Design and Realization of Silhouette Operation Platform Based on GIS

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Abstract. Artificial weather effects after several generations of unremitting efforts in many provinces, municipalities and districts have become a regular business to serve the community. In the actual operation of the actual impact of weather operations, on-site job terminal system functional integration is not high, such as the operation process cumbersome operation instructions unreasonable, the weather data lag, the data form of a single factor and other factors seriously affect the weather conditions, Sexual and intuitive improvement. Therefore, this paper adopts the Android system as the carrier for the design and implementation of the silhouette intelligent terminal system. The intelligent terminal system has carried on the preliminary deployment trial in the real-time intelligent command system which realizes the weather operation in a province, and has formed a centralized, unified and digital artificial influence in combination with the self-developed multi-function server system platform and the remote centre command system Weather operation communication network, to achieve intelligent terminal and remote centre commander between the efficient, timely and stable information exchange, improve the shadow of the economic and social benefits, basically reached the initial design purpose.

1. Introduction
In recent years, in the continuous progress of information technology, artificial weather technology information is also the development and upgrading of intelligent, but its business involves a wide range of data types, timeliness, involving more departments, technical difficulties and other issues increasingly Highlighted. For a set of artificial weather system, the way the job terminal displays information and the speed is directly related to the final effect of silhouette operations, so the design of a job terminal system in the entire silhouette operating system plays a vital role. Most of the current silhouette operations are still using ordinary SMS and telephone way to conduct on-site command, data is not enough degree of diversity, and usually do not use a variety of basic weather data radar, satellite, conventional weather information to support job decisions, This makes it difficult to further improve the level of man-made weather operations.

In this paper, the business operation foundation of the weather operation command system in a province is studied, and the research and design of the equipment characteristics of the mobile terminal are carried out. The main task of the project is to design an artificial intelligent weather terminal operating system with perfect function, reliable, efficient and easy to expand. The system adopts three-tier structure, which consists of user interface layer, business-processing layer and data
interaction layer. The application layer is written and the video processing section is written and communicated by realizing both. Operating point terminal program for mobile phone or tablet computer development program through the network through the adaptive heartbeat package to maintain a dynamic connection with the relay server, in the instruction transceiver module to achieve the automatic operation of the instructions and manual feedback, take the initiative to the command machine to request the job, Reply to the command and after the completion of the results of the assessment form, the alarm tone prompts; in the mobile module using the map to achieve the terminal radar radius selection, path search, data return, data collection, in the video live module Live video live, but also to achieve the program automatically or manually update and other functions.

2. System Workflow Design

Artificial weather operations intelligent terminal based on the Android platform development, installation and distribution at the operating point. The terminal application connects to the silhouette server platform through the 3G wireless network, and can obtain the real-time operation information sent from the command center and display or the voice broadcast on the smartphone. The system can automatically and manually confirm the various information received through the built-in SIM card can also return the location of the operator, through the GPS combined with the map to collect part of the job effects information, and back to the central server. The system also has a video live module, received in the central commander to send live instructions, open the live button for live video broadcast. After the job is completed, the operation of some of the parameters through the relay server feedback to the silhouette command center.

Figure intelligent terminal operating system workflow is divided into two stages of waiting for work and work. Silhouette center command personnel according to the national, provincial and municipal short-term weather forecast scientific judgment in the future hours is likely to be operational weather conditions. If the conditions of implementation of the operation into the preparatory state, and one day in advance to inform the lower level of the shadows do the preparatory work, the lower level of the shadow department after receiving the job notice, arrange personnel, ammunition and vehicles, and at the scheduled time to reach the job site The command center to enter the job preparation state need to increase the observation and data analysis density, if the conditions are appropriate, according to the radar echo map, wind direction and other data to generate operational instructions, and must apply to the Air Force air traffic control department airspace and time, only approved To proceed to the next step, otherwise you can only cancel further operations. The silhouette terminal is connected to the transit server after setting the parameters, and keeps the real-time connection through the adaptive heartbeat package. The silhouette commander is also connected to the relay server and forwards the job instruction broadcast to the relevant job point through the relay server. The silhouette job intelligence terminal automatically returns a response packet after receiving the job information, and the command center can confirm that the job point has received the job instruction, and then the job point intelligent terminal analyzes the instruction in the job instruction by the received instruction type The contents of the operation, and then pop-up on the screen job details window, and according to different instructions to play different alarm sound, to be operator to read and press the button back to confirm a manual reply to the packet, the silhouette command staff can confirm the scene The job operator has checked the job information, and if the silhouette command center determines that the job point has not received the job information, the job information may be sent for the emergency backup using the telephone. Experienced operating personnel to determine the job site feasible operating conditions, you can take the initiative to the silhouette commander to send the requested job, after the batch to push the operation.
3. The Architecture Of Android Smart Platform

