Construction of Agricultural Meteorological Information Service Platform Under Background of Network Development

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Abstract: Agricultural weather information service plays an important role in the demand of agricultural gas services and artificial weather influencing operations. It is very important to strengthen the application of agricultural meteorological information.This paper proposes a method for constructing agrometeorological information service platform based on network technology and embedded technology.With the help of the network information platform, an agrometeorological service platform was designed to provide services for agricultural weather forecasting and human demand for agricultural gas demand.The framework of the platform is based on the odeIgniter framework of the "model-view-controller" MVC model, which realizes the separation of logic and presentation. The controller is an intermediary between resources such as models and views. Its main function is to implement scheduling functions on the platform.The platform adopts MySQL database, which is constructed by a three-tier structure system of user layer, information layer and control layer.In the process of agricultural weather information service, a full-duplex communication mechanism was proposed, and software development and design of the agricultural weather information service platform was implemented under the CCS 2.20 development platform.The test results show that in the context of network development, the agricultural weather information service platform has good reliability and application.

Keywords: network; agrometeorological information service; evaluation; software design

1. Introduction

Due to the influence of natural conditions, agriculture has become a relatively weak industry in our country, and relatively poor has produced agricultural disasters. Therefore, under extreme weather conditions, accidents have been increased, and agricultural production has almost suffered great losses year by year. In addition, the deep research on agricultural meteorological exhibition, which is also a strong lag in the realization of transmission process, makes the "three rural issues" gradually prominent[1]. To a certain extent, it has seriously affected the realization of comprehensive development goals in the agricultural industry. Meteorological information service plays a protective role in agricultural production, so it is very important to strengthen the application of meteorological information service in agriculture. In order to give full play to the application effect of meteorological information and improve the awareness of disaster prevention and mitigation, the agrometeorological information service platform is constructed under the background of network to provide agricultural meteorological service for people. The resources of agrometeorology are the key resources for the agriculture to realize the goal of smooth production and scientific research, which directly affect the steady increase of production and income of agriculture. Therefore, our country should do a good job in the service of agricultural meteorology. It is one of the key contents of agricultural service. Because of the incomplete data and scattered meteorological resources, and not timely report and collation, it restricts the acquisition of meteorological equipment and the efficient utilization of meteorological resources.[2]

In order to solve this problem, the optimal design of agrometeorological information service platform is carried out in this paper, and the three-layer structure system of user layer, message layer and control layer is adopted to construct the agricultural meteorological information service platform. In the course of agrometeorological information service, the communication mechanism of full duplex is provided, and the software development and design of agricultural meteorological information service platform is realized under CCS 2.20 development platform. Firstly, the three-layer architecture design and overall design modeling of agrometeorological information service platform are carried out, the function and technical index of the service platform are analyzed, and the knowledge rule base and log database of agricultural meteorological information service platform are constructed. The database structure, such as model base, is

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used to develop the network components of agrometeorological information service platform in the B / S architecture system[3]. Finally, the software integration design of agricultural meteorological information service platform is realized in the embedded environment, and finally, the system test is carried out. The superior performance of the design system in agricultural meteorological information service and management is demonstrated.

2. General Design and Functional Structure Composition of Service Platform for Agrometeorological Information

2.1. Integration of platform resources and services

In a broad sense, the resources of agrometeorological information are not only the meteorological data resources needed in agricultural production, such as warm and wet water wind. It should also include the resources of literature related to the implementation of agrometeorological norms, changes related to agrometeorology and policy guidance, audio and video resources and so on. The integration of platform resources and services consists of three parts: user applications (farmers, production services, researchers, scientific research services, managers, decision services), resource content (document information resources, data information resources), multimedia information resources, service implementation (information customization and push, information query and analysis, virtual consulting. Among them, producers can use the platform to query the relevant information about the main meteorological elements, and it can also use the portal website to browse the meteorological consultation and related policy regulations, and then grasp the current meteorological information and national laws and regulations. If in doubt, we can consult with experts in many ways to help farmers realize scientific production[4]. For example: face-to-face audio and video consultation with experts, not only facilitate the question, but also facilitate the expert to solve the doubt in detail. Using the platform, the researchers can retrieve and browse the information of agrometeorology related documents effectively, at the same time, individualize the information of customized literature, and feedback the latest information directly to the researchers on a regular basis. It is not only convenient for tracking research, but also continues the research of agrometeorology. The managers use the platform to grasp the latest information of agrometeorology in real time, and the latest situation of agricultural information all over the country, so as to grasp the status of development on the whole. In the implementation of agricultural development related planning, we can use internal comprehensive information for analysis and as a valuable reference, but also for the development

of domestic agricultural production to provide scientific decision-making.

