

# The Design and Application of Computer Security Management Information System in Coal Mine

Ziguang Yang<sup>1\*</sup> and Hong Xu<sup>2</sup>

<sup>1</sup>College of Information Science and Technology, Shijiazhuang Railway University, Shijiazhuang 051132, China

<sup>2</sup>Sifang College in Shijiazhuang Railway University, Shijiazhuang 051132, China

**Abstract:** With the development of coal technologies, the previous management mode has been unable to meet the requirements of modern coal mine construction, so it is essential to design a new and effective security management information system. The design of this system is based on B / S structure, which main function is to collect and analysis the basic information of coal mine. In such a management information system, administrators can keep abreast of information in coal mine, detecting the abnormal situation timely and solving the problem effectively. Besides, the information input module in the system is easy to use, and users can also filter the information when using the system to inquiry, the query results can be outputted in tabular form. The system can also sort out all kinds of violation cases and accidents in the form of security information report, showing to the administrators. In another data analysis module of the system, it reveals the contents of the security information table by a bar chart. To ensure the security of the system, login steps are needed. Anyone who entering this system can modify the password, but each person's permission is different, and they can only operate within their own permission scope.

**Keywords:** Coal mine, computer, management information system, design.

## 1. THE CURRENT SITUATION OF COAL MINE AT HOME AND ABROAD

In terms of our country's disposable energy at present, coal accounts for about 70% [1]. Therefore, it is the principal disposable energy in our country during a long period. To get the coal resources, coal mine operations must be performed, while coal mine operation is an extremely dangerous industry. No matter the harsh geological and environmental conditions or the large labor intensity of workers may cause dangerous accidents. Especially in recent years, the frequent occurrence of coal mine accidents brings an irremovable gloom to countless families in the society. The tendency of coal mine accidents' occurring makes people extremely anxious. Any enterprise's development is based on sound security work system. Wanting to make great profit, coal mine enterprises must ensure the work security.

Due to the left over foundation problems, it was in the 1970s that China actually put the computer into the management work [2]. While the developed country had already formed a mature management information system at that time, fulfilling the gradually change from lower to higher. Depending on good using effect, every coal mine project began to put it into use, establishing a variety of computer-based management systems such as security inspection system. Many coal mine enterprises built up local area networks in order to realize this informatization management mode. But owing to the shortcomings of

Tel: +8618722191181; E-mail: [yangziguang@163.com](mailto:yangziguang@163.com)  
system, it cannot achieve information automation management fully at the present.

Computer appeared in 1950s [3], which could be said to bring an earthshaking change. Using its powerful ability in data processing, people began to try to get it working in management, this is the first appearance of information management system.

## 2. THE DESIGN REQUIREMENTS FOR MANAGEMENT INFORMATION SYSTEM

### 2.1. Functional Requirement

Two managements are included in daily security information management: "three-violation" management and hidden danger management. Among them, the subjects of "three-violation" are administrators who need to complete the corresponding fine management index monthly, otherwise accepting the corresponding punishment. Meanwhile, administrators supervise the site construction workers, punishing them if their works involve the "three-violation" phenomenon. This punishment is just the way administrators reaching their index by. Security management is a closure process, just as Fig. (1).

Security assessment mainly refers to evaluate the construction workers' coal extraction and tunneling according to the organized evaluation information in the system. This kind of evaluation method is easy to input and can distinguish the grade based on the assessment results [4].

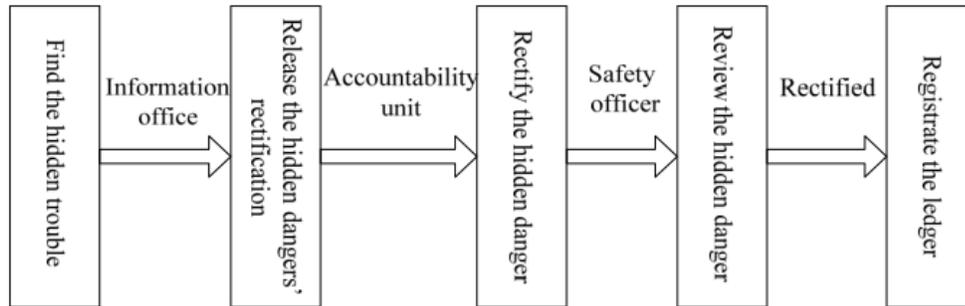


Fig. (1). Security management process.

