Research on power environment monitoring system of information room

Xin Song\(^1\)*, Chenggang Hao\(^1\), Xin Zhang\(^1\), Yifei Wang\(^1\)

\(^1\)Siping Power Supply Company of State Grid Jilin Electric Power Company, Siping, China

* Corresponding author’s e-mail: 1182201444@ncepu.edu.cn

Abstract. With the increasing number of equipment in the information room, the timed patrol inspection by duty personnel alone cannot effectively monitor the entire room environment in real time, and there are large potential safety risks. This paper introduces the technical scheme and construction scheme of power environment monitoring system for information room of Siping Power Supply Company, Jilin Province Power Co., Ltd. Through the construction of the system, unified operation monitoring of all equipment in the information room is achieved. Once the system is applied, and once a fault is found, the system will send an alarm signal to the on duty personnel at the first time. It also informs operation and maintenance personnel by SMS to handle the malfunction in time, so as to ensure the safe and stable operation of the information room equipment and system.

1. Introduction

With the rapid development of information technology construction, the host system, network system, precision air conditioning, fire control system, UPS power supply and other equipment in information room are increasing. Safe and stable operation is very important. The information operation and maintenance personnel cannot find the faults of the equipment or system at the first time, nor can they troubleshoot the faults of the equipment or system at the first time [1]. There are large security risks, which will affect the normal operation of the business system in serious cases, and information security assessment events will occur. In order to ensure the safe and stable operation of all kinds of equipment and systems in the company's information room, it is necessary to establish a set of intelligent power environment monitoring system for the information room, real-time monitoring of the real-time operation status of all kinds of equipment and systems in the information room, once a failure is found, it can be handled at the first time, so as to further improve the information security management level of the company. State Grid Jilin Electric Power Co., Ltd. Siping Power Supply Company (hereinafter referred to as "Siping Power Supply Company") has explored and studied the application of power environment monitoring system in information room, effectively improving the level of safe operation management and control of information room [2].

2. Technical scheme design

2.1. The structural composition of the system

The overall architecture of the system is composed of computer room equipment and local monitoring stations. The local monitoring station mainly includes local monitoring host, computer network, multimedia voice alarm system, smart voice phone card, smart device, integrated interface of mobile
phone short message, remote browsing station and other devices and modules. Machine room equipment mainly includes precision air conditioning, UPS power supply, distribution cabinet, temperature and humidity, access control system, video monitoring, water leakage monitoring, as is shown in figure 1.

Figure 1 The structural composition of the system

2.2. Functional decomposition

The power environment monitoring system of information room can be divided into two parts, collection layer and management layer according to the functional distinction. Collection layer mainly uses RS232/RS485 interface or device driver card of smart device in IP network and information room to connect, then collects all monitoring devices in the room through protocol conversion module, signal processing module and smart collection module, and then transfers the collected data to the monitoring system for data processing [3]. The management mainly uses the local monitoring station to process and analyze all kinds of data collected, and generates the monitoring interface of each monitoring subsystem for the on-duty personnel to carry out daily monitoring and timely troubleshooting.

2.3. System function

Power distribution monitoring. The power distribution monitoring system monitors and records the important parameters of the three-phase power supply of the power distribution cabinet in the information room (such as current, voltage, switch operation status) in real time, and stores them in the form of logs in the system to form a historical curve for future convenience query and fault analysis [4]. Once the distribution monitoring system finds that the distribution switch has tripped, the mains power is out of power, or the operating voltage or current exceeds the set threshold, it will alarm at the first time, and the monitoring system will automatically switch to the relevant alarm interface. The display is displayed in a flashing and color-changing manner, and a voice alarm and SMS alarm will be issued at the first time to notify the duty and operation and maintenance personnel, and troubleshoot in time.

Air conditioning monitoring. Air conditioning monitoring system with precision air conditioning itself own intelligent communication interface to realize interconnection, can be collected with precision air conditioning parts (temperature and humidity, temperature and humidity value, compressor, fan and the compressor running status of low pressure and high pressure alarm, heater heating status and power failure, humidifier humidification state and power failure, the overload, dehumidifier, fan, water, gas flow failure, filter clogging, refrigeration, air conditioning running state,) the values of the parameters, running status, anomalies and fault alarm, and can be remotely change air conditioning set various parameters (such as temperature, humidity). It can also open and shut down the precision air conditioner remotely.

