Study on the Impact of Robot Application on the Integration of Industrial Chain and Innovation Chain

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Abstract: With the rapid development of science and technology and the promotion of innovation, robotics has been widely used and has made remarkable progress. Robots are no longer a distant concept in the field of science and technology, but are gradually integrated into the production and service of various industries, becoming an important assistant in modern society. Based on this, this article studies the impact of robot application on the integration of industrial chain and innovation chain for reference.
Keywords: Robot application; Industry chain; Innovation chain; Integration

Introduction

With the rapid development of artificial intelligence and robotics, robot applications play an increasingly important role in the industrial and innovation chains. The wide application of robots not only improves the production efficiency and reduces the cost, but also promotes the integration and upgrading of the industrial chain and innovation chain. The research in this paper aims to explore the impact of robot application on the integration of industrial chain and innovation chain, and to provide theoretical reference and practical guidance for further promoting industrial upgrading and innovation development in the future.

1. Research purpose

To study the impact of the application of robots in the industrial chain on the production efficiency and industrial transformation and upgrading, to explore how to realize the intelligence and automation of the production process through robot technology, which can improve the production efficiency and quality. Explore the role of robots in the innovation chain, analyze the role of robotics in the construction and optimization of the innovation chain, which can drive enterprise innovation, product development and service upgrading. Analyze the role of robot application on the integration of industrial chain and innovation chain, and explore how robot technology can promote the synergy and information sharing between different links, which can promote the optimization and upgrading of the whole value chain. Exploring the application path and mode of robotics technology in traditional industries can provide experience and reference for the application of robotics technology in various industries, so as to promote the transformation of traditional industries to intelligence. The ultimate goal of this research paper is to put forward effective policy recommendations and strategic planning to promote the deep integration of robotics technology with the industrial chain innovation chain, and to promote industrial upgrading, economic growth and social development.

2. The impact of robot application on the integration of industrial chain innovation chain

2.1 Production efficiency improvement

Robots are able to replace manual labor on production lines for repetitive, tedious or hazardous tasks. The high speed, accuracy and stability of robots means they can perform production operations with greater efficiency and accuracy, resulting in shorter cycle times and reduced error rates and product defects. Compared to human employees, robots are often able to perform long periods of continuous operation without fatigue, breaks or time constraints, which means that robots can achieve continuous production 24 hours a day, greatly improving equipment utilization and dramatically shortening production cycle times.The robot has good flexibility and adaptability to a wide range of product types and production processes. With simple program adjustments, robots can quickly switch production tasks, reducing downtime and line adjustment costs when switching products. Robotic applications can also provide real-time monitoring and feedback, enabling smarter production management. Through sensors and connectivity technologies, robots are able to collect and analyze large amounts of data to provide real-time reports on production quality and efficiency, helping companies make timely decisions and optimize operations.

2.2 Industrial structure upgrade

The wide application of robot technology promotes the transformation of traditional industries into intelligent manufacturing. Through the introduction of intelligent equipment and automated production lines, enterprises are able to improve production efficiency, optimize resource allocation, and promote the intelligent development of the entire industry. The application of robot technology enables enterprises to produce more complex and sophisticated products. These products usually have higher added value and higher profit margins, thus helping to enhance the market competitiveness and profitability of enterprises.The flexibility and adaptability of robotics enable companies to achieve customized production. Customized production can meet consumers' individual needs and improve customer satisfaction, while reducing inventory and production costs and promoting the industry's shift to customized production. The application of robotics promotes the synergistic development between different industries. Through the connection and application of robots in the industrial chain, enterprises in different segments can better cooperate and win-win, realizing the overall optimization, collaborative development and value sharing of the industrial chain.

2.3 Innovation chain optimization

The wide application of robotics can accelerate the process of product development and innovation. Through the application of robots in experiments, testing and data analysis, researchers can obtain experimental results and analyze data faster, thus improving R&D efficiency and promoting the accelerated cycle of the innovation chain.The application of robots in product design and engineering can help designers to complete more complex and sophisticated designs, and achieve the optimization of product function and appearance. Through robot-assisted design tools, designers can carry out design work more efficiently and improve design quality and innovation. The application of robotics in marketing can help companies better understand market demand and customer behavior, so as to optimize marketing strategies.By analyzing big data and predicting market trends through robots, enterprises are able to make more accurate marketing decisions, effectively explore new markets and increase product penetration. Robot application organically combines knowledge, technology and resources from different fields and promotes the realization of open innovation. The convergent application of robotics provides a platform and tools for cross-field innovation, promotes exchanges and cooperation between different fields, and promotes the optimization and upgrading of the innovation chain.

