

Research on the application of automation technology in mechanical engineering control

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Abstract. Automation technology, as one of the important achievements of modern science and technology research and development, plays an important role in the innovation and development of various enterprises. According to the accumulated experience in the development of mechanical engineering and automation technology in recent years, relevant departments and enterprises attach great importance to the learning and accumulation of basic theory and applied technology, and will integrate social experience and market economic structure together. In the biochemical research of mechanical equipment projects, the automation development goal of mechanical engineering control can be truly realized and the core pace of market economic system can be accelerated. In this paper, based on the understanding of the development status of mechanical engineering control and automation technology, mainly from the integrated automation, flexible automation, the Internet of things and other aspects of application research, and combined with the development of practice, clear the application advantages of automation technology, in order to provide technical support for the development of mechanical engineering in the new era.

Keywords: Automation technology; Mechanical engineering, Engineering control, Internet of Things; Market economy

1. Introduction

In the rapid development of our socialist market economy system, the technical theory and scientific research results have an excellent achievement. Most industrial machinery equipment application requirements are clearly put forward higher machinery equipment manufacturing requirements, which further speeds up the development of machinery engineering and automation technology. Now, our production manufacturing level is becoming more and more high, the type, scale, model of mechanical equipment products gradually international standards, this for our country become a large machine equipment country to lay a solid foundation. In essence, with the steady development of social economy and science and technology, automation technology has gradually developed from the initial simple form of technology to the current comprehensive technology including artificial intelligence, communication technology, sensor technology, computer and other new technologies. It has been widely used in agriculture, medical, factories and other fields, mainly to solve a variety of complex social and economic problems.[1-3] No matter what kind of field automation technology is applied in, it has distinct technical characteristics: first, multi-disciplinary technology crossover and highly extensible; Second, every automation technology is your automatic control as the core; Third, the release of human beings from the complex and tedious working environment can not only improve the practical work efficiency, but also effectively control the cost. From the perspective of practical application, the development of modern society has higher and higher requirements for automation technology. People have gradually changed the development thinking of traditional mechatronic integration or a single production line, and built a research system with electrical and electronic technology as the core, comprehensively presenting the application advantages of computer, communication technology and sensor technology. A variety of automation products can evolve in different terminal environments. The theory of automatic control takes the mathematical system theory as the basis, requires the system to operate according to the predetermined rules, fully liberates the human labor force, and shortens the operation time of production. Therefore, automatic control is divided into

three parts in the application: the first is process automation, the second is machinery manufacturing automation, and the last is management automation.[4]

The application of automation technology in mechanical engineering control requires the mechanical equipment to operate automatically according to the pre-set process on the basis of not being affected by the external environment, so as to realize the automatic production, automatic management, automatic control and other basic functions of machinery. From the perspective of long-term development, automation technology has transformed the application function of traditional mechanical engineering. On the basis of continuous expansion of mechanical engineering functions, it has orderly completed the technological innovation of working mode, further improved the work efficiency and work quality of mechanical production, effectively controlled the manual operation pressure, and provided convenient conditions for the production activities of modern society. Now, the application of automation technology in mechanical engineering control is in the primary stage, and compared with the technical means of developed countries, our research on mechanical automation technology is still in the monad automation and rigid automation stage. The reason for this phenomenon is that Chinese enterprises do not really realize the importance of automation technology application research, practice development lacks the spirit of reform and innovation, and they are not willing to try new things like automation. They still use the management mode and production mode in the traditional sense, and the training of relevant technical personnel is not strong. Under the influence of traditional education concepts, The practical ability and innovation consciousness of college graduates are insufficient. Although they have stored a lot of theoretical knowledge and application technology, they cannot meet the needs of enterprise innovation and development, which leads to the application effect of mechanical automation can not meet the expected requirements. At the same time, from the perspective of automation application, mechanical automation is mainly reflected in digital processing and technical control, and relevant technical theories are in the initial stage. Therefore, scientific research scholars should fully demonstrate the application value of automation technology theory on the basis of in-depth exploration of mechanical engineering control automation technology, and gradually accelerate the level of mechanical production and internal management. To truly achieve the Sustainable Development Goals. On the basis of understanding the development status of mechanical engineering control and automation technology, this paper discusses the application direction of automation technology in mechanical engineering control from multiple perspectives, and makes clear the application value of automation technology, so as to provide effective basis for the innovation and development of mechanical engineering in the new era.[5-7]

