Intelligent Development of Building Fire Monitoring System

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Abstract: This paper analyzes the characteristics of the intelligent development of building fire monitoring system, combined with the advantages of intelligent development of building fire monitoring system. Through the research of intelligent monitoring equipment, intelligent monitoring process, intelligent fire detection, intelligent fire alarm, the development strategy aims to raise people's awareness of intelligent monitoring systems and improve the safety level of residents' lives.

1. Introduction
The rapid development of Internet technology has created a good space for the development of the industry economy. At the same time, the height of the building has increased the risk of fire. By actively developing an intelligent monitoring system, on the one hand, it can detect fire hazards in time and reduce public property losses; on the other hand, it can reduce the probability of fire and improve the stability of system operation.

2. Characteristics of Intelligent Development of Building Fire Monitoring System

Table 1 Statistics on the number of fires received by the national fire department from January to May 2019

| Month | January | February | March | April | May |
|-------|---------|----------|-------|-------|-----|
| Numbers (ten thousand pieces) | 1.12 | 1.23 | 1.33 | 1.55 | 1.58 |

As shown in Table 1, as of May 2019, the national fire department received a total of 68,100 fires, including a total of 15,800 fires in May, resulting in 106 deaths and 236 injuries, resulting in a total of 188 million. Social and economic losses [1]. Compared with May 2018, the number of accidents decreased by 16.33% year-on-year, the death toll increased by 6.3%, the number of injured people decreased by 5.6%, and the economic loss decreased by 29.63%. The intelligent development of the system can effectively shorten the time required for firefighters to rush to the scene of the fire, effectively control the spread of fire, and speed up the suppression of fire accidents. When build a building fire monitoring system intelligently, it is necessary to ensure that the system has the following development characteristics.

2.1 Complex Function
The increase in the height of buildings has increased the difficulty of building fire control systems, especially the rapid development of building technology, increasing the number of buildings above 100 meters. According to national statistics of 2018, the number of buildings with a height of more than 100 meters in China has exceeded More than 1,700, and the trend of increasing year by year [2]. Therefore, the intelligent fire monitoring system has more functions, such as fire warning, fire location,
fire source type, surrounding buildings and so on. In the process of rushing to the scene of the fire, the firefighters can basically understand the situation on the spot according to the relevant information provided by the intelligent system, so that the follow-up firefighters can select the optimal treatment plan, shorten the fire extinguishing time and reduce the economic loss caused by the accident.

2.2 High Software and Hardware Technology
The intelligent building fire monitoring system needs real-time control of all situations in the jurisdiction, and the uploading time interval of the collected information should be kept between 1ms and 10ms [3]. In order to achieve the purpose of synchronous uploading of information, intelligent systems require higher-configuration hardware and software facilities, and each type of technology executes different operational instructions to ensure timely delivery of instructions. It should be noted that software and hardware technologies need to be developed in a timely manner to meet the requirements of contemporary fire prevention. Technicians need to update the software and hardware technologies in the system in time to reduce the delay time of data uploading, thereby improving the timeliness and usefulness of data collection.

2.3 Timely Alarm
After receiving the fire alarm call, the fire detachment needs to complete the police within 1 minute and arrive at the fire scene as quickly as possible. According to the statistics of the national fire department, the occurrence of fire can be divided into three stages: the germination stage, the comprehensive combustion stage, and the natural extinction. The germination stage is the golden time period for fire suppression. According to big statistics, the fire germination stage of general buildings is 7 minutes. If the building has more wood materials, the time will be shortened accordingly. It can be seen that arriving at the fire scene in the shortest time can reduce the difficulty of fire extinguishing and shorten the time of fire extinguishing. The intelligent fire monitoring system can feed the latest fire information into the system in a very short time. According to the location of the fire, the system selects the nearest fire detachment to enter the site, and strives for more on-site rescue time and reduces building fires. The economic loss caused.

