Research on the Application of Electrical Engineering and Electrical Automation in Computer-controlled System

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Abstract. Computer-controlled system greatly accelerates the intelligent and info level of electric engineering & automatization realm. Electrical automation also provides a carrier and platform for the application of computer-controlled system. They accelerate each other and cooperate with each other, which has high research value. Based on this, this paper first analyses the process control of electric engineering & automatization, then studies the control framework and bus structure of computer-controlled system, and finally gives the design strategy of computer-controlled system utilization of electric engineering & automatization.

Keywords: Electrical Engineering, Electrical Automation, Computer-controlled System

1. Introduction

With the iterative progress and maturity of computer tech, it has been widely and deeply applied and popularized in many realms, especially in the realm of electric engineering & automatization control, which makes the mutual promotion and integration between the two. It not only improves the level of electric engineering & automatization, but also makes the research in the realm of computer-controlled obtain more significant achievements [1]. On the one hand, the computer-controlled system greatly accelerates the intelligent and info level in the realm of electrical engineering and automation. On the other hand, electric engineering & automatization provide the carrier and platform for the utilization of computer-controlled system. They accelerate each other and cooperate with each other, which reflects the utilization value of intelligent tech.

With the continuous development of electrical engineering and automation in many realms as shown in Figure 1, higher requirements are put forward for the accuracy, response speed and intelligent degree of automatic control [2]. In electric engineering & automatization control, the control efficiency and control precision are the important characteristics of the intelligent degree of...

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computer-controlled system. As a comprehensive tech integrating multi realms and multi disciplines, intelligent tech is often used in high-risk and difficult work scenes in the realm of electric engineering & automatization, so as to carry out the corresponding complex research and utilization instead of human beings.

In addition, as an important reflection of the level of computer-controlled tech, the utilization of electric engineering & automatization in many occasions and realms has significantly improved the working environment of equipment control personnel, reduced their work pressure and work intensity. In addition, electric engineering & automatization also help to improve the reliability of related computer-controlled equipment, reduce the maintenance cycle and frequency of equipment, thus greatly reducing the maintenance cost, so as to improve the efficiency of computer-controlled system in the overall level.

In a word, the current computer-controlled system has made great progress in practical utilization and theoretical research, especially with the gradual abandonment of the disadvantages of traditional electrical automation in electrical engineering, the utilization of computer-controlled system is constantly improved. The computer-controlled system of electrical engineering automation operation, its system control is realized under the support of the corresponding theoretical basis and structure, and from the specific utilization level, the utilization scope of electrical automation system is expanding, with the deepening of computer-controlled system research, there will be more accurate cognition and more effective realization of its specific utilization path in the future [3]. Therefore, the research on the utilization of electric engineering & automatization in computer-controlled system has important engineering practice value.

![Figure 1. Utilization realms of electrical engineering and automation](image)

2. **Process control of electric engineering & automatization**

2.1. **Connotation of process control in electric engineering & automatization**

The process control of electric engineering & automatization is the automatic control of one or some physical parameters in the production process by means of digital or analog control. The types of controlled parameters include temperature, pressure, flow rate, liquid level, composition and physical properties. Electrical engineering process control has experienced several stages, such as local automation, centralized control, and distributed control. In the centralized control stage, the complex control and computer-controlled and simulation have been realized. In the stage of distributed control, a series of intelligent utilizations represented by advanced control algorithm and optimal control algorithm gradually occupy a dominant position.
2.2. Typical characteristics and classification of electrical automation process control

In the modern process control process of electrical automation, the realization of info and control feedback is through the modern process control of electrical automation. Most automatic control systems are negative feedback control systems [4]. Electrical automation control has several typical characteristics, such as the diversity of controlled process, many process detections instruments and control instruments, rich control schemes, slow process parameter control and constant value control. In addition, electrical automation process control can be divided into different types according to different processes, different control laws of system regulators, different fixed values and different ways of overcoming interference, such as temperature, pressure, flow, proportion, feedforward and other different control types.

2.3. Performance index of electrical automation process control

The performance index of electrical automation process control is to take the step interference related to the controlled parameters as the input of the control system, and obtain the different transition process curves of the controlled parameters [5]. It includes the performance index, attenuation ratio, attenuation rate, maximum deviation and overshoot of the transition process, the residual index to measure the steady-state accuracy of the system, and the regulation time and oscillation frequency index to measure the rapidity of the process control system. The performance index of transition process is shown in Figure 2.

