A Mobile Information Management System used in Textile Enterprises

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Abstract. The mobile information management system (MIMS) for textile enterprises is based on Microsoft Visual Studios .NET2003 Server, Microsoft SQL Server 2000, C++ language and wireless application protocol (WAP) and wireless markup language (WML) technology. The portable MIMS is composed of three-layer structures, i.e. showing layer; operating layer; and data visiting layer corresponding to the port-link module; processing module; and database module. By using the MIMS, not only the information exchanges become more convenient and easier, but also the compatible between the giant information capacity and a micro-cell phone and functional expansion nature in operating and designing can be realized by means of build-in units. The development of MIMS is suitable for the utilization in textile enterprises.

1. Introduction
In general, information management system (IMS) refers to deal with information exchanging, storing, processing and predicting in order to reduce the waste from information process and management, including separating storage, collection, transfer, transport, and disposal[1]. Information exchange or communication occurs often immense and popular at high frequency in our daily life.

The model of Ref.[2] was an elaboration on the description of information management system (IMS) with Pascal and Athos languages, and a review of the transformation on the application of IMS in Bulgaria show that there have been seven distinctive development.

An artificial intelligence (AI) approach to the design and control of an integrated maintenance management system was reported in Ref. [3]. The research work has been done on two levels. At the managerial level, the overall maintenance management system is designed by the GRAL method.

The application of next-generation distributed multimedia systems is significantly dependent on the efficient and strong support of a new information management system that will improve the performance and reliability in such applications. The system, despite in embryo, was published with an active management framework based on programmable monitoring agents and event-filter-action recursive model[4]. Due to the active and intelligent management on information, users can self-define the different functions, to reconfigure the system resources, and to self-direct and monitor the

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executing procedures, and the tasks can be automatically customized at run-time in order to track the system behavior\cite{5,6}.

With the greatly popular use of mobile-phone, the information can be displayed and transported through pressing the keys on a micro-cell phone and speaking to the microphone in the phone. There are few methods to be found and discussed, however, about the mobile information-based management system by using micro-cell phones for textile enterprise, it is shorted for mobile information management system (MIMS).

As for the situation in this aspect, we try to adopt C++ language, wireless application protocol (WAP) and wireless markup language (WML) technology, to build up a portable information management system used in textile enterprises with a three-layer structure, i.e. MIMS. The purpose is to improve the quomodo for information exchange, to increase efficiency and convenience, and to utilize enterprise information in maximum extent.

2. The Collectivity Design of MIMS

Firstly, let wireless application protocol (WAP) combine Internet technology with mobile phones, thus, make customers able to communicate information on the internet work with abundant information resources at any time and anywhere by using a micro-cell phone.

Secondly, while an information tower receives the visiting signals emitted by the mobile phone, the visiting information is transferred by WAP gateway to Internet work, and then the serving port of the information-based management system receives the information.

Thirdly, the information will be treated through a corresponding processor or server, and then the processed or required information is transmitted to the WAP gateway through Internet. Through the WAP gateway, the information returns to the tower and to the mobile phone of the client. Therefore, every client can visit every server of the MISM if it is approbated through Internet only by using a mobile telephone, thus, the information exchange becomes very convenient to the client.

By means of a WAP mobile telephone, a client can visit the system through the browser of the mobile telephone at any time and any place, thus, various information from different textile factories can be communicated and known each others and in real-time, e.g. the information on a product course in processing, the amount of material shortage or surplus, etc. The information flow and exchange are as following:

Mobile telephone ⇔ WAP protocol ⇔ WAP gateway ⇔ HTTP protocol ⇔ WEB server ⇔ database server.

3. Preparation on the System

Collocation of computer: Pentium IV 2.0G/512M or over;
Operating system: Microsoft Windows2003;
Developing integrating system: Microsoft Visual Studio. NET2003 Server;
Database developing system: Microsoft SQL Server2000;
Information configuration system: Internet information server management system.

This system is based on WAP technology, and C++ language is used to the programming and logic driving. The information exchange in the interface is based on WML technology.

4. Realization of System Function

The realization of the system functions includes following three parts: firstly, building the basic items; secondly, configuring and modifying the environment for developing and testing; and thirdly, configuring and developing the database environment. The database environment can save all the materials and insure the safety and reliability to information materials. In the MIMS, the fall-type and extensible model is adopted, and the developed phase is plotted with following: analysis of demand and function; collectivity design; coding compilation; and integration.

4.1. Analysis of demand and function
The realization of the demand and functions relies on the design of the MIMS. At first, the system template should be formed according to general and assembly requirement, and then, on the base of the template, the management information system can be achieved and used in various textile enterprises after some modifying to match with individual features. In the system template, the functions that user can realize are: examining and managing the material-information of the enterprise; viewing and managing the department-information of the enterprise; looking over and managing the product-information of the enterprise; examining and managing the equipment-information of the enterprise; seeing over and managing the stuff-information of the enterprise.

4.2. Collectivity design of the system
The collectivity design is to determine the functions of the MIMS and includes three aspects, i.e. three-step design.

1) Discussing the whole information flow in the system; analyzing and finding out the best information-treating flow to fit with the system; and drawing the corresponding information flow chart.

2) Making out the input port and the output port, that is the programming ports for users.

3) Designing a database for information management, i.e. establishing the system database or data storehouse for all material information.

