Construction of Intelligent Electricity Platform under the Background of Intelligent Fire Protection

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Abstract. In order to forecast and warn the electric fire accidents, and to provide support for the emergency rescue of the electric fire accidents, the intelligent electric monitoring system is applied to the electric fire. The system uses Internet of Things, Mobile Internet, Cloud Platform and Big Data Technology to realize real-time online monitoring and graphical display of current, leakage, temperature, harmonic and other parameters of electrical lines. Once the electrical parameters exceed the threshold, they will alarm at the mobile terminal, monitoring screen, computer and other terminals. After the intelligent electric fire alarm system is issued, the basic information of enterprises, surrounding environment information and emergency information can be viewed through the system, so as to improve the speed and efficiency of emergency rescue. The system can realize the early warning of electric fire and provide support for emergency rescue of electric fire accidents.

1. Introduction

With the development of social economy, the proportion of electric fire in fire accidents is abnormal. According to the data analysis of various kinds of fire statistics in recent years in our country, the fire caused by electrical reasons such as short circuit, overload and electrical equipment failure accounts for about 30% of the total fire occurrence rate, which is the most direct and main cause of all kinds of fires, and the proportion of electrical accidents is increasing year by year, which is worrying. This proportion is much higher than the percentage of fire accidents caused by electrical faults in developed countries such as Europe and America. In foreign countries, such as Japan, electricity consumption is 8 times that of China, but electrical fires only account for 2% of the total number of fires. The fundamental reason is that the Japanese government issued a policy in 1987 to force the installation of electrical fire prediction, early warning and prediction system, which can eliminate hidden dangers before the occurrence of electrical fires.

2. Traditional Electrical Fire Monitoring Scheme and Problems

At present, electrical fire monitoring methods mainly include the following categories:

(1) Manual monitoring

No electric fire monitoring system, through the placement of monitoring posts, implementation Manual 24-hour shift monitoring alarm.

(2) Traditional Electrical Fire Monitoring System
Electrical fire monitoring system is set up in each enterprise, including installation of electrical equipment, Fire monitoring host, communication manager and electrical fire monitoring detector. Connect the devices through RS485 or CAN bus and set them up, Specialists are on duty 24 hours a day.

However, the shortcomings and disadvantages of the traditional electric fire monitoring scheme are as follows:

1. Wasting human and cost resources;
2. The cost of the system is high;
3. It has no powerful analysis function and can not effectively prevent fire.
4. There are many factors delaying fire treatment, and the real-time fire alarm is poor.
5. Each enterprise is an independent monitoring host, decentralized and complex. It is not easy to unify control.
6. Lack of data collection and analysis platform for formulating fire prevention plan.

3. Intelligent Power Safety Management Platform

3.1. System Description

1. Based on the technology of Internet of Things, big data and cloud platform, the main factors (cable temperature, current, residual current, fault arc) causing electric fire are monitored and counted online by intelligent terminal and wireless transmission equipment through intelligent sensor terminal (field monitoring module and transmission module). Analysis, summary for real-time transmission of electrical safety data to cloud platform.

2. Electrical safety data include: three-phase voltage, three-phase current, power supply quality (three-phase unbalance, qualified rate of power supply quality, power failure), leakage current, three-phase cable temperature, box temperature, load current (overload alarm), electric energy, fault arc, harmonic, poor contact. Zero-ground mixing, zero-line mixing, etc.

3. Through the analysis and judgment of the stored data on cloud platform, we can grasp the hidden dangers of power safety in the dynamic operation of lines, find out the hidden dangers of electricity in time, prevent fire and improve the level of power safety management in enterprises.

4. Automatic reminder of safety status of power system: local acousto-optic alarm, mobile app remote monitoring, short message alarm, telephone notification and other ways.

5. Through the analysis and judgment of the relevant parameters of the circuit of electrical equipment on cloud platform, the causes of the failure are found, and the management of the enterprise is guided, so as to eliminate potential electrical fire safety hazards and fully guarantee the safety of electricity consumption.

3.2. System Structure

The smart power security management platform consists of three layers: smart power security sensor terminal, transmission network, and smart power security management service platform; including smart power security management cloud platform, computer terminal display system, APP terminal software, electrical Security terminal equipment, networking equipment, etc. By installing a smart sensor in the electric circuit, the electric operation data is collected in real time and transmitted to the back-end system for storage analysis. Once the indicator is abnormal, the system is pre-warned according to the security policy set by the system, or the fire-fighting center interface is used for alarm. And the town safety office, the fire prevention brigade and the relevant functional department leaders can log on the system's monitoring platform, remotely control the operation of the electric lines of each monitoring point, and achieve centralized management to effectively prevent electric fire.
3.3. System Characteristics

3.3.1. Wireless Networking. The gateway can support switch volume, RS485, ethernet, wireless and other multi-interface, multi-protocol mode, and facilitate the access of other sensors (fault arc, smoke, gas detection, etc.) for easy expansion.

3.3.2. Web Browsing and Mobile App. The system can log on to the monitoring platform through the Internet, and equipped with mobile terminal APP. At the same time, the management departments at all levels are given different operating rights to facilitate operation.

3.3.3. Statistics, Analysis and Treatment of Hidden Dangers.

(1) Statistical and analytical functions of electrical fire hazards: it can intuitively view the changing trend of data over a period of time;
(2) It has the function of dealing with potential electrical fire hazards: the system generates detection reports to assist users in dealing with hidden dangers. The report includes: feature analysis (one-week alarm comparison, one-day time comparison, etc.), hazard analysis, elimination of reference methods, etc., which can quickly realize the investigation, analysis and treatment of electrical fire hazards.
(3) Output hidden danger supervision report: provide information about equipment coverage, distribution of hidden danger, proportion of hidden danger types, hidden danger management, and provide data analysis function of hidden danger (from the investigation rate, hidden danger rate, response time, solution time, etc.). At the same time, analyze the regional hidden danger risk status from the perspective of investigation rate, hidden danger rate, response time and so on. Monthly, quarterly and annual reports can be generated as required.

4. Conclusion

Intelligent power safety management platform upgrades and improves the traditional electric fire monitoring through new technologies such as Internet of Things, big data, cloud platform, etc. It tracks and analyses the main factors causing electric fire uninterruptedly, and finds the potential safety hazards of electrical lines and equipment in real time. And immediately send early warning information to the managers of power utilities to guide the power utilities to carry out governance and eliminate potential safety hazards. The system can effectively solve the problems of old electrical lines in power utilities, no professional electrician in small and micro enterprises, no intuitive system for immediate detection of electrical hidden dangers with naked eyes, and difficult inspection of hidden engineering hidden dangers. The introduction of this system can effectively improve the fire safety management and intrinsic safety level of electrical equipment in power utilities, and effectively prevent the occurrence of major malignant fire property losses and major malignant casualties. At present, this system has been widely used in various industries and has been widely praised by users, and has achieved good social value and economic benefits.

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