

Application research of intelligent Internet of things technology in industrial engineering in intelligent manufacturing

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Abstract. The competition between countries around the world is becoming more and more intense, and it is the biggest problem facing enterprises to continuously improve production efficiency and control cost management. Among them, the processing and manufacturing industry applies the intelligent Internet of Things technology, and the intelligent Internet of Things technology has realized the reduction of operating costs. The intelligent Internet of Things technology is an important part of the processing and manufacturing management. This technology provides support for enterprises to use intelligent and automated processing tools. The technology efficiently completes various business operations, saves the cost of processing and manufacturing, and improves processing efficiency and product value. At the same time, this technology is also the focus of higher vocational teaching. The author gives a brief overview of the intelligent Internet of things technology, and then the author analyzes the application and exploration of intelligent Internet of things technology in processing and manufacturing. This article has certain reference significance for the industry.

Keywords: Industrial engineering; Intelligent IoT technology; Intelligence; Processing and manufacturing.

1. Introduction

At present, the intelligent Internet of Things technology is gradually being applied on a large scale. The traditional processing and manufacturing industry are facing a huge impact. The intelligent Internet of Things brings many advantages, but also brings unknown challenges to the entire information technology field. At this stage, the intelligent Internet of Things technology has been combined with the Internet, communication and other technologies to create more advantages. This technology is widely used in mechanical automation, industrial intelligence, transportation industry, logistics management and public information services and other industries. This technology truly realizes the sharing and tracking of material information in the world [1]. This technology reduces the overall cost of processing and manufacturing management. This technology has become an important information technology in current research. This technology is considered to be the trend of information technology after the computer and the Internet.

2. Smart IoT Technology

2.1 Relevant connotation of intelligent IoT technology

The intelligent Internet of Things technology is influenced by the network technology represented by the Internet, and the intelligent Internet of Things technology has gradually evolved into one of the core basic elements represented by the Internet. In real operational activities, intelligent IoT technology needs to apply information sensing devices such as radio frequency identification, and the technology needs to follow the prescribed operating procedures. This technology uses the characteristics of effective transmission of the Internet for the connection between any items and realizes various information communication exchanges. This technology realizes functions such as automatic tracking, monitoring and service of essential transmission [2]. The connotation of intelligent Internet of Things application is that people put various exchange items into the network environment, and the application allows the social population to feel the exact function of the surrounding things. This technology has a good application prospect in daily life at this stage.

Intelligent Internet of Things technology has now become the main component of modern information technology. With the Internet as the core element, people realize efficient information exchange and communication between various types of items, and people finally realize the unified management of various items under the principle of scientific norms. See Figure 1.

