Research and Design of Wireless Intelligent System for Ordering Management

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Abstract. Selecting the Single Chip Microcomputer SPCE061A as the control core, combining wireless communication technology, computer technology and other technologies, a new type of wireless intelligent system for ordering management has been designed. The system mainly includes wireless intelligent ordering terminal, data acquisition node of the total station management, the total station computer management. In the wireless intelligent ordering terminal, the corresponding content selection of dishes, soup and drinks is completed through keyboard, selected contents are displayed by liquid crystal 12864, at the same time, the corresponding contents are sent to the data acquisition node of the total station management by wireless transmission module NRF905, when the operation is abnormal, the terminal automatically sends out the alarm. The data acquisition node of the total station management receives and storages the data from the wireless transmission module NRF905, and transmits them to the total station management computer. The software control between wireless intelligent ordering terminal and the data acquisition node of the total station management is achieved by C language and the total station computer management is designed by the software Visual Basic. Trials show that the system not only realizes the intelligent management of catering, but also completes the paperless operation and management. Orders are transferred in real time, in this way, the phenomenon of wrong order or missing order is avoided. The wireless intelligent system for ordering management can complete autonomous ordering dishes, adding food, retreating food, checkout, calling the waiter etc, and it is easy to expand, so the wireless intelligent system for ordering management has a good application prospect.

Introduction

With the improvement of people's living standards and the changes of people's lifestyle, catering industry has a huge investment market, known as the gold industry in China. More and more catering management have reached a consensus that the traditional order management methods can not meet with the demand of the market, the traditional catering management mode is not only a waste of time, inefficient, it is but very prone to error, which will greatly reduce the quality of service, bring unnecessary losses to enterprises [1]. The wireless intelligent system for ordering management is a kind of interface order tool using wireless communication to transmit real-time data, it can meet with the actual request, it integrate with the SCM technology, communication technology, computer technology. The system solves the disadvantages of the traditional order mode, it can let customers understand the characteristics

of food timely, and it can make customers stick out a mile to the quantity and the price of ordered food, so it is convenient for the customer's consumption, and reduces the service pressure of restaurants, so the wireless intelligent system for ordering management realizes the intelligence of catering management, reduces the cost, at the same time, the restaurant managers can also according to the specific business statistics in real time to adjust management, in order to seek more profits.

Master Design of the System

The wireless intelligent system for ordering management realizes the intelligence of catering management, and it can complete autonomous ordering dishes, adding food, retreating food, checkout, calling the waiter etc [2]. The system mainly consists of wireless intelligent ordering terminal, data acquisition node of the total station management, the total station computer management, and its structure diagram is shown in Fig. 1.
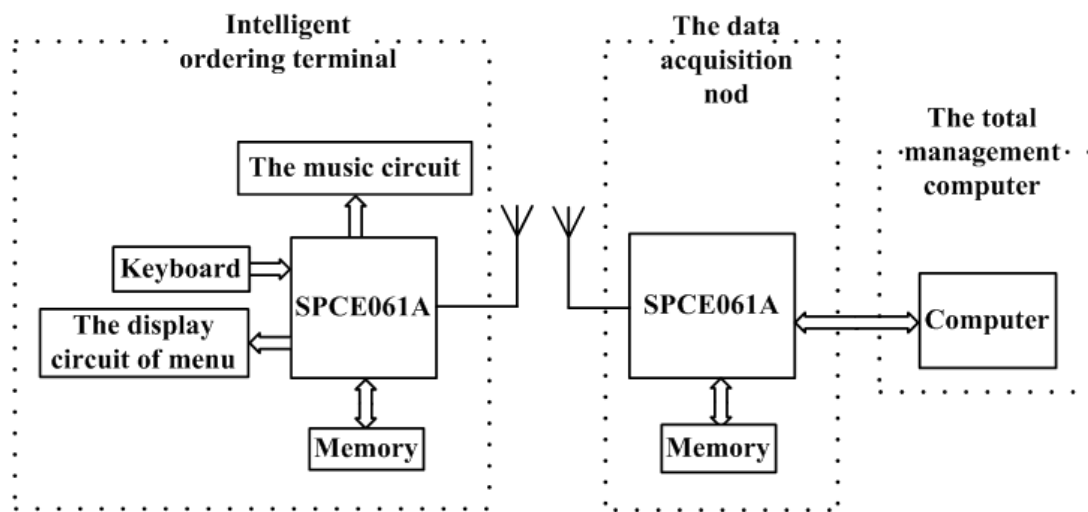

