The design of remote data exchange system for Intelligent pharmacy

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Abstract: To achieve the intelligent management of drugs in pharmacy, a remote data exchange system is designed. Based on Labview, the software of doctor side and pharmacy side is designed. According to the demand of smart pharmacy, the software are divided into various functional modules, and then the workflow of each software module is designed. By using TCP/IP protocol, the remote communication between the doctor and the pharmacy is realized. By using the Access database technology, it can realize the functions of data storage and data real-time display in the whole intelligent pharmacy system. Finally, experiments were performed and the results showed that the doctor can issue prescriptions through this system; Pharmacy can automatically receive prescriptions, and update it to uniform drug database.

1. Introduction
With the development of automation and information technology, the intelligent pharmacy with the functions of automatic drug storage, automatic prescription allocation and drug distribution will be the development direction of hospital pharmacy in the future[1-4]. Through the information software to complete the operation of drug information, it has the advantages of high speed, high accuracy and easy maintenance.

In order to meet the needs of remote control of intelligent pharmacy information system, this paper designs a remote data exchange system between doctor and pharmacy based on LabVIEW and TCP/IP protocol. The doctor terminal has the functions of real-time updating and displaying the drug information and inputting the prescription; The pharmacy terminal has the functions of drug storage entry, receiving prescription and drug delivery, which realizes the unified operation, display, sorting and saving of drug data in the whole intelligent pharmacy system.

2. The link of drug management database
In order to manage huge number of drug data, this paper uses access database to manage drug information. LabVIEW uses universal data link (UDL) to get information from the database and realize the function of database connection. The update and query of drug database are realized by VI function, which mainly includes the following three operations.

2.1 Read drug information from database VI
The drug information is stored in the access database. The database connectivity toolkit is used to establish the connection with the access database. The database named "inventory" is extracted by using
DB tools select data. The extracted data is converted into format and stored in Excel file. Finally, the drug information in the database is displayed in the form of table.

2.2 Input new drug VI
Open the database connection through DB tools open connection control; The new drug information is inserted into the database by using DB tools insert data control, and the newly entered drug information is displayed in the form of table.

2.3 Modify inventory drug information VI
It is used to transmit the changed drug data to the database in real time after the prescription. The main changes involved in this topic are the modification time and the quantity of drugs, and the drug name is unchanged. The SQL statements are as follows:

① update stock set revision time=' ' where drug name= ' ';
② update stock set revision=' ' where drug name= ' '.

3. Design of remote data exchange system for intelligent pharmacy

3.1 Software design of doctor terminal
The doctor side software is designed by LabVIEW software to realize the functions of querying the quantity of current drug reserves, inputting and sending prescriptions, it mainly includes two parts.

3.1.1 Doctor side prescription sheet entry
By reading the drug information VI in the database, the drug information is stored in the excel file. LabVIEW then obtains the column information of drug name by means of index array, so as to realize the function of drug query and drug selection on the doctor side. The design flow chart of prescription entry on the doctor side is shown in Fig.1.

![Fig. 1 flow chart of prescription entry on the doctor side](image)

3.1.2 Remote data communication with pharmacy
In order to realize the real-time remote communication between doctors and pharmacy, the TCP / IP protocol is used to realize the remote transmission of data. The flow of prescription remote sending is
shown in Fig. 2. The doctor side listens to the connection request from the pharmacy side. After listening to the request reply, the doctor side establishes a TCP connection with the pharmacy side, then sends the prescription information issued by the doctor. Once the data transmission is completed, the connection is closed and the communication ends \cite{5-6}. TCP data interception, connection, sending and closing connection are all completed by TCP control of LabVIEW.

![Flow chart of remote delivery of prescriptions](image)

Fig.2 flow chart of remote delivery of prescriptions

### 3.2 software design of pharmacy

The pharmacy software is designed by LabVIEW, which can realize the storage management of drugs, the prescription and the storage management of drugs, it mainly includes two parts.

#### 3.2.1 Drug information storage

The design flow chart of drug database storage management software module in pharmacy is shown in Fig. 3. When the drug is put into storage, the program first connects to the drug database, and then put it into storage, and input the drug storage time, quantity and other information in the corresponding list of the database. For new drugs, you need to create a new entry for the drug, and then input the drug storage time, quantity and other information. Finally, after the completion of the drug storage information inputting, close the database connection, complete the drug database storage management function.
3.2.2 Prescription receiving and drug delivery

The design flow chart of the pharmacy side prescription receiving and drug database delivery software module is shown in Fig. 4. The pharmacy side software listens to the TCP/IP port information in real time. When the prescription information is retrieved, the program automatically connects to the drug database, and searches the corresponding drug information of the prescription and checks the prescription information. When the prescription is delivered, the program will automatically connect to the drug database, The program modifies the status of the corresponding drug in the drug database to outbound, updates the drug database information of the corresponding drug, finally closes the database and listens to the TCP/IP port information again, so as to complete the function of prescription receiving and drug outbound.

Fig. 3 flow chart of drug storage management in pharmacy
4. experiments and results

In order to verify the actual performance of the system, the software of the doctor side is installed on one computer, and the software of the pharmacy side is installed on the other computer, and the two computers are connected through the LAN.

On the doctor side, click the "choose drug" item, and enter the quantity, and then click the prescribe and send button to complete prescription, the doctor side prescription interface is shown in Fig. 5. It can be seen from Fig. 5 that the selected drug has appeared in the list of prescribed prescriptions on the doctor side. The interface of pharmacy end is shown in Fig. 6. It can be seen from Fig. 6 that the prescription is displayed in the prescription column. The remote receiving of prescription is completed, and the unified management of drug information is realized.

Enter the new drug name "baking soda" and quantity "10000" in the pharmacy side, and click "enter". At this time, the interface of the pharmacy side is shown in Fig. 7. It can be seen from the figure that the new drug information is displayed in the spreadsheet of the doctor side and the pharmacy side, completing the new drug warehousing, and realizing the unified management of drug information.
5. Concluding remarks
This paper designs a remote data exchange system for intelligent pharmacy, which realizes the functions of prescribing prescriptions, sending prescriptions, querying the quantity of drugs, receiving prescriptions and entering drugs in the pharmacy. After the completion of the system design, the experimental verification is carried out. The experimental results show that: the system can quickly and efficiently complete the functions of remote prescription, sending prescription, query quantity, drug storage, drug delivery and so on, which provides a certain basis for the realization of intelligent pharmacy.

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