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Wireless Food Ordering System

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***Abstract* --The Wireless Food Ordering System aims to design and develop a wireless food ordering system in the restaurant, cafeteria or any other food services. The project application will become an important tool for restaurants to improve the management aspect by utilizing PC to coordinate food ordering and this could increase efficiency for restaurants and caterers by saving time, reducing human errors and by providing higher quality customer service. With the combination of simple design and readily available emerging communications technologies, it can be concluded that this system is an attractive solution for the Hospitality industry. A micro controller based wireless restaurant order taking/ transmission system. It requires Microcontroller, LCD module, RF data Modem etc.**

Keywords -PIC Microcontroller; RF Module; automated; ordering; and Graphical User Interface.

I. INTRODUCTION

This restaurant system is ideal for all catering environments being a pizzeria, a fast-food, a cafeteria or any other food-service. The restaurant system can be installed on any computer running Microsoft Windows. You do not need any special expensive hardware to run the system. It can even run on any Pentium computer. In these modern days the number of restaurant are increasing. They also require very fast processing for serving food to the customers. With the increasing number of customers, it would require more man power, since the current situation has become hectic for the restaurants. Also changes in the hardcopy of the menu can't happen. By using simple components and programming techniques, an automation system is proposed. The project mainly aims in designing completely automated menu in restaurants with the help of microcontroller and GUI using RF module and a LCD to provide a user-friendly environment. The menu will be displayed automatically on the LCD on customer table using wireless RF connectivity and we can directly order the menu with the help of keypad.

II. EXISTING SYSTEM

In the existing system, order is taken from the customer manually by a written note which needs a person to go near the table, show the menu card and ask for the order. After placing the order, the person will pass the information to the concerned section and the order is delivered accordingly to the customer.

III. DESCRIPTION OF THE PROPOSED SYSTEM

The wireless food ordering system uses microcontroller, LCD display, RF module, keypad, buzzer, RS232 Converter and PC. The project is divided into two parts hardware and software. This project makes use of GUI (Graphical User Interface) to display the ordered menu on the kitchen section. This project is divided into two sections i.e. transmitter (customer table) and receiver (kitchen section). The power supply circuit in transmitter is based on 3 terminal voltage regulators, which provide the required regulated +5V. Power is delivered initially from standard 12V AC/DC adapter or 12V_500ma Transformer. This is fed to bridge rectifier the output of which is then filtered using 1000uF electrolytic capacitor and fed to voltage regulator IC 7805. +5V output powers the micro controller and other logic circuitry. LED and its associate 1K current limiting resistors provide power indication.

In transmitter RF module in interfaced to TX and RX pin which is present in port C of microcontroller. RF module works in half duplex mode. LCD is interfaced to port C and port E of microcontroller. Microcontroller sends the data signals through RC0 – RC3 and control signal through RE0 and RE1 of the micro controller. Pin no 3 of the LCD is used to control the contrast by using preset of 20k. Switches are interfaced to port B of microcontroller and Port B is pulled up via 10K resistor bank. Switches are used to select items, increase or decrease the quantity of item, display the ordered items, reset, select items, and confirm the order. It is always best connecting the switch to ground with a pull-up resistor. When the switch is open, the 10k resistor supplies very small current needed for logic "1". When it is closed, the micro controller port pin is short to ground. The voltage is 0V and the entire sinking current requirement is met, so it is logic "0". The 10k resistor will pass 0.5 mA (5 Volt /10k ohm). Thus the circuits waste very little current in either state. Clock signal for the microcontroller is provided by crystal oscillator of 4 MHZ and two 33PF capacitors to ensure correct loading for the crystal, so that it starts reliably.