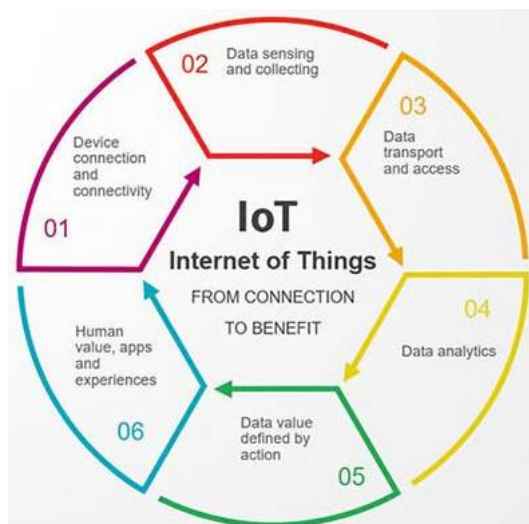


Figure 1. Overview of Smart IoT Technology

2.2 Advantages of Intelligent IoT Technology

As mentioned above, the smart Internet of Things technology realizes functions through information sensing devices such as radio frequency identification, infrared sensors and laser scanners. On the one hand, the intelligent Internet of Things technology with the Internet as the core element runs through various media, and the Internet has strengthened the breadth of the application activities of the intelligent Internet of Things technology; on the other hand, people have realized the extension and expansion of Internet user terminals. People realize the exchange and communication of information between any objects. Intelligent IoT technology realizes operation procedures through perception layer, network layer and application layer [3]. This article mainly uses the radio frequency identification (RFID) technology under the core technology of the intelligent Internet of things, and the radio frequency identification (RFID) technology is the most critical and widely used technology. On the basis of understanding the processing and manufacturing process, we have made the following functional process distribution map. This distribution map mainly includes material warehousing, material production, material transfer, material inventory and material information maintenance. Combining the latest technologies, this distribution map finally realizes intelligent management of processing and manufacturing. Processing and manufacturing are the most fundamental environmental basis for the application of intelligent Internet of Things technology [4]. We need to consider the facilities and equipment used in mechanical processing and manufacturing. In particular, we need to find the links with storage from the overall supply chain. The design of the processing and manufacturing system based on the intelligent Internet of Things technology mainly operates from the following three functions: first, the enterprise uses the intelligent Internet of things technology to optimize the various processes of the processing and manufacturing work and maximize the mechanical efficiency; second, the enterprise Use the intelligent Internet of Things technology to supervise, deploy and manage the processing and manufacturing personnel, equipment, etc., so that the enterprise can achieve the most reasonable control; The environment is monitored in real time[5].

3. Industrial IoT system architecture and requirements

We can describe the three dimensions of smart factories in terms of manufacturing intelligence, product intelligence, and management intelligence. If people can get real-time data support and give

real-time instructions from these descriptions and expressions. Enterprise product information can interact between these three dimensions, which is the smart factory. See Figure 2.

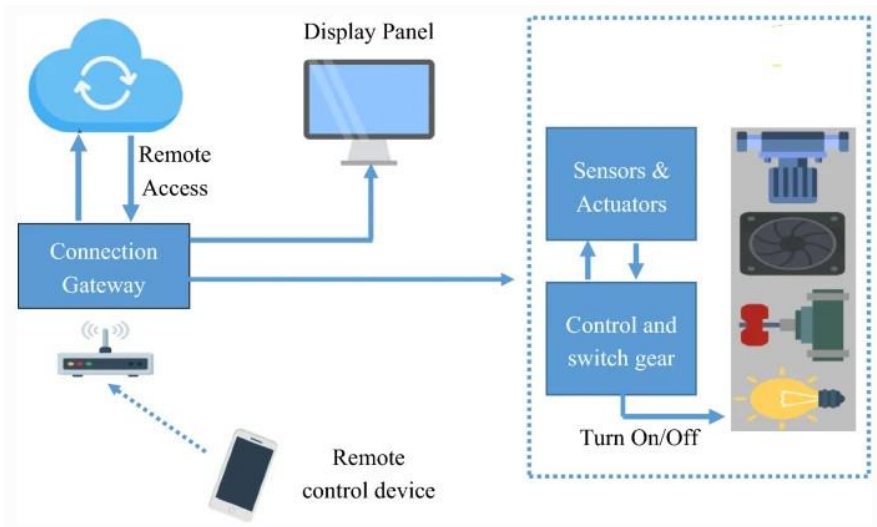


Figure 2. Industrial IoT system architecture

3.1 The architecture system application of the centralized control system function

The downstream equipment and control equipment of the control terminal of the intelligent processing plant are controlled by the field bus to realize the data perception of the industrial environment and the issuance of control commands. At the same time, the intelligent control terminal monitors the production process and tracks the operation status of the production equipment. The intelligent control terminal uses our self-developed centralized control system to achieve the optimal allocation of resources and optimization of the production process. Communication centralized control and improve production efficiency. The functions of the centralized control system mainly include: First, the Web terminal. The main functions of the web terminal are production management and decision analysis. The second is the machine side. The main functions of the machine side are workshop management and task query. The third is mobile. The main function of the mobile terminal is to query the production progress. The fourth is the big screen. The large screen mainly displays the real-time running status and progress.