Air conditioning monitoring system once the monitoring to the parameters of the precision air conditioning exceeds the threshold or malfunction will be at the first time issued a warning, monitoring and control system will automatically switch to the related alarm interface, for display in color flashing way, and will send a voice alarm and SMS alarm at the first time inform the staff and operations staff on duty, the fault handling in a timely manner.
Video surveillance. Information room using an array of HD video monitoring to monitor the important parts information room, monitoring information transmission to the video hard disk video recorder for storage, video monitoring system by video hard disk video recorder can adjust the direction of the monitor head with clarity, realize the information rooms of all kinds of equipment for centralized monitoring and management. At the same time can also review the history of the video to check the monitoring records of the machine room.

Leakage monitoring. Leakage monitoring system receive real-time precision air conditioning deployment under the slack rope from the monitoring information, once detected information room water leakage incident, will be issued a warning in the first time, at the same time, monitoring and control system for monitoring interface automatically cut is up to water interface of the computer room is leaking area, for display in color flashing way, and will send a voice alarm and SMS alarm at the first time inform the staff and operations staff on duty, the fault handling in a timely manner [5].

Temperature and humidity monitoring. The temperature and humidity monitoring system records and displays all kinds of information from temperature and humidity sensors in the information room in real time in the form of electronic map, so that the personnel on duty can visually view the temperature and humidity situation in the information room [6]; The personnel on duty can use the temperature and humidity monitoring system to reset the temperature and humidity alarm threshold according to the actual situation of the temperature and humidity in the information room; Once the temperature and humidity in the information room exceed the set threshold, the temperature and humidity monitoring system will send voice alarm and SMS alarm to inform the personnel on duty and the operation and maintenance personnel in the first time to deal with the fault in time. At the same time can also refer to the historical curve to check the room temperature, humidity operating conditions.

Access monitoring. The access control monitoring system will record the access control card information used by the operation and maintenance personnel entering the information room in real time, the name of the entry area, the entry and exit time. And this information will be stored in the form of logs in the system log file, for the convenience of future log query and problem investigation. The access control monitoring system can be linked with the video monitoring system. When someone swipes the card in front of the information room, the video monitoring system will immediately capture and record video, so as to facilitate the duty personnel to identify the personnel who enter the computer room. If someone wants to illegal invasion computer room door, door access control monitoring systems state sensor will be triggered immediately, and will alarm information sent to the system, monitoring system will automatically pop up on the electronic map alarm interface, and invasion of the location of the visual display occur, at the same time will send a voice alarm and SMS alarm at the first time to inform staff and operations staff on duty. Entrance guard monitoring system can through the electronic map real-time display room door open and close state, researchers in and out of, the operation of the system equipment, can accurate positioning, and display of entrance guard alarm information, can also be achieved by the company's network remote switch information room door, and also to be able to in and out of the room personnel to implement intelligent attendance [7].

SMS alarm system. SMS alarm system is through the system and the company's information release platform to do the interface, to complete the alarm information in the form of SMS sent to the information operation and maintenance personnel's mobile phone function. That is, when the system receives the alarm information of all kinds of equipment in the information room, it will classify all kinds of alarm information, and then send the information to the SMS platform of the company in accordance with the original set format, and then the SMS platform of the company will send it to the mobile phone of the relevant customized operation and maintenance personnel according to different categories of SMS.

SMS alarm system can be according to the computer room categories (such as information room, communications equipment room), room location (city company room, county company equipment room), equipment category (e.g., host equipment, network equipment, infrastructure equipment), information important level (such as emergency information, important information, and general information) and so on carries on the classification, and then according to different categories of alarm
information sent to the different types of leadership, management, operations personnel or personnel on
duty [8]. SMS alarm system can also according to different time to send the alarm information (such as
night just send the emergency alarm information, send alarm information important only increase during
the day, but general alarm message not send text messages, just pop up alarm information on the system
interface), SMS sending form can be modified according to the requirements in terms of concrete.

