

ZIGBEE BASED HOTEL MENU CARD AND ORDERING SYSTEM

Yogita Jagdale¹, Neha Singh², Mr. Devidas Chikale³

Department of Electronics and Telecommunication Engineering

^{1,2,3}Lokmanya Tilak College of Engineering

Navi Mumbai, India

Abstract— A new design scheme of hotel menu card and ordering system applied to all range hotels is proposed in this paper. The 802.15 Zigbee technology is used as wireless communication standard in this paper. There is no need of waiter to take order from table according to system proposed in this paper. The proposed system will have two sections, one section is customer section where the customer and other is billing or supply section. In customer section customer will look for menu and order its menu using joystick. In billing and supply section order will be displayed on their monitor. The communication of customer section to billing or supply section will be done by ZigBee. The proposed system is easy to install and gives a rich environment to the hotels or restaurants.

Index Terms— Zigbee, 802.15, Wireless network, Graphical LCD, PIC16F877A.

I. INTRODUCTION

In today's world we have automation in all sectors except menu card and ordering system. In hotel and catering industry new technologies are always welcomed and are being used by the people. Billing standards are already upgraded in restaurants by using the computers and giving printed bills instead of handwritten. The customers of restaurants or hotels are always concerned of the time consumed along with the money and taste. The older methods of ordering menus in the hotel industry includes more human efforts for getting the order from customer by giving them the printed menu cards on their table, as well as billing is a great task by giving a special attention to their orders. The menu card and ordering system using a graphical LCD for menu and display and ordering menu using joystick will get a great response from hotels. As it will save time of customers, and it will reduce the human efforts of waiter of collecting menus from customers from their table along with that, waiters will get rid of their great task of giving special attention on each table. This system is smarter to communicate. ZigBee will provide a faster and accurate data transmission in a low cost. The system which is proposed in the paper can be used even by an illiterate people. This system can be used by all range of hotels and restaurants, as its cost of installation is cheaper due to the use of ZigBee communication which is used as a

wireless interface and graphical LCD and joystick as customer interface.

II. RESEARCH METHODOLOGY

The background methodology involves the study about the wireless technologies in the market, alternatives for display methods and also about the bill processing and claim methods.

There are various wireless technologies in the market in their category of communication ranges. While choosing a communication technology for out implementation, the first concern to make is, the requirement of communication range. The communication technology to be used should always be enough capable of providing the range of communication as per the application requirement and the frequency band should be enough to carry by the hardware implemented. The next concern about the communication technologies is to choose the less expensive technology which will also satisfy the frequency range. Apart from this all, one more concern is about the modulation technique using in the communication technology. The modulation technique will effects the service quality in data exchange.

The next step of research is about the interface/display technologies, the interface involves displaying the menu items on any output device. Since our proposed system consists of a portable handheld device for menu display at every table, it should be always less expensive and easy to operate by anyone. The portable interfaces can be used with microcontroller are having the choices like Alphanumeric LCD display, that it can display alphanumeric characters on it with the help of inbuilt microcontroller in it. The next stage from alphanumeric LCD's is graphical LCD, it can display the monochrome images also along with the alphanumeric characters.

The research about the billing methods followed by the most of the restaurants is all manual billing method by monitoring the items issued to a particular table, and finally they will issue a paper statement of bill to the customer.