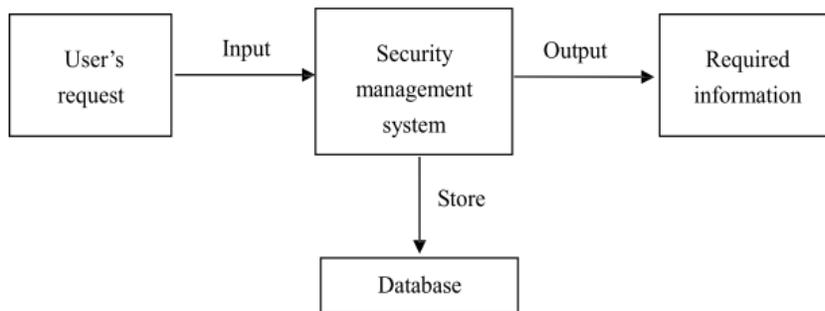


Fig. (2). Data flow graph.

**2.2. Data Flow Graph**

During the system design, we simplify the system to the maximum extent, making it just one process, inputting our request in the system. Through this process, the system outputs the required information and stores the information in the database, its structure just as Fig. (2).

At this moment, we decompose a process in the graph above, inputting data flow graph (“three-violation” information management).

**3. THE DESIGN OF DATABASE**

**3.1. The Design of Conceptual Structure**

According to the obtained information, we can design the connections existing among various entities to meet the needs of users, by these connections, data flowing through entities [5]. In the design of this system, such a relationship exists among entities: a production worker can only belong to one unit, a unit can have multiple production workers; both the existence of hidden danger and “three-violation” information can be detected by multiple people, while just one responsible for the hidden danger.

**3.2. The Design of System Module**

Based on the above analysis, we can divide the management information system into several modules, just as Fig. (3).

**3.3. The Design of System Function**

**3.3.1. Security Information Input**

Take the “three-violation” information input for example, filling in the person’s name is needed when input the information, cannot typing the name but selecting it in the cadre’s information table and can only selecting the information that existed in system. Equally, the name of fined person also selected in the same way, which not only has the advantage of simple operation, but also guarantees the correctness of the information security. The date to filling is consistent with the system date in a default way, if any change needed, just clicking the drop-down menu in the date column to select. According to the selected name information, the system can generate units and positions automatically, without manual operation. The types of violation can also selected in the drop-down menu directly, only the violation facts need to manually typed, and the system will automatically limits the input words within 100 [6]. After finishing all of these, clicking OK, the previous selected and provided information will be displayed. Now users have the right to change or delete the information, clicking SAVE after making sure there is no problem, then the information will be kept in “three-violation” registration form automatically.

**3.3.2. Stoppage Information Input**

Be similar with the “three-violation” information input, stoppage date defaults to the system date, if any difference existed, clicking the drop-down menu to alter. The