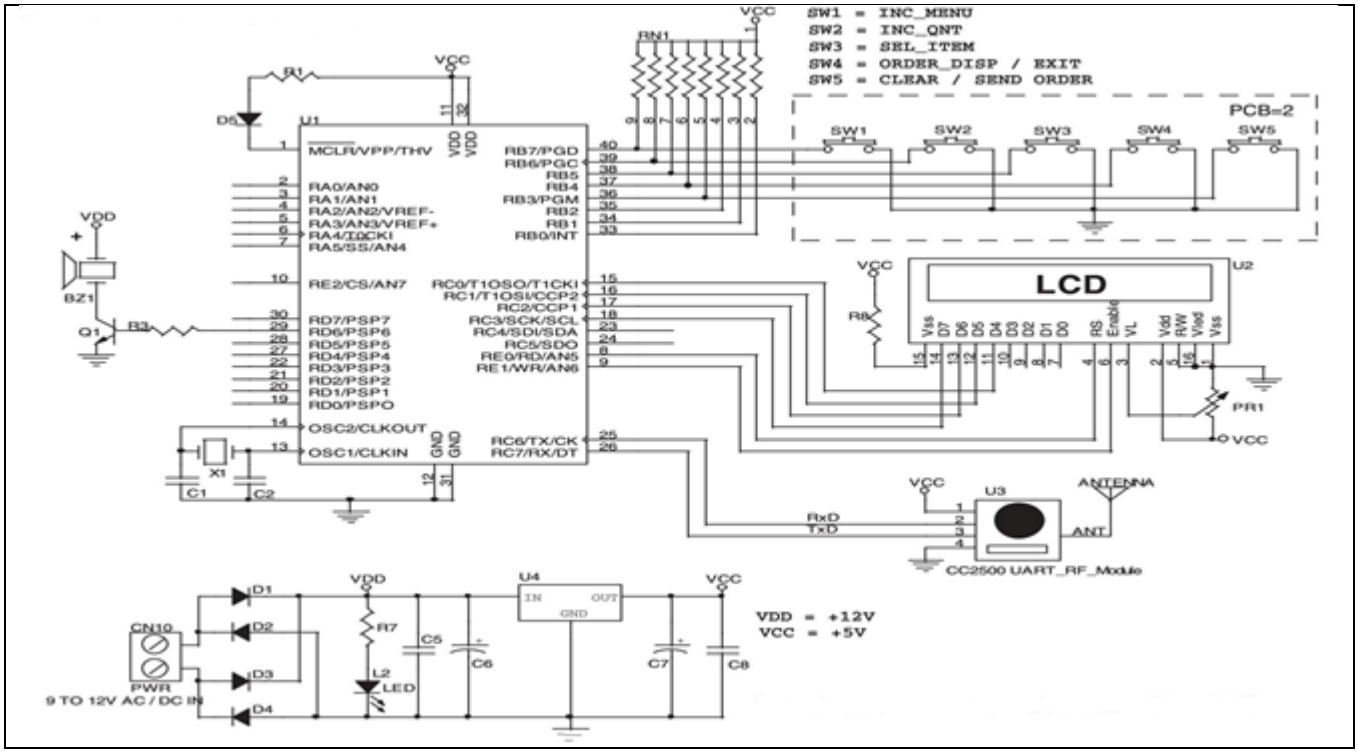

Figure 1. Transmitter circuit diagram

In the receiver section RS232 and IC MAX232 is used to interface between RF module and PC. The RS232 specifies that logic '1' is represented by +12.5V and logic '0' is represented by -12.5V. This obviously presents many problems for RF Module that are running at +5V. That is where the level converter comes into play; it converts -12.5V to 0V and 12.5V into 5V, standard TLL logic levels. This makes interfacing with the RF module extremely easy. The communication between the RF module and PC requires an RS-232 interface which serves to convert the CMOS TTL output voltage of the RF module (0-5 volt) into a voltage of+/- 12 volt. The converter uses the MAX232 converter IC. The connection of MAX232 to the PC uses the RS232 data cable. By using Graphical User Interface in PC, we can easily update the menu of the restaurant. For GUI we make use of Visual Studio.