2.4 Low Fault Tolerance
After the fire of the traditional building, the finder fired a 119 fire alarm to report the location of the fire, and then the fire detachment arrived at the scene to extinguish the danger. The traditional practice has a high fault tolerance rate. After the firefighters arrived at the scene, the fire was very hot. Difficult to control, increasing the difficulty of fire suppression. The application of the intelligent fire monitoring system can connect the system with the networks of various jurisdictions, and process the data information with the high-precision processing system. Once the fire-related data is found, the system will issue instructions to the fire detachment in a very short time, reducing the number of instructions. The fault-tolerant rate of information transmission improves the accuracy of information transmission.

3. Advantages of Intelligent Development of Building Fire Monitoring Systems

3.1 No Need to Build A Control Model
When the traditional building fire monitoring system conducts on-site supervision, it is uncontrollable because of the cause of the fire, such as short circuit, natural gas fire, and excessive external temperature [4]. Therefore, when performing fire control, managers need to perform accurate calculation of data and increase the total amount of calculation of data information. By developing an intelligent building fire monitoring system and setting warning values in the system, such uncontrollable factors can be effectively supervised. If the system finds unconventional parameters, using the big data technology and expert identification technology, the system can effectively identify such parameters, reducing the time cost of the control model construction, and thus improving the
intelligent control coefficient of the building fire control system.

3.2 Facilitating the Supervision of Fire Conditions

The working principle of the intelligent fire control system is to use the system equipment to supervise the on-site operation of the jurisdiction in real time, and control all data transmission time within 10ms [5]. Considering that the amount of data is large, several subsystems are set up in the system. The subsystem is responsible for the preliminary sorting of data collection. The processing time is controlled from 1ms to 10ms, so that all data information can be transmitted synchronously. In addition, compared with the traditional building fire control system, the intelligent fire control system can screen out the optimal fire arrival route, fire suppression mode and fire control route in a very short time, and realize the rapid adjustment of the overall information parameters of the system. It can improve the effectiveness of fire control while improving work efficiency.

3.3 Coordinate the Relationship Between Systems

The intelligent building fire control system is an organic whole, and the components and control systems maintain a high degree of consistency. During data transmission, each branch system does not need to format the data information, which effectively improves the data transmission efficiency, enables the control instructions to be transmitted to the specified location in the shortest time, and reduces the fault tolerance of the command transmission. In the specific control process, each control system achieves different control effects. All equipments operate in a very orderly manner. Even if a certain link in the system fails, the corresponding operations cannot be performed temporarily, and other subsystems will take over the system for command transmission, it is helpful to control the system within a reasonable operating range.

4. Strategy for Intelligent Development of Building Fire Monitoring System

4.1 Intelligent Monitoring Equipment

The intelligent building fire monitoring system consists of a variety of equipment, which has high requirements for the knowledge reserve and operational capability of the control personnel. During the operation of the system, the control personnel need to adjust the system parameters reasonably according to the actual situation on the site, thereby improving the effectiveness of the system control. In the specific operation process, the control personnel can intelligently process the control components and the execution components in the monitoring system. The control components are the basis for building fire monitoring. The area is divided into key monitoring areas, general monitoring areas and general monitoring areas according to the area of each sub-area within the jurisdiction, the location of the fire detachment, and the type of building. The data transmission frequency of each monitoring area is maintained between 90Hz and 115Hz, which improves the accuracy of data transmission. Execution components are the primary device for passing control commands. During the execution of the command, the intelligent control system can perform dynamic adjustment of the operating conditions of the system in combination with the execution parameters of the device, so that the parameters of the two systems are consistent, and the timeliness of data information transmission is improved. By intelligently processing the monitoring equipment, on the one hand, it can timely discover the on-site fire problem and reduce the risk of fire accidents; on the other hand, it can perform real-time monitoring of data and improve the supervision quality of the fire monitoring system.