In production management production tasks can be assigned to production equipment in the system. After workers confirm the assignment information, the system will officially release the task to the equipment. Production registration can adjust abnormal production data or add and delete some production data, which makes production data more accurate. Decision analysis is mainly used to view the information of production tasks, reported output and task progress, and the system reports display information from multiple angles and different dimensions to facilitate managers to view and assist management.

Workshop management is mainly to allow production personnel to log in to the system. Production personnel can check the progress of production tasks and production tasks through the system. Logging in to the system allows production personnel to eliminate paper documents to quickly report output and view task progress conveniently and quickly. The craft instruction book can be downloaded directly in the system by the worker, which saves the work of copying the craft instruction book from the office. The workshop management on the machine side has changed the original working method. This working method does not require the transmission of paper documents, which makes the work simple and fast and improves the communication efficiency.

Workers can view production task information and real-time progress of production tasks through mobile devices, and check the progress of tasks anytime, anywhere. Let managers view and control production progress in real time regardless of time or region, making management simple and efficient.

The large-screen electronic kanban can display the running status of the equipment and the real-time progress of production tasks, so that every person passing through the large-screen can gain insight into the production situation of the entire workshop.

3.2 Requirements for system construction

The system construction follows the requirements of intelligent manufacturing and unified planning to meet the requirements of information management. The system design adopts advanced concepts and technologies. The techniques used in this paper have all been successfully applied by many production enterprises. Considering the trend of information development, we should widely use current popular technologies while adopting mature technologies. Current popular technologies include advanced technologies such as big data technology, artificial intelligence technology, support graph technology, etc., which ensures that the system can adapt to the future development of modern technology.

Mature and practical technologies are adopted in system structure design, system configuration, system security and other aspects. The system should ensure stable and reliable operation 7×24 h, and the system should meet high performance requirements and support sufficient concurrency. The system has a backup and recovery mechanism. When the system fails, the backup mechanism can quickly restore the system to make it run normally.

The system has strong business processing capabilities, the system meets the current and future business needs of the enterprise, and the system has better performance expansion capabilities. System design should fully consider practicality to provide users with a good operating environment. The system supports at least 50,000 users and meets concurrent requirements. System designers should fully consider the operating habits of users at all levels, and the system should be simple to operate and user-friendly.

The system construction is based on the standard index system of the power industry and the business standardization management concept, and the system construction should be adapted to the information management system of the smart factory. The system can prevent security risks such as illegal intrusion from the outside of the system and leapfrog operations by operators. The system construction should ensure that the system data is safe, stable and reliable. Designers should provide a complete security model, and designers should design security for data, access, development, and architecture at all levels in the software and application process from the aspects of application security, data security, user access security, and architecture security.

