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ZigBee Based E-Menu Ordering System

Abstract: A new design scheme of the E-Menu ordering terminal applied to middle and small hotel is proposed. The development of the E-Menu ordering is based on the software-hardware platform on ARM7 (LPC2148), using ZigBee short-range radio communication technologies. It has advantages of high performance-cost ratio, low power, high reliability and friendly user interface. This paper introduces two sections one is hand held device section and other is main section. Both sections consist of Zigbee transceivers. From the first section menu should taken and saved in memory in that section. This information is forwarded to the main section via Zigbee wireless communication. Main section will receive the information from the first section and stores that data in memory. According to that order which is stored in memory service is provided. Here LCD is used to display the data PC is used to display data and record for billing.

Keywords: Touch Screen, GLCD, ZigBee.

1. INTRODUCTION

Utilizing information technology to upgrade the service quality and management efficiency has always been received great concern in information development of catering industry. E-Menu Ordering System can help catering enterprises reduce the costs of human resources, improve work efficiency and leap forward from the external image to the internal service quality. Using wireless modules, can save the development costs. However, the user interfaces are not friendly, input errors easily occurs, and the display is single color. And besides, because of using infrared ray communication, transmission range will be extremely limited. The analysis shows that the scarcity of wireless ordering system for the medium-sized hotels directly leads to promote slowly. Through comparing with different grades of E-Menu ordering systems, the key difference lies in selection of ordering terminal and wireless communication. In this paper, the development of wireless handheld terminal is based on the Software-hardware platform of ARM7 (LPC2148) and, using ZigBee short-range wireless communication technologies.

BHANU SIRAMSHETTI: M.Tech, Dept of ECE, CMR College of Engineering & Technology, Hyderabad, AP-India.
P.RAVEENDRA BABU: Assoc Prof, Dept of ECE, CMR College of Engineering & Technology, Hyderabad, AP-India.
K.BHAVIKA: Asst Prof, Dept of ECE, CMR College of Engineering & Technology, Hyderabad, AP-India.

2. HARDWARE REQUIRED

A. ZigBee Module

The ZigBee network is defined by the ZigBee Alliance and based on the IEEE 802.15.4 standard, which is target data RF embedded applications that require a low data rate, long battery life and secure networking. It is intended to operate in the 2.4GHz unlicensed ISM band [1-2]. There is no large numbers of data which need to convey between the wireless ordering terminal build-in ZigBee module and the center node, and because of having no high requirement of data rate, so ZigBee is well suited for wireless ordering system. Each ZigBee modules includes an IEEE 802.15.4-compliant radio, an 8051 microcontroller, programmable I/O, flexible antenna and range solutions, Transmit range is up to 300m, which can meet the demand of wireless ordering system completely.

ZigBee module can be configured in star, mesh, and cluster tree network topologies. IP-Net includes support for our innovative ‘serial mesh mode’, allowing RS232/RS485 data streams to be transmitted over multiple hops to improve data reliability and increase transmission range. ZigBee Wireless network of restaurant which is configured in star topology. In this routing topology, data traffic and network commands are routed through a central node. Peripheral nodes require direct radio contact with the central node. An ordering end device acted as a peripheral node in the network is an RFD, it have stringent requirements for low power and memory space. An IEEE 802.15.4 network requires at least one FFD usually line powered to act as a network coordinator. The coordinator sets up a network, initializes a network,

manages network nodes, stores network nodes information, and transmits to control center server via RS232.

B. GLCD and Touch Screen

The handheld ordering terminal implements human computer interaction by 128x64 GLCD and touch screen. There is a high performance GLCD Controller integrated on chip. CPU transfers pixel data to GLCD screen. The terminal uses 4-wire resistive touch screen. S3C44B0X need sampling to judge whether a touch screen has been touched. FM7843 is a 4-wire resistive touch screen input controller integrated circuit which is widely applied to small portable devices battery powered. The device is a 12-bit analog-to-digital converter with a synchronous serial interface and touch screen driving circuit.