Figure 1. The structure diagram of the system

Selection of the Main Modules and Demonstration of Schemes

Power Module. The first scheme is using batteries, it is easy to change batteries at any time. The change of batteries is relatively simple, but changed batteries can cause environmental pollution easily, and the cost is high, during the use, because of the resistance, the voltage is unstable, individual cases may lead to SCM reset.

The second scheme is using AC 220V, it is step-downed by the 12V transformer, and then it is rectified and filtered, the voltage of DC 12V can be obtained, then the voltage of DC 5V can be gotten through the regulator module LM7805 and the filter circuit. Finally, the voltage of DC 3.3V can be gained by the regulator module LM117. At the same time, batteries are added to prevent accidental power-off, it can ensure the voltage stability in the use process, and it will not lead to SCM reset. Its use is lower, and this scheme is more conducive to environmental protection for a long term use.

Considering from the environmental protection, stable voltage, environmental protection and reliability, we choose the second scheme.

Main Control Module. The first scheme is using the SCM SPCE061A, it is the latest SCM developed by Sunplus technology, its cost is low, its performance is high, it has 32k FLASH

ROM, it is suitable for conventional programming, high processing speed of SPCE061A can complex digital signal processing easily and quickly [3], therefore, the SCM SPCE061A has been widely used in many embedded control system.

The second Scheme is using the chip AT89C52 developed by the atmel company, it is a low voltage, high performance MCU built-in 8 bit CPU and flash storage unit, but the chip itself integrated hardware need software to achieve, the operation is complex.

Through compare and analysis, we find the SCM SPCE061A is suitable for the controlling system for ordering management. Therefore, we select the first scheme.

Transmission Mode. The first scheme is using wireless data transmission, it can avoid the unfavorable factors, and it has wide adaptability, when new equipment is added, it only need connect with the wireless transmission radio station, the wireless data transmission has good scalability, it only need to maintain the data transmission module in use.

The second Scheme is using wired data communication, its limitations is too large, not only to consider environmental factors, but also a very restrictive to the circuit layout, maintenance of wired communication link along the line need check, it is difficult to identify the fault point.

After analyzing the advantages and disadvantages of wired and wireless transmission, we choose the first scheme.

Design of Main Circuits

Power Circuit. The power circuit is shown in Fig. 2. Firstly, AC 220V is step-downed by the 12V transformer, and then it is rectified and filtered, the voltage of about DC 11V can be obtained, then the stable voltage of DC 5V can be gotten through the regulator module LM7805 and the filter circuit, it can offer supply power to the display circuit, keyboard, the music circuit and other circuit. Finally, the stable voltage of DC 3.3V can be gained by the regulator module LM1117, it provides power to the SCM SPCE061A and the wireless transmission module [4].
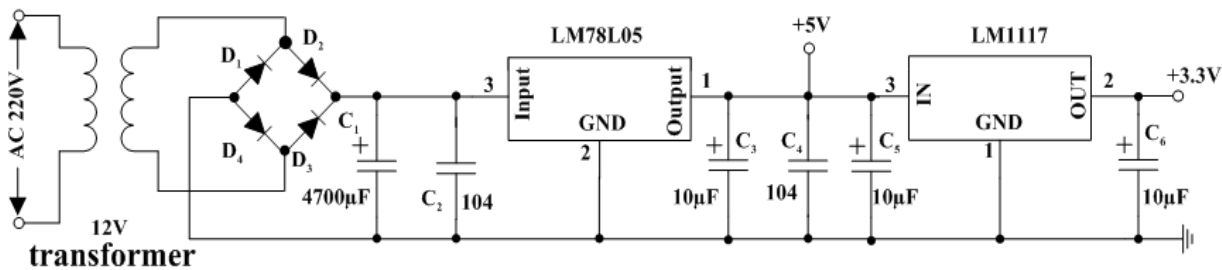