3. Implementation plan

3.1. Power distribution system monitoring implementation
In the information computer room power distribution cabinet deployment acquisition devices, phase
voltage and phase current, operation frequency of alternating current (ac), apparent power and power
factor, active power and active power, reactive power and reactive power, zero voltage and air switch
the running state of real-time acquisition, and the collected information uploaded to the system. The
system displays and saves the collected information in the form of graphical interface on the monitoring
platform, and displays the operating parameter values of all monitored devices and the operating state
of each line switch in real time.

System also for all operating voltage and current, and the lower limit alarm threshold, when a line
running voltage and threshold when the current exceeds the system, the system will in the first time a
voice alarm and pop up alarm information on system monitoring platform, to inform the personnel on
duty room inspection, in the form of short message notification operations staff in a timely manner to
deal with failure.

3.2. Implementation of air conditioning system monitoring
Install deployment of acquisition in the information computer room precision air conditioning
equipment, temperature and humidity, temperature and humidity of precision air conditioning set the
alarm threshold, overload and operating state of the fan, compressor, compressor running status of high-
pressure alarm and low voltage alarm, heating and humidification state of heater, heater and power
failure, dehumidifier humidifier spilled water, filter clogging, gas flow failure, refrigeration, air
conditioning running state of real-time acquisition, and the collected information uploaded to the system.

The system can remotely open or close the air conditioner through the control command, and can
monitor the real-time running state of the air conditioner, real-time saving and display the running state,
operating parameters and alarm of the various components of the air conditioner. When the air
conditioning in alarm, the system will send out the voice alarm and at the first time on the system
monitoring platform pop-up warning information, inform the duty personnel to go to the machine room for inspection, and inform the operation and
maintenance personnel in the form of short message notification operations staff in a timely manner to deal with failure.

3.3. Leakage system monitoring implementation
To computer room precision air conditioning installation deployment information leakage monitoring
equipment, namely the floor at the bottom of the precision air conditioning use leakage monitoring rope
around enclosure, when the air conditioning pipe appear slack phenomenon, leakage monitoring line
will be induced the leakage incident, and sends the leaking information to the system, the system will
record the precision air conditioning water leakage incident information. At the same time, the system
will immediately send out voice alarm and pop up alarm information on the system monitoring platform
to inform the duty personnel to go to the machine room for inspection, and inform the operation and
maintenance personnel in the form of short message to deal with the fault in time.

3.4. Implementation of temperature and humidity monitoring
The temperature and humidity sensors are uniformly installed and deployed in different areas of the
information room [9]. By collecting all the temperature and humidity sensors, the system can monitor
the temperature and humidity values and changes in each location of the information room in real time,
and can display the changes throughout the day in the way of graph. System also for all the temperature, humidity sensor and the lower limit alarm threshold, when a certain temperature and humidity sensor induction to room temperature and humidity of more than the threshold set, the system will in the first time a voice alarm and pop up alarm information on system monitoring platform, to inform the personnel on duty room inspection, in the form of short message notification operations staff in time to treatment failure.

3.5. Implementation of access control and attendance system
To prevent illegal migrants entering information room, at the same time, the information into the computer room management staff to achieve effective and safety controls, all information into the computer room door installation deployment of the entrance guard system, entrance card, in and out of the information personnel must brush entrance card can pass in and out of the room, entrance guard system at the same time for each behaviour can log in and out of the room and is easy to query and analysis in the future. The deployed access control system can analyse the data of the attendance system according to the set conditions, such as the entry and analysis of the data of the special circumstances such as asking for leave and going out, and generate the attendance report monthly.

4. Conclusion
System construction after implementation, the personnel on duty in the control room operation can see on the monitor and control system to information engine room all the equipment running status and operation parameters, browse a variety of monitoring equipment operation curve and run the report, the history of the personnel on duty at the same time can also remote control equipment running status (such as open, shutdown). When running all kinds of equipment failure, the system will sound to remind the personnel on duty in the first time, at the same time will pop up alarm information on the system fault phenomena, and the alarm information through the short message is sent to operations staff on the phone, so that operations staff can get in the first time, the fault handling in a timely manner. In addition, each subsystem on the system has realized the linkage control with each related equipment, so as to achieve the optimal control and remote operation for all operating equipment.

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