Application Analysis of Artificial Intelligence in Mechanical and Electronic Fields

Bohai Zhang, Wei Zhang

Hainan Mechanical and Electrical Engineering School, Haiko, 571100, China

Keywords: Artificial intelligence, Mechatronics, Application

Abstract: In recent years, with the rapid development of computer network and information technology, the gradual improvement of artificial intelligence has been promoted, thus further broadening the application field of artificial intelligence. The integration of mechanical and electronic engineering and artificial intelligence has promoted the improvement of productivity. It is necessary to deepen the integration and application of the two and create a new trend in the development of mechanical and electronic engineering. It is gradually being popularized by the society. As a new thing, artificial intelligence is gradually attracting people's attention and is showing great brilliance. Judging from the attention and utilization rate of artificial intelligence at this stage, it has become a new favorite in the market. This paper introduces the development of mechanical and electronic engineering and artificial intelligence, and discusses the fusion application of the two, hoping to provide a reference for the innovation and development in the field of mechanical and electronic engineering.

1. Introduction

In recent years, various countries have attached great importance to the development of mechanical and electronic engineering in order to enhance their productivity competition. Artificial intelligence is the product of the continuous development of science and technology, and is also a successful attempt after cross-disciplinary integration. Mechanical and electronic engineering is a comprehensive discipline combining mechanization, automation, electronic engineering, electronic information engineering and other disciplines [1]. It takes mechanized engineering as its core, integrates the advantages of automation, electronic engineering and electronic information, and is assisted by computer science. With the progress of information technology, the level of intelligence will continue to improve. Taking the application of artificial intelligence as a typical representative, a new trend of human-like intelligence development and application will be formed in the field of mechanical and electronic engineering [2]. At this stage, mechanical and electronic engineering gradually transits from traditional manual operation to mechanization, and the production process realizes streamline operation, which not only reduces the labor amount of workers, but also greatly improves the production efficiency and effectively guarantees the precision of products [3]. Especially since the development of artificial intelligence technology, the application of this technology in the field of mechanical and electronic engineering has become more and more extensive, and its significance for improving the level of productivity is also very exact. In order to win in the fierce competition, mechanical and electronic engineering enterprises need to continuously improve the level of intelligent control and strengthen the research and development of artificial intelligence technology in order to obtain more economic benefits [4].

2. The Relationship between Artificial Intelligence and Mechanical and Electronic Engineering

2.1 The Development of Artificial Intelligence Technology

The proposal of artificial intelligence technology provides core technical support for the development of computer technology. The core of its research is to use intelligent technology to

  DOI: 10.25236/iwmecs.2020.033

create intelligent machinery that people need, namely intelligent machinery [5]. As an important branch of computer science, artificial intelligence technology seeks to understand the essence of intelligence and develop an intelligent machine that is highly similar to human intelligence. Under artificial intelligence, the functions of mechanical and electronic products have become more powerful and their volume has been greatly reduced, thus enabling them to meet various demands of the market. The continuous improvement of production level and the improvement of scientific content are the inevitable choices to conform to the development of social progress, industrial production and machinery manufacturing. The core content of artificial intelligence technology mainly involves image recognition and processing technology, language analysis and processing technology, expert system technology and other aspects. The development of artificial intelligence technology has brought new technological revolution and innovation to mankind [6]. Since the birth of artificial intelligence, relevant theories and application technologies have been maturing, and the application scope of artificial intelligence technology has also been significantly expanded. The continuous development of artificial intelligence has also made inestimable contributions to the development of social economy. It can not only drive the demand of market consumption, but also promote the development of related fields of machinery and electronics. It is of great significance to the stability and prosperity of the national economy.

