

# *Research on Automatic Control Technology of Low Voltage Electrical Equipment Based on Artificial Intelligence*

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**Abstract:** With the rapid development of artificial intelligence technology on a global scale, it will affect the future development trend of the electrical industry to a large extent. According to the research on the automation control technology of air-conditioning equipment in shopping malls, the research on the automation control technology of low-voltage electrical equipment based on artificial intelligence is proposed. In the design of artificial intelligence low-voltage electrical equipment automation control technology, firstly, a brief overview of low-voltage electrical equipment automation control technology, through analysis of low-voltage electrical equipment automation control technology composition and use process, The air conditioning system based on fuzzy neural network is studied in detail. Using artificial intelligence to showcase the technical examples in the automation control of electrical equipment, study the automation energy-saving optimization countermeasures of air-conditioning equipment in shopping malls, and clarify the important management projects of air-conditioning active energy-saving and energy-saving, and commit to the important management projects of air-conditioning active energy-saving.

## 1. Introduction

### 1.1 Overview of Low-Voltage Electrical Equipment Automation Control Technology

This article takes the air conditioning of the shopping mall as an example to briefly summarize the automation control technology of low-voltage electrical equipment, and build the daily management and energy-saving interface. Air conditioners, as electrical equipment with high energy consumption and high demand, have attracted a lot of attention due to the high energy consumption required for work. The main monitoring platform used in shopping malls is the building automation system, which mainly aims at the energy-saving effect of the monitoring of high-energy electrical equipment. Therefore, in order to save energy control of the store air conditioner, it must be equipped with a corresponding design. The building's building automation system designed a total of 1310 physical air conditioning points, and targeted optimization of the

equipment monitoring program and the corresponding module of the controller, centralized control of the air conditioning of the entire mall <sup>[1]</sup>.

## 1.2 Low-Voltage Electrical Equipment Automation Control Technology Composition

The low-voltage electrical equipment automation control technology is mainly the building automation system, and the building automation system is the abbreviation of the shopping mall electrical automation monitoring system. The system is mainly combined by sensors, communication and computer technology to manage and control the air-conditioning equipment in the mall, so that the air conditioner can maintain stable and energy-saving operation. The air conditioning system in the shopping mall refers to air conditioning units, new air blowers, variable air volume units, fan coils and other equipment. Its control mainly refers to temperature and humidity adjustment, scheduled timetable and automatic start and stop control. If the air-conditioning system in the building already has a high degree of automation control, it can also be used only in a controlled manner. The building automation system's management of air-conditioning equipment mainly includes: monitoring the status of the freezer, air conditioner, water pump, etc.; measuring the temperature and humidity, and adjusting the temperature and flow of the cold and heat source required by the air conditioning system. The automatic control of electrical equipment in shopping malls is centered on air conditioning control. The automatic control of the air conditioning system is an automatic adjustment of the general thermodynamic process. The automatic adjustment of the air conditioning system has the following advantages:

(1) For production buildings, the control accuracy of temperature and humidity can be improved, and the quality of products can be improved. The residential and commercial buildings are mainly to improve people's comfort.

(2) The energy can be increased or decreased according to the situation in which the volume is changed, so that energy consumption can be reduced and energy can be saved.

(3) It can reduce labor intensity, increase indoor environment comfort, effectively improve shopping mall comfort and provide users with the best life experience<sup>[2]</sup>.

## 1.3 Low-Voltage Electrical Equipment Automation Control Technology Use Process

The main content of the low-voltage electrical equipment automation control technology use process is to centrally monitor, display and control all controlled objects and monitoring objects on each floor in the central control room. The control room of the building automation system can simultaneously monitor and control the controlled objects at each level to ensure its normal operation. The first floor to the fifth floor of the shopping mall and the top floor communicate with the central control room to monitor the air supply and return air temperature. In addition to the centralized control of the central control room, the air supply temperature can be displayed and set on site. Monitor, display and control the solenoid valve switch and opening. Control and monitor the start and stop of variable air volume air conditioners. Monitor the supply and return air pressures and perform a three-stage alarm on the filter status. On-site manual control of the highest priority grant. In the central control room, according to the setting of the upper computer, the air conditioner is displayed and controlled centrally. The employees do not need to frequently go to and from the air-conditioned rooms in each floor. The air-conditioning operation is carried out according to the owner's requirements, reducing the complicated work caused by the lag of the owner's sense of body<sup>[3]</sup>. The site has both display and manual control functions. The process of using low-voltage electrical equipment automation control technology is roughly divided into four parts:

(1) All test data in the system can be displayed on the display, such as: fresh air, return air, temperature and humidity of the air supply, filter silencing alarm, fan opening and closing status.