III. HARDWARE DESIGN

A. Customer Section

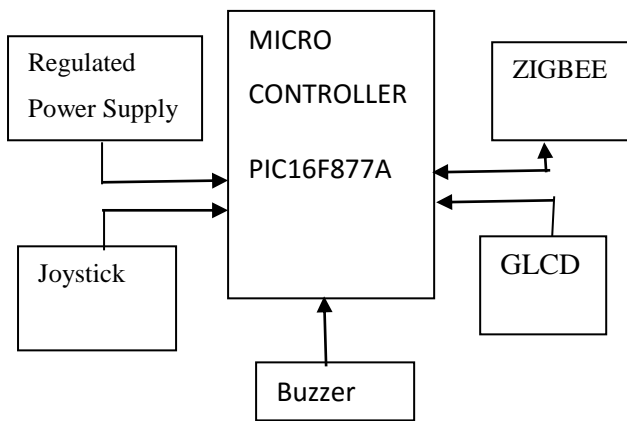


Figure.1 Block diagram of customer section

B. Billing and Supply Section

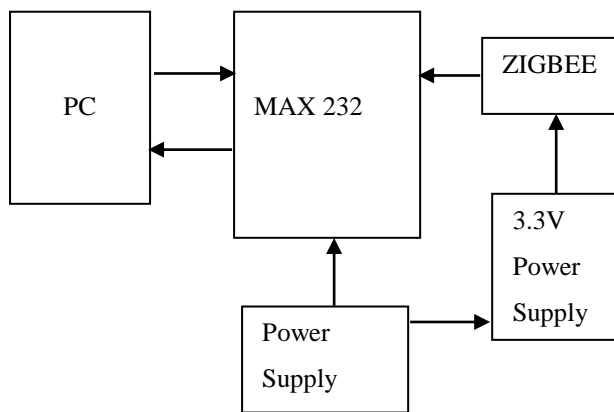


Figure 2. Block diagram of Billing and Supply section

The above block diagrams shows the primary elements involved in two section of the proposed menu ordering system.

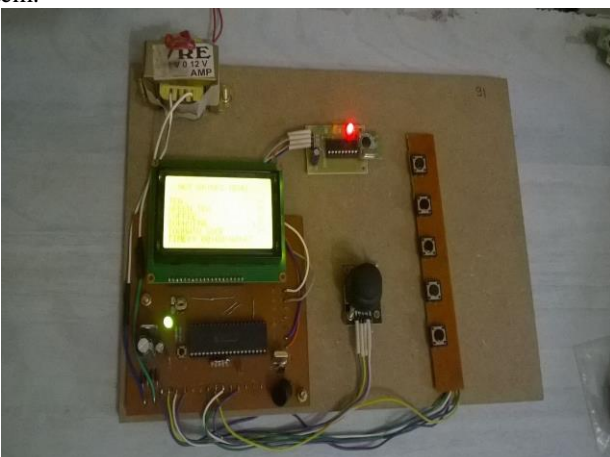


Figure 3. Proposed System of customer section

ZigBee: The IEEE 802.15 standard is named as ZigBee. It is a wireless communication protocol that operates in the frequency range of 2.4GHz. The reason behind choosing the



Figure 4. ZigBee

ZigBee as wireless interface is, it is an open source communication standard. No licensing for band usage is required. It use the OQPSK modulation technique, where the phase of the message signal will vary in terms of its phase with 4 angles. The ZigBee is also faster in data transfer with 20 to 250Kbps based on the frequency used. The major preferable feature in ZigBee is, the Zigbee devices can be used as either receivers or transmitters. So there is no need to use the separate devices for transmission and reception. The operating range of a ZigBee device practically tested is nearly 50m which is an enough range for a restaurant geographical measurements.

Graphical LCD: The graphical LCD used in this proposed system is JHD12864E. The graphical LCD is in general a display which can able to handle the numeric, alphabets and monochrome images. It has two inbuilt controller KS1080.



Figure 5. Graphical LCD

The 128x64 graphical LCD is having two pages and each page can be controlled by one KS1080. The displaying of images or text can be separated into pages and columns in the LCD. First the page should be selected by giving the appropriate command and then the columns selection. Any data to be displayed is given in the form of calculating the pixels in binary form.