4.3. System structure
The structure of the MIMS is a three-layer one in general. It is constructed with the port-link module for mobile-phone information; the treatment module for operation; and the database module for the storage of system information and instructions.

The three modules can communize mutually and to the MIMS in all through the material information flow of the system, where the link-port module is mainly to exchange information and data with the treatment module of operation; and the treatment module of operation mainly communicates with the database module in data. In addition, the treatment module of operation includes three parts, namely client input and output treatment sub-module, procedure flow logic treatment sub-module, and database mutual treatment sub-module.

Three-layer structure, such as Client/Server, is adopted. It is illustrated in Fig 1.

The information flow chart of the MIMS is illustrated in Fig 2. In Fig 2, the column figure represents database, and there are five parts of the databases; the rhombus stands for information processing unit and is connected to the corresponding database; and the arrow and line is the flow of information.

4.4. Database design
The database is the fundamental part of the MIMS and also a system, i.e. a relationship database management system (RDBMS), which is used to save all the information of the system. The RDBMS is divided into five sub-databases (s-DB), that is the material-information s-DB; the product-information s-DB; the facility-information s-DB; the department-information s-DB; and the stuff-information s-DB, respectively corresponding to the five columns in Fig.2.

5. Particular design
Particular phase do particular analysis and design in light of the collectivity design. The object-oriented procedure design language is used in it. The particular design is mainly based on the idea of class, and abstract and inherit things.

5.1. Database visiting
After database being established, it can be transferred and amended only through being connected. Adopting the class of object-oriented designing will realize the visiting of database. And this can improve the concision of system.
Operating database is the operating of database affair. It includes appending notes, deleting notes and modifying notes to lists, etc.

5.2. WAP and WML are adopted to design the radicle species
WAP and WML are necessary to compile system program for the mobile management information system.
(1) WML radicle species controlling
By WML, a user can write files that suit to themselves according to their necessaries, and every file should be titled in files where it begins and where it ends, so that the system can distinguish them. The head character strings and trail character strings in WML are the flags to distinguish the corresponding file.

![Diagram of Three-layer-structure of the information management system](image)

**Fig.1. Three-layer-structure of the information management system**

(2) Card interface controlling
Card interface controlling is like a container, and it is used to save all contents of every page. Because the controlling is also a WML file, distinguishing in the beginning and the end of the file is absolutely necessary.

(3) Backpedal button interface controlling
Backpedal button interface controlling is written for realizing function of backpedal button on interface. It is used to gain the head character string functions and trail character string functions of WML file.

(4) Button interface controlling
Button interface controlling is more complex. Before using button controlling, a button control should be created in the system. To establish various pages, such as material, production and facility pages, in the system is in virtue of the button control, at least including the appending button and deleting button.

(5) Affair treating interface controlling
When the database is used by the system, that is the data are transferred from or into the database, the procedure is called as an affair. Every affair is controlled and dealt with through an affair treating interface control.

![Diagram of information flow chart of the system](image)

Fig.2. Information flow chart of the system

5.3. Sub-model of material information management
The model adopts the inherit technology of object-oriented, and it includes four files. One file is used to display information of the page; one file is used to realize function of appending and deleting; one file is used to realize function of modifying; and one file is used to hand the modifying to database.

The functions provided by the interface include: selection of appending material information; selection of deleting material information; principal interface of backpedal; and principal interface of return. A user can append some material information of the enterprise to the system with the function of selection of appending material information. The user can delete some trashy material information of the enterprise with the function of selection of deleting material information. Meanwhile, the user can return to the last procedure interface with the function of principal interface of backpedal, and can return to the principal interface with the function of principal interface of return.

5.4. Sub-model of production information query management
The inherit technology of object-oriented procedure design is adopted to the realization of the sub-model. The model includes four files. One file is used to display information of the page; one file is used to realize function of appending and deleting; one file is used to realize function of modifying; and one file is used to hand the modifying to database. The functions provided by the sub-model are the same as those of 5.3 Sub-model of material information management, but only the object is different.

5.5. Sub-model of facility information query management

The same technology as the section 5.3 or 5.4 and the same number of the files are adopted to form the Sub-model of facility information query management. The functions provided by the sub-model are the same as those of 5.3 Sub-model of material information management, but only the object is different.

6. Conclusion

Compared with traditional information management system (IMS), the mobile information management system (MIMS) can be visited by clients through a micro-cell phone at any time and any place, thus, the MIMS is more rapid and more convenient for information exchanging, deposition and processing just in time. Meanwhile, the displaying of the information is different from the traditional computer screen, so that the method to display information lines, columns and forms is considered and improved to match the small screen of mobile-phone, while the privacy for various information and their exchanges is still held.

Wireless Markup Language (WML) was connections of the input and output units of exchange information of the MIMS. The page display has been modified to be suitable for the server of a micro-cell phone according to the system-fitting-instructions, which are programmed by the authors, so that the displaying information on mobile phone can be paged up and down continuously for both inputting and outputting based on WML.

In the developing of the MIMS, the object-oriented language was used. All models and interface-units for enterprise uses with the effective functions have been programmed, integrated, packed into the MIMS, and employed in a simulative textile mill. The trial results show that the properties, concise and end-use performance of the MIMS have be improved. All the information displaying and inputting can be conducted by a micro-cell phone independently. In the realization of the usability, veracity and stability MIMS, the fall model way of soft engineering has been followed, and the WAP was applied, thus, the system is suitable for textile enterprise use.

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