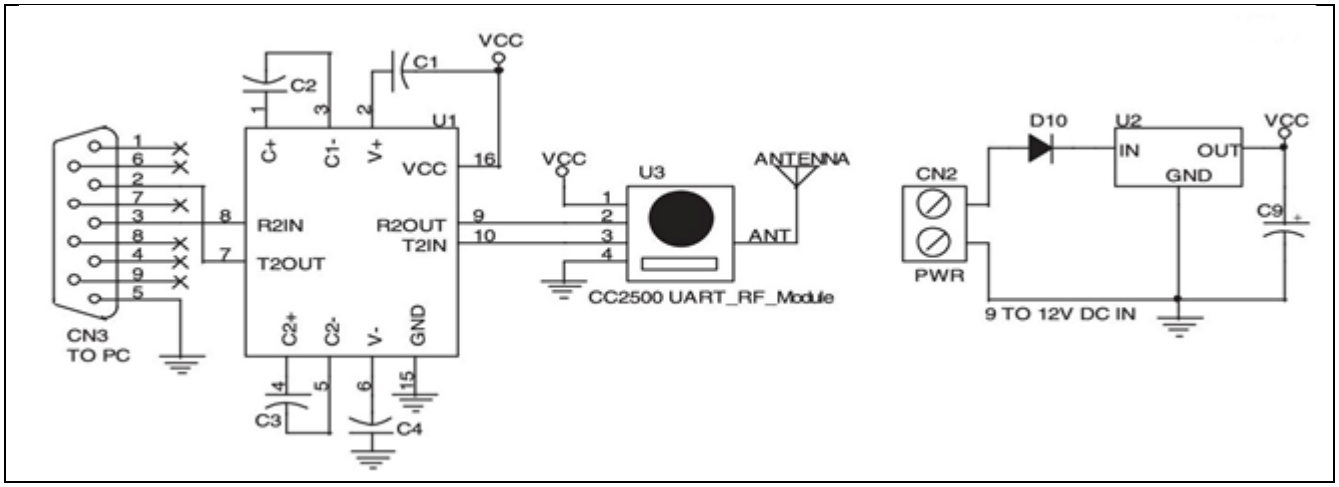

Figure 2. Receiver circuit diagram

3.1. Hardware components used in the model

Microcontroller PIC16F74, 16*2 LCD, Switches, LM 7805 voltage regulator, CC2500 UART RF Module, Buzzer, RS232, MAX232, Power supply, Crystal Oscillator, Misc. (Resistor, Capacitor, Diode, LED).

3.2. Software Requirement

- **Microsoft Visual Studio:** Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs for Microsoft Windows, as well as web sites, web apps, web services and mobile apps.

3.3. Components Description

3.3.1. PIC16F74 Microcontroller

This powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) 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 PIC16F74 features 8 channels of 8-bit Analog-to-Digital (A/D) converter with 2 additional timers, 2 capture/compare/PWM functions and 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.

3.3.2. FSK UART RF Module (2.4 GHz)

CC2500 UART RF data modem working at 2.4 GHz frequency in half duplex mode with automatic switching of receive/transmit mode with LED indication. Receives and Transmits serial data of adjustable baud rate of 9600/4800/2400/1200 bps at 5V or 3V level for direct interfacing to microcontrollers. This model can work with other 2.4 GHz models. RF modem can be used for applications that need two way wireless data transmission. It features high data rate and longer transmission distance. The communication protocol is self-controlled and completely transparent to user interface. The module can be embedded to your current design so that wireless communication can be set up easily. This module works in half-duplex mode. Means it can either transmit or receive but not both at same time. After each transmission, module will be switched to receiver mode automatically. The LED for TX and RX indicates whether module is currently receiving or transmitting data. The data sent is checked for CRC error if any. If chip is transmitting and any data is input to transmit. When you power on the unit, the TX LED will briefly blink indicating that initialization is complete and it is ready to use.

