



Design and Development of Crop Seedling Condition and Disaster Reporting System Based on Android Phone

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Diseño y desarrollo de un sistema de informes de desastres y estado de desarrollo en las plántulas basado en Android.

RESUMEN

Basado en la plataforma móvil de Android, se ha desarrollado un sistema de información del estado y de los desastres ocurridos en las plántulas de los cultivos. El sistema está compuesto por una cámara, un GPS y por la transmisión de datos del teléfono. Las funciones y la interfaz se han diseñado de acuerdo con la técnica de programación Android. El sistema funciona toma los datos en tiempo real, prepara el resumen y lo envía al servidor remoto (plataformas en la nube) que trasmite la situación de los cultivos y el problema acaecido. También proporciona las funciones de estadísticas e informes para el estudio del estado y problemas de los cultivos. Este sistema proporciona apoyo fiable para la obtención de datos agrícolas en tiempo real y llevar a cabo las labores de recuperación tras el desastre.

Palabras clave: móviles; Android; situación del cultivo; desastre; rápido reporte

ABSTRACT

Based on the Android mobile phone platform, a reporting system for crop seedling condition and disaster was designed and developed. The system relied on the phone's camera, GPS, data transmission and the functions and interface were designed according to the Android programming technique, realizing real-time collection, summary and the remote server (cloud platforms) transmission of crop situation and disaster for the fixed farmland or non-fixed farmland. It also provided the functions of statistics and prompt report for large data of crop situation and disaster. This system could provide reliable support for obtaining real-time agricultural data and carrying out rescue work after disaster.

Key words: mobile; Android; crops situation; disaster; repot promptly

INTRODUCTION

China is a great agricultural country with various frequent agricultural disasters, bringing a great influence to the agricultural production (Ding, 2014). After the disaster, the disaster condition information collection becomes an important job for the governmental disaster relief department to understand the disaster situations in time and deploy urgent rescue missions(Rong, 2014). However, the biggest bottle neck is that after each disaster, although many primary level organizations can collect the data quickly and accurately(Wang, 2013), the limitation of information communication methods and channels often delays the data reporting and implementation of the rescue work. Therefore, designing and establishing a systematic platform that can report the real-time agricultural disaster condition is especially important for the national government departments to carry out the disaster prevention and rescue work efficiently.

With the development of the mobile internet technology, Android applications are showing up in more and more areas(Teen, 2012; Sharon, 2009). Li Hui et al(Li, 2013) developed an aquaculture remote surveillance system based on the Android platform and Internet of Things, which realized the remote collection of information and data storage. Shang Minghua et al(Shang, 2011)brought up an idea of information collection system based on intelligent mobile terminals, which implemented the obtaining information on wheat production risks quickly and conveniently. However, there are few studies aiming at each kinds of crop growing situation and the real-time disaster reporting, especially the agricultural meteorological diagrams data collection based on mobile terminals.

This research plans to use the photographing, GPS positioning and communication functions based on Android platform to design and develop a mobile system for seedling and disaster reporting, in order to realize the collection and uploading of the picture information in fixed and unfixed areas, in the hope of providing basic supports for the government to carry out the after-disaster rescues.

MATERIALS AND METHODS

A seedling and disaster information reporting system was established based on Android Phone, the result was validated using the field data of Tianjin agricultural meteorology on July 2015.The system consists of server terminal and client terminal, the server terminal takes charge of receiving and storing the data, and the client terminal takes charge of collecting and uploading data.

Server terminal: The mobile receiving terminal of seedling and disasters information applies Http File Server, which is a free open source of HTTP file server that can realize the uploading and downloading of remote documents by setting IP, ports and user names, passwords and shared paths, meanwhile realizing the one-time and overlap processing of multiple requests, which solved the problem of waiting time delay caused by the simultaneous uploading multiple mobile seedling and disasters information from the terminals. The testing environment of the server terminal is: Server IBM System x3550, operating system Windows 2008.

Client terminal: The client terminal mainly realizes the collection, storage and uploading of the agriculture disaster information, which is developed basing on android devices. When we want to upload information to the server, we need switch the GPS on android devices and add site information, then take photos of the crops by android devices's cameras, and add the notes if there is other necessary information for uploading. The client terminal's development environment is: Window 7 + Java Development Kit + Eclipse 3.5 +Android SDK; System test environment is: Smart phone Lenovo A808t (Android 4.42 Version).

RESULT

A server terminal was used receiving terminal of seedling and disasters information applies Http File Server as the testing software (Fig2). Refer to the help file of Http File Server for detailed functions. A client terminal was used reporting terminal for seedling and disaster information include fixed-point collection of seedling and disasters situations (Fixed-point collection), mobile collection of seedling and disaster situations (Unfixed-point collection), picture management for the seedling and disasters situations (Picture management), map viewing for the orbits (Map) and basic settings (Settings). The main interface of the Android mobile terminal is as showed as Fig3.

The weather of July with high temperature and little rain had led to different degrees of droughts in Tianjin, However, in the early August, a short but strong raining had led to flood disaster in part of the fields. During this period, the agriculture stuffs in each districts used the seedling and disasters information reporting system to report the growth and development conditions of the damaged crops(fig4), from which we can see the summer corns' growth got blocked with low rate of emergence and slow development compared with the same period of history and the spring corns suffered waterlogging, which helped the agriculture department obtain the first hand materials for writing the service documents and provided reliable supports for carrying out the rescue work including irrigation and drainage after the disasters.

CONCLUSION AND DISCUSSION

In this article, the seedling and disaster reporting system for crops based on Android mobile phone is provided with the function of reporting the growing situations and disaster situations in real-time, being able to transmit pictures with texts and geography information whenever and wherever possible, basically realizing the quick reporting of the massive seedling and disasters data, which can provide basic supports for the related business sectors to obtain agricultural data and for the government departments to carry out the rescue work after disaster. Furthermore, this research is a software installation of which the development is based on Android devices, which means it reduces the expense of the regular hardware parts, reducing the usage costs at maximum. Therefore, it has a certain application value. So far the designed system in this article has been primarily applied in Tianjin and has obtained a certain degree of recognition.

However, according to the feedback from the user of mobile seedling and disasters information client terminals and the business stuffs from the server terminals, the system design still needs further improvement for this moment. For instance: The proper nouns in terms of greenhouse with facilities have no repeating memory and association functions, you have to input the data every time; the further analysis software after uploading the data to the server cloud still cannot satisfy the further requirements of the business stuffs.

Acknowledgments

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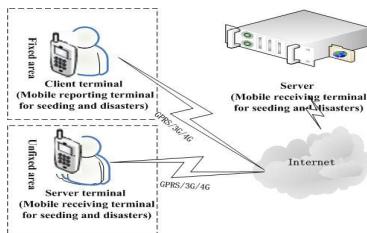


Fig1. General Structure of the System

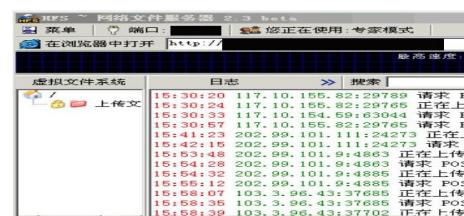


Fig2. Http File Server Software



Fig3. System Main Interface



Fig4. Drought and Water logging in July and August