4.2 Intelligent Monitoring Process

The monitoring process is a key part of the intelligent control of the building fire monitoring system. Compared with the traditional monitoring process, the intelligent fire control system breaks the original time and space constraints, and can monitor the target area in real time at any time and any place. In the event of a fire accident, the system will automatically issue a control command to be
executed. The related operations of the components reduce the daily workload of the control personnel. Usually, when constructing an intelligent control process, an expert system and a control system can be introduced to assist the system operation. The expert system is mainly responsible for collecting the data related to the on-site fire occurrence, and finding out the root cause of the fire. In the subsequent construction of the electrical engineering of the building, the corresponding countermeasures can be taken to control, reduce the operational risk after the building is put into use, and complete the data. After the statistical analysis, the total monitoring system will establish a data statistics database of the cause of the accident, and provide a scientific data reference for the subsequent improvement of the fire control system. The control system numbers all jurisdictions and numbers them to identify different functional divisions within the jurisdiction. In the event of a fire accident, the control system can quickly locate the functional area, find the specific location of the fire accident, and improve the fire suppression efficiency. By intelligently processing the monitoring process, the system operating cost can be effectively reduced and the system supervision efficiency can be improved.

4.3 Intelligent Fire Detection

Fire detection is the core component of the fire monitoring system. The main work content is to collect and analyze the field data, and accurately collect the collected data to improve the accuracy of the control instructions. When intelligently processing fire detection, it is necessary to pay attention to the influence of the height of the field beam on the position of the fire detector, to avoid excessive conflict between the two, and affect the accuracy of the detection result.

| Building beam height | Influence level |
|----------------------|-----------------|
| <200mm               | No effect       |
| 200mm-600mm          | Very serious    |
| 600mm-1000mm         | More serious    |
| >1000mm              | No effect       |

As shown in Table 2, different beam heights will affect the fire detector data acquisition to different degrees. When the beam height is less than 200mm or more than 1000mm, the corresponding number of detectors can be installed according to the internal structure of the building. The measurement results will not be affected by the beam height; when the beam height is between 200mm and 600mm, it is blocked by the beam, which will affect the measurement accuracy of the detector to some extent. For such cases, the technician needs to combine the height of the building when installing the detector. And the detector coverage area is scientifically arranged, and some areas can be cross-covered, using expert system to offset the error of measurement data in each area, and improve the scientificity of intelligent detection results; compared with the former, the influence of beam height between 600mm-1000mm is relatively small, only a fire detector is arranged at the beam connection, and the transition zone of the adjacent detector can achieve the intended detection purpose.

When calculating the number of detectors in the target control area, you can refer to the following formula: N=S/(K×A), where N represents the number of detectors; S represents the area of the target area (unit m²); K represents the correction factor; A represents Detector monitoring area (in m²).

4.4 Intelligent Fire Alarm

The occurrence of fire is accompanied by the chemical and physical reaction processes of smoke, light and heat. When the fire alarm system is intelligently processed, such factors can be included in the alarm system as fire identification features, and the corresponding warning values are set once the data parameters When the warning red line is touched, the system will automatically perform an alarm operation to achieve effective control of the fire scale. In the specific execution process, the instruction operation model can be constructed. The specific execution formula is as follows: (1) x(t)=xf(t)+xm(t); (2)x(t)=xm(t). x(t) represents the fire signal received by the system; xf(t) represents the characteristic parameter of each type of fire occurrence; and xm(t) represents the non-fire signal caused by other factors. The formula (1) indicates the fire signal received by the system in the event of a fire, and the formula (2) indicates the warning signal received by the system when there is no fire accident. All information will be judged by “yes” or “no” by two formulas. According to the judgment result, the
system will issue corresponding adjustment instructions to realize intelligent management of fire monitoring.

5. Conclusion
In summary, as the height of the building increases, the difficulty of rescue when the fire occurs is increased. How to make an accurate warning at the first time of the fire can save more time for fighting the fire and protect the lives and property of the residents. By developing the fire monitoring system along the intelligent direction, it can not only improve the timeliness of fire warning, shorten the time of fire suppression, but also create a living environment with a higher level of safety and improve the living comfort of residents.

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