2.2. Overall structure framework of the system

The agrometeorological information service platform adopts the open design network system and the database architecture. Under the background of network development, the agrometeorological service platform is designed. The agrometeorological information service platform mainly realizes the functions of information collection, information fusion and meteorological information transmission, and realizes the information synthesis in the human-computer interaction environment. The network development and design of agrometeorological service platform are carried out under the framework of B/S network system. The database includes the knowledge rule base, the environment information base, the meteorological database and the user information base. Through the radio frequency network RFID module[5], the agrometeorological information is collected and uploaded, and the parser of the Association rule data is constructed. In the application layer, the emulator mainly completes the online processing and data analysis of agrometeorological information. According to the above analysis, the overall structure of the agrometeorological information service platform designed in this paper is shown in Figure 1.

2.3. Composition of functional modules

The network component interface design of agricultural meteorological information service platform is realized based on TinyOS[6]. The application layer, business layer and data layer are used to design the application layer, business layer and data layer of the agricultural meteorological information service platform. The system adopts VXI bus technology to collect the 32-channel control data of the agricultural meteorological information service platform. The frame of the platform is the odeIgniter framework of MVC mode based on "model-view-controller" to realize the separation of logic and representation. Based on H.323 protocol, the data output communication protocol is constructed, the collected agrometeorological information is converted into digital signal, the background server is built and the interface is designed under the framework of B/S. The software of agrometeorological information service platform is developed in embedded ARM environment and B/S architecture. It mainly analyzes the development of database, agrometeorological information processing module and network communication module[7].

(I) Database development. Database development is the basis of the development of the whole agrometeorological information service platform. In the information processing control layer of the collected data output, the agricultural meteorological information management

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database is constructed, and the on-line scheduling and real-time evaluation of agricultural meteorological information are carried out by using database access and database scheduling technology. The distributed data

source of agricultural meteorological information is sampled by VIX bus scheduling technology to realize multithread socket and interface communication transmission of agrometeorological information service platform.
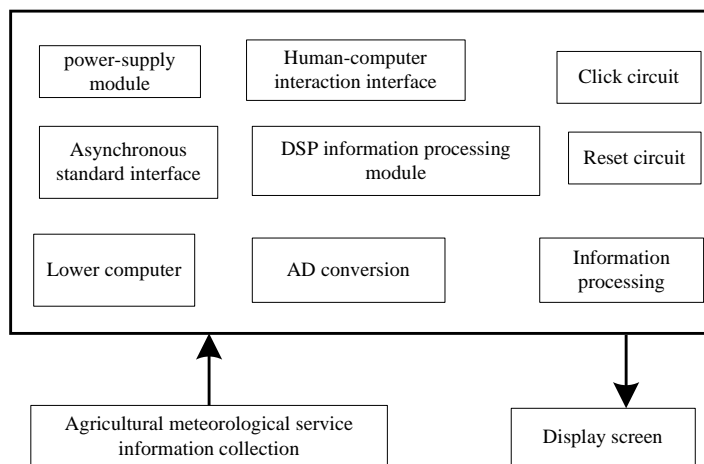
Figure 1. Overall structure of agrometeorological information service platform

(II) Information processing module. The information processing module is the core of the design of the whole agricultural meteorological information service platform. The embedded ARM9TDMI is used as the kernel microprocessor. The embedded information processing and management scheduling of agricultural meteorological information are realized, and the CAN_MD1 register of agricultural meteorological information service platform

is configured by using CAN function. The processing information of agricultural meteorological information service platform is sent to DSP buffer to realize synchronous trigger control[8].