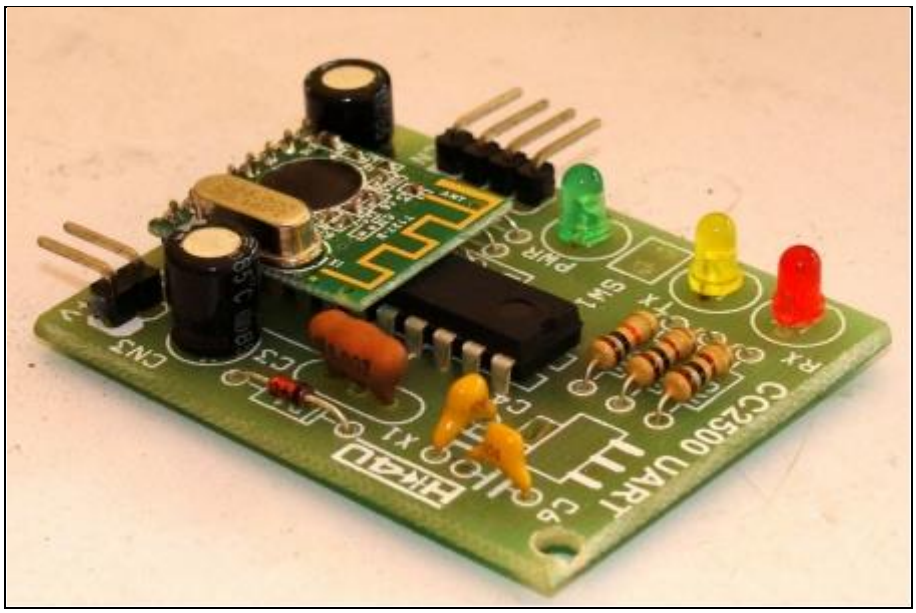

Figure 3. RF Module

3.3.3. 16*2 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

3.3.4. PC RS232 Interface

The RS232, also more commonly known as the serial, specifications specifies that logic '1' is represented by +12.5V and a logic '0' is represented by -12.5V. This obviously presents many problems for RF Module that are running at +5V. That is where the level converter comes into play; it converter -12.5V to 0V and 12.5V into 5V, standard TLL logic levels. This makes interfacing with the RF module extremely easy. The schematic shows the simplicity of the design by using one of IC's level converters. It includes a Charge Pump, which generates +10V and -10V from a single 5V supply. This IC also includes two receivers and two transmitters in the same package. This is handy in many cases when you only want to use the Transmit and Receive data lines. The communication between the RF module and PC requires an RS-232 interface which serves to convert the CMOS TTL output voltage of the RF module (0-5 volt) into a voltage of+/- 12 volt. The converter uses the MAX232 converter IC. The connection of MAX232 to the PC uses the RS232 data cable.

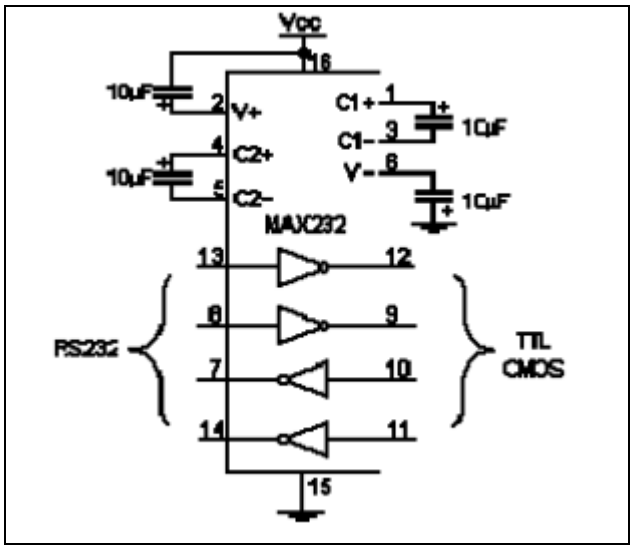

Figure 4. IC MAX232

3.3.5. Switches (Button) Interfacing

A switch is a mechanical component which connects two points over its contacts. By function, button contacts can be normally open or normally closed. It is always best connecting the switch to ground with a pull