

# Research on the application of robot technology in electrical control

Jiahao Lyu

Wuhan Britain-China School, Wuhan 430000, Hubei

**Abstract:** the application of robot technology in electrical control work can not only optimize the process of industrial production, but also enhance the production quality and efficiency of products, reduce the cost of human and material resources, optimize the allocation of resources, improve the stability of electrical control, and help to enhance the economic benefits of the electrical field. This paper mainly expounds the connotation and development trend of robot technology, and discusses the practical application of robot technology in electrical control.

**Key words:** robot technology; Electrical control; Practical application

With the rapid development of science and technology, robot technology came into being and has been applied in many fields. The process of electrical equipment is complex and prone to safety accidents. The application of robot technology in electrical equipment can effectively avoid the probability of safety accidents, ensure the stability and safety of electrical control, and effectively improve the economic benefits of production. Therefore, in order to promote the continuous development of the field of electrical control, we should strengthen the exploration of the integration of robot technology and electrical control.

## 1. Overview of robot technology

Robot technology is an integrated technology simulating human body, which integrates machinery, electronics, sensors and artificial

Intelligent and other advanced technologies are applied in electrical automation equipment. Various production processes can be completed through human control, and automation can also be achieved through computer programming by professionals. Robot technology is applied in many fields of society, which can meet the needs of mass production, ensure the quality of products, and enhance the production process and economic benefits of products. In the 1970s, China independently carried out robot technology research. With the rapid development of science and technology, it obtained more development opportunities. According to the current situation, the continuous development of social economy, the increasing material and cultural needs of the people, and the increasing production demand in the manufacturing field have prompted the vast majority of robot technology to be applied in the logistics handling link in the manufacturing field. The practical application of robot technology promotes the development of logistics industry towards automation and intelligence, and promotes the reform and development of logistics industry to a certain extent. For logistics and transportation in the manufacturing field, robot technology is moving towards systematization. By guiding the logistics handling work from single to collective management, it can replace manual sorting, packing, stacking and other processes of goods, achieve the purpose of shortening time and improving efficiency, promote the continuous progress of logistics handling work, and improve the level of mechanical technology to some extent. The development of robot technology continues to enrich, and the future development trend is that robots are applied in various fields, and the number of robots is equal to the number of people. With the increasing demand for robot technology, we need to firmly grasp the development opportunities, effectively improve the competitiveness of enterprises, enhance production efficiency, and make it invincible in the fierce market competition.

## 2. Development trend of robot technology

### 2.1 Intellectualization

By understanding the current history of robot development, we can conclude that intelligence is the main trend of robot technology development. The development direction of intelligent robot is mainly divided into two aspects: first, humanoid intelligent robot; Second, high-end intelligent robots. Humanoid robot refers to the intelligent robot at the primary stage, which is similar to human perception, has certain recognition function, and has the corresponding adaptability. It can complete the modification of its own program within the controllable range according to the continuous change of external needs. This modification range is set in advance by the programmer. High end intelligent robots are high-level robots. Different from low-level robots, high-end intelligent robots can modify the program according to their own actual situation. This program is not set by programmers. It can be said that such robots have a certain sense of independence.

### 2.2 Harmonization

With the increasing demand for robot technology in production, the traditional and single robot can not meet the needs of industrial students

Therefore, in order to promote the expansion of industrial production scale, the cooperation of robots is needed to boost the robot technology towards coordination. In a variety of production fields, the assembly line production process is selected, which requires multiple robots to control and cooperate, so as to adapt to the speed of commodity production. If we only emphasize the application form of robots in industrial production and ignore the coordination and cooperation among multiple robots, we will not be able to give full play to the important role of robots in post work, and even worse, it will damage the production process of the production line and reduce the efficiency

of commodity production. The coordination of robots can be optimized and adjusted by combining the actual internal force and the expected internal force between robots. If the error between the two is small, it means that the coordination between robots is strong. On the contrary, it needs to be optimized and adjusted by technicians to enhance the coordination between robots.

### 2.3 Miniaturization

With the passage of time, the rapid development of technology, combined with the national development needs, robot technology presents a micro

Type development trend. Miniaturized robots are mainly used in medical and military fields. The application in the medical field mainly lies in the use of miniaturized and flexible machinery to enter the human body during endoscopic surgery to help doctors carry out minimally invasive surgery and reduce damage to the human body. Micro robots, such as microsattelites and aircraft, will also be used in the military field to give full play to their due value. Therefore, the research of micro robot not only has a huge demand market, but also has a certain driving force.

