The Design and Implement of Electrical Operator Monitoring System

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ABSTRACT

Since the traditional electrical system data monitor equipment has some shortage, such as limited monitoring objects, single monitoring direction, the authors combine computer science Internet technologies with electric power system production process and extend the scope of monitoring system. This paper analyzes the key technology by which the operator monitoring system can be realized, and puts forward the scheme, which based on.NET platform, of recording operator’s behaviors during electric power generation, and it is implemented in WINDOWS system.

Keywords: Electric Power System, Monitor, Monitoring System, .NET, Operator

1. INTRODUCTION

1.1. The Concept of Power System Monitoring

Power monitoring system which covers PC technology, data communications, image rendering, and control technology, science and technology, is a highly automated features integrated system. According to the design philosophy of “decentralized control functions and centralized operation management”, this system has several advantages, including high computing capability, high accuracy, real-time display, convenient repairs and maintenance, simple operation, friendly interactive interface.

1.2. Mainstream Research Orientation of Relative Subjects

As the general commander in the process of electric power generation, Electricity System Operator panel has a significant position. Currently, mainstream products generally focus on monitoring parameters during power system process, as well as data which are not easy to

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directly be monitored or data which are calculated indirectly. In this way, the monitoring efforts in artificial operation is insufficient.

The mainstream research orientation of power control system is to unify time parameters of each data, to maximize valid data during more generation process, and to control the equipment in lowest-disturbance. The monitoring system this paper puts forward, considering historical data, monitors and controls the operator’ movement, providing reference and assurance for subsequent analysis of empirical data and for log data organization. Meanwhile, it will also provide a new approach and ideas for anthropomorphic expert system.

2. THE OVERALL DESIGN OF ELECTRICAL OPERATOR MONITORING SYSTEM

2.1. Characteristics of Electrical Operator Monitoring System

Power monitoring system has strict requirements of data timeliness, data accuracy and temporal synchronization. Besides, each operation system may have a profound impact on following operation, so that the records of operational history, system analysis and decision-making reference by expert system are rather important. This paper, taking historical records of on-site operation as the cut-in point, elaborates a supplement and strengthening scheme for original records of operation system during power generation in detail.

2.2. Design Patterns of Relative Monitoring System and Analyses on Limitations

Power monitoring systems nowadays on the market are generally built by SQL Server architecture and are set up in cooperation with respective monitoring softwares. And these systems are basically about on-site data monitoring and background data processing, which have little controlling efforts on operator himself.

On one hand, the more objective data there are, the better operation it is; on the other hand, artificial operational data are more worthy of studying. In this way, the idea of monitoring system for operator in this paper is different from traditional monitoring softwares that monitor data, it pays attention to monitor the operation of operator himself. Especially, it will be helpful for confirmation of impressibilities after accident, operation backup, preservation of exceptional operations (such as plant shut-down, factory-use electricity blackout, diesel generator ignition), even be beneficial for the study and development of experience database of “Expert Systems” (Artificial Intelligence).

2.3. Design Pattern of Monitoring System for Electrical Operator

As is shown in Figure 1, the clients are respectively placed in every PC that has operating authorization, and they record by reading operator’s keyboard and mouse operation in real time, avoiding data transmission in peak time and uploading data to encryption server at fixed time when operations reduce. Besides, they can pause for intensive operation to spare bandwidth for important operational data transmission.

2.4. Characteristics of Monitoring System Client for Operator

Electrical operators mainly have three categories: 1. Attendant of power station; 2. Dispatcher on dispatching desk; 3. Operator in power plant. Their responsibilities generally are remote control of quipments, dispatching and attributione of power load. Operators usually use high-performance computers with highly versatile windows XP system and a control software (such as ABB’s). The control software operation concludes mouse for image and keyboard for numbers input.

However, because different factories apply different control softwares of diverse manufactures, models and assembly jump instructions, it is rather difficult to build monitoring system by reading memory under such circumstances.