Design of Central Air Conditioning Control Acquisition Device Based on IoT Technology

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Abstract. With the rapid development of Internet and electronic technology, the Internet of things (hereinafter referred to as IOT) has become an important way of many intelligent devices, which can improve people's application of intelligent devices. Through the IOT, we can carry out the research on the centralized monitoring system of central air conditioning [1]. Through the IOT, we can realize the IOT of indoor and outdoor units of central air conditioning, which can realize the important application of practical engineering projects. Through fuzzy algorithm, this paper can improve the overall improvement of the project. Through the cooperation of MCU and GPRS module, we can complete the wireless transmission of data., This can realize computer terminal monitoring and mobile terminal monitoring. Through engineering application, we can realize the automation and information integration of system monitoring, which will greatly improve the monitoring efficiency. Through the development of acquisition device, we can improve the comfort and security of central air conditioning, which will enhance the communication between the physical equipment of the system and the upper server network. Firstly, this paper analyzes the flow of fuzzy PID algorithm. Then, this paper specifies the system diagram of the central air conditioning control acquisition system [2]. Finally, this paper puts forward the important work of system acquisition.

Keywords: Internet Of Things, Central Air Conditioning, Control Acquisition Device

1. Introduction
IOT is an important part of the new generation of information technology, which is an Internet system connected with things. Through the Internet, we can complete the information exchange and communication between the upper equipment and the required items. The IOT can promote the rapid development of monitoring technology, which will seriously affect the industrialization and information integration of air conditioning industry [3]. The central air conditioning has energy saving compared with the traditional central air-conditioning, which requires advanced control and flexibility. Central air conditioning has become an indispensable tool in modern office, which requires us to improve the centralized monitoring system, which will better realize the functions of data acquisition, processing, real-time monitoring and control of remote equipment. At the same time, through the
acquisition system, we can improve the intelligence of human-computer interaction terminal products, which can reduce air conditioning energy consumption and operation and maintenance costs. Through IOT technology, we can build a data acquisition device for central air conditioning water system, which can realize the detection of central air conditioning [4,5].

2. Fuzzy PID algorithm flow
Fuzzy logic system is a logic system based on fuzzy algorithm. In traditional logic, either black or white is 0 or 1, which is no other case. However, fuzzy logic can exist in other cases between 0 and 1, which can be called gray area. In this paper, the flow of fuzzy PID algorithm is developed, as shown in Figure 1.

![Figure 1. Flow chart of fuzzy PID algorithm](image)

The increment formula of PID controller is shown in Formula 1.

\[
\begin{align*}
\Delta u(n) &= a_0 e(n) + a_1 e(n-1) \\
&= K_p E + K_i \frac{dE}{dt} + K_d E
\end{align*}
\]

3. Development of central air conditioning control acquisition device

3.1. Overall system framework
This paper designs an intelligent acquisition and detection system, which can better realize the monitoring of central air conditioning [6,7]. Users can realize the centralized monitoring of central air conditioning through mobile phones and computers. At the same time, based on the three-tier architecture of the IOT, this paper designs a framework for the intelligent IOT layer, processing layer and intelligent application layer, which is mainly composed of three parts. The overall framework of the system is shown in Figure 2.
3.2. Composition of fuzzy control system

According to the characteristics of the control object of the control system, the fuzzy controller can determine the structure, input and output of the fuzzy controller. The number of input variables is usually called the dimension of fuzzy controller. The composition of fuzzy control system is shown in Figure 3.

4. Hardware design of central air conditioning system

4.1. Power distribution cabinet

The power distribution cabinet is used to take out the power supply from the 400V switch cabinet, which can simultaneously distribute various auxiliary power distribution supporting equipment in the energy-saving control system of the water supply system [8-10]. Each refrigeration equipment can complete the simultaneous power distribution of various auxiliary power distribution equipment through a power distribution cabinet, including 1 refrigeration and antifreeze host, 1 refrigeration water pump, 1 cooling water pump, 1 cooling tower and some auxiliary fans, which can ensure that a set of equipment can always operate normally in case of power loss. At the same time, the distribution
cabinet can reduce the impact of power supply failure on ventilation and air conditioning system equipment.

4.2. Centralized control cabinet
The centralized control cabinet of water system mainly includes water system fuzzy controller, industrial tablet computer, PLC, Ethernet switch and power distribution components, which can be used for the coordinated control of various equipment of the whole water system [11]. When receiving the system level command of BAS, we can upload the relevant data of water system to BAS system. The distributed controller of the chiller is integrated into the centralized control cabinet, which can be used to start and stop the chiller and collect the operating parameters of the chiller. The centralized control cabinet can communicate with the water pump control cabinet, cooling tower fan control box, field signal acquisition device and other equipment, which will realize the automatic optimal control of the air conditioning water system. The centralized control cabinet has the function of system fault diagnosis and self recovery, which can ensure the safe, stable and reliable operation of the system. After the fuzzy PLC power on system is started, it has entered the main program of the system [12,13].

4.3. Data acquisition cabinet
The data acquisition, analysis and calculation system is mainly used to predict the change of operation state of energy-saving control load system, which can improve the basic technology of optimizing energy-saving load control. Control system optimization system, we can formulate the energy-saving control system equipment of the whole optimized energy-saving control load system, including the temperature of chilled water supply / return main pipe and the temperature of cooling water inlet / outlet main pipe. The field signal acquisition device includes distributed controller, expansion module and other auxiliary components. We can collect the system water temperature, flow, differential pressure and other parameters, which can provide a basis for the operation optimization control of the water system.

5. Conclusion
Through the cooperation of MCU and GPRS module, we can complete the wireless transmission of data., This can realize computer terminal monitoring and mobile terminal monitoring. Through IOT technology, we can build a data acquisition device for central air conditioning water system, which can realize the detection of central air conditioning. Therefore, this paper formulates the system diagram of the central air conditioning control acquisition system, which can better complete the project work.

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