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APPLICATION ON INTELLIGENT TECHNOLOGY OF ELECTRICAL ENGINEERING AND AUTOMATION

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ИССЛЕДОВАНИЯ ПО ПРИМЕНЕНИЮ ИНТЕЛЛЕКТУАЛЬНЫХ ТЕХНОЛОГИЙ В ЭЛЕКТРОТЕХНИКЕ И АВТОМАТИЗАЦИИ

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Abstract. In the electrical industry, the complexity and construction scale of electrical engineering are increasing, the traditional technology has been difficult to efficiently adapt to the development needs of the new era industry, deepening the popularization of the application of intelligent technology in electrical engineering and automation, is an important development direction of the electrical industry. This paper describes the basic connotation of electrical engineering and automation and intelligent technology, analyzes the electrical engineering and automation intelligent technology application in improving the level of system control, improve data processing accuracy and optimize the significance of system design, studied the electrical engineering and automation system in fault response processing, automation control, system design, the specific application of real-time monitoring.

Аннотация. В электроэнергетике сложность и масштабы строительства электротехники возрастают, традиционные технологии трудно эффективно приспособиться к потребностям развития отрасли новой эры, углубление популяризации применения интеллектуальных технологий в электротехнике и автоматизации, является важным направлением развития электроэнергетики. В статье описывается основная коннотация электротехники и автоматизации и интеллектуальных технологий, анализируется применение интеллектуальных технологий электротехники и автоматизации в повышении уровня системного управления, повышении точности обработки данных и оптимизации значения системного проектирования, изучается система электротехники и автоматизации в области обработки сбоев, управления автоматизацией, системного проектирования, специфического применения мониторинга в режиме реального времени.

Keywords: intelligent technology, electrical engineering and its automation, application.



Ключевые слова: интеллектуальная технология, электротехника и ее автоматизация, применение.

Under the background of the continuous development and innovation of science and technology, the application of intelligent technology has further promoted the prosperity and development of social production and economy. Especially in the field of electrical engineering and automation, GPS positioning, precision sensing, PLC intelligent technology can significantly improve the electrical engineering and automation system design, operation quality and efficiency, efficient processing of electrical system of huge operation data information, promote the development of electrical industry modernization, has a very broad prospects for development.

Electrical engineering and its automation is an automatic electrical system established by combining power network and control theory and computer information technology, which involves various types of technologies such as power, electronic technology, and electromechanical integration and so on, and realizes the deep integration of electromechanical, strong and weak electricity and hardware and software is its most prominent feature. The main content of electrical engineering and its automation is to improve the efficiency of electric energy utilization through the efficient control and utilization of electric energy, so as to provide higher quality services for the social production and life.

Control is the essence of intelligence, intelligent technology refers to the use of scientific and technological means to effectively control the target activities of the technology, can realize information, flexible control, automatic and environmentally friendly production process [1]. The application of intelligent technology in electrical engineering and its automation can realize the independent, unmanned and accurate and efficient operation of electrical engineering, and has a significant advantage in reducing labor input and production costs. First, the intelligent technology has the application characteristics of high accuracy and high efficiency. Intelligent technology through the use of CPU control system, high-speed RISC and CPU chip, the collection of artificial intelligence control, big data and computer technology, so that the operation accuracy and efficiency of electrical engineering is greatly improved [2]. Second, the intelligent technology has a variety of chemical, process complex characteristics. A variety of multi-system control and process composite performance in intelligent technology can effectively simplify the production process, improve production efficiency and shorten the production cycle. The third intelligent technology has the characteristics of computing visualization. By carrying big data algorithm, intelligent technology can accurately and vividly present various complex parameters in electrical engineering in visual forms such as dynamic charts and pie charts, so as to provide convenience for engineers to carry out adjustment and testing work [3].

Controller is the core of intelligent technology application in electrical engineering and its automation system [4]. Traditional electrical engineering controller in the system operating equipment as the control object, but the electrical engineering system is increasingly complex, and control object in various forms of dynamic change, uncertainty factors more and more, lead to the traditional controller work difficulty increases greatly, it is difficult to accurate and efficient analysis of the running status of the system equipment, control effect is limited[5]. The intelligent controller adopts the vertical structure, uses the GPS line to receive the information, the signal amplifier converts the information content, and then distributes the information data according to the signal demand and environmental science. After the monitoring equipment receives the signal data, it conducts signal analysis and processing by the terminal and sends the signal to each application site respectively. By using cloud computing and big data technology to analyze GPS signals, the

intelligent control of electrical engineering and its automation is finally realized. After receiving the signal, the remote communication equipment is used to complete the connection of the signal to the communication equipment off-station, and the information is verified and saved.