![Figure 2. Performance index diagram of transition process](image)

3. Control frame and bus structure of computer-controlled system

3.1. Control frame of computer-controlled system

The basic function of computer-controlled system is signal transmission, processing and comparison. It is completed by detecting and transmitting device, controller and executive device. The framework of control form of computer-controlled system is shown in Figure 3 below. The controller is replaced by computer. A/D and D/A converters are added. The control law is realized by program. The control process of computer-controlled system mainly includes real-time data acquisition, real-time decision-making and real-time control [6]. In addition, the typical forms of computer-controlled system can be divided into operation guidance control system, direct digital control system, supervisory control system, distributed control system and realambus control system according to their utilization characteristics and control purposes.
3.2. Bus structure of electrical engineering computer-controlled system

The bus structure of electrical engineering computer-controlled system defines the collection of some leads of signal, electrical and mechanical characteristics, so as to establish signal connection between various components in the computer system and between various external systems for data transmission and communication [7]. With the help of computer bus, manufacturers can design and manufacture computers according to unified standards, and users can connect different models of templates and equipment to form their own system. The communication bus between templates in computer system is called internal bus, which includes mechanical elements represented by template size, connector size and pin number, and electrical elements represented by signal level and timing.

In addition, the external bus of the computer-controlled system includes the communication bus between the computer system and the system or peripherals. It includes mechanical elements represented by connector model and cable, electrical elements represented by level and timing of sending and receiving signals, and functional elements represented by management ability, control function and coding rules of sending and receiving parties.

4. Utilization of electrical automation in computer-controlled system

4.1. Integration of computer-controlled system and electrical automation

Computer automation as a comprehensive professional, covering the machinery, electronics, electrical, info and many other professional, electrical automation mainly focuses on power automation and electrical automation. Among them, electronic info automation is to control the stable operation of electronics and info, while electrical automation has control theory and control engineering that focuses on both strong current direction and weak current direction, that is, it focuses on computer electronics and info [8]. On the other hand, electrical engineering and automation integrate many specialties, such as power electronics tech, computer tech, motor and electrical tech, info and network control tech, mechatronics tech and so on. It can be seen that computer-controlled and electrical automation have similar basic knowledge of engineering tech and corresponding professional knowledge of electrical engineering, which is also the basis and premise of the integration of the two utilizations. In addition, as a computer info science closely related to electrical engineering, the info carrier used before is mainly electromagnetic. Electrical engineering and computer-controlled system have the same disciplinary basis.
4.2. **Utilization of computer-controlled system in electric engineering & automatization**

The utilization of computer-controlled system in electric engineering & automatization includes introducing data calculation to reduce energy consumption, realizing integrated control and forming data management mechanism [9]. Among them, in the aspect of introducing data calculation to reduce energy consumption, the computer-controlled system is used to continuously optimize the circuit, innovate the energy-saving design in electrical engineering, and dynamically monitor the operation efficiency of electrical engineering. In the integrated control level, the unified automation system of computer is used to realize the dynamic detection of the whole electrical engineering. Secondly, in the technical utilization level of fault diagnosis, computer-controlled is used to create troubleshooting steps to ensure the electrical engineering troubleshooting. In addition, the utilization of computer-controlled of electrical engineering operation procedures are simplified, so that the probability of errors will be greatly reduced, so as to better carry out the electrification control service.

4.3. **Design strategy of electrical automation computer-controlled system**

The design points of electrical automation computer-controlled system include intelligence, energy saving, reliability and unity. Among them, in the intelligent level, the editor for automatic parameter design, to ensure the intelligence of electrical automation computer-controlled system. Secondly, in the aspect of energy saving, the energy saving factors are integrated from the whole system design process to control the resources in the system [10]. In addition, at the reliability level, to ensure the correct operation of the electrical automation computer-controlled system. Finally, at the level of unity, the control system design of electrical automation computer-controlled system conforms to the scientific design principle, so that the computer-controlled system software can be shared.

5. **Conclusion**

In summary, the progress of computer-controlled system in practical utilization and theoretical research, especially the gradual abandonment of the disadvantages of traditional electrical automation in electrical engineering, makes the utilization of computer-controlled system constantly perfect. In the computer-controlled system of electrical engineering automation operation, the utilization scope of electrical automation system is expanding, which not only improves the level of electric engineering & automatization, but also makes the research in the realm of computer-controlled get more significant development. This paper analyzes the characteristics and classification of electrical automation process control through the research of electric engineering & automatization process control. Through the analysis of the control framework and bus structure of the computer-controlled system, this paper studies the integration of the computer-controlled system and the electrical automation, and finally gives the design strategy of the utilization of the computer-controlled system in electric engineering & automatization.

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