## 3. Practical approach of robot technology in electrical control

### 3.1 Application in electrical control

Electrical control requires operators to have strong professional quality and operation level. The emergence of robot technology meets the operation requirements of electrical control equipment. Therefore, robots are more used in electrical control. With the rapid development of science and technology, the scientific and technological means are also extending in the direction of intelligence. The practical application in the field of electrical control also shows the trend of intelligent development. The development of automation in the field of electrical appliances is of great significance. Electrical equipment automation is based on robot technology to maintain the working state of high-speed operation. It requires technicians to master the professional knowledge and field practice related to robot technology, so as to ensure that they have strong professional quality and sense of responsibility in the process of participating in the work. In the above process, enterprises need to increase the investment cost in talent. The essence of robot technology is also the extended practice of programming technology, which simulates the calculation form of human beings, effectively improves the efficiency of electrical equipment production, effectively reduces the labor cost, and promotes enterprises to obtain better economic benefits.

### 3.2 Application in daily electrical operation

For the operation of electrical appliances, it can be said that it is a technology with high requirements for ability, which contains certain risks. In the past, due to the influence of the technical level and safety awareness of the staff in the manual operation process, it is easy to cause some improper electrical operation accidents, which seriously threaten the life safety of the staff. By using robot technology in the production line, we can choose to use intelligent robot instead of manual operation, which can effectively reduce the probability of safety accidents caused by staff errors, and maintain the stability of electrical equipment operation. With the help of robots to complete various electrical operations, the efficiency of electrical work can be effectively improved. If it is necessary to safely start the electrical equipment, the remote control can be used to complete the operation. This remote control mode can not only ensure the safety of workers, but also simplify the working process of electrical equipment and effectively improve the efficiency of the production line. It is worth noting that the application of robot technology to the daily operation of electrical equipment can save the cost of manual use, enhance the efficiency of electrical equipment, reduce unnecessary waste of resources, and create more economic benefits for enterprises.

### 3.3 Application in electrical fault diagnosis

The operation failure of electrical equipment is a common problem, which will affect the daily production process within the enterprise.

The application of robot technology can effectively improve the efficiency and accuracy of electrical equipment fault detection and processing. The traditional diagnosis mainly adopts the form of manual detection, which is mainly combined with the corresponding theoretical knowledge and practical experience. The repair takes a long time, the processing speed is slow, and the fault accuracy can not be guaranteed. The application of robot technology gives full play to the role of fuzzy theory and expert technology, which can quickly diagnose the causes and locations of electrical equipment faults, and propose targeted solutions, which will help to improve the efficiency of electrical equipment fault diagnosis and processing. During the operation of electrical equipment, it will be affected by many factors, and the equipment is prone to work failures or safety accidents. If the relevant staff can not diagnose and analyze the faults of the electrical equipment, it will cause certain damage to the electrical equipment and bring corresponding economic losses to the enterprise. In the electrical automation control, it is necessary to further strengthen the automation and intelligent detection of equipment use, equipment failure and other aspects, so as to realize intelligent fault processing and intelligent fault location. The use of robot technology will gradually reduce the time of fault diagnosis, making the whole fault diagnosis more convenient and accurate.

### 3.4 Practical application in electrical equipment

The traditional electrical control production process is more dependent on manual mode, and the application of robot technology is to replace one

The quantitative manual action makes the electrical control more intelligent and automatic. In the process of processing, the error caused by manual operation is avoided, and the accuracy of electrical equipment control is significantly improved. The practical application of robot technology is embodied in the two levels of neural network control and system fuzzy control. It is mainly used to collect, analyze and process the analog quantity inside the electrical equipment system, timely reflect the specific data of the system operation status, as the information source of the database, and lay the foundation for the later management work. At the same time, strengthening the intelligent

