Design and Test Research of Fire Monitoring and Alarm System Based on Red and Ultraviolet Double Discrimination Technology

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Abstract. Fire, as a catastrophe that endangers the survival of human beings, is receiving more and more attention. People hope to find a way to detect fires in advance, so that they can detect and extinguish fires early, minimize the damage and protect people Safety of life and property. Fire occurs almost simultaneously with the use of fire, and with the development of society, material wealth increases, causing more and greater harm. In particular, cities have the characteristics of dense buildings, concentrated population, concentrated property, multiple sources of inflammable and explosive materials, large numbers of points, and wide coverage, which brings more fire and explosion hazards. Once fires and explosions occur, there will be heavy casualties and serious economic losses. So we must have the awareness of safety protection. Therefore, the fire alarm system based on the red-ultraviolet dual-checking platform is a more humane fire-fighting system, which allows people to detect fires early and can stifle the fire in the cradle, reducing people's losses due to fire.

Keywords: Fire Monitoring, Design, Research

1. Introduction
Through the causes of electrical fires, it can be found that in practice, the proportion of leakage fires is relatively low. In engineering practice, it can be found that the leakage problems in some newly built electrical systems are due to the dielectric strength of electrical equipment Insufficient, poor insulation of the applied wires and cables, errors in electrical wiring construction and irregularities in the construction process. In electrical engineering, red and ultraviolet dual-check monitoring detectors should be set up reasonably, so that you can understand the electrical Problems and deficiencies in the construction of the system. Under normal circumstances, the electrical monitoring system will operate normally after the commissioning is completed, which will basically solve the hidden fire hazard problem in the electrical system construction. However, through the analysis of the construction status and level of my country's electrical system, it can be found that there are still some problems and deficiencies in practice and these problems cannot be solved in a short time. In this regard, in order to ensure the construction quality of the electrical system, it is necessary to reasonably set up a red and
2. Red ultraviolet technical analysis

Infrared is the invisible light adjacent to visible light in nature. Its wavelength range is $0.78 \sim 1000 \mu m$. It has the general performance of visible light and also has the characteristics of reflecting the temperature field and energy field of the surface of the object. Ultraviolet-visible spectrophotometry (UV-Vis) is an experimental method used for identification, impurity inspection and quantitative determination in drug inspection and testing. It uses the characteristics of different absorption degrees of 190-760nm wavelength electromagnetic waves produced by sample molecules to achieve qualitative, quantitative and Analyze the experimental purpose of the structure. Because UV-Vis spectrophotometry has obvious advantages of wide application, simple operation and reliable results, it promotes the rapid development of related inspections in various fields. The principle is that the thermal motion of the molecules of an object is proportional to the thermal infrared energy radiated to the outside world and the thermal motion of molecules is proportional to the temperature of the object. Therefore, the higher the temperature of the object, the greater the energy radiated and vice versa. The lower the temperature of the object, the smaller the radiated energy. Infrared temperature measurement technology is based on this principle. By measuring and using an electrical signal processing system to process the infrared energy radiated by the target, an infrared imaging map of the target is obtained and the temperature distribution of the object is analyzed through the infrared imaging map to find the existence of the device Defects. The processing unit of the red-ultraviolet dual-sensing imaging smoke fire detector is the core part of the entire detection system. Its function is to detect the smoke and flames produced by the fire in the early stage of the fire. Process, analyze, identify, and determine. Image processing is mainly divided into four levels: image preprocessing, image segmentation, image analysis and image understanding. The image processing in the fire detection of the red-ultraviolet dual-discrimination imaging smoke detector is the continuous processing of dynamic images. For each target on the image, the matching relationship with the target in the previous frame is determined according to a certain algorithm, so as to obtain The continuous change law of each target, and finally judge whether there is a fire. For example, using wavelet transform for image processing, first determine the active area in the video, then use the space model to segment the flame color area in the active area, and finally use wavelet transform to analyze from the time domain and the space domain. The time domain mainly analyzes the change in the color value of a pixel in the segmented area, and uses it as the flicker frequency of the flame. This becomes the first criterion for fire judgment, and then the change in the pixel value of the segmented area is analyzed in the spatial domain. As the second criterion for fire judgment. Combining the first criterion and the second criterion can more accurately determine whether a fire has occurred.

3. Design of fire alarm system

3.1. Automatic fire alarm system

Automatic fire alarm system is the abbreviation of fire detection, alarm and fire protection linkage control system. It is a kind of basic task that realizes early detection and alarm of fire, sends control signals to various fire fighting equipment and receives equipment feedback signals and then realizes predetermined fire protection functions. When selecting fire detectors for automatic fire-fighting facilities, the decision should be based on factors such as the formation and development characteristics of the initial fire that may occur in the detection area, the height of the room, the environmental conditions and the reasons that may cause false alarms. For places where there is a smoldering stage at the beginning of the fire, a large amount of smoke and a small amount of heat are generated and there is little or no flame radiation, smoke detectors should be selected. For places where the fire develops rapidly and can generate a lot of heat, smoke and flame radiation, you can choose a temperature-sensing fire detector, a smoke-sensing fire detector, a flame detector or a combination thereof. For places with rapid fire development, strong flame radiation and a small
amount of smoke and heat, flame detectors should be selected. For places where combustible gas or flammable vapor is used and produced, combustible gas detectors should be selected. In short, suitable detectors should be selected for different places and environments to avoid false alarms and omissions, detect fires as soon as possible, promptly call the police and activate relevant fire-fighting facilities. Guide personnel to evacuate [1]. If the fire develops to the extent that automatic fire extinguishing facilities need to be activated, the corresponding automatic fire extinguishing facilities should be activated to extinguish the initial fire and prevent the fire from spreading. The alarm system is shown in the figure below.