The application of intelligent technology in the electrical engineering and its automation system can monitor the operation status and engineering data of each equipment in the electrical engineering system in real time to ensure the good operation of the system. According to the specific application environment, different calculation algorithms can be adopted to reasonably design the system functions, and the high precision calculation methods can be used to improve the automation control level of the system equipment [6]. First of all, the application of intelligent technology can realize unmanned control of the system, breaking through the limitations in the traditional control mode. For example, it can reduce the risk coefficient of high risk work. Taking high pressure control as an example, the hidden operation problems of high pressure equipment can be found and handled in time. Secondly, the construction and operation of electrical engineering and its automation system are extremely complex. When the intelligent technology is applied, the fuzzy controller can be used to assist in the control work. The fuzzy controller is mainly composed of fuzzy, reasoning machine and knowledge base, and has the corresponding rule base. Among them, the reasoning machine can predict the operation state and specific operation of the system equipment, and send the prediction results to the system center to give operation instructions [7]. Finally, once the operation failure occurs in the power system, the controller knowledge base can build the corresponding digital model to accurately analyze the operation data of the system equipment, which can be used as the decision basis for the confirmation and elimination of the fault cause. To sum up, the application of intelligent technology realizes the maximum monitoring and control of power engineering and its automation system, which is of great significance for the safe and efficient operation of the system.

The daily operation of electrical engineering and its automation system will produce a huge amount of data information, and these data need to be processed accordingly. The application of intelligent technology can improve the standardization and accuracy of data processing, so as to effectively meet the specific needs of system automation control. And with the iterative update of information technology, the volume of intelligent processor is gradually shrinking, but it can achieve faster operation and analysis speed. The use of large-scale integrated electrical appliances in electrical engineering and its automation system can further improve the computing accuracy and computing efficiency, significantly improve the standardization of data processing and data comparable performance, and minimize the risk of computing errors [8]. In addition, the use of the neural simulator in electrical engineering and its automation system can further enhance the fit degree of human thinking and computer computing, and give full play to the application value advantages of intelligent technology.

On the one hand, due to the limitation of technology and capital, it may not be possible to equip the corresponding number of automation equipment, but the intelligent transformation control of the system equipment can still be realized through PLC device and other applications. Figure 1 is the schematic diagram of PLC device. PLC has programmable logic control, excellent application compatibility and performance, small size, and can be connected with the equipment in the electrical engineering system through various forms such as man-machine interface, so as to become the information transmission bridge between the computer control system and the system equipment [9]. After receiving the control instruction, the PLC device will analyze it and call the control program and the field sensors to control and adjust the operating state of the equipment. For the non-automatic and semi-automatic equipment in the electrical engineering system, it can realize

intelligent transformation and upgrading at the lowest cost to meet the needs of production and operation cost control of electric power enterprises. On the other hand, the traditional electrical engineering is to realize the controller control function on the basis of the control model, and the application of intelligent technology, can realize without the construction of the control model, can effectively complete the intelligent control of the electrical equipment to ensure the healthy operation of the equipment. In addition, with the help of some software can also indirectly control the electrical equipment, reduce the human workload, and promote the full play of the role of the electrical system.