2.2 Development of Mechanical and Electronic Engineering

Compared with traditional mechanical structure products, mechanical and electronic products have the characteristics of simple structure, small volume and high degree of automation. Mechanical and electronic engineering makes up for the shortcomings of traditional machinery and plays a decisive role in the development of mechanical industry. Under the artificial intelligence technology, besides being able to complete part of the human brain's consciousness activities, it has even more obvious advantages over the human brain in some functions, such as processing information, speed of taking actions, accuracy of actions and memory, etc. However, because the assembly line can only process standard parts, and the changes in market demand have put forward higher requirements for products, the disadvantages of this mode will appear [7]. Based on the development mode of artificial intelligence technology, this paper also divides the development stage of artificial intelligence technology into three stages. The first stage, in which artificial intelligence technology has not yet taken shape, computer technology has just emerged, and the Internet has not yet been popularized. The development in the field of mechanical and electronic engineering can be divided into three stages: the first stage is represented by traditional handicraft industry; The second stage is the gradual popularization of mechanization and the gradual completion of production lines. The third is the mature stage. With the continuous improvement of artificial intelligence technology, it has been more and more widely used in the field of mechanical and electronic engineering, which makes mechanical and electronic engineering enter a mature stage [8]. At present, mechanical and electronic engineering has entered the development stage with flexible manufacturing system as the core. Through the combined application of processing flow, logistics and information flow, the level of production automation and intelligence can be improved.

2.3 The Importance of Artificial Intelligence Technology to Mechanical and Electronic Engineering

First of all, artificial intelligence technology can improve the control accuracy of mechanical and electronic systems. In the field of mechanical and electronic engineering, in the process of module optimization design, it is very important to control relevant data with high precision and scientificalness. In addition, through the application and development of artificial intelligence technology, it also provides direction and guidance for the future development of ICT and other network technologies. Large-scale network applications including cloud computing, in-depth learning and intelligent algorithms have become one of the important development directions of ICT industry. It provides conditions for information interaction and greatly improves the transmission speed of information. As the core of artificial intelligence is computer, it has extremely powerful computing ability, which can calculate and integrate huge data, and the whole process

takes less time; to ensure the smooth and effective operation of the system, it is necessary to reasonably fine tune the functional parameters of the system according to the actual situation of the outside world [9]. However, the staff often cannot observe the occurrence of the problem in time or handle it in time, which requires artificial intelligence technology to replace the staff. The relationship between artificial intelligence is getting closer and closer. The deeper the application of artificial intelligence is, the better the performance of human-like intelligence in actual production. This is of great significance to the development prospect of mechanical and electronic engineering and represents a brighter future.

Secondly, artificial intelligence technology can make mechanical and electronic systems more stable. As the most important part of mechanical and electronic engineering, mechanical and electronic system's working nature is mainly the input and output of data and information. For example, the design of various management, production and processing and manufacturing technology modules are more closely combined, the product structure and characteristics are increasingly complex, the performance is improved, the appearance is reduced or optimized, and it is more efficient and exquisite than traditional mechanical engineering. With the rapid development of electronic information technology, Internet of Things engineering technology has also begun to be applied in some fields. In this stage, artificial intelligence technology began to be popularized and deeply welcomed by people. Artificial intelligence technology is also widely used in the field of mechanical and electronic engineering. Therefore, in order to ensure the stability of the system, it is necessary to actively combine with artificial intelligence technology to improve the ability of mechanical and electronic systems to process data, and to help mechanical and electronic systems to input, process and output data efficiently and quickly, thus improving its stability. As one of the focuses in the field of artificial intelligence research, deep learning can promote the leap-forward development of the Internet field by constructing a neural network simulating human brain for analysis and learning.