Figure 2. Power circuit

Control Circuit. Sunplus SPCE061A not only has the advantages of small size, high integration, good reliability, easy installation, stronger interrupt processing ability, but also has very strong modularity. In addition, SPCE061A is also equipped with a specialized compiler environment, providing convenience for software design. In the hardware aspect, SPCE061A has input ports and output ports, it is convenient for SPCE061A to connect with robot, computer [5]. Therefore, we all use SPCE061A as the controller in wireless intelligent ordering terminal and data acquisition node of the total station management, the connection of the controller of the wireless intelligent ordering terminal and other is shown in Fig. 3.
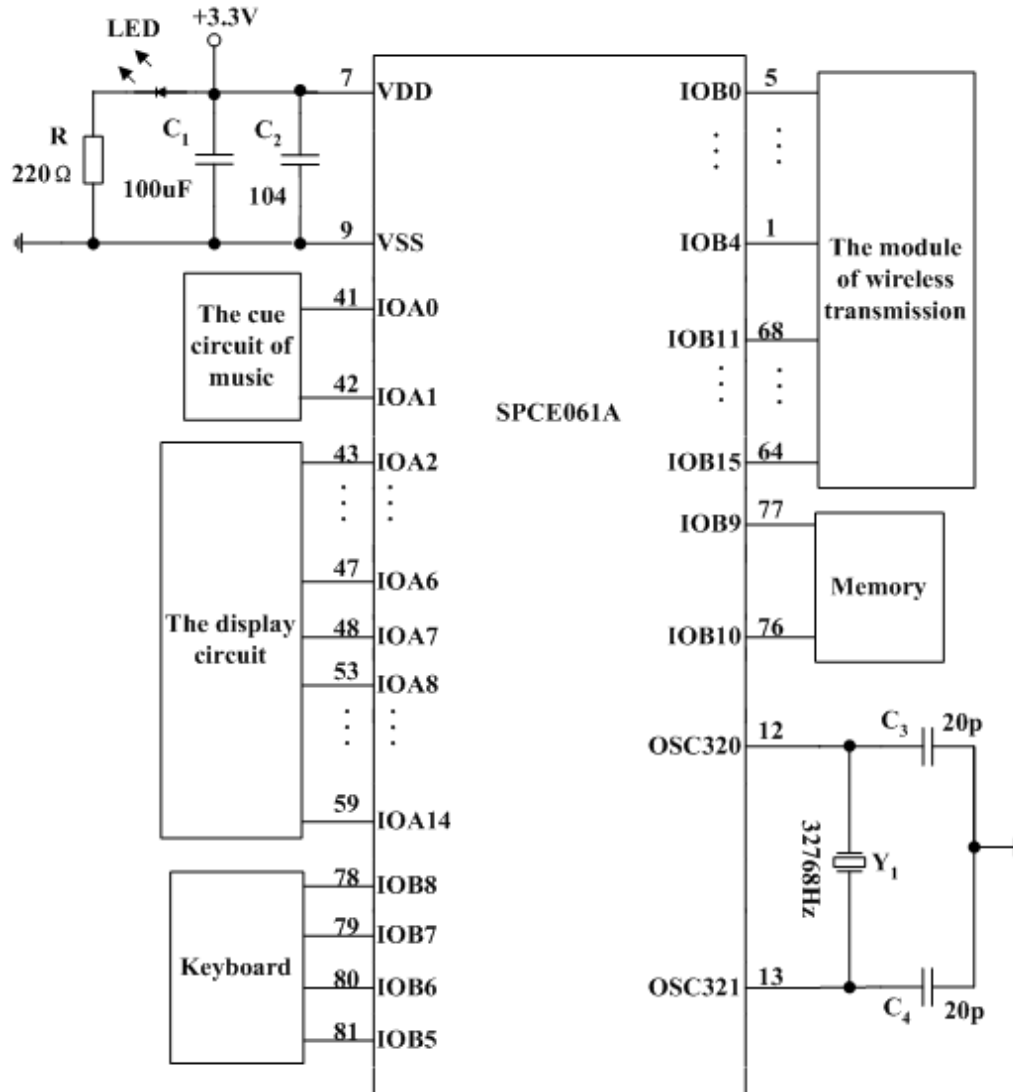
Figure 3. Control circuit of the wireless intelligent ordering terminal