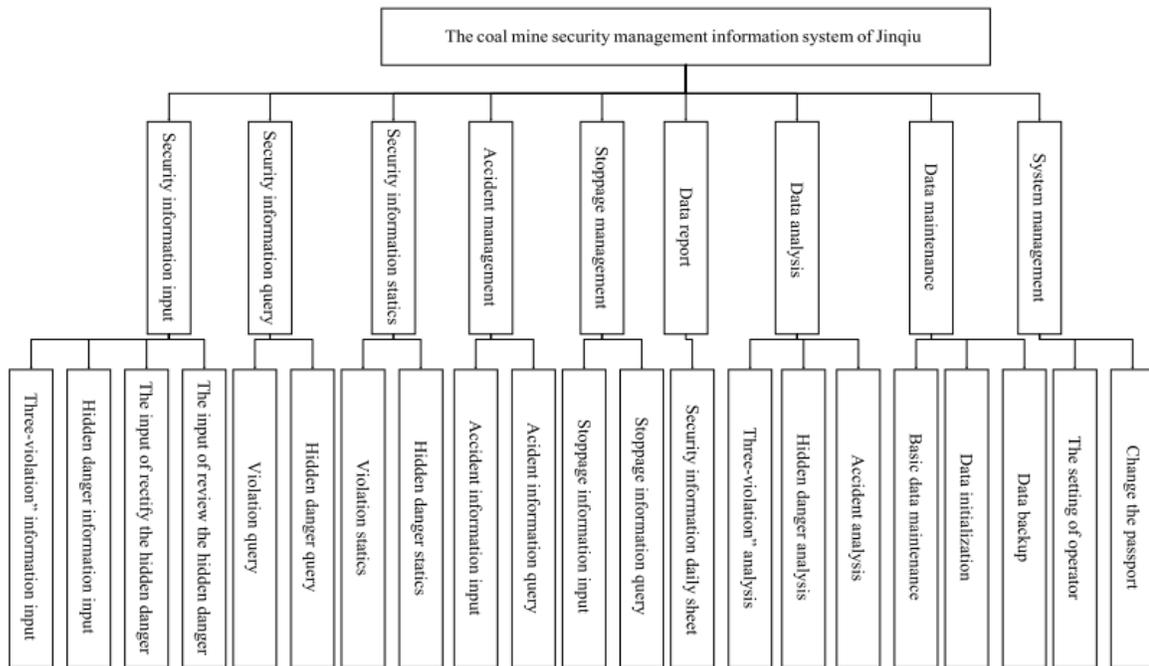


Fig. (3). System module structure graph.4. Conclusions.

construction unit also need to be selected, sometimes there will be such a situation that the option does not exist, and then we can modify the information table of the production unit according to the role permissions. Like violation facts, the causes of stoppage need to be inputted manually, and the system will automatically limits the input words within 50. Clicking OK after inputting, the system will keep the information automatically and shows “information input successfully”.

### 3.3.3. Data Information Query

In computer security management information system, data query concludes several kinds, in which we can query based on the combination of relevant conditions or just one. After the query results can be exported in EXECL file format, connecting to the printer and clicking PRINT if needed, simple operation, fast speed and high accuracy.

### 3.3.4. Data Information Analysis

Time is adopted as the analysis standard when analysis the data information in the system. Selecting the time you need during the default time quantum of the system (from the January 1st of the year began to use till the current system date) and clicking ANALYSIS, the system will generate the results automatically and display them in tables and charts. According to the results showed by two different forms, users can keep abreast of information timely, whether the hidden danger exists or not, causes of accident etc.

With the development of coal technologies, the previous management mode has been unable to meet the requirements of modern coal mine construction, so it is essential to design a new and effective security management information system. While the application of computer has achieved excel-

lent effect in management information system, realizing the automation supervision of coal mine engineering, detecting abnormal situation timely and accurately, guaranteeing the security of mine work. But, in terms of our country's coal mine computer security management system at present, big inadequacies really exist, so in this paper the writer designs a system which can meet the requirement of coal mine security information management on the ground of realities. The design and application of this system has brought great convenience to the coal mine information management. However, a lot of deficiencies exist due to the system still in the probation period, which can be noticed and made improvements timely in the actual application process of the system, to ensure the smooth running of the system and provide more convenience to coal mine enterprises.

## CONFLICT OF INTEREST

The author confirms that this article content has no conflict of interest.

## ACKNOWLEDGEMENTS

The authors would like to gratefully acknowledge the support from National Natural Science Foundation of PR China (51208056), Foundation of Loess Region Key Laboratory of Transportation Ministry (KLTLR-Y12-7) and Shanxi Transportation Science and Technology Foundation (11-2-24).

## REFERENCES

- [1] B. Z. Qin, J. Qin, and C. X. Ge, “Main fan remote integrated monitoring system is PAC based on coal mine”, *Coal Technology*, vol. 29, no. 12, pp. 38-40, 2010.

- [2] J. F. Hou, *Design and implementation of coal mine production safety information management system*. Beijing: Beijing University of Posts and Telecommunications, 2008.
- [3] Z. Z. Han, P. Lu, and S. J. Mao, "The web-based management information system of production attempering", *Coal Mine Modernization*, no. 1, pp. 41-42, 2007.
- [4] Z. J. Liu, *The combination of coal mine safety management information system based on C/S and B/S model*. Taiyuan: Zhongbei University, 2011.
- [5] X. Y. Sun, *The research and development of coal mine safety management information system based on GIS*. Handan: Hebei University of Engineering, 2010.
- [6] Q. Mei, *Design and implementation of mine safety management of information system based on Ajax technology*. Dalian: Dalian University of Technology, 2009.

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Received: August 10, 2014

Revised: October 25, 2014

Accepted: December 05, 2014

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