PIC16F877A: This powerful(200 nanosecond instruction execution) yet easy-to-program CMOS FLASH-based-8-bit microcontroller packs Microchip's powerful PIC architecture into an 40- or 44- pin package and is upwards compatible with the PIC16C5X, PIC12CXXX and PIC16C7X devices. The

PIC16F877A features 256 bytes of EEPROM data memory, self-programming, an ICD, 2 capture/compare/PWM



Figure 6. PIC16F877A

functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI) or the 2-wire Inter-Integrated Circuit (I²C) bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

IV. SOFTWARE USED

The entire proposed system uses two software tools. They are

- I. Keil u Vision
- II. Flash Magic

Keil uVision: It is an IDE for various microcontrollers such as 8051, ARM family microcontrollers. It is an integrated tool with all the requirements for programming of a microcontroller. It is having a text editor for writing the program code in it. It is having a compiler/debugger for error checking. And also having the Hex file generator for converting the code into binary format for writing it into microcontroller. It provides a programming platform for various microcontrollers with all their library headers.

Flash Magic: After writing the code in IDE, compiling and debugging will be completed in IDE itself. The next step is to write the binary form of the code into microcontroller's flash memory. Flash magic is the tool that provides the writing Hex file into flash memory through UART interface to the computer's COM port. As the LPC2148 is having the internal ISP feature which enables the programmer write the code directly into the microcontroller without using any extra device. The additional software tools used for implementation of this system is uC Flash. This is also a programming tool for 8051 microcontrollers but it is very specific to a programming device of that particular manufacturer. We are not giving much description about this tool because of the programming device is chosen by the user availability and the tool will changes according to the device used.

V. WORKING DESCRIPTION

The ZigBee based menu ordering system starts working from displaying the menu items available in the restaurant on graphical LCD connected to the PIC16F877A microcontroller at every table in the restaurant. The users can choose any of the item by simply tapping the corresponding item switch on the joystick. The joystick will send the corresponding instructions about the selected item to the PIC16F877A. The PIC16F877A will processes the item details and adds the table number to the data and send it to the order/billing section through ZigBee device. The billing/order section will get the items along with the table number on its display with a buzzer sound to alert the attenders at that particular place. After completion eating or delivery of the items of one table, the customer can request for bill. Then the bill will be calculated by the MAX232 in billing unit and sent to the customer section to the corresponding table. The bill amount will be displayed on the graphical LCD then the customer can know the bill and they can pay it.

VI. RESULT

After customer takes seats, the customer selects the item required from the menu displayed on GLCD, the customer selects the item using joystick then the data will be send to the controller then the controller receives the data and transmit the data to the main section through ZigBee and the billing section will receive the data and data displayed on PC contain the information like item ordered by the customer and quantity required by customer as shown in below figures.



Figure 7. Displayed menu on GLCD

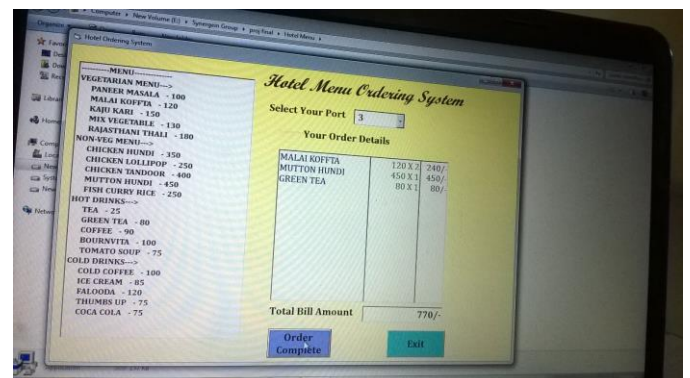


Figure 8. Billing section



Figure 9. Payment to be made by customer

VII. CONCLUSION

The implemented system of restaurant menu ordering system is a modern and smart solution for menu ordering methods in any kind of restaurant. The system will reduce the manual efforts and also gives more accuracy in calculating the bill for each individual table. It is also a low cost alternative to be used by middle and low level restaurants also. In this paper, a high performance-cost ratio wireless handheld ordering terminal is proposed, which is based on the hardware platform of ARM7, and ZigBee wireless communication technology. The ordering terminal has the advantages of simple structure, stable operation, low power consumption and friendly interface, thus it has bright market prospect.

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