3.1. Real-time data transmission
In the field of complex weather conditions, the artificial weather control system needs to ensure that the operational instructions are transmitted from the silhouette commander to the intelligent terminal in a timely and accurate manner. To this end, a set of command communication in accordance with the specific operational command of the weather the agreement is very necessary. The network communication protocol is composed of semantics, grammar and timing. The semantics is the corresponding control information, the corresponding action and the corresponding response. The grammar is the structure and format of the communication data and control information. The timing is the realization of the event a detailed description of the order.

Taking into account the security of meteorological data, this communication protocol sets up a variety of terminal authentication mechanism to ensure that unknown clients can’t connect to the transit server, such as intelligent terminal response packets are not verified, will be forced to disconnect and return Error message; the relay server does not receive the response packet will be forced to disconnect, and return the error message; when the unknown terminal to connect to the relay server will not be able to identify the response packet is forced to disconnect.

Job clock calibration. When the weather conditions have been suitable for silhouette operations, but also the need for airspace applications, but the airspace management department approved the work of the airspace time is generally very limited, usually also ten minutes. If you cannot complete the command within the time of application, it is possible to cause a security incident. In order to protect the silhouette security, to prevent the silhouette center command machine and intelligent terminal time is not synchronized, must be all intelligent terminal clock calibration. Before the operation, the silhouette commander broadcasts the local time synchronization to the intelligent terminals. The terminals adjust the local clock to the clock standard of the command machine and return the response packet.

3.2. GIS services
The weather data processing is mainly done on the integrated data platform, such as the processing of radar satellite data processing, the processing of weather warning information, the automatic station message, the report monthly report processing, real-time vehicle scheduling and so on. Not a detailed analysis of this one, the integrated data platform will be completed on the seamless integration of meteorological products and data through a unified data interface for other client inquiries. For some basic information such as job instruction information, information, scheduling instructions, operation log and other information, you can through the two-dimensional relationship table for data storage and then read and write access, but for some meteorological business decision data such as data format Text, raster, image, and so on. These data sources are of a variety of types, the processing degree is different, and the format is diverse and complicated. How to express the problem of this article on the mobile side.

The current silhouette operations command, the silhouette center commander cannot intuitively know in the operating area of the relative location of the operating point and the formation of the operating range, due to the use of terminal-based devices are built-in navigation chip, through the module program, To the silhouette center command machine to send the request to open, return coordinates and driving speed information, and finally gathered in the silhouette center command machine map on the map shows the various operating points, so that the command of the location of each job at a glance. Artificial weathering vehicles are dispatched from the garage to the destination, through the open navigation and path search function can be convenient to help the workers to reach the job site. Browse the map, through the REST interface to read ArcGIS Server stored on the GIS data, through the touch screen can easily zoom in and out of the map data, and select the need to display the layer and the appropriate display ratio. In the process of silhouette operation, the operator can locate the line, surface space data, generate silhouette effect evaluation parameters, data collection
is completed, the newly collected data can be superimposed on the background map to form a new information, while Upload to the server side, for the server storage processing, if the next time in this area operations, you can always call out the previous operating results for reference.

4. Platform Implementation And Testing

The system first need to build the system development system required for the development process, and then in accordance with the main function of the module, focusing on the analysis of key technologies to achieve the operation of the interface effect. Finally completed the system development, carried out a variety of tests to solve the various problems in the test.