Wireless Transmission Circuit. The corresponding information is transmitted by the module of wireless transmission NRF905, NRF905 is a single chip radio frequency transmitter developed by Norway Nordic Company. NRF905 is composed of frequency synthesizer, a power amplifier, demodulator, crystal oscillator, modulator and other function parts. The module of NRF905 has advantages of extremely high stability performance, relatively simple programming and good effect of partition communication, it has been widely used in intelligent system, signal acquisition, wireless sensor network and other fields [6], and the wireless transmission circuit is shown in Fig. 4.
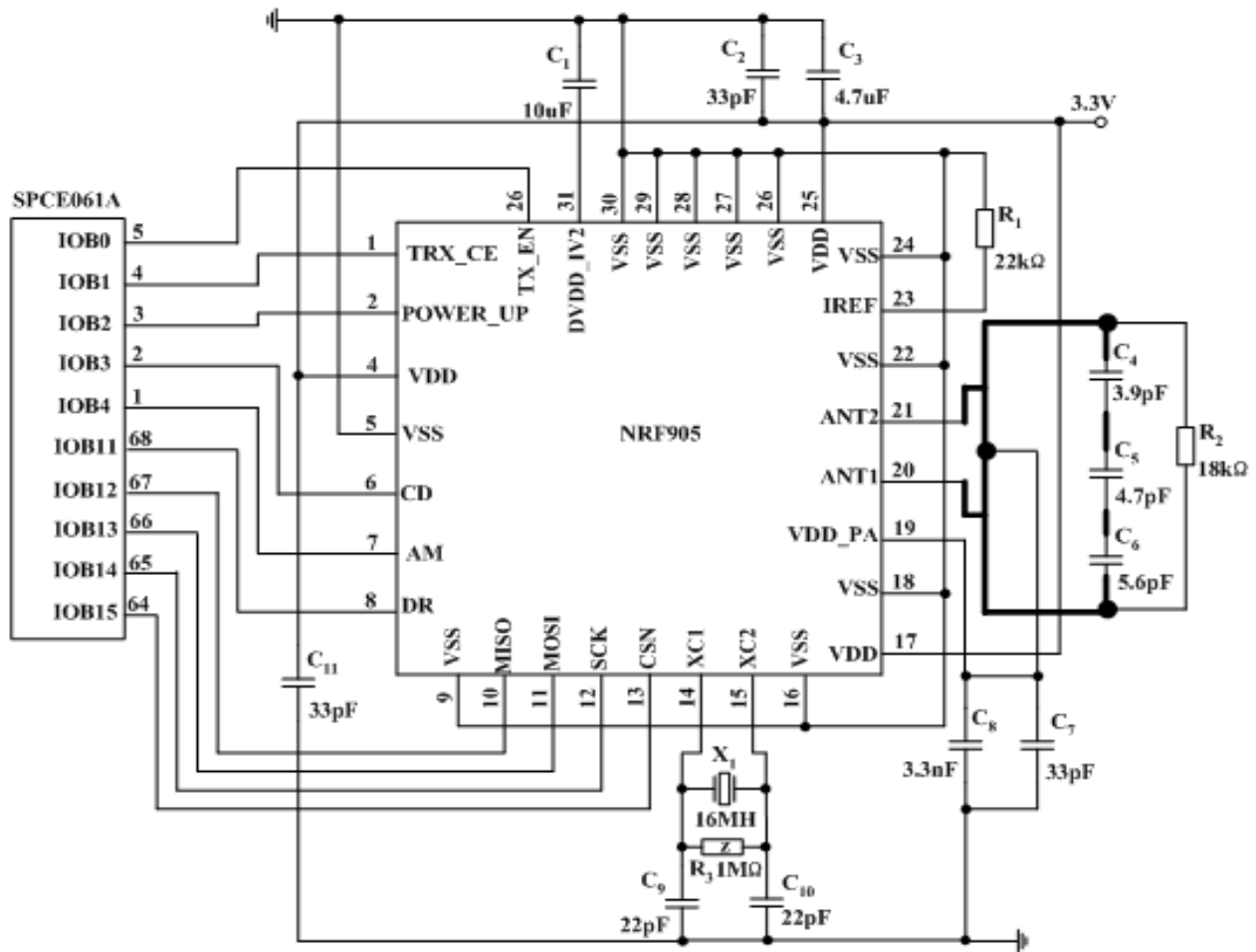
Figure 4. Wireless transmission circuit

