

Intelligent Buildings Equipment Management System Interface Information Integration

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Abstract—There are more and more intelligent buildings in our life. Building automation system (BAS) is the main content of intelligent building system equipment management. This paper discussed the integration of information and graphical interface of the lighting system, air conditioning system and security system.

Key words: *Intelligent building; information integration; graphical interface; management system*

I THE DEFINITION OF INTELLIGENT BUILDINGS

The intelligent building is the inevitable product of the Information Age. In today's world, science and technology development was marked by 4C technology, namely Computer, Control, Communication and CRT. 4C technology will be applied to buildings, set the building within a computer network, to realize the integrated management of the equipment inside the building.

Revision of national standards "smart building design standards (GB/T50314-2006) of the intelligent building is defined as " Building to the platform, both the information facilities and systems, application of information technology systems, construction equipment management

system, public security system, set structure, system, service, management and optimization of combination as a whole, to provide safe, efficient and convenient, energy saving, environmental protection, health building environment.

Building intelligent structure is composed of three systems: the building automation system (BAS), Office Automation System (OAS) and Communication Automation System (CAS). Here we mainly research on the building automation system (BAS) equipment management system interface.

II THE MAIN CONTENTS AND FUNCTION OF INTELLIGENT BUILDING EQUIPMENT MANAGEMENT SYSTEM

Modern intelligent building comprises a plurality of management system, for instance lighting systems, air conditioning systems, security systems, fire control system, elevator system, access control system, distribution system, cold and heat source system. The main function is to monitor daily, which functional are shown in Figure 1. Requirements of these subsystems for unified monitoring, control and management in the building center control room and used the same network environment, the same software interface for centralized monitoring.