3. SOFTWARE REQUIRED

A. Kiel software
B. Embedded ‘C’
C. Flash magic

We use Kiel software to write the program and execute it, program is written in the embedded ‘c’ language, after completion of executing the program hex file program is dumped into the controller using flash magic

A. GLCD

```
#define GH_LCD_ON   0x3F
#define GH_LCD_OFF   0x3E
#define GH_LCD_SET_PAGE_ADD 0xB0
```

#define GH_LCD_ON 0x3F command is used to on the glcd and #define GH_LCD_ON 0x3E is used to OFF the glcd #define GH_LCD_SET_PAGE_ADD 0xB0 is used to select the page of glcd on which data to be displayed we use 4pages glcd in this paper tha pages can be selected (0xB9/A/B/C).

```
Void quantity (void);
Unsigned char one_page1[]={0x00,0x08,0x0c,0xff,
0xff,0x00,0x00,0x00};
Unsigned char one_page1[]={0xc0,0xc0,0xc0,0xff,
0xff,0xc0,0x0c,0xc0};
```

Void quantity(void) is the function called in the main function and the above instruction is used to display the image 1 on glcd by using this command the image of 1 will be displayed on glcd

B. LCD

```
Lcd_Init();
Lcd_Data_Chr (bit, unsigned char line, unsigned
char pos, unsigned char temp1);
Lcd_Wr(unsigned char);
```

Lcd Init(); is used to initialize the lcd include the selection of lines , and to select where to display the cursor. Lcd_Data_Chr (bit, unsigned char ,unsigned char, unsigned char temp1); bit indicates the if it is 0 it indicates as command if 1 it indicates data, unsigned char line indicates the on which line data to be displayed, unsigned char position indicates from which potion data has to be displayed on lcd unsigned char *temp temp is the data which will be displayed on lcd. Lcd_Wr(unsigned char) to write the data on lcd RS=0/1(cmd/data) should be selected, ans EN=1.

C. Touch screen

```
#define X      (1<<29)
#define X_minus (1<<30)
#define Y      (1<<28)
#define Y_minus (1<<27)
Void Pin_config_touch(void);
Void Read_Y_Cord(void);
Void Read_X_Cord(void);
```

The inputs from the touch screen to the controller is x, xminus, y, y minus is given to the controller to the pins (27, 28, 29, 30) of port1, void Pin_config_touch(void) is used for setting the configuration to the inputs in order to detect the touch, void Read_Y_Cord(void) is used to read Y the coordinate value void Read_X_Cord(void) is used to read the X coordinate.

4. FUNCTIONAL DESCRIPTION

The E-Menu ordering is mainly applied to middle and small hotels are proposed. By using this technology help catering enterprises reduce the costs of human resources, improve work efficiency and leap forward from the external image to the internal service quality.

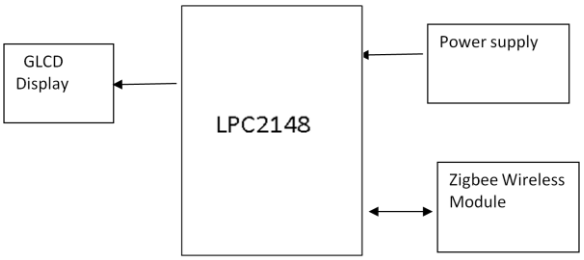

Fig1: Block diagram of handheld section

In this wireless handheld ordering system there will be one center server (main section), and any number of slaves (customer section). In this the data from the different slaves will be transmitted to the main section (master) through Zigbee. In this paper we have one main section and five handheld sections (customer section). In the customer section (slave) we have one GLCD (Graphical LCD), one ARM7 (LPC2148), Zigbee transmitter and at main section we have one controller, buzzer, LCD, PC, Zigbee receiver. When the customer take seats and he orders the requirements by using GLCD on which the items are displayed in images format, and when the customer selects the item, the input from the touch screen will be sent to the controller of ports p1(27,28,29,30) the data from the controller will be in analog form and controller will convert the analog data to digital data by using in built ADC, the controller receives the data in digital form and according to user input the controller will display the data(images) on GLCD which is connected to the port0(17-24) and sends the data to the zigbee through the transmitter pin(P0.1) then the zigbee transmits the data to the main section zigbee,

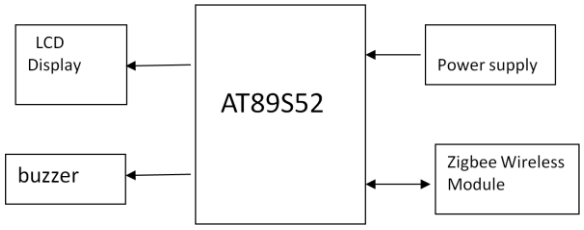

Fig2: block diagram of main section

The main section zigbee receives the data transmitted by the handheld section zigbee and sends the data to the controller 10th pin and as soon as the data has received, the controller will make the pin(p2.2) high to which the buzzer is connected, when it is made high then the buzzer will blow which indicates data has received and the controller in mean while display the data(order by the customer which) on the LCD is connected to the controller to the port1 pins and the controller will send the data to different section of server and it will display the data on PC as table no, items ordered by the customer for billing.