3. Application of Artificial Intelligence in Mechanical and Electronic Engineering

3.1 Analysis of the Relationship between Mechanical and Electronic Engineering and Artificial Intelligence

Mechanized electronic engineering technology uses the input and output of electronic information system to transfer information and control the process. In this process of input and output, due to the instability in the process of mechanical electronic engineering control, many information input and output errors will occur. The establishment of artificial intelligence is mainly based on neural network system and fuzzy processing system. The former simulates human brain structure to analyze digital signals to give reference values, while the latter simulates human brain function to analyze language signals. Both information processing methods take the form of network structure to infinitely approximate the accuracy of continuous functions. After receiving the abnormal data, the control system will output control instructions through analysis and processing to adjust the deviation, thus ensuring the normal operation. Especially when dealing with complicated and huge information, the electronic information system often makes mistakes, resulting in unpredictable errors in information transmission. Artificial intelligence is able to monitor errors due to electronic information systems. The compact structure of artificial neural system makes the whole neuron system very intelligent, which can calculate complex mathematical formulas and process various complex information in a short time [10]. The application of artificial intelligence technology and its integration with mechanical and electronic engineering systems have very definite advantages in solving the problems of system instability, uncertainty and complexity. The application of network technology in artificial intelligence has created more space for the development of artificial intelligence, and its technical advantages in various aspects have gradually emerged.

3.2 Application of Artificial Intelligence in Mechanical and Electronic Engineering

At present, artificial intelligence technology is widely used in the field of mechanical and electronic engineering. One of the most representative applications is the application of neural network system and the application of fuzzy inference system. Artificial neural system is the main application of neural network system. For mechanical and electronic engineering, a single method cannot meet the needs of development and application. Therefore, comprehensive artificial intelligence systems have begun to actively explore method integration to complement each other. The emergence of fuzzy neural network system is a successful practice. In addition, in some special environments, such as dark environments, the optical reflection principle can be used to track the running track of mechanical and electronic facilities, and complex tracks can be recorded by marking. The existence of neurons makes the whole process more intelligent. The main form of its implementation is to analyze some digital information through analog structure and then give the results. Finally, the participation value is obtained through the analysis of the results. Fuzzy reasoning system creates related functions simulating human brain, analyzes language signals, approaches continuous functions infinitely under the support of network structure, and stores information according to mapping rules from domain to domain. It can realize distributed storage of information and cooperative processing of dynamic information. The neural network system can simplify the structure to the greatest extent on the premise of ensuring abundant behaviors, thus not only improving the working environment, but also avoiding mistakes. The application of navigation system in mechanical and electronic engineering has realized intelligent control under different working conditions.

3.3 Application of Human-Like Intelligence

The future development in the field of mechanical and electronic engineering will be intelligent manufacturing and humanoid intelligence. Mechanical and electronic engineering itself is inherently unstable, and the development and application of artificial intelligence technology will minimize this instability. It is a relatively complete system guided by fuzzy set theory. Fuzzy inference system is different from neural network system. Neural network system is a point-to-point mapping, while fuzzy inference system is a domain-to-domain mapping. By optimizing the traditional mechanical structure, the robot applications can coordinate with each other in production practice, improve the efficiency of mechanical transmission, and finally realize the improvement of the working efficiency of industrial robots. In order to provide strong support for fault diagnosis and information processing, this is also the main direction of artificial intelligence application in the field of mechanical and electronic engineering in the future. Human-like intelligence will have an immeasurable significant impact on modern mechanical manufacturing and production.

At present, the two major directions in the development of mechanical and electronic engineering are intelligence and automation. Active exploration of human-like intelligence can provide a powerful boost for deepening reform and innovation. It combines computation with relevant biological knowledge to improve the analysis and processing capability of industrial robots for information data. The function of neural network system is used to directly simulate the brain structure and analyze digital signals to form a point-to-point mapping relationship between each neuron, thus achieving the purpose of improving the input and output accuracy of information data and increasing the calculation amount. At the same time, it can accurately locate errors, save time and energy for software developers to find errors, and improve the efficiency of software development. The combination of human-like intelligence and mechanical and electronic engineering is conducive to the formation of a complete industrial chain of research and development, testing, manufacturing, integration and service systems, and to the creation of a new base of intelligent equipment industry with both scale and competitiveness in the new era. When mechanical and electronic engineering applies fuzzy inference system, it simulates the function of human brain by means of relevant elements. Language signals are analyzed by simulating the function of human brain, and then many groups of functions are obtained through a series of network analysis. Fuzzy reasoning system is widely used in the field of mechanical and electronic

engineering.

