

# Development of Electric Power Networks Inspection Information Management System Based on MapWorld API

Jingran Zhong<sup>1</sup>, Bi He<sup>1,\*</sup>, Chuanzhi Geng<sup>2</sup>

<sup>1</sup> School of Civil Engineering, Shandong Jiaotong University, Jinan, 250023, China

<sup>2</sup> Beijing Sunway Technology Co., Ltd, Beijing, 102206, China

\* Corresponding author: Bi He (Email: 204018@sdjtu.edu.cn)

**Abstract:** According to the management requirements of a large number of spatial data and attribute data generated by daily inspection of power system, the power inspection information management system is developed by using WebGIS (Web Geographic Information System) technology. Firstly, the user layer of the whole system is developed by using HTML and CSS as tools, and then the basic data is managed by using sky map API and JavaScript as tools, combined with the relevant functions of sky map API, the functional modules of the system are developed to realize the functions of visual information management and two-way query. The system can provide corresponding solutions for the management of Power Patrol information.

**Keywords:** MapWorld; WebGIS; Power Inspection; Information System.

## 1. Introduction

Electric power system is the core infrastructure of national economic construction and residents' life. In order to ensure the safe and stable operation of electric power system, strict daily inspection is required. In the daily patrol inspection process of power system, the patrol objects involved, such as lines, stations, transformer stations, etc., are spatially presented in the form of points, lines, planes, etc. At the same time, a large amount of attribute information is generated in the patrol inspection process. Scientific and effective management of these patrol objects and patrol information is the basis for giving play to the patrol inspection effect and ensuring the safe operation of the power grid. According to the characteristics of patrol objects and patrol information, which have both spatial location information and attribute information, an effective way to manage such information is to run Geographic Information System (GIS) technology. This paper uses this technology to design and develop a set of electric power patrol information management system.

## 2. MapWorld API

When Geographic Information System technology manages information, it will run in a unified data management mode and data operation mode according to the characteristics of spatial information and attribute information, which can play a standardized effect. In order to better use these unified management and operation modes, developers integrate these modes into a set of standard instructions, which are called API (Application Program Interface). The secondary developers only need to call the corresponding functions to complete the corresponding standardized operations, which greatly reduces the development workload and reduces the possibility of program running errors. The MapWorld API is a map API platform established by the National Basic Geographic Information Center. It mainly provides two functions, one is to provide vector map data including conventional ground objects, which omits the process of re mapping basic ground object

vector data by secondary developers; Second, it provides function call interfaces including common functions such as map operation, object search, and object creation, which greatly simplifies the development workload of secondary developers. This paper uses the MapWorld API as a tool to make use of these two functions to better achieve the design goal.

## 3. Overall Design of System

The overall design of the system is to design the overall structure of the system at the macro level, which is the basis for the development and implementation of the software system. The quality of the overall design determines the operation quality of the software throughout its life cycle, and is the basic guidance for the development work.

### 3.1. User Requirements analysis

According to the early investigation, the users of the electric power networks inspection information management system developed in this paper need to specifically include the following:

#### 3.1.1. Informatization operation of on-site patrol inspection

The most basic and main function of the electric power networks inspection information management system is to realize the whole process information operation of on-site inspection. It is subdivided into operator identity login management, automatic transfer of inspection items, and image and text data entry of inspection results.

#### 3.1.2. Wireless upload of inspection data

On site patrol inspection uses smart phones to collect inspection result data. After data entry, it needs to be synchronously uploaded to the data center of the system wirelessly.

#### 3.1.3. Unified management of inspection data

The data uploaded from the mobile terminal or its multi system data terminal, after entering the management center, it needs to be managed uniformly in the management center.

Therefore, a function module for unified data management needs to be designed.

### 3.2. Structure Design of System

The software system developed in this paper runs in network mode and adopts B/S architecture. The overall structure of the system is shown in Figure 1.