The structure diagram of the function module of the agricultural meteorological information service platform is shown in Figure 2.
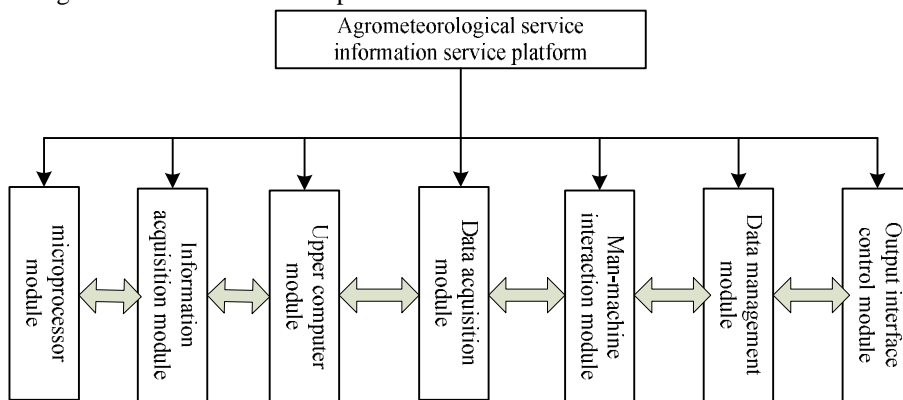
Figure 2. Functional modules of agrometeorological information service platform

3. Design and Implementation of Agrometeorological Information Service Platform

3.1. Logical control design

The application program of agricultural meteorological information service platform based on multi-platform is analyzed with figure 2. The application program includes code generation, file structure management, engineering

file generation and man-machine interaction and other sub-modules. The main program is run directly under the Windows window, the software is designed according to the code development flow[9], the driver of the agricultural meteorological information service platform is developed with C language, and the frame synchronization control is carried out using two optional communication protocols. The platform adopts a odeIgniter framework

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based on the MVC pattern of "Model-View-Controller" to separate logic from presentation. The timing logic controller of the agricultural meteorological information service platform is controlled directly by the node pulse, which is converted into a suitable data structure format. The conversion table is described in Table 1.

Table 1. Conversion table of data structure of agrometeorological information service platform

Pin	Name	Description
1	CCRN/DA T3	IIC Serial interface / data line[bit 3]
2	CMD	Controller
3	LCD	Data line [bit 1]
4	VDD	Data line [bit 0]
5	I/O port	Clock
6	VSS2	Power ground
7	DAT0	Asynchronous serial I/O out
8	DAT1	Set parity bit

3.2. Information processing and Human-Computer interaction design

The information is processed in the resource dispatching center of agrometeorological information service platform, and the program is loaded by cross-compiling control method, and the information classification of agricultural meteorological information service platform is car-ried out. The multi-channel serial port technology is used to design the input and output interface of the network. The input and output interface of the agricultural meteorological information service platform adopts the UART interface design method. Controller is the intermediary between model, view and other resources, and its main function is to implement scheduling function in the platform. In the course of agrometeorological information service, the communication mechanism of full duplex is provided. The interface object and C code communication attribute of agricultural meteorological information service platform is defined by integrating pop-up menu such as ANSIC code library, etc. The serial port design and communication module design of agricultural meteorological information service platform based on multi-platform are completed. The socket network is connected to the Web monitoring center of agrometeorological information service platform, and the background server is built under the framework of B / S. The data storage system of the platform adopts MySQL database. The agricultural meteorological information service platform is constructed by using the three layers structure system of user layer, message layer and control layer. The control bus of the agrometeorological information service platform is shown in Figure 3.
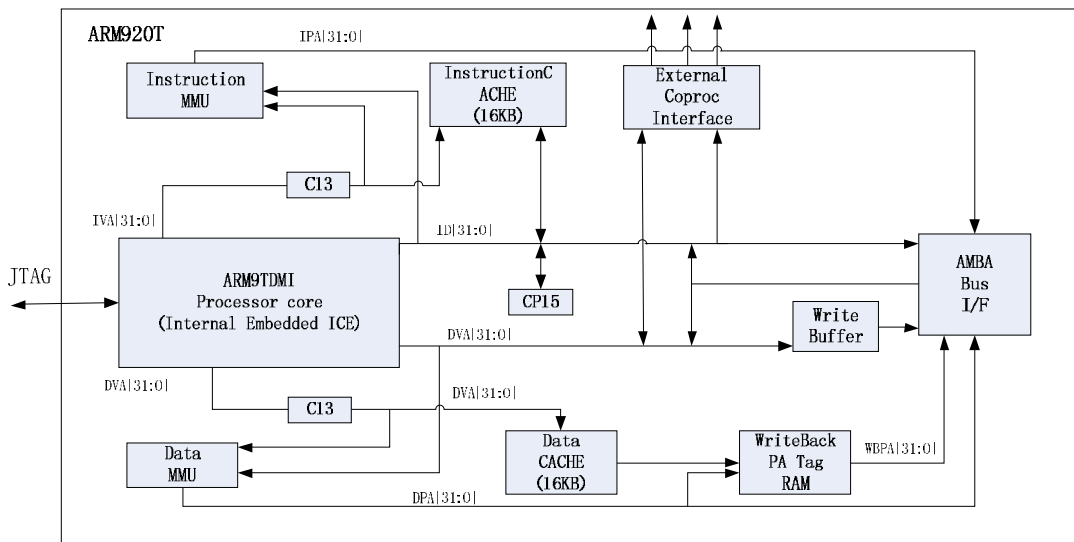

