Design and Implementation of Agriculture Industrialization APP Based on Industrial 4

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Abstract; This paper designs and implements a wisdom agriculture platform client based on Android. According to the need of wisdom agriculture and achieve goal of agricultural industrialization, combined with mode of operation of agricultural production, this paper analyses agricultural production related business processes and information systems process from services provided the supplier's perspective. The system realizes the data synchronization between server and client and the real-time monitoring and control of the production condition of each greenhouse. At the same time it provides real-time production of the majority farmers for agricultural experts and leadership and improves the efficiency of agricultural management.

1. Introduction

With the integration of information technology and industrial technology, the Deep interleaving of Network, computer technology, information technology, software and automation technology to create a new value model. We call the virtual network - physical system industry 4.The system is associated with resource, information, goods and people. It will promote the formation of a new platform for information and physical systems. The new information system platform can connect all the people, objects and systems. It will provide a comprehensive, fast, safe and reliable service and application business processes. And it will support the mobile terminal devices and the collaborative manufacturing, service, analysis and forecasting processes of the business networks.

In the new era, the goal of agricultural industrialization is to make agricultural production and management intelligent, convenient, scientific and efficient. It can provide farmers with agricultural production related information, so as to establish market-oriented, specialized agriculture, improve the efficiency of agricultural production, and realize the modernization of agriculture. As a large agricultural country, it is important to make full use of the limited resources to develop the agricultural industry and improve the grain yield.

Our government attaches great importance to the development of agriculture in our country. With the continuous development of the Internet of things technology, more and more technology is also applied to agricultural production. At present intelligent agriculture has achieved the monitoring of the various indicators of agricultural greenhouses, and it promotes the development of agricultural industry. However, these platforms transmit to the farmer's information in a single, fragmented and so on, and they cannot provide a strong guidance to farmers. So the role of intelligent agriculture will be greatly reduced. Therefore, a rapid configuration, rapid implementation, rapid application, rapid and effective agricultural information technology application platform will be very obvious advantages.

2. System Framework Design

The so-called wisdom agricultural solutions is the system can automatically open or close the specified equipment by collecting the environmental parameters such as temperature, soil temperature, CO2 concentration, humidity signal, illumination, humidity and dew point temperature. It can be processed at any time according to user needs. It provides a scientific basis for the automatic monitoring of ecological information, the automatic control and intelligent management of the environment. And it can realize remote control of temperature and humidity in greenhouse by collecting data such as temperature sensor and transmitting data through wireless signal transceiver module.

From the need of wisdom agriculture and the goal of agricultural industrialization, combined with mode of operation of agricultural production, it analysis agricultural production related business processes and information systems process from the perspective of the service provider. At the same time it takes into account

Foundation items: Zibo science and technology development project (No. 2015kj010047)

the actual demand of agriculture and information transfer between the two sides of the supply and demand in the planning of its management system, and it highlights the business characteristics of wisdom agriculture.

The whole system framework as shown below:

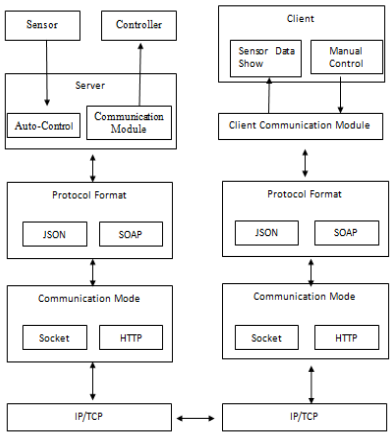

Figure 1. System Framework

Server: It is mainly responsible for the management of the system users, the current data collection. it is responsible for adapting the protocol connection between various clients, and It can feed the data which the client needs back to the client through the protocol interface. It can also receive control information from the client and control the corresponding control unit.

Client: It is responsible for displaying and controlling the data and status of the system, including the implementation of data curve charts, historical data show and manual control.

The communication protocol format: It includes JSON and SOAP two data format protocol. This has nothing to do with the specific communication mode.

Communication mode: It includes HTTP and SOCKET two communication modes.

The log module: The log function of server is used to record the information of client, operation type, operation time and other relevant information. It can also browse logs.

3. The Design of The Server Module

The design of the server module as shown below: This paper focuses on the design and implementation of the client, so the server part is not the focus of this paper.

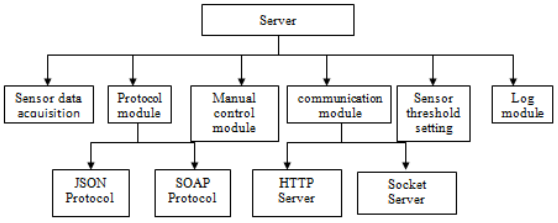

Figure 2. the Server Module

4. The Design Of The Client Module

The design of the client module as shown below:

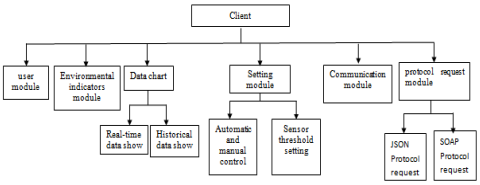

Figure 3. the ClientModule

4.1 Functional Design

The user module: This includes user registration, login, etc.

Administrator permissions: It can be manually controlled and finish each sensor's threshold setting.

Environmental indicators: It can display the current value of all sensor data in real time, and it can be judged that an alarm is needed according to each sensor threshold.

The data chart: This includes real-time data show and historical data show.