2. Methods

2.1 Integrated Automation

As one of the most widely used contents in the field of mechanical engineering, integration technology will improve and optimize the existing information technology means, and gradually improve the operation process of mechanical manufacturing. Based on the analysis of the integrated technical structure diagram shown in Figure 1 below, it can be seen that it contains a number of contents such as database, browser, server, etc., which can collect and process various production information, combine data information with production activities, and ensure that the system can achieve the expected work objectives in the automatic update.[8]

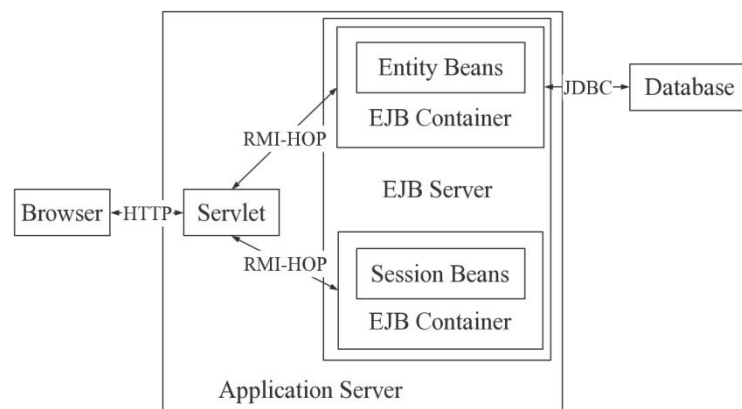


Figure 1 Structure diagram of the integration technology

For example, in the production of spare parts, the integrated system is used to collect production-related information data, apply the information data to practical production activities, comprehensively control the production operation process, re-store the modified information, and finally further improve the existing integrated system to ensure that it can be applied to the next production activity. The safety and effectiveness of the applied technology products can be guaranteed based on the quality inspection of the produced machines and equipment.[9-11]

2.2 Flexible Automation

Different from rigid automation technology, this technology is more in line with the requirements of machinery production in the new era. In the development of modern technology innovation, flexible automation technology is one of the important forms of the development of mechanical automation technology. It has a good operation function in production and manufacturing, and can really realize the requirements of automatic production management. Combined with the structure diagram of the flexible automation system shown in Figure 2 below, it can be seen that as a kind of flexible automatic production control system for high-quality boxes developed by current researchers, it is mainly applied in the field of printing and packaging technology. Numerical control technology and process technology are regarded as the core content, several adjustable machine tools are combined together, and automatic distribution devices are installed to form a production line. A variety of production modes can be selected using computer management. Compared with the traditional mechanical processing, flexible automation technology can better complete the basic work of product processing, product manufacturing, product assembly, product testing and so on.[12-15]

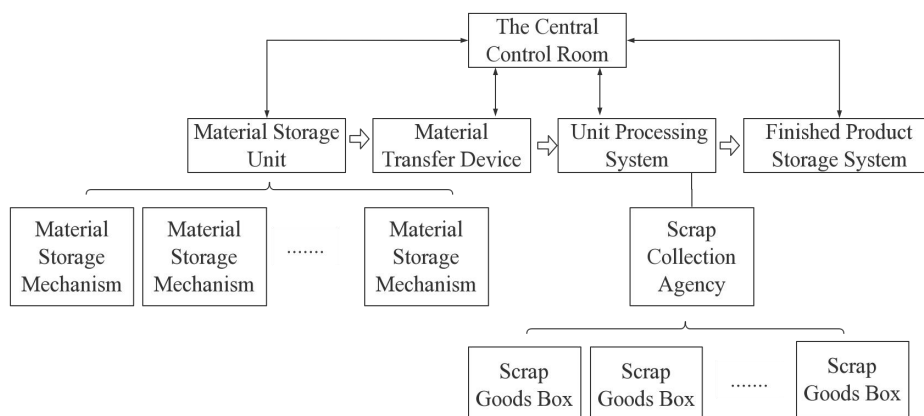


FIG. 2 Flexible automation technical structure diagram

From the point of view of practical application, as the operating platform of flexible automation technology, computer can further help the staff to complete the automatic operation of mechanical production; Numerical control technology is the core of flexible automation technology, which can

realize the work objectives together with information technology and computer platform. From the perspective of the long-term development of mechanical engineering control, flexible automation technology has a good promoting effect, which can not only improve the efficiency of mechanical production and manufacturing, but also ensure the quality of the overall production operation.