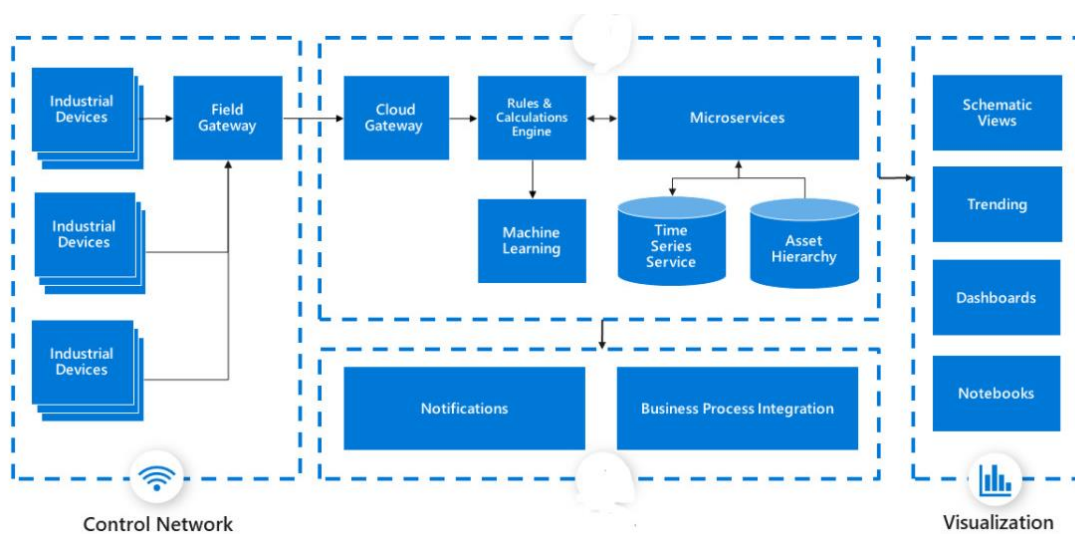


Figure 3. The architecture system application of the functions of the industrial Internet of things centralized control system

The system design fully considers good scalability and elasticity. In view of the diverse and changeable characteristics of business of each enterprise, designers adopt flexible mechanisms from

software architecture, software functions, data structure design and other aspects to facilitate business expansion and change. See Figure 3.

4. Core problems encountered by the centralized control system

The core technology of the centralized control system is developed in the long-term by relying on the intelligent Internet of Things technology. Therefore, enterprises should continuously improve the core technology level of the centralized control system, and enterprises should actively develop and introduce new technologies to promote technological innovation. First of all, the enterprise should establish a public service platform, the platform is used to solve the technical problems encountered in the development process of the centralized control system, and the enterprise technical personnel can conduct technical research and development on the platform. Accelerate technological innovation and do a good job of top-level design to meet the needs of the development of intelligent manufacturing plants; secondly, enterprises should focus on technology development and research, and enterprises should increase research on key businesses and key technologies and establish standard verification and simulation. Service platform, the government accelerates the construction of standard systems; thirdly, enterprises should not follow the old traditions in technology research and development, and enterprises should actively learn from excellent cases. Enterprises should combine the current situation of the intelligent manufacturing industry and the industry development of future intelligent manufacturing factories to conduct comparative analysis to speed up technology research and development.

4.1 Application of intelligent Internet of things technology in processing and manufacturing

4.1.1 Monitoring system

In the actual processing and manufacturing process, due to the constraints of objective factors such as environment, climate and ventilation conditions, the production conditions in the processing workshop have changed. The processing workshop is also limited by air gas and some dust, microorganisms and other factors. Therefore, in order to ensure the safety of the processing workshop, the application of the monitoring system reflects the value. The monitoring system process will use objective measurement conditions such as temperature and humidity as monitoring parameters, and the remaining influencing factors are also included in the parameters considered. In the real warehousing production process, we use the monitoring system and mechanical ventilation control system under the intelligent Internet of Things technology, and the monitoring system occupies a position that cannot be ignored. Our control of processing and production not only includes changes in processing and manufacturing links, but also scientifically and rationally observe and judge the displayed parameters, from which we summarize the reasons for the existence of the problem, which to a certain extent guarantees the processing and production Security and stability. Secondly, the monitoring system has a unified and standardized data storage format and interface transmission process, which can reasonably ensure the real-time and effective sharing of data, which is conducive to the smooth progress of processing and manufacturing. The measurement and control host and the combined data query client play a role in the entire processing and manufacturing LAN operation process. The measurement and control host include the actual design and judgment of the processing and manufacturing operating parameters in the application process. computer to control. The data query client is different, and can reasonably set up multiple computers under the warehouse local area network. The responsible personnel need to regularly check the data, analyze the data and statistical data. Once a problem occurs in the work process, the monitoring system under the application of intelligent Internet of Things technology can improve and adjust the situation in time to ensure the safety of the processing and manufacturing workshop. See Figure 4.