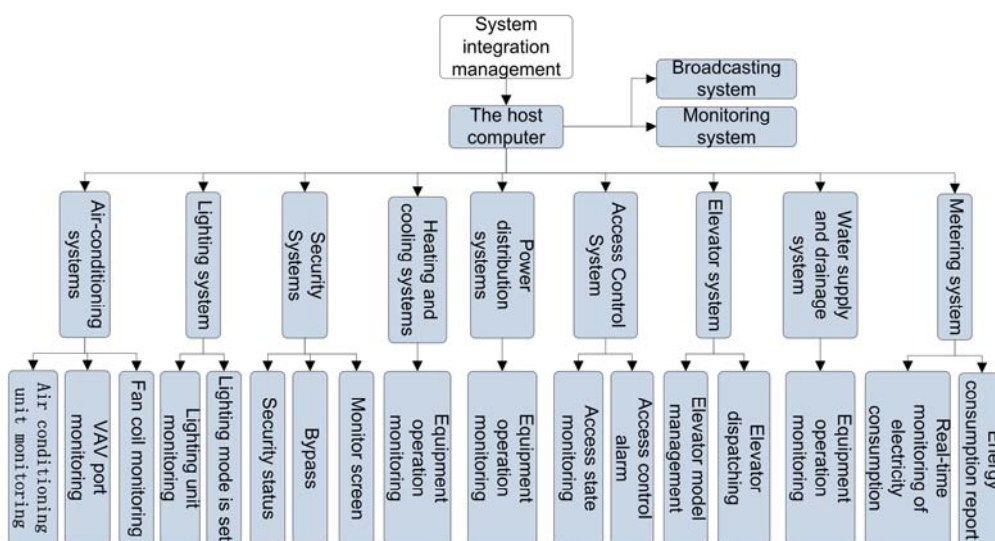


Fig 1 System function overview

III INTELLIGENT BUILDINGS EQUIPMENT MANAGEMENT SYSTEM ANALYSIS OF DESIGN DEMAND

The system mainly consists of three parts: lower computer equipment, the intermediate network elements and upper monitor equipment. Lower computer get data in real time. Via the intermediate network element, the data is transferred to upper monitor to complete the implementation monitoring. The system will unified manage lighting system, air conditioning system, security system, measurement system, fire control system, elevator system, access control system, distribution system, cold and heat source system and other equipment in the building. Through TCP/IP technology building IP address database for the equipment units, it connects the units with upper monitor PC, concentrates operating data of each systems to monitor in real time. System interface focused on various system terminal equipment running status monitoring, terminal group, equipment switch controlling, and timely handling of abnormal alarm. The interface emphasizes the clear information, the clear operation feedback and good usability. Interface framework should be consistent and inheritance. The system services in the central control unit of intelligent building, used for daily equipment operation monitoring and fault alarm.

IV SYSTEM INTERFACE INFORMATION INTEGRATION

From the angle analysis of daily monitoring equipment, man-machine interface of the system requirements reflect the operational status of the terminal equipment of the various subsystems, as well as their position and their group relationship, and requires that each system structure and operation logic consistency. Therefore the interface is asked to

integrate the architecture of each system. Its main principles are: (1) the entrance of the subsystem functional areas, (2) in accordance with the geographical area, (3) graphical representation of the terminal equipment.

Based on the above three principles to the analysis and design the lighting systems, air conditioning systems and security systems. Set subsystem function button as a navigation interface, by clicking on the button to enter the various subsystems. After entered the subsystem, the second navigations are divided based on the floor area. Each floor plan indicates that the device terminal location and the control range. Operation button area is used to set up commonly used shortcuts and linkage operation buttons. And using the list mode monitors and finds the device status.

A. Graphical interface of lighting system

The lighting system's main function is to monitor the operation status of the building lighting, control lighting group switch, and switch mode that has been set up. The main information area shows all lighting within the group to run the state and the difference between types of equipments in the current floor. The system uses the device icon in the status of the switch to indicate that the device open, close, and unavailable. The operator can click the device icon to control the corresponding group in the region of main information, and click on the button of the operating area of the control joint group. Click on the icon and the button will pop up a dialog box for confirmation in order to avoid misuse. Lighting system interface information architecture, shown in Figure 2. Through the following aspects, we designed the system graphical interface, shown in Figure 3.

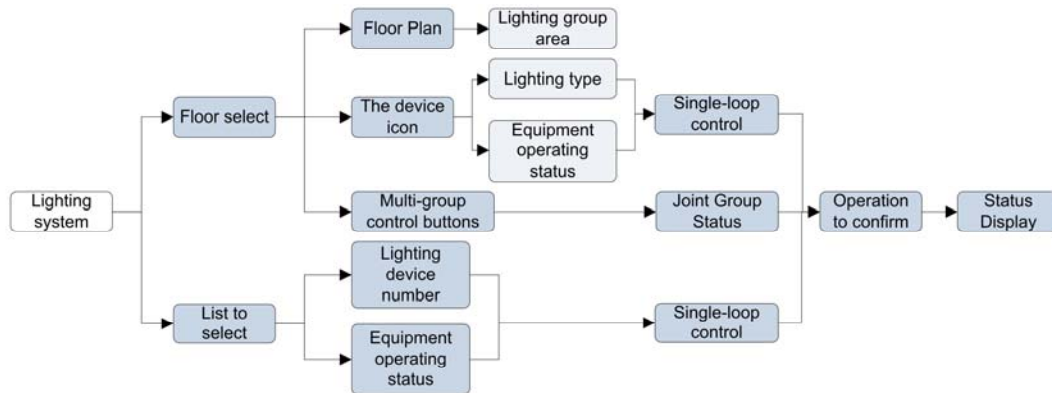


Fig 2 Lighting system interface information architecture

- The main information area of the system uses the building plan as a background. In order to make the picture simple and focused, we only retained the main structural walls as well as the unit of work to simplify the floor plan, reduced the visual interference of the background for the operator, and used different color to identify control range of device groups. This facilitates the operator to visually select the region.
- Use equipment terminal icon to distinguish between the types of lighting equipment and operating status. According to the placement of the actual lighting in buildings, we design different types of icon to indicate bulbs, trough lights, lights, spotlights and others and put them on actual placement. Easy to operate under the name, location of the equipment to find and monitor.