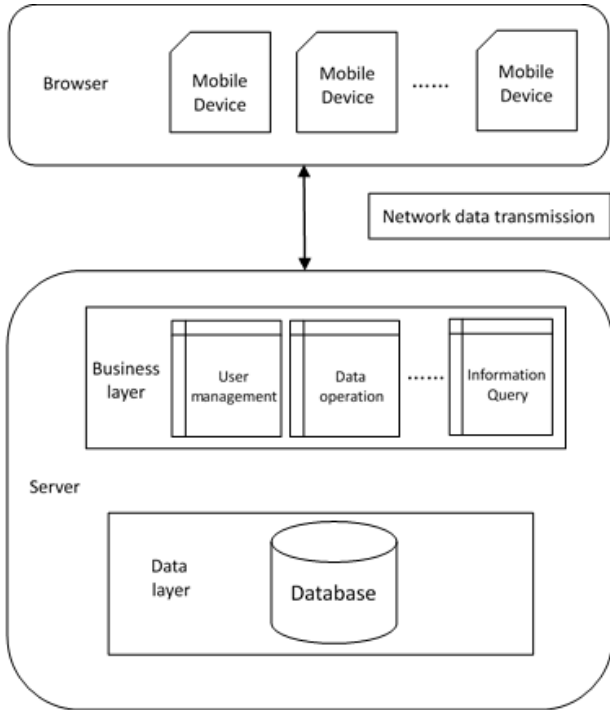


Figure 1. Overall Structure of System

The system is generally composed of front-end (B end, browser end) and back-end (S end, server end). The front end runs on the mobile device of the operator, mainly used to complete the collection and entry of the electric power patrol inspection, and upload the entered information to the server. The back end is mainly composed of two layers, namely the business layer and the data layer. The data layer mainly completes the centralized storage and management of data, connects with the business layer through the data engine interface, provides data to the business layer, and receives the processed data from the business layer. The business layer undertakes the main business processing tasks of the entire system, which is composed of different functional modules.

## 4. Calling of MapWorld API

The map foundation of the system is realized by calling the MapWorld API, which is referenced in the header file of the web page file on the server side. The main code is as follows:

```
<script type="text/javascript"
src="http://api.tianditu.gov.cn/api?v=4.0&tk=Key"></script>
<script>
var map;
var zoom = 12;
function onLoad() {
map = new T.Map('mapDiv');
map.centerAndZoom(new T.LngLat(117.41,
36.89), zoom);
}
</script>
```

After calling the MapWorld API, we can obtain the basic map data and complete the basic data settings of patrol information map visualization.

## 5. Function Design of System

The functional design of the system is to complete the design of each functional module planned in the overall design, so that each functional module can complete the corresponding work. The main functional modules of the system designed in this paper include: user information management, data browsing, data management, information query. The function module of system can be expressed by Figure2.

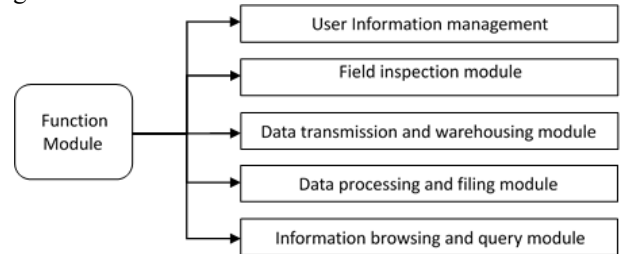


Figure 2. Function module of system

### 5.1. User Information management

The user information management module is a functional module that stores and manages the user name, user information and login password. Its design idea is to establish a user information table in the system database. When a user logs in, the user name and password entered match the preset information in the user information table. If the information matches, the user is allowed to log in. If the information does not match, the user is refused to log in. This module not only classifies users' identities to provide different functions, but also guarantees system security.

### 5.2. Field inspection module

The field inspection module runs on the mobile terminal, and its main function is to provide the patrol inspectors with operation tools. After logging in, the patrol inspectors can see various inspection items, provide the security inspectors with input windows, and provide the function of taking photos, so that the security personnel can take photos of the site situation. After the patrol inspectors complete the inspection data entry and taking photos, the module stores relevant information.

### 5.3. Data transmission and warehousing module

The function of the data transmission and warehousing module is to transmit the inspection result information of the mobile terminal to the server and store it in the data table of the server. Here, we mainly use Java under the Android platform environment to develop the data transmission function, and use PHP to develop a receiving function on the server side to place the information in a separate table. After the data processing module verifies the data, it will be stored in the system database.

### 5.4. Data processing and filing module

The data processing and filing module runs on the server side and is mainly developed by PHP. The function of this module is first to verify the data transmitted from the mobile terminal. When the data is correct, the module stores the data in the information table corresponding to the project in the database and archives the data according to the time and other parameters of the inspection task.

## 5.5. Information browsing and query module

The information browsing and query module also runs on the server side. Its function is to provide information services for users by using attribute data and spatial data interconnection based on archived patrol data. There are two forms of query service. One is to query the figure objects according to the attribute data, and the other is to directly query the attributes of the figure objects.

## 6. Conclusions

Electric power inspection is a basic and important work in the electric power industry. The data generated by the inspection is a direct reflection of the operation situation of the power system, which has great research and application value. How to manage and use these data is an important work to better play the role of electric power inspection. The comprehensive management ability of spatial data and attribute data provided by GIS technology, as well as the excellent performance of spatial analysis, can well realize the management, analysis and use of patrol information. At the same time, with the development of artificial intelligence and big data technology, as well as the introduction and use in this system, the analysis ability of the system will be further improved, and the value of electric power patrol data will be better excavated, which is the next development direction of this system.

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