(2) Through the pre-written logic program in the DDC controller, the system can perform the following chain functions: the damper installed at the entrance of the fresh air is interlocked with the fan. When the fan stops, the new damper is fully closed; the electric control valve is interlocked with the fan. When the fan is stopped, the electric control valve is also closed at the same time; the start and stop state of the fan is detected by the differential pressure switch. When the fan starts, when the differential pressure on both sides of the fan exceeds its set value, the normally open contact in the differential pressure switch is closed, the signal is sent to the DDC controller, and the control program of the system is put into operation immediately<sup>[4]</sup>.

(3) Any data in the DDC digital controller can be extracted and modified on-site through the portable detector, such as: sensor detection range, control program parameters, including input to output.

## **2. Technical Example of Artificial Intelligence in Electrical Equipment Automation Control**

### **2.1 Research on Optimization Countermeasures for Energy Saving Optimization of Air Conditioning Equipment in Shopping Malls**

In order to ensure the convenience of the monitoring system in the process of use, the energy used by the device is effectively controlled. In the operating system, a dynamic graphic is used as a monitoring interface, and the building management staff can completely control the device in the monitoring room. All interfaces have a similar design and are used in the same way, so that managers and operators can quickly get the software up and running, saving a lot of money on technical training and maintenance. It also allows the system to improve its operational efficiency.

Through the monitoring system, managers can fully grasp the use of resources in the mall, which can effectively improve the emergency response capability in the event of an emergency and reduce the risk of accidents. The comprehensive functions in the system can analyze and integrate the data information in the monitoring, which can provide a basis for designing energy-saving schemes and equipment configuration schemes<sup>[6]</sup>.

### **2.2 Air Conditioning Initiative to Save Energy and Important Management Projects**

In the management process of air conditioner active energy saving, when the indoor heat and the remaining heat are the same, the indoor temperature will be in a constant temperature state, and the air conditioner runs smoothly. In this case, the heat flowing into and out of the room is the load in the room. If there is interference in the room, the load value will be affected and a certain change will be made. The air conditioning adjustment system will restart, adjust the parameters, and change the heat inflow and output values until the room reaches the inflow and output heat again. Therefore, the characteristics of the air conditioning adjustment target load value will be affected by the requirements of the air conditioning automatic control system. Once the abnormality of the adjustment parameters of the adjustment object occurs, the air conditioning automatic system must react and adjust in the shortest time.

### **2.3 Realizing Energy-Saving Methods for Air-Conditioning Automation Systems**

The main four links in the air conditioning energy-saving control engineering system are system-related maintenance, overall development design, system integrator and project management. The main considerations of the system's overall designer system integration, in the integrated design of

the system, should fully consider the monitoring of air conditioning control systems and other related equipment. For example, whether the configuration is reasonable, the interface design is reasonable, and whether the overall design can be optimized<sup>[7]</sup>. Applying intelligent technology to electrical automation can effectively improve the operational efficiency of electrical automation, reduce the labor cost of enterprises, and achieve energy saving in air conditioning automation systems.

### 3. Conclusion

Today, with the rapid development of China's economy, the growing demand for good people and changes in living habits are driving the development of the electrical industry. With the increasing degree of electronic informationization, artificial intelligence electronic information has emerged as the times require, and has been applied to various fields. The emergence of artificial intelligence technology in the electrical automation control system is no harm, and artificial intelligence has become an indispensable part of its control system. Not only can it greatly accelerate the development of electrical automation control systems, but also promote the development of China's electrification industry to a large extent.

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