Infrared Detection Platform Based on Mobile and Cloud Computing Technology

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Abstract. With the continuous development of technology, mobile and cloud computing technology in the power industry has been widely used. Make full use of mobile and cloud computing technology, so that in all aspects of infrared detection work, in the infrared detection operations management, on-site standardization of operational processes and data templates, teamwork, communication and knowledge accumulation, give full play to mobile terminals and cloud computing platform characteristic. This can improve the traditional business model, the establishment of infrared detection site and state evaluation center real-time linkage of the new business model, improve on-site work efficiency, improve the level of fine management, give full play to the evaluation center expert resource advantages, effectively support the continuous development of infrared testing business.

Introduction

As an effective means to discover the latent operation of equipment, infrared detection has become an important means of fault detection of power equipment in recent years [1]. The infrared imaging technology has the advantages of high efficiency, safe and reliable, accurate judgment, intuitive image, far detection distance, fast detection speed, no contact detection, no electromagnetic interference and other characteristics [2]. The detection range has gradually developed from the initial joint overheating to the cable, Arrester, transformer and other voltage-heat type, small temperature difference device overall heat situation. At present, infrared diagnostic technology has become an effective tool for power industry status detection and electrical equipment reliability analysis, fault prediction and state maintenance [3][4].

At present, there are still a number of problems in the infrared inspection business. First, the infrared test data mainly rely on the field test of professional manual records, this original way there is poor data normality, measurement results cannot be easily carried out statistical analysis of archives and other defects [5]. Second, the infrared detection site to collect data types, the number of large, in the preparation of test reports need to go through very cumbersome data collection, collation and editing work, not only low efficiency, data accuracy and integrity is also difficult to guarantee. Third, the rapid development of infrared testing business, a single team's work efficiency is far less than the requirements, multi-team collaboration is imperative. However, the participation of multi-team also brings the work process normative and the quality of the work product varies greatly, the standardization of management requirements are increasingly urgent. Fourth, PMS system, although accumulated a lot of valuable data, but in the field of infrared detection work due to site, equipment, network and other reasons cannot be effectively used.

With the continuous development of technology, mobile and cloud computing technology in the power industry has been widely used. Make full use of mobile and cloud computing technology, so that in all aspects of infrared detection work, in the infrared detection operations management, on-site standardization of operational processes and data templates, teamwork, communication and knowledge accumulation, give full play to mobile terminals and cloud computing platform characteristic. This can improve the traditional business model, the establishment of infrared detection site and state evaluation center real-time linkage of the new business model, improve
on-site work efficiency, improve the level of fine management, give full play to the evaluation center expert resource advantages, effectively support the continuous development of infrared testing business.

System Structure

The architecture of the infrared inspection standardization operation management platform based on mobile and cloud computing technology is shown in the following figure. As shown in Figure 1, the platform consists of two parts:

![System architecture diagram.](image)

Infrared Detection Management Platform

The target user is the company leadership and status evaluation center. For the company's leadership, the concept of management cockpit, mainly infrared monitoring business, some macro-monitoring and key indicators of statistical reports, auxiliary leadership decision-making, to make a reasonable resource and plan optimization program. For the state evaluation center, the main function is for the infrared detection team management, infrared detection task management, testing report editing and knowledge accumulation. The status evaluation center as the initiator of the infrared detection mission, auxiliary performers and supervisors, management platform can have timely and effective feedback on-site work progress and data, give full play to the evaluation center of expert resources to assist in the field work.

Intelligent Infrared Imager

The target user is responsible for the work of the infrared detection site, the person in charge of each test project [6]. The intelligent infrared detection terminal can receive the infrared detection tasks issued by the management platform in real time. After receiving the task, the intelligent team can perform the infrared detection work according to the predefined operation flow and data template in the management terminal. When you encounter problems, you can use the management of the terminal's knowledge base functions, query typical cases, equipment accounting or various technical specifications. The management terminal can keep the data communication with the management platform in real time, feedback the parameters of the field record and the material collected in time, and establish the communication platform between the management terminal and the management platform, play the multi-team resources and cooperate to overcome a certain problem. The management terminal supports data access expansion of various types of infrared detection equipment, real-time communication with the testing equipment, which greatly reduces the workload of post-data export and data sorting.
Infrared Inspection Management Platform Technology Architecture

Management platform technology architecture shown in Figure 2 is divided into data layer, service layer, logic layer and display layer of four parts.

A. Data layer
Data layer mainly uses relational database to store business data, accounting information and other content, the file database mainly stores pictures, reports and other file information.
User management, providing users and authorized management functions. Equipment management, to create and maintain the infrared detection equipment type, infrared detection equipment and other related information functions. Log management, to provide query and export system login log, operation log and abnormal log function.

B. Service layer
The service layer mainly provides the data access service between the data within the system and the data integration service with the external system.

C. Logic layer
The logic layer is mainly for the display layer to provide a variety of display the necessary data resources.

1. Regional analysis, combined with temperature lattice data, local temperature acquisition and analysis.

2. Comparative analysis, through real-time data and historical data comparison, analysis of equipment operating status.

3. Trend analysis, access to the same device at different times the temperature trend of change.
D. Display layer
Display layer is mainly used to more mature pages, chart display technology, to provide users with a friendly system interface.

**Infrared Detection Terminal Technology Architecture**

Detection terminal is based on the current use of a more extensive Android platform to achieve the professional equipment. Android platform can be better integrated 4G network, storage, camera, Bluetooth, GPS and other hardware resources, and at the same time through USB, WIFI and other means of data exchange with other devices, a strong scalability to meet the mobile terminal in business, technology and other requirements. Its main functions are:

1. **Login**, the user needs to enter the correct user name and password and through authentication to log.
2. **Imaging parameters configuration**, the user can set the scene according to the situation of reflection temperature, ignore the ratio, correction coefficient, emissivity, imaging mode.
3. **Take pictures**, the terminal to provide camera function, the user can prompt the system according to the specified content of the scene to take pictures of the scene can also be taken at any time according to the need to take pictures.
4. AC feedback, users in the field of work if you encounter some problems require expert assistance for remote assistance, you can use the system to provide the exchange of feedback function, the issue will be sent in the form of mail to help request.

5. Submit. The user can complete the infrared detection work in the terminal, the user clicks the send button, the terminal directly to the contents of all the detection work and the results sent to the management platform in real time, the platform will receive the first time to detect all the work, for managers Access.

6. Equipment and detection templates:

![Equipments and detection template](image)

**Figure 6. Equipment and detection template.**

**Reference**