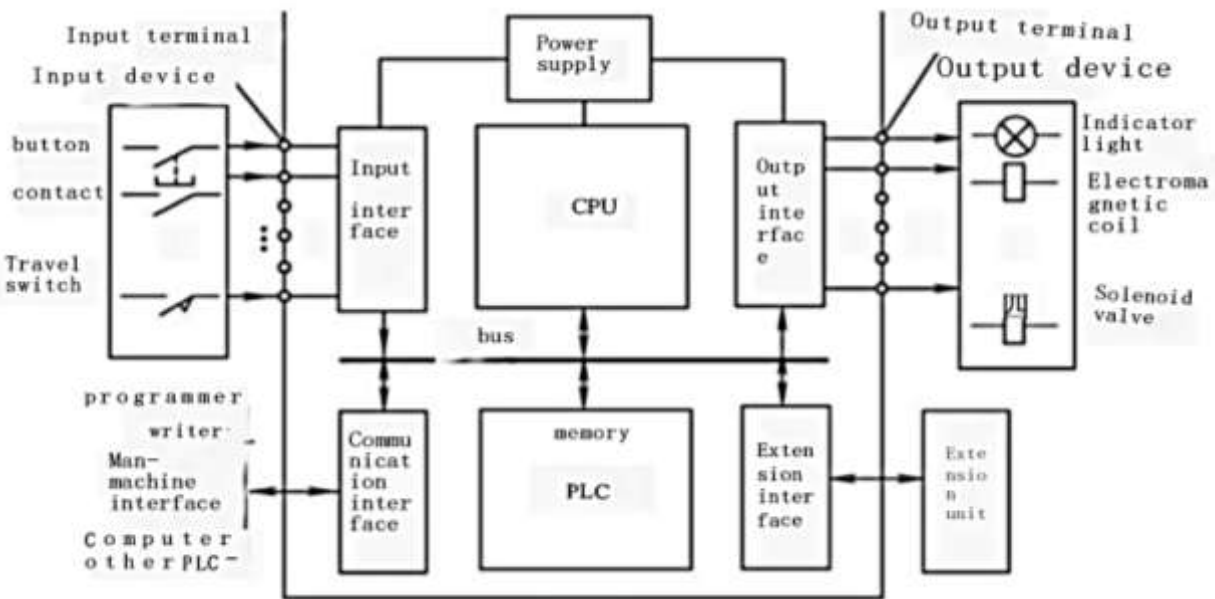


Figure 1. Schematic diagram of the PLC device

In the process of system design, first need to debug the relevant data value, and the specific equipment as a "threshold" in the control program device, intelligent equipment, comparing the operation parameters and the corresponding "threshold", if the operating parameters is within the "critical" allowed range, indicates that the operation is normal, instead, if the operating parameters approaching or beyond the critical value, means that the cold running fault, the fault area should be removed [10]. In addition, after setting the "critical value", a subsystem with intelligent supervision and diagnosis function can be formed by integrating relevant systems and equipment, such as the common intelligent short-circuit detection and control system. For example, the maximum operating temperature of an electrical equipment is 180°C, which can rise to 210°C in the limit state. If it exceeds 210°C, it indicates that the equipment will most likely have a short circuit. Therefore, the "210°C" can be set as the safety "critical value" in the intelligent control program, and the temperature sensor can be "210°C" as the standard for real-time dynamic equipment and circuit temperature monitoring. Once the operating temperature of the equipment is kept at 180°C for a certain period of time, the information warning should be carried out. When the operating temperature of the equipment is greater than 180°C and quickly rises to or more than 210°C, it indicates that the equipment is very likely to have short circuit and other serious faults. When the monitoring equipment sends the early warning information to the computer control center, it should also convey the execution instruction to cut off the circuit to the relay in time. Based on this, once the short circuit of equipment occurs in the electrical engineering and its automation system, the

emergency treatment can be carried out in time, but also the relevant parameter information can be quickly obtained for follow-up risk assessment and response work.

The intelligent control technology of neural network shows excellent self-control ability and powerful data processing function. When applied to electrical engineering and its automation system, it can realize the self-learning and calculation of the system, further improve the operation mechanism of the system, and improve the automatic control level of each equipment in the system. Taking the heating of air conditioning system as an example, the intelligent control technology of neural network can collect the temperature and humidity information inside the building in real time, and automatically adjust the data information through the cold and hot air volume to ensure that the air conditioning system will not overload. Figure 2 is the schematic diagram of the intelligent air conditioning system. At the same time, the air conditioning system can learn the requirements of the building users for the indoor environment, intelligently control the operation parameters of the system, to provide the building users with the most comfortable environment experience. While meeting the environmental temperature requirements of building users, intelligent parameter regulation helps to maintain the operation stability and efficiency of electrical engineering and its automation system and reduce the energy consumption and waste in the increasingly complex environment.