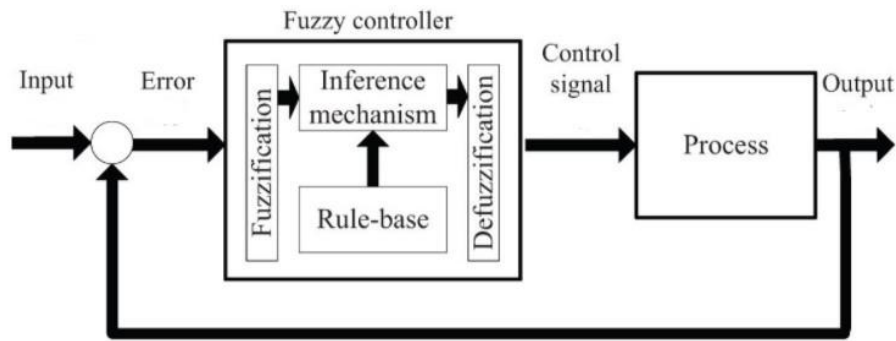


Figure 4. Workflow logic diagram of the industrial IoT set system

4.1.2 Workshop ventilation control system

The workshop ventilation control used under the intelligent Internet of Things technology is mainly composed of air ducts, processing and manufacturing ventilation automation valves, and automatic switching windows. In specific production activities, the workshop ventilation control system software is also used for intelligent cooling and ventilation, intelligent natural Ventilation and other types of ventilation equipment, enterprises can freely choose according to the actual situation of processing and manufacturing. In addition, the workshop ventilation control system can also analyze the actual ventilation situation through data to ensure that the warehouse ventilation environment meets the qualified standards. The workshop ventilation control system is mainly used in the ventilation process of processing and manufacturing. The system realizes effective detection and analysis of changes in the internal temperature, humidity and ventilation parameters of processing and manufacturing. The system analyzes the actual ventilation conditions to find the best ventilation timing. Avoid unschooled or inefficient ventilation during manufacturing. Moreover, the company uses the workshop ventilation control system to reduce the labor cost of manufacturing and production, the company uses the workshop ventilation control system to improve the overall warehouse working environment, and the company uses the workshop ventilation control system to ensure the overall quality and efficiency.

5. The future upgrade direction of the centralized control system

Although the operation division of each layer and the business implementation process of each layer of the centralized control system in the application smart factory are clear, the centralized control system has a coupling association problem between the massive data transmission of signal information between the layers and the virtual space. This problem We haven't delved into it yet. In order to realize the perception and interaction in the complex environment of intelligent manufacturing and centralized management and control, the Internet of Things also needs to establish a virtual model of the physical simulation space and the information simulation space. At the same time, we also established the electromagnetic interference model of the complex factory environment. In the Industrial Internet of Things, multiple types of networks often coexist, and many information islands are formed between different networks. To achieve interconnection between different networks, it is necessary to establish connections between different networks. Whether the current research is based on the idea of designing a unified gateway or the idea of a cognitive network, there are only a few types of network integration, and these few types of networks are far from meeting the actual needs. In future research, we will develop a unified physics and its protocol to promote the integration of multiple networks in view of the heterogeneity of the IoT network and the large amount of carrying traffic. The centralized control system considers that the security of each layer in the framework of the Industrial Internet of Things is not independent but interdependent. The security protection strategy designed for each layer of the centralized control system is not comprehensive, and its scope of application is limited. Different application scenarios have different emphasis on security requirements. Therefore, we design a wider range of intrusion detection and prevention

systems, we design more effective access strategies, and we formulate effective mobile device cross-domain authentication methods will be the future Internet of Things. security research hotspot.

6. Conclusion

With the advent of the Industry 4.0 era and the development needs of the equipment manufacturing industry, the author's research group has developed integrated planning and scheduling, production modeling and material tracking, based on the latest industrial intelligent IoT technology, system optimization scheduling methods and advanced manufacturing ideas. New technologies such as equipment data energy consumption collection. We hope to play a role in the future industrial intelligent manufacturing.

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