2.3 Internet of Things technology

Combined with the technical structure diagram shown in Figure 3 below, we can see that it contains various terminal equipment and technical facilities, which play an important role in modern mechanical engineering control work. The Internet of Things technology originated from the media industry and is an important product of the third revolution of the information technology industry. Through the use of information sensing equipment, all objects are connected with the network technology in strict accordance with the agreed protocol. Objects can realize information exchange and effective communication through the information communication media, so as to achieve the basic functions of intelligent identification, accurate positioning, tracking and supervision.

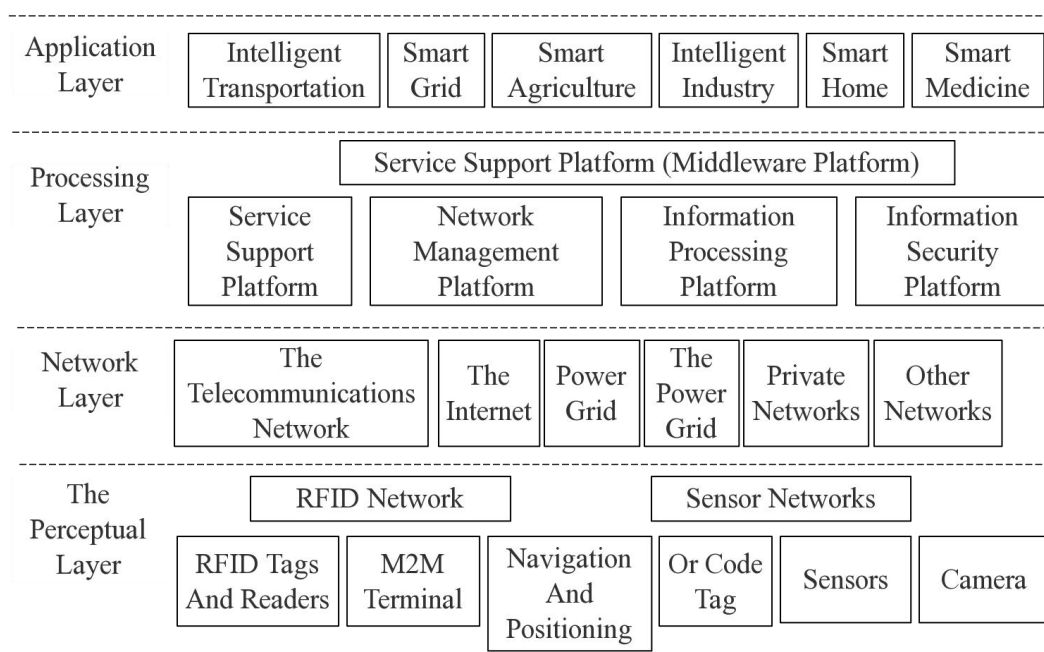


FIG. 3 Structure diagram of IoT technology

According to the analysis in the figure above, the Internet of Things consists of three levels from bottom to top. The first is the perception layer, which is the core ability to realize the comprehensive perception of the Internet of Things. Secondly, it refers to the network layer, which will pay attention to the infrastructure of the comprehensive coverage of mobile communication network, pay attention to the optimization and transformation of the application characteristics of the Internet of things, and form a system-aware network system. Thirdly, it refers to the processing layer, which contains multiple platforms such as service support, network management, information processing and information security. Finally, it refers to the application layer, which will combine the Internet of Things technology with the industry information requirements, and propose intelligent application solutions.

2.4 Short-range wireless communication technology

This technology is consistent with the Internet of Things technology, which is one of the most common contents in current market research and development, and has a very wide range of practical applications. As long as the information transmission distance between two devices is not

far away, radio frequency signals can be used for transmission. The specific structure is shown in Figure 4 below:

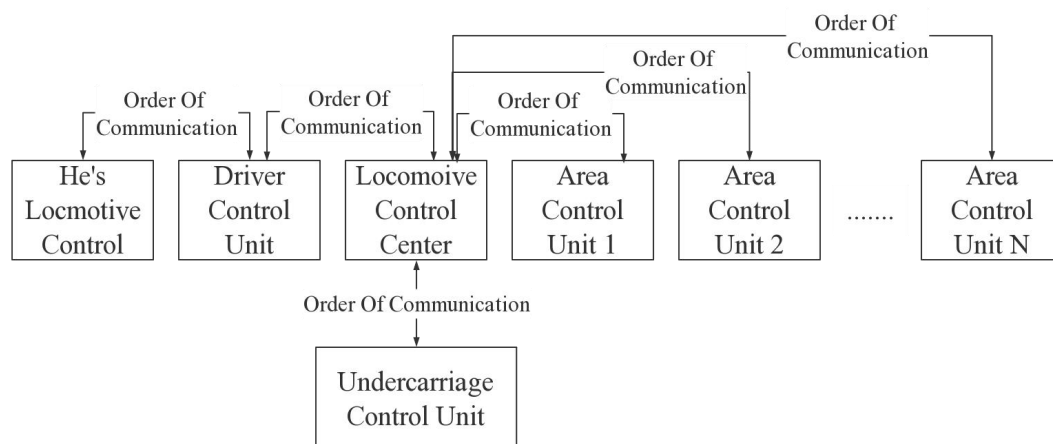


FIG. 4 Structure diagram of short range wireless communication technology

Based on the above analysis, it can be seen that the hardware platform uses digital radio frequency chips, microcontrollers, peripheral devices and other components to form radio frequency communication modules with specific functions, so that the control units in different areas can transmit communication instructions, and finally realize effective information communication and exchange.

2.5 Geographic Information Systems

This content will regard terminal technology, network technology and computer technology as the main support. After defining the scope of work, the data and information obtained will be collected and stored. After data processing and analysis, the information output device will be visually presented to provide effective reference basis for the field staff. The specific structure is shown in Figure 5 below:

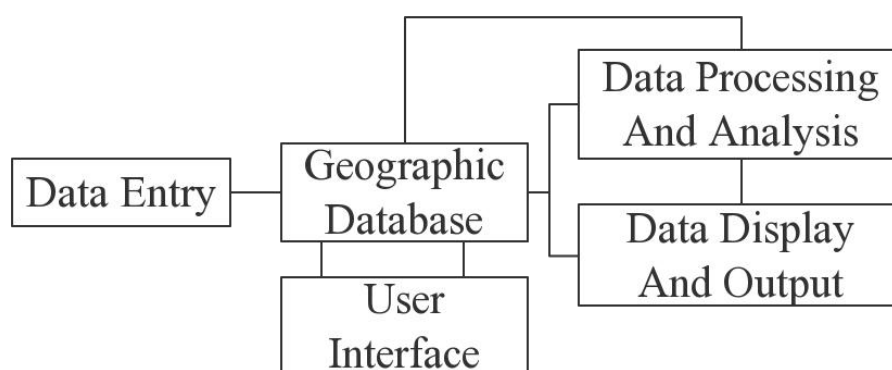


Figure 5 Structure diagram of GIS

3. Result analysis

Based on the above analysis, it is found that automation technology plays an important role in the field of mechanical engineering control, which is reflected in the following aspects: First, there is no need to establish a control module. In the traditional sense, before the application of automatic control system, it is necessary to set the control module in accordance with the electrical engineering, otherwise it cannot be predicted according to the real-time dynamic evaluation, resulting in a large number of uncontrollable factors in the overall control work. Automation technology does not need to establish a self-control module, which can effectively avoid the

negative impact of uncontrollable factors; Secondly, the consistency is high. The application of automation technology in mechanical engineering control can form an intelligent control system, which can directly analyze, identify and store data information, truly realize the precise management objectives, and avoid blind problems in mechanical engineering control. Finally, the overall operation is more convenient. Whether it is integrated automation technology or flexible automation technology, it has changed the traditional mechanical engineering control management mode to a certain extent, so that the field operation becomes more simple, the data can be directly stored in the database, so that the department staff to achieve remote supervision and control. In this process, the working pressure of the staff is lower and lower, and the uncontrollable factors generated by manual operation are less and less, which meets the requirements of mechanical engineering control management in the new era.

Conclusion

To sum up, in the process of social economy and technological innovation and development, the field of mechanical engineering should not only strengthen the research on automation technology, but also pay attention to actively cultivate more excellent technical talents, gradually change the traditional mechanical engineering control and management mode, and fully demonstrate the application value of automation technology theory.

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