design of the controller can directly enhance the accuracy and flexibility of electrical automation in the operation process. The controller is the device that completes the line startup and transmission process in the electrical system, and it is a part of the electrical system. The method of optimizing the controller design is the application of robot technology. PID technology is a commonly used control algorithm. The calculation process should pay attention to the specific parameters of the controller in operation. The change of parameters means that there is a large deviation from the actual situation or interference from other factors. At this time, there are often errors in the control instructions. The application of robot technology is the improvement of PID control algorithm in technology, which controls the parameter error in the minimum range and increases the accuracy in the operation process; It is also an important way for electrical operation parameters to be dynamically monitored in the whole process of computer technology, which significantly reduces the error rate in control work. Taking the AVG robot as an example, during the use process, it will select the magnetic conductive line inspection, and realize the tracking operation of the car through differential control. The front and rear of the AVG robot are equipped with anti-collision protection devices, which will immediately shut down after a collision. The control system of the robot is mainly composed of PLC sensor, walking driver, landmark sensor and other components. In this system, tracking control is very important. At the same time, we should strengthen the control of AVG mobile robot deceleration and stop, conveyor belt operation and so on.

For the design of electrical equipment, relevant personnel need to analyze the actual situation of the application of robot technology and automation technology in electrical equipment, and optimize the design drawing of electrical device combined with relevant research. In addition, it is necessary to carry out in-depth exploration on the characteristics of robot technology. Due to the complexity of various circuit layout systems inside electrical equipment, they contain a lot of components and knowledge of many disciplines. In the design process, some algorithms can be designed through the application of software control mode, so as to realize the analog calculation of the internal system data of circuit electrical equipment, so as to realize the optimal design of the control system of the entire electrical equipment. To some extent, improve the working efficiency and quality level of equipment operation.

### 3.5 Experimental study on bionic snake like robot

#### Background:

Serial manipulator is an important form of mechanical structure. Snake like robot is a kind of bionic robot. Compared with other bionic robots, it has its unique role. This experiment will set up a bionic snake. It is mainly controlled by four motors with four degrees of freedom. In recent years, bionic robots have gradually occupied an important proportion. Snake robots can complete the detection and rescue at the scene of natural disasters or accidents, and can realize both pipeline maintenance and landmark detection. They have a wide range of service fields and broad application prospects. With the proposal and improvement of new ideas such as modular design, snake like robot has gradually become the highlight of experimental research. Fully combined with the development history of snake like robots at home and abroad, with reference to the activity characteristics of snakes, and based on the perspective of bionics, combined with the theories of robot dynamics and friction mechanics, a snake kinematics model for behavior control is constructed. The movement of snake like organisms is transformed into a local traveling wave state, and propagated along the snake through a fixed phase difference. Based on the in-depth exploration of the snake movement mechanism, it is obtained that the change and movement can be completed with the help of the rod structure, and the phase difference can control the frequency and general law of the robot movement, which is verified in the experiment.

#### Objective:

Understand the basic concepts of snake like robot, robot motion planning, and preliminary cognition of gait. Skilled palm

Grasp the use methods and skills of various components.

#### Experimental steps:

1. sort out all kinds of materials learned in this test and find the devices required for the test.
2. writing of robot action

Click the up-mrcommander software, click the button in the menu bar, and click the action file about the wriggling of the snake robot joints. This action file is used to simplify the operation. For the time being, it is unnecessary to consider how to write the action of the snake like robot, and let the snake like robot move as soon as possible. After the action file is integrated into the menu, the reality of the program interface is shown in the following figure.

The control of the snake like robot is realized through the regulation of each link. After completing various actions, observe the results of the experiment, and analyze the problems in the motion process of the snake robot.

#### Experiment summary:

Through this experimental operation, learn how to actually control the movement of the robot, how to set the predetermined action,

Practically realize online debugging activities, clarify how to burn the program to the control board, and realize the uniformity and beauty of various line connections. The completion of the construction of snake like robot can deepen their understanding of such mechanical design knowledge, so as to correctly recognize the electrical automatic control. By repeatedly assembling the robot with this structure, we can have a deeper understanding of robots, bionic robots, motors and mechanical structural devices, and have a better and profound understanding based on our understanding of the overall stiffness and the matters needing attention in future tests. The goal of doing the experiment was achieved. At the same time, it also improves the ability of hands-on, and achieves the purpose of combining theory with practice.

#### 4. Concluding remarks

Robot technology has strong adaptability and can show a good development prospect in various fields of society.

Robot technology plays an obvious positive role in electrical automation control, but the specific application experience is still less. We need to know more about robot technology, based on our own development, promote the combination of the two, make them complement each other, and realize the benign development of electrical automation control.

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