Cue Circuit of Music. In the wireless intelligent ordering terminal, when the operation is abnormal, the SCM SPCE061A triggers interrupt, under the control of SPCE061A, the abnormal operation is stopped, and the music sound module is started [7], the corresponding circuit is shown in Fig. 5.
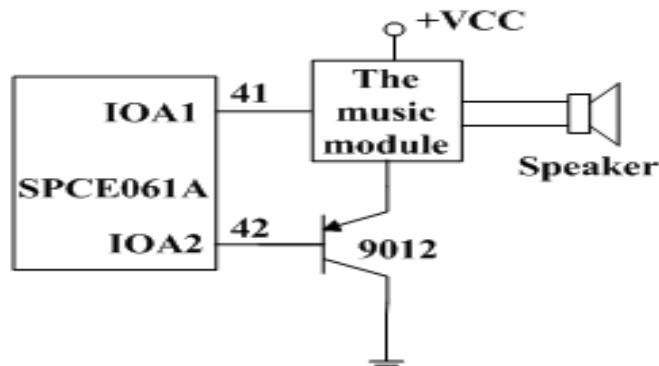

Figure 5. Cue circuit of music

Key Circuit. The 4*4 matrix keyboard circuit is shown in Fig. 6, the key circuit uses only four IO interfaces, it can complete functions which the general circuit needs eight IO interfaces to complete. The 16 push-buttons are defined as 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, A, B, C, D, E, and F.

The number push-buttons are used for table numbers, serial and amounts of dishes, A is choosing dishes, B is ending ordering, C is transmission, D is menu list, F is OK.
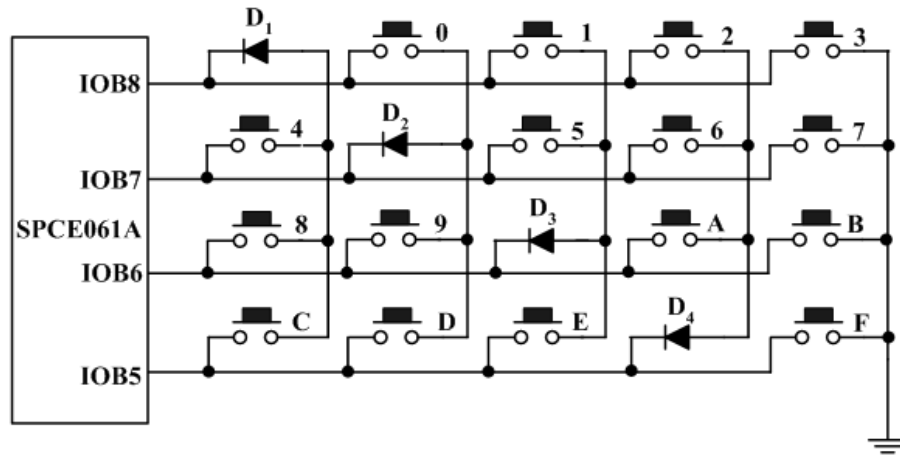