Fig 3(a): zigbee module

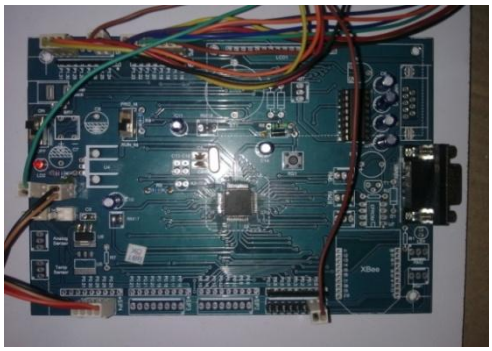

Fig3 (b):arm7 (lpc2148) controller

Fig3(c): GLCD

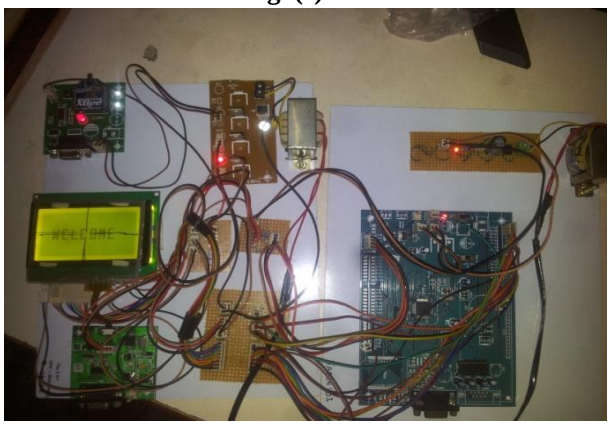

Fig3

Fig(d): Handheld section

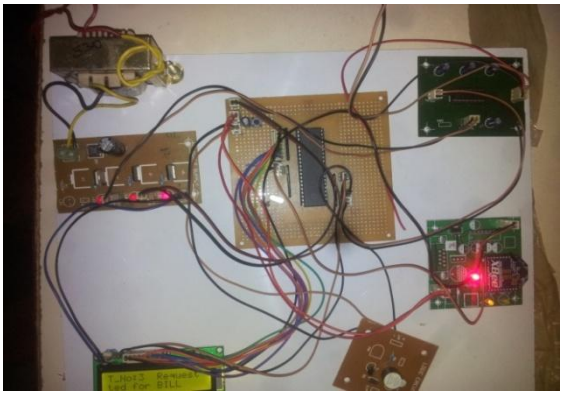

Fig 3(e): Receiver section

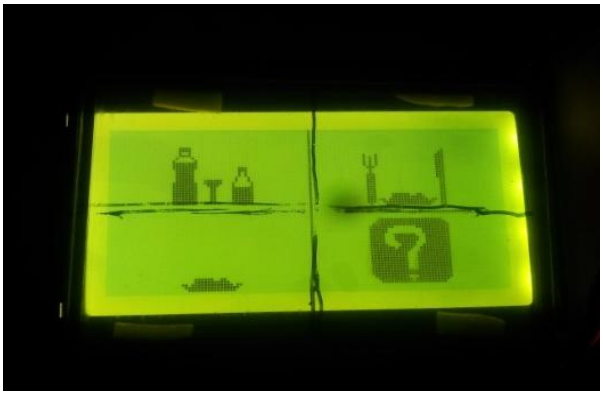

Fig 3(f) Menu display on GLCD

5. RESULT

After customer takes seats, the customer selects the item required from the menu displayed on GLCD, the customer selects the item using touch then the data will be send to the controller then the controller ask for the quantity required then the customer selects quantity required displayed on GLCD then the controller receives the data and transmit the data to the main section through zigbee and the main section will receive the data and displays the data on LCD data displayed on LCD contain the information like table no, item ordered by the customer and quantity required shown in fig(g)

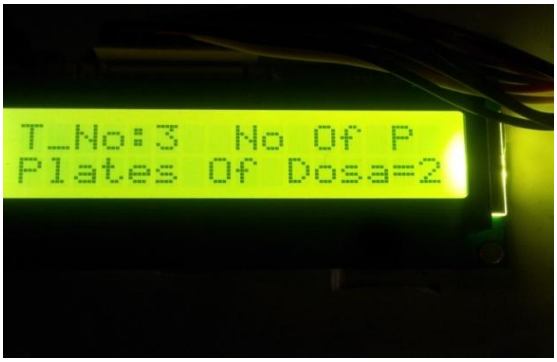

Fig 3(g): order displayed at the main section order by the customer

Testing

The handheld terminal transmits data, and the receiver controller is connected to the PC and LCD with ZigBee wireless module receives data. The receiving data display in hyper terminal of PC and on the LCD. Experimental testing results in different interval distances show no data loss over 30mtrs

6. CONCLUSION

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

References:

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