Automatic and manual control switch: it provides two control modes, one is automatic control and the other is manual control. The function can be set in the system settings.

Sensor threshold setting: The client can set the maximum and minimum values for each sensor. The system will be based on the threshold to judge whether to enter the alarm state.

The communication module: The client can choose to communicate with the server using HTTP or SOCKET.

The protocol request module: The client can choose to interact with the server using the JSON or SOAP data format protocol.

4.2 The Protocol Interface Design

Communication between the client and the server uses the answer mode. That is, the client sends a request, the server receives it and it responds based on query results.

For example, in the HTTP communication mode, the SOAP request content of the user login should be:

Url:http://192.168.1.119:8890/type/soap/action/login

<? xml version="1.0" encoding="utf-8"? >

<soap:Envelopxmlns:xsi="http://www.w3.org/2001/XMLSchem-instnce"

xmlns:xsd="http://www.w3.org/2001/XMLSchema"

xmlns:soap="http://schemas.xmlsoap.org/soap/envelop/">

<soap:Body>

<username>admin</username>

<pssword>admin</password>

</soap:Envelop>

The response of the server:

```
<? xml version=\"1.0\" encoding=\"utf-8\"? >
<soap:Envelopxmlns:xsi="http://www.w3.org/2001/
XMLSchem-instnce"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/soap/envel
op/">
<soap:Body>
<result>ok</result>
</soap:Body>
</soap:Envelop>
```

This indicates a successful login.

```
<? xml version=\"1.0\" encoding=\"utf-8\"? >
<soap:Envelopxmlns:xsi="http://www.w3.org/2001/
XMLSchem-instnce"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/soap/envel
op/">
<soap:Body>
<result>failed</result>
</soap:Body>
</soap:Envelop>
```

This indicates a failed login.

For example, in the HTTP communication mode, the JSON request content of the user login should be:

Url:http://192.168.1.119:8890/type/soap/action/login

Body:{'username':'admin','password':'admin'}

At this time if the server's response is {'result':'ok'} which indicates a successful login. If the server's response is {'result':'failed'} which indicates a failed login.

5. Client Implementation

The client APP is developed by Android language. For example, we read the sensor data from the client in real time, the relevant code is as follows:

```
/**
 * Set up and start the thread to get the current value
of the sensor
 *
*/
private void setGetSenosorThread() {
mSensorThread = new RequestThread(this,
mApp.getHandler());
mSensorThread.setLoop(true, 1500);
mSensorRequest = new GetSensorRequest("");
mSensorRequest.setSensorValue(mApp.getCurSenso
rValue());
mSensorRequest
.setOnResponseEventListener(new
OnResponseEventListener() {
@Override
public void onResponse(BaseRequest
requestRequestResult result) {
mUpDate.upDate();
}
});
mSensorThread.setRequest(mSensorRequest);
mSensorThread.start();
}
/**
 * Update data
 *
*/
public void upDateView() {
mList.clear();
SensorBeanmBean;
SensorValuemValue = mApp.getCurSensorValue();
SensorConfigmConfig = mApp.getSensorConfig();
// Set CO2 sensor data
mBean = new SensorBean(mStrings[0]);
mBean.setMaxValue(mConfig.maxCo2);
mBean.setMinValue(mConfig.minCo2);
mBean.setValue(mValue.getCo2());
mList.add(mBean);
// Set light sensor data
mBean = new SensorBean(mStrings[1]);
mBean.setMaxValue(mConfig.maxLight);
mBean.setMinValue(mConfig.minLight);
mBean.setValue(mValue.getLight());
mList.add(mBean);
// Set air temperature sensor data
mBean = new SensorBean(mStrings[2]);
mBean.setMaxValue(mConfig.maxAirTempera
ture);
mBean.setMinValue(mConfig.minAirTemperature);
mBean.setValue(mValue.getAirTemper());
mList.add(mBean);
// Set air humidity sensor data
mBean = new SensorBean(mStrings[3]);
mBean.setMaxValue(mConfig.maxAirHumidity);
mBean.setMinValue(mConfig.minAirHumidity);
mBean.setValue(mValue.getAirHumid());
mList.add(mBean);
// Set the soil temperature sensor data
mBean = new SensorBean(mStrings[4]);
mBean.setMaxValue(mConfig.maxSoilTemperature);
mBean.setMinValue(mConfig.minSoilTemperature);
mBean.setValue(mValue.getSoilTemper());
mList.add(mBean);
// Set the soil humidity sensor data
mBean = new SensorBean(mStrings[5]);
mBean.setMaxValue(mConfig.maxSoilHumidity);
mBean.setMinValue(mConfig.minSoilHumidity);
mBean.setValue(mValue.getSoilHumid());
mList.add(mBean);
mAdpater.notifyDataSetChanged();
}
```

After analyzing and testing, the system runs stably and smoothly. The system realizes the data synchronization between server and client and the real-time monitoring and control of the production condition of each greenhouse. At the same time it provides real-time production of the majority farmers for agricultural experts and leadership and improves the efficiency of agricultural management.

6. Conclusion

With the rapid development of industry 4, mobile Internet and big data, it is very important for making use of intelligent mobile phone real-time access to

agricultural monitoring data and the guidance of the development of intelligent agriculture. This paper hopes to make up for the deficiency of the existing market products, at the same time, it is close to the actual needs of the agricultural industry, and it can effectively promote the process of the intelligent agricultural development and promote the rapid development of the agricultural industry management, production, transportation, processing.

Acknowledgment

Foundation items: Zibo science and technology development project (No. 2015kj010047)

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