Figure 6. Key circuit

Software Design of the System

Software of the wireless intelligent system for ordering management is programmed by C language and Visual Basic, has completed the control function of the system, in this way, the control function of the system is completed [8][9][10]. The flow chart of the main program of the wireless intelligent ordering terminal, the flow chart of the wireless transmission and the flow chart of ordering management in total station are shown in Fig. 7, Fig. 8 and Fig. 9 respectively.
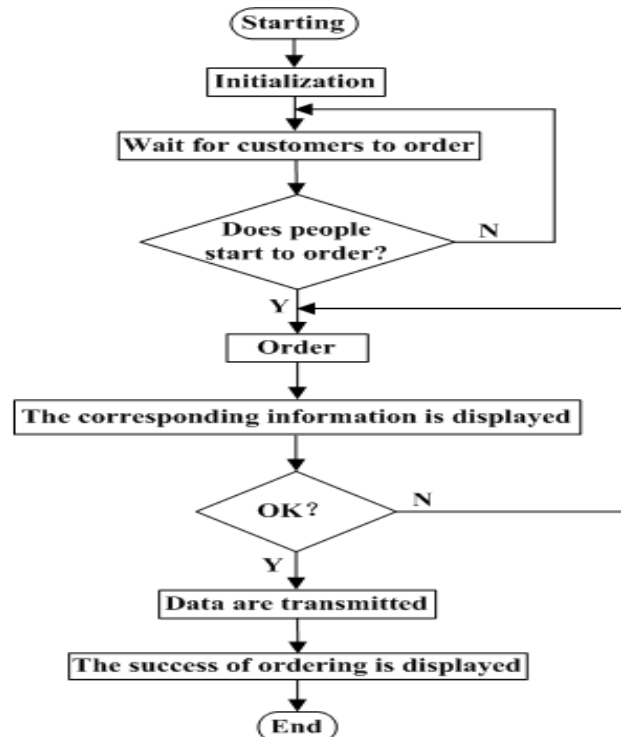

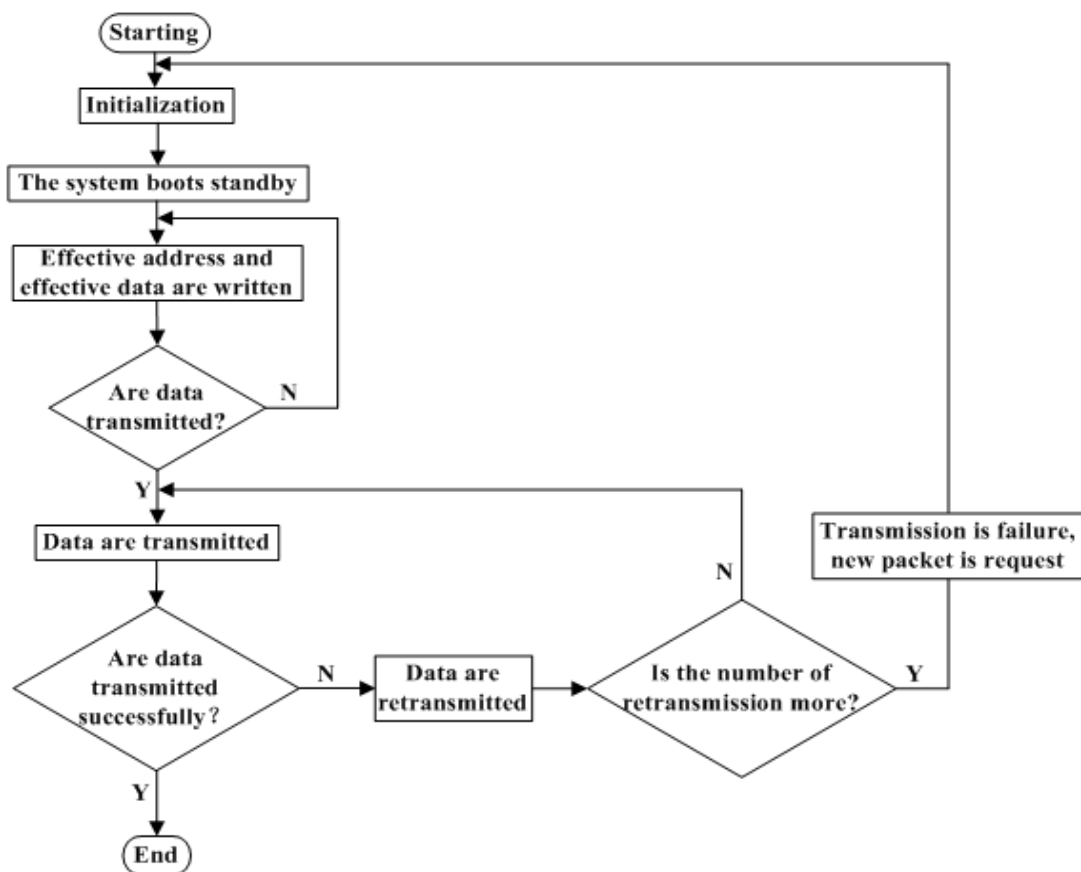Figure 7. Flow chart of the main program of the wireless intelligent ordering terminal