Figure 1. Alarm system.

3.2. Use special testing instruments to simulate fire alarms for smoke, temperature, or manual alarm buttons

The dual-band image fire detection and red-ultraviolet dual-sensing imaging smoke detectors are combined with the fire alarm controller. The image-based fire detection and alarm system is suitable for various warehouses, memorials, exhibition halls, and furniture stores where smoke occurs in the initial stage of fire. Hotel lobby, underground tunnels and other large areas, high racks, long-distance protection of fire detection and prevention, the basic principles of installation: (1) According to the actual detection distance, select the appropriate type of detector (30m-100m). (2) Determine the arrangement method and installation height of the detector according to the protection angle of the detector. (3) The detection blind zone is easy to form directly under the detector. Pay attention to the installation angle of the detector, or use other detectors to eliminate the detector's wall mounting height as close to the ceiling as possible. Dual-band image detectors are generally wall-mounted, using special brackets, or ceiling-mounted. Each set of dual-band image detectors is connected to two video coaxial cables (SYV-75-5 or SYV-7-7) and one power supply line (RVV2×1.5). For open spaces, such as stadiums, airports, subway stations, shopping centers, hotels, entertainment venues, warehouses and manufacturing sites, fire detection is very challenging [2]. These challenges include the reliability of fire detection, the flexibility of configuration, and how to prevent interfering alarms, how to effectively reduce the cost of installation and maintenance, and provide benefits. These will be the topic of our eternal discussion. The management mode is shown in the figure below.
3.3. Fire linkage control system

Fire-fighting linkage control has an important function of automatic fire-fighting after receiving the fire alarm signal. A scientific and reasonable design of the control logic is a prerequisite for its linkage control function. After the fire alarm is confirmed by logic (or manually confirmed), the fire linkage controller should accurately send linkage control signals to the corresponding fire fighting equipment according to the set control logic within 3s and feedback the action signals to the fire control after the fire equipment operates Room and show. In addition to the linkage control method, the control equipment of the fire water pump, smoke prevention and exhaust fan should also be directly controlled manually in the fire alarm controller (linkage type) of the fire control room or the manual control panel of the fire linkage controller [3]. The start-stop button on the control panel should be directly connected with the control box of the fire pump, smoke prevention and exhaust fan with control wires or control cables. The control system is shown in the figure below.
4. Test and development model of alarm system

4.1. Intelligent
The automatic fire alarm system is designed according to people's thinking. It can sensitively perceive the external environment, dust and smoke and other conditions and then process the collected data through high-precision technical calculations and compare and judge each data to ensure the system being able to broadcast fire accurately can avoid mistakes to a certain extent. When a fire occurs, the system can give a detailed description of the situation around the fire site based on the collected data and information [4], coordinate with the map to provide three-dimensional prompts, rationalize the number of police personnel and remedial methods and minimize the loss of life and property. The data collected in the fire can be used as the basis for determining the cause of the fire and can also be used as an effective evidence for investigating the responsibility of the accident.

4.2. Diversification
The fire detectors currently used in our country are designed according to the working principle of human body circulation and their principles can be divided into olfactory perception and temperature perception. Among them, olfactory perception can be said to be the leader in automatic fire alarm systems. The connection method of the automatic fire alarm system equipment also reflects diversified forms. With the continuous update and reform of network technology, the alarm system can choose a convenient and reliable transmission method according to the external environment. The copper wire used in the connection of the automatic alarm system equipment is poor in high temperature resistance, easy to wear and the system is complicated to maintain, which affects the reliability and accuracy of the automatic fire alarm system. The diversification of equipment can also make up for the lack of equipment links, so that the systems are closely linked and cooperate with each other during automatic fire alarm, so that the transmission between systems is more convenient and reliable. Even the alarm equipment does not need to be installed independently. The fire situation can be grasped as long as the external environment is judged by the network technology, so that the automatic fire alarm system is used more conveniently and can be installed in large shopping malls and high-end communities, but many residents in Western countries have installed automatic alarm devices. The installation of automatic alarm devices can effectively prevent the occurrence of fires and can also detect fires in the first time, avoiding the threat to people's lives and property safety due to fires [6].

5. Conclusion
In this design, the control method of alarm delay start fire extinguishing system is adopted, which reduces the loss caused to people due to the false alarm of the system. Protecting social wealth and maintaining public facilities are the responsibilities of citizens: every citizen must earnestly abide by fire protection regulations and perform the fire safety duties entrusted by the law. Only in this way can social wealth be protected from fire hazards and public fire protection facilities from damage. At the same time, the design of the control system only realized the automatic start of the automatic alarm system, but after comprehensive analysis and judgment of the fire situation, it did not realize the automatic shutdown of the automatic alarm and fire extinguishing system.

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