3.4 Application of Artificial Intelligence in Building Materials Industry

With the continuous improvement of our country's specifications for all building construction and the stricter requirements for building materials production, the traditional building materials industry can obtain advantages in bidding only by continuously improving its electromechanical integration level. The aim is to promote the basic theoretical research, original innovation and high-tech development of intelligent robots, enhance the independent research and development level and practical application ability of intelligent robots, and thus provide development assistance for manufacturing fields represented by mechanical and electronic engineering. From the current situation, most mechanical and electronic engineering are systems with higher complexity. Although the functions of such systems are very powerful, the control is also relatively difficult. Therefore, it can be found that the accuracy of fuzzy inference system is lower than that of neural network system. At present, the fuzzy inference system adopted in the field of mechanical and electronic engineering can simply simulate some functional information of human brain. Moreover, because the gradation control of building materials has a great influence on the final building quality, the application of mechatronics technology can help control the gradation of materials and reduce the gradation error as much as possible, thus reducing the occurrence of potential safety hazards and prolonging the usable life of building engineering.

4. Conclusion

To sum up, with the economic progress and the further development of science and technology, mechanized engineering has been widely used in social life, exists in people's sight and is gradually accepted and popularized by the society. Large-scale operation of industrial robots is China's future industrial production mode. At present, there are still many problems in the application of industrial robots in China. Compared with the development of western countries, it also has many deficiencies. Modern mechanical and electronic engineering design must rely on the reasonable application of artificial intelligence technology to achieve a win-win ideal situation. In this process, relevant personnel must pay full attention to the integration of mechanical and electronic engineering and artificial intelligence technology, and continuously develop new artificial intelligence technology. Therefore, artificial intelligence technology is a shortcut to improve the overall level of mechanical and electronic engineering. The progress and development of mechanical and electronic engineering are closely related to artificial intelligence. It is necessary to actively explore the application of artificial intelligence, promote its perfect integration with mechanical and electronic engineering, further improve the level of productivity, serve the innovative development in the field of machinery, and lead the development trend of mechanical science and technology.

References

[1] Wang Yufei, Hao Qinglong, Chunfeng Li, et al. Analysis on Effective Application of Artificial Intelligence Technology in Mechanical and Electronic Engineering. Times Agricultural Machinery, vol. 44, no. 2, pp. 34-35, 2017.

[2] Dai Yongrui. Correlation Analysis between Mechanical and Electronic Engineering and Artificial Intelligence and Safety Production Application. Science and Technology Innovation and Application, no. 005, pp. 114, 2017.

[3] Lan Haoxiang, Analysis of the application of artificial intelligence technology in mechanical and electronic engineering. China Youth, no. 2, pp. 240-240, 2018.

[4] Li Xiangdong, Hu Fangtong. Relationship between Mechanical and Electronic Engineering and Artificial Intelligence. Electronic Technology and Software Engineering, no.014, pp.253-253, 2017.

[5] Hanshi Jie. Relationship between Mechatronic Engineering and artificial intelligence. Hubei

agricultural mechanization, no. 011, pp. 68, 2019.

[6] Wang Xin, Zhao Wenxin. Application of artificial intelligence technology in mechanical and electronic engineering. Electronic technology and software engineering, no. 006, pp. 231-231, 2019.

[7] Lu Jiayuan. Analysis of effective application of artificial intelligence technology in mechanical and electronic engineering. Internal combustion engine and accessories, no. 15, pp. 242-243, 2019.

[8] Xiang Yunxiang. Research on the relationship between mechanical and electronic engineering and artificial intelligence. Digital world, no. 1, pp. 127-127, 2018.

[9] Liu Siyuan, Li Lingling. Research on the relationship between mechanical and electronic engineering and artificial intelligence. Nanfang agricultural machinery, vol. 049, no. 023, pp. 206, 2018.

[10] He Yuyan. Application of artificial intelligence technology in intelligent building. Communication world, no. 6, pp. 256-257, 2017.