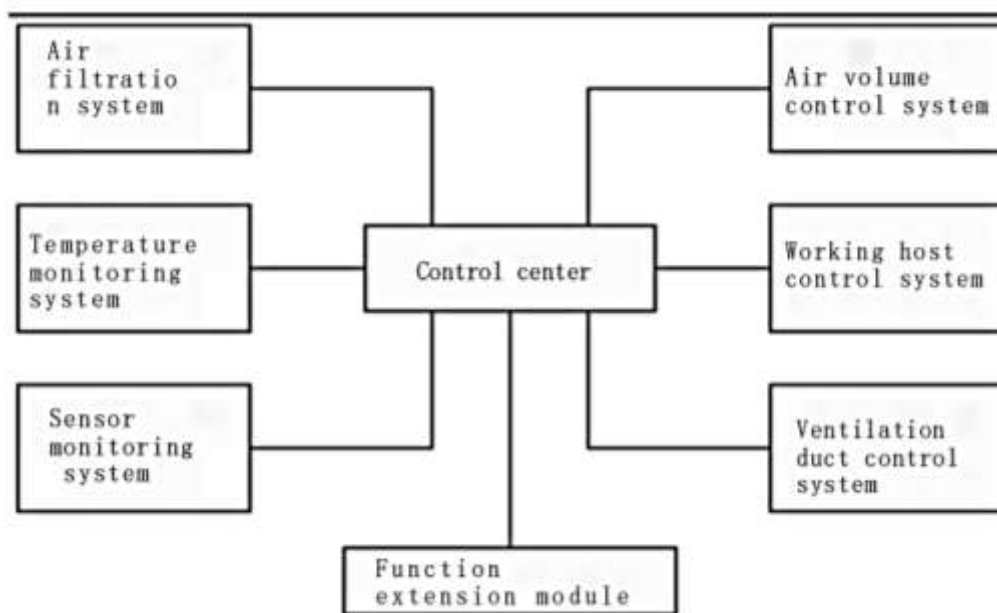


Figure 2. Schematic diagram of the intelligent air-conditioning system

First of all, the electrical equipment design quality is an important influencing factors determines the automation and intelligent control level, involving electromagnetic, electrical and circuit, and many other disciplines, in the system design stage must repeatedly scheme optimization, the traditional design workload is very large, involving content is very tedious, and due to excessive reliance on the personal experience of design workers, it is difficult to achieve the best design application effect. With the application of intelligent technology in system design, with the help of genetic algorithm and CAD auxiliary design software, can reasonably optimize electrical engineering and its automation system, greatly shorten the design cost and time, reduce the construction cost at the same time, improve the quality of system operation, effectively adapt to the practical application of electrical engineering and its automation system. Genetic algorithm is a

typical intelligent technology design means, including drawing optimization, accurate image processing and other systems, which can effectively solve the technical difficulties in the traditional design process, conduct accurate parameter design for the actual needs, and greatly improve the advancement and application of the electrical system [11].

Secondly, distributed structure is a common intelligent design method in the design of electrical engineering and its automation system. The intelligent distributed structure is used to form diversified functional modules, and the modules are independent of each other, which can not only improve the operation stability of the system, but also greatly reduce the probability of risk in the operation process. Finally, PLC intelligent technology can monitor the wireless comprehensiveness of electrical engineering and its automation system, especially in the process of distribution network line contact and switching, which can not only ensure the stable operation of equipment, but also show high accuracy. Intelligent real-time monitoring is an important means to realize the control of buildings without dead corners. The application of intelligent technology in real-time monitoring can provide real-time relevant monitoring video, and timely warn in case of emergencies, and take effective measures to deal with them to maximize the reduction of the occurrence probability of various safety accidents. Figure 3. is a diagram of the workflow of the intelligent monitoring system. Take the monitoring system in the parking lot as an example. After the light relief sensor is installed in each parking space, if a car enters the parking space, there will be a signal transmitted to the control system and displayed on the visual interactive page. The owner can quickly find the empty parking space according to the display on the page, greatly improving the convenience of parking. The intelligent monitoring system can also effectively monitor and control the switch, natural gas valve, sluice and other construction facilities. If there is leakage, gas leakage or water leakage sudden failure, the intelligent monitoring system can remotely control the valve closure, and reduce the damage of the accident to the minimum [12].

When the smoke concentration and temperature inside the building rise abnormally, the intelligent monitoring system will alarm and automatically spray water to cool down, and send the abnormal information directly to the property management department to prevent the spread of the fire to the greatest extent.

Its operation is directly related to the development of social economic production activities and people's personal property safety, and the internal power grid complexity continues to increase, the intelligent technology into electrical engineering and automation system is the inevitable trend of the development of industry, and meet the social people of life, important means of intelligent technology, in the social people daily life production demand, improve the quality of life plays an indispensable role. With the continuous development and maturity of intelligent technology, the application of intelligent technology in electrical engineering and its automation will inevitably achieve higher operation efficiency, show more superior performance, and provide users with more diversified functions.

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