4.1. Platform to build

The first problem in the mobile GIS module is the problem of real-time display of the map. In order to pursue the fastest map display speed at the mobile terminal, it will usually include video, street, terrain, or other base map for the thematic layer, Generate good pictures, when the user requests directly from the server to read, the next time after the end of a cache can continue to use, because the base map is usually not too much change, relatively easy to maintain. You can also use ArcGIS Server to publish and create a cache for your own map files. When you set up the cache, if you choose to integrate all the layers, the performance will be the best. However, after the release of a single layer cannot control the display and hidden. To deal with this part of the need to hide the layers, you should publish them as a separate map service as a base map or thematic layer. When creating a cache, it is best practice to cache only the areas that need to be displayed. By default, the caching tool will cache the entire map area of the entire map document. ArcGIS Server can specify the need to create a cache through a vector file, which is particularly useful when the map display area is striped and does not need to waste system resources for large blank areas. When the system resources are tight, and to establish the cache area is very large, you can consider only when the request to establish the cache. A more flexible strategy is to pre-create the cache by specifying the vector file in the hotspot area, while the other area creates the cache at the time of the request, so that the delay is only displayed when the first user visits. At this point to pay attention to those who are set to request the establishment of the cache area, they also need to update. Re-create the cache by re-request.

The system provides data acquisition function is mainly for the collection of spatial data, spatial data acquisition is mainly through the GPS to obtain. GPS data acquisition is the key to obtain the current location coordinate information, and thus generate .shp type elements, according to the current mobile terminal built-in GPS module positioning accuracy, can be satisfied with the requirements of data collection. For example, the remote command system needs to know the specific location of the operating point of such data, you can send open GPS requirements instructions to locate the job site, or on-site operations can be based on the location of the coordinates of the coordinates, delineation of polygons estimated silhouette the scope of the effect. In the process of collecting the data submitted to the collection of information needed to collect data, collectors and other names for future reference. Traditional manual entry is large and inefficient. In addition, each time you need to repeat the input. Combined with the operating characteristics of the Android system, the use of memory parameters of the box, eliminating the need for operational data collection personnel to go to the trouble of operation.

4.2. Platform implementation

First, the commander of the silhouette command center according to the meteorological forecast department and the regular meteorological data analysis, that the next hour may appear in favor of silhouette operation weather conditions. Command personnel through the silhouette center command machine to the lower level of the silhouette department to send operational warning information, ahead of deployment of operating personnel and work vehicles and other equipment, ready to work. When the operator is ready to enter the scene, first in the mobile phone program list to find Jiangsu silhouette icon, as shown. Click to enter the Silhouette intelligent terminal system, the program starts after the main interface as shown.
The first use of the system need to set, click the menu button to enter the system settings interface as shown in the server address, port number, the machine belongs to the unit, the job point, phone number fill box (Figure. 1). Field operators can map and achieve positioning and navigation through the upper left corner of the interface and kilometres of the button can be circled on the map radius of the radar to help the operator to the point of the general judgment (Figure. 2, Figure. 3).

Figure 1. User login interface. Figure 2. Command the user radar monitoring.

Figure 3. Numerical model product display

Acknowledgments
This paper mainly designs and studies the intelligent terminal operating system based on artificial influence, and combines the current mainstream mobile development mode and the business demand of weather influence. The overall frame analysis and detailed function design of the system are carried out. Finally, the system is run. One is to adapt to the changes in the era of science and technology using intelligent mobile terminal as its operating platform, and the use of the whole process of touch-type interaction; Second, the mobile side based on the interface display, business processing and data
separation of multi-layer Architecture, the encapsulation of the common module to reduce the coupling between the modules; third is to customize the communication protocol format and the received SMS with automatic and manual response mechanism, so that the silhouette command function to quickly understand the reception of text messages. The fourth is to propose an adaptive heartbeat packet mechanism to improve the network reconnection, improve the error and delay rate in the process of command transmission, and greatly improve the command efficiency and reliability of the weather operation. Mobile traffic consumption; Fifth, in the intelligent terminal to achieve the data browsing, based on the use of part of the data collection.

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