3. Robot application optimization strategy in the integration of industrial chain and innovation chain

3.1 Customized robot solutions

Enterprises should focus on analyzing the problems and needs existing in a specific industrial chain or innovation chain. To have in-depth understanding of the enterprise's production process, product characteristics and market demand, to clarify the application space and optimization direction of robotics technology in it. Based on the results of the demand analysis, customize the design of the robot system suitable for the specific industry.The system should take into account factors such as the production environment, operating characteristics, and safety standards, while integrating sensors, visual recognition, and automation control to meet the production needs of specific industries. Select the type and brand of robot that suits the needs of a specific industry. The most suitable robotic equipment is selected to perform specific tasks, taking into account the robot's flexibility, accuracy, load capacity, and other performance indicators to ensure that the requirements for customized solutions are met.Integration and testing of the robotic system should be performed to ensure that the robot works with existing production systems, equipment and environment without any obstacles. The stability, efficiency and safety of the robotic system should be verified through simulations and field tests to ensure the reliability of the customized solution.

3.2 Data-driven intelligent production

First of all, ensure that the data of each production link can be accurately collected and integrated. Utilize sensors, monitoring equipment and IoT technology to collect real-time production data, including production line efficiency, equipment status, product quality, energy consumption and other information, and integrate them into a unified platform for storage and management. Through data analysis and mining technology, the collected data is analyzed in depth to discover the laws and trends hidden behind the data.

Use data mining, machine learning and artificial intelligence algorithms to identify optimization opportunities in the production process, predict potential problems and optimize production plans and processes. Establish a real-time monitoring system that utilizes data-driven intelligent technology to monitor key indicators and changes in the production process in real time. When abnormal situations or risks occur, the system can issue timely alerts and provide corresponding response solutions, thus realizing rapid response and adjustment of the production process.

3.3 Collaborative robot system

First of all, the production environment and task requirements should be comprehensively analyzed to clarify the tasks that need to be

completed by robot collaboration and their characteristics. According to the complexity of the task, workspace and collaboration methods, determine the appropriate collaborative robot system program. Select the type of robot suitable for collaboration, including collaborative robots, movable robots and so on.Considering factors such as robot size, load capacity, range of motion, and sensor configurations, and use advanced control systems and communication technologies to ensure that robots can work safely and collaboratively with each other. Design robot paths, planning, algorithms, and collaborative control strategies to avoid collisions between multiple robots.

4. Conclusion

By studying and exploring the impact of robot application on the integration of industrial chain and innovation chain, we deeply realize the importance and potential of robot technology. The intelligent application of robots can not only promote industrial upgrading and improve production efficiency, but also help the construction and optimization of the innovation chain.With the continuous progress of technology and the continuous expansion of applications, it is believed that robots will play a more important role in the industrial chain innovation chain and contribute to the sustainable development of the economy and society.

References

[1]   ZHANG Benxiu, WU Fuxiang. Research on the impact of robot application on the integration of industrial chain and innovation chain[J]. Economic and Management Research, 2024, 45(02):21-40.

[2]   GONG Yinyin, ZHANG Yongqing, ZHENG Sujiang. Industrial Robot Application and Total Factor Productivity Enhancement - Based on the Perspective of Human Capital Upgrading[J]. Enterprise Economy, 2023, 42(11):15-27.

[3]   Industry chain innovation drives home appliance industry to enter "new latitude"[J]. Daily Electric Appliances, 2023, (08):3.

[4]   LI Qinqin, CAO Qingfeng, LI Hong. A study on the impact of imported robot application on the domestic technology content of Chinese enterprises' exports[J]. World Economic Research, 2023, (08):31-42+135-136.

[5]   Open and Close.2023 Robotics Industry Chain Innovation Enterprises TOP100[J]. Internet Weekly, 2023, (14):14-16.