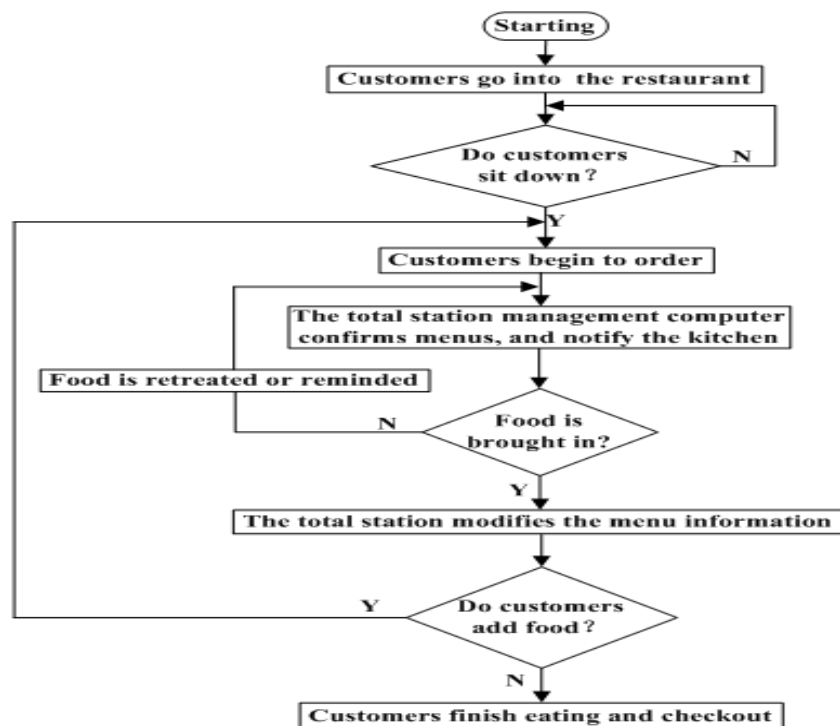Figure 8. Flow chart of the wireless transmission

Figure 9. Flow chart of ordering management in total station

The System Testing. The wireless intelligent system for ordering management has been developed and experienced, it has been on trial in the open laboratory of the department of physics and electronic engineering. Operation results show that the operation is easy, data transmission is accurate, working is stable, the can well realize the intelligent management of order. Terminal ordering interface, main interface of the total station computer management, and bill management interface are shown in Fig. 10, Fig. 11 and Fig. 12 respectively.
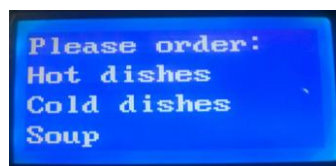

Figure 10. Terminal ordering interface

Figure 11. Main interface of the total station computer management

Figure 12. Bill management interface

Conclusion

Starting from the current development situation of catering management and practical application, comprehensively utilizing a variety of technology, a set of the wireless intelligent

system for ordering management has been researched and designed. The system achieves a good wireless intelligent management function for catering, it is convenient for the customer's consumption, and saves a lot of manpower, material and financial resources for restaurants. The design will have a positive role in enhancing service quality and reducing the cost in restaurants, the wireless intelligent system for ordering management has the advantages of high intelligence, high ratio of performance to price, stable performance, convenient use and easy installation. So it has a good application prospect and will play an immeasurable role in promoting the establishment of a harmonious society.

Acknowledgements

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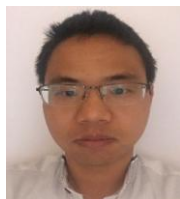
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