identification operations.

4.2 Embedded System Technology

The sensor technology, computer equipment, microelectronic technology and integrated circuit technology in the Internet of Things technology are upgraded, and they are integrated in a nested and embedded manner to form a complex embedded system technology. To facilitate understanding, we visualize the network and regard it as the nervous system of the human body. At this time, the sensor is the human sense organ, and the embedded system is the brain. With the advancement of society and technology, embedded system technology is constantly updated and optimized to make its application more extensive. At this stage, the fields that have been applied on a large scale

mainly include intelligent terminal equipment, national defense construction, industrial production, etc. In these fields, embedded system technology is an irreplaceable part.

4.3 Architecture Technology

The Internet of Things architecture technology is mainly to make up for the shortcomings of the identification technology in the information processing of abnormal structures. It provides more stable and convenient technical support for people's applications, and facilitate the exchange of information during the application process. In the application process of the Internet of Things technology, a variety of ways need to be used for interoperability. At the same time, it is necessary to build a platform for users and providers to exchange information and ensure that the platform is safe and reliable. So we can realize the effective exchange of information and resources, which not only reduces intermediate links, but also greatly improves the exchange efficiency. To sum up, the architecture technology improves the sharing and interoperability of information.

4.4 Data and Signal Processing Technology

The field of industrial enterprise automation involves many automation links, including production links, transportation links and sales links. The ultimate goal of an enterprise is to make profits. The deepening of automation and the improvement of production efficiency are all to further expand profit margins. Therefore, in the process of enterprise automation, the fundamental purpose of increasing benefits is to use data and signal processing in the Internet of Things technology. When applying this technology, it collects information and data and extracts key parts of it, and uploads it to the IoT platform for processing to ensure the validity and scientificity of the data obtained.

5. Applications of Internet of Things (Iot) Technology in the Field of Industrial Automation

With the improvement of economy and technology, industrial enterprises often apply the Internet of Things technology in the process of operation and management, which has accelerated the transition from the Internet era to the Internet of Things era. The Internet of Things technology has been widely used in the industrial automation production process. The Internet of Things technology can effectively adapt to a variety of different industrial enterprises, and at the same time play its own advantages in industrial enterprises in different fields. The extensive application of Internet of Things technology in the process of industrial automation can not only improve production efficiency and save costs, but also improve operational safety. So we can realize environmental protection, energy saving and emission reduction of enterprises. On this basis, this paper studies the applications of the Internet of Things technology in the field of industrial automation.

5.1 Application of Internet of Things Technology in the Field of Manufacturing

With the continuous improvement of the Internet of Things, its inclusiveness and applicability are more extensive. What’s more, its application fields are more extensive and its use is also more convenient. Now it has been applied to all aspects of industrial production. In the process of industrial production, according to the nature and characteristics of the equipment, we try to find the matching IoT technology to increase the operating speed of the equipment, thereby increasing the production efficiency. Not only that, the application of the IoT technology in this link can also effectively reduce manpower operations, thereby save labor costs. From the perspective of

production raw materials, the identification technology in the Internet of Things technology can guarantee the quality of the production materials, so as to ensure that the product quality is qualified. In addition, the detection system in the Internet of Things technology can effectively detect the operation of the production line and deal with problems in time. Internet of Things technology can also find unqualified materials and products and improve the automation level of industrial production and manufacturing.

5.2 Application of Internet of Things Technology in the Field of Product Information

In recent years, China's overall national strength, the economy and people's living standards have been continuously improved. People have paid more attention to healthy. Chinese people pay attention to “the disease comes from the mouth”. Therefore, product quality has become the first choice for people to choose products. Therefore, product information has become the most important content for the development of enterprise automation. Detailed product information plays a vital role in the production, transportation and final sales of the product. The information that can be queried is related to the product's market share and also related to imagery of consumer. This requires companies to apply Internet of Things technology in the production, transportation and sales processes to achieve continuous tracking of products and ensure that product information is true and effective. At the same time, monitoring technology is used to effectively control this process to make up for the shortcomings in time.