- According to the semantics of the lighting equipment, we designed the lighting of three states, normally open, closed and unavailable. For the mode setting of some special groups, different icons are placed in the vicinity of the corresponding region to switch modes.
- Use the button of operating area to control multiple groups. Users can customize the button functions in the system settings. Click the button will pop up a dialog box for confirmation in order to avoid misuse.
- The list area displays information and running status of all lighting in the floor terminal. Users can find and monitor them according to the device number.

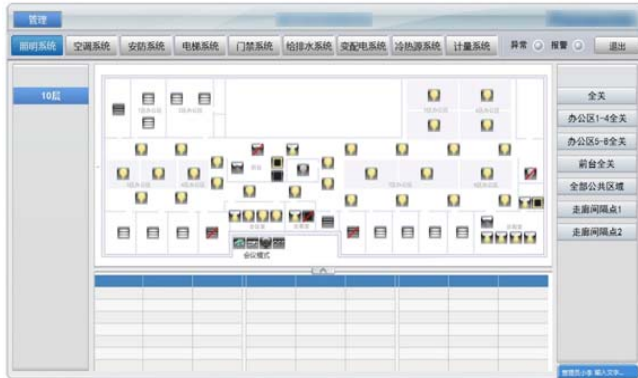


Fig 3 Lighting system interface

B. Graphical interface of air condition system

Air-conditioning systems main function is to monitor the operation of equipment of air conditioning units in the buildings, open, turn the device off valve, deal with equipment malfunction alarm and so on; to monitor the different regions in the building exhaust machine, VAV and fan coil units operating conditions.

Air conditioning units in this building are composed of the new air handling unit, blower, exhaust machine and other components. This requires that a software interface provide to visualize the unit model for the user. Past industrial control software is to use the device two-dimensional view and drawings to indicate machines. it is difficult understand and operate to the low educational level and expertise of operator.

- Dynamic map expresses in unit operation effects, such as fan rotation, the direction of air movement, humidification cooling effect. Because the operators have lower professional standards, require the use of a visual image to show equipment operating status.
- In the main interface of the air conditioning unit, show the various device parameters, and use the list representation in the list area.
- If the device is abnormal, the main interface warning lights will flash. Click on the alarm point, then display the alarm list. The user can confirm or ignore the information in the alarm list. Alarm information

and the operation will be recorded in the alarm log. Figure 4, the air conditioning system interface



Fig 4 the air conditioning system interface

C. Graphical interface of Security System

Security system's main function is to monitor the operation of the camera in the building. Users can arm, disarm, bypass the regional monitoring equipment, and process alarm. The operator can monitor all monitoring points in the building in the "global monitoring". When a certain region of the alarm, he can make a alarm.

- A simplified three-dimensional rendering is used as security information on the main interface background images. A flat map is used as a special regional security background image. Security alarm icons in accordance with the security position in the buildings are placed on the building renderings. The operator can visually monitor the status of each alarm point, and quickly locate the floor, the location and number of the zone. Figure 5, security and global monitoring interface



Figure 5 security and global monitoring interface

- Security alarm system is connected with surveillance cameras screen. When an alarm occurs, the operator can determine the location of the alarm point in the main information area, and directly view the monitor screen picture here.

V CONCLUSIONS

The intelligent building plays an important role in the modern city of skyscrapers. Intelligent building automation

control is very important to the entire building operation and safety management. So we need an efficient, reliable, easy-to-Building Equipment Management System to do it. According to the characteristics of the building systems and regionalization, we integrate information of various systems and use a unified architecture. Equipments operation information is graphically represented in a unified, friendly interface. We pay more attention to user-friendly, intuitive, easy user operation.

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