Figure 3. Control bus of agricultural meteorological information service platform

Finally, the Web development technology based on .NET Framework is taken to realize the network communication between the ADO.NET component library and the database of the agricultural meteorological information service platform. The real-time processing ability of agricultural meteorological information service platform is improved. Based on the above description, combine network technology, the development and design of agricultural item information service platform is realized.

4. Simulation Experiment Analysis

In order to test the performance of the agricultural meteorological information service platform designed in this paper, the simulation experiment is taken based on Matlab 7, the software design of agricultural meteorological information service platform is realized under the CCS 2.20 development platform, and the sampling clock of the A / D chip is configured. The output clock frequency

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is less than 1%. The output interface of the platform uses NAND Flash to start the kernel program, to process and integrate the meteorological information, in order to improve the running speed of the meteorological information service platform. The three universal asynchronous serial interfaces of S3C2440 are set up for serial communication, the node communication module is constructed by telosB wireless module, the integrated development of agricultural meteorological information service platform is realized by ZigBee network module, and the time cost of meteorological information service is tested. The result is shown in figure 4.
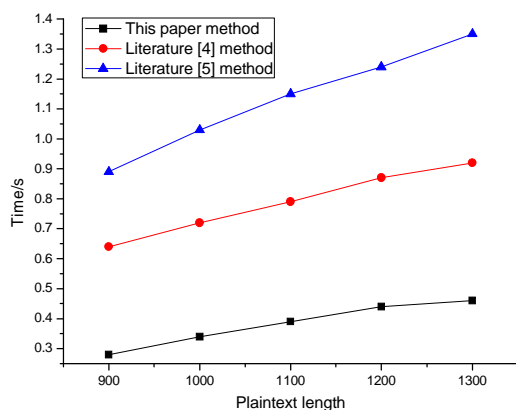

Figure 4. Time overhead testing

Figure 4 shows that the response time of the agricultural meteorological information service platform designed in this paper is short, which shows that the real-time performance of the platform is better and the performance is superior.

5. Conclusions

In this paper, the construction method of agrometeorological information service platform based on network technology and embedded technology is put forward. With the help of the network information platform, the agricultural meteorological service platform is designed to provide public service for agricultural meteorological forecast and forecast. The frame of the platform is the odeIgniter framework of MVC model based on "model-

view-controller". To achieve the separation of logic and presentation. Controller is the intermediary between model, view and other resources, and its main function is to implement scheduling function in the platform. The data storage system of the platform adopts MySQL database. The agricultural meteorological information service platform is constructed by using the three layers structure system of user layer, message layer and control layer. In the course of agrometeorological information service, the communication mechanism of full duplex is provided, and the software development and design of agricultural meteorological information service platform is realized under CCS and Matlab development platform. The test results show that the designed agrometeorological information service platform has good reliability and application under the background of network development, and it has good stability and application value in practice.

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