5.3 Application of Iot Technology in the Field of Safety Production

In the process of industrial automation, not only product quality must be ensured, but production safety must also be paid attention to ensure the stability of the entire production process. The positioning function of the Internet of Things technology is relatively powerful, even if the page can achieve accurate positioning on a global scale. In addition, Internet technology has various perception functions. The application of these perception functions can reduce various potential risks in the production process, thereby achieving stable production and improving production safety. Therefore, the staff working in the industrial production workshop often carry the Internet of Things equipment. According to the powerful positioning function, not only can ensure the safety of the staff, but also ensure the safety of production in all aspects of the enterprise, thereby reducing potential safety hazards and ensuring safe production.

5.4 Application of Iot Technology in Energy Saving and Emission Reduction Industries

The purpose of enterprises is to make profits, but modern enterprises take profit as their goal and long-term development is also their main purpose. Sustainable development not only refers to energy conservation and emission reduction, but also the reduction of pollution, the level of enterprise automation is improved, and the goal of energy conservation and emission reduction is finally achieved. The application of Internet of Things technology in industrial production can effectively solve the difficult problems of high pollution. The main way is to install sensors in enterprise production to monitor the internal pollution sources in the enterprise in time, establish a relatively powerful pollution environment detection system and promote energy saving and reduction. So the effect of platoon can be maximized. Through the application of pollution detection system, the effect of energy saving and emission reduction within enterprises is enhanced, and the sustainable development of industrial enterprises in China is promoted.

5.5 Application in Business Management

The Internet of Things technology continues to develop, and its application range is becoming wider and wider. It is not only applied to the production process by industrial enterprises, but also widely used in the management of enterprises. As modern industry implements industrialization upgrades, actively link upstream supply companies and downstream consumers to form an industrial chain. Thereby optimizing resource allocation and improving corporate competitiveness. In the management of the industrial chain, the application of Internet of Things technology can effectively reduce operating costs, improve the overall strength of the industrial chain, and increase the production efficiency and operational efficiency of each node enterprise, thereby improving the management level of the entire industrial chain.

6. Conclusion

With the development of the Internet of Things technology, the technology is continuously optimized, reformed, and innovated, and the inclusiveness is becoming stronger and stronger. The scope of application is also further expanded, making people's lives more convenient and becoming an indispensable part of modern society. The application advantages of the Internet of Things technology are becoming more obvious, which plays an important role in promoting the deepening of industrial automation. Applying the Internet of Things technology to each link of the industrial automation process to achieve effective cost control of these enterprises, reduce manpower input, improve product quality and production efficiency. Thereby it can promote the optimization and upgrade of enterprises and further increase the profit margin of enterprises. Not only can we obtain higher economic benefits, but also better social benefits, which is conducive to the establishment of a healthy and green image for the company. As a result, we can establish our own corporate brand, improve core competitiveness and achieve sustainable development of the company. To sum up, it is necessary to fully apply the Internet of Things technology and give full play to its advantages in industrial automation production, so as to make enterprises invincible.

References

[1] Shou Dajin (2017). Application of remote control and Internet of Things technology in industrial automation control. East China Science and Technology: Academic Edition, no. 8, pp: 46-46.

[2] Tianzhen (2018). Application research of Internet of Things technology for industrial automation[J]. Communication World, no.5, pp:80-81.

[3] Long Jin (2018). Application analysis of Internet of Things technology in industrial automation[J]. Electronic Components and Information Technology, no. 8, pp:78-80.

[4] Ma Xuefeng (2019). Application of remote control and Internet of Things technology in industrial automation control. Information and Communication.

[5] Wu Xujia (2020). Research and application of routing algorithm based on industrial data monitoring system.

[6] Jin Liguo, Li Xiaofang, Liu Yijie. Discussion on the application of intelligent substations based on the Internet of Things in coal mine safety production. Coal mine automation and informatization-the 28th National Coal Mine Automation and Informatization Academic Conference and the first Proceedings of the 9th China Coal Mine Informatization and Automation High-level Forum.

[7] Wang Yingjie, Wang Yangyang, Zhang Zhou, et al (2019). Application of Internet of Things technology in classroom environment monitoring system. Automation Technology and Application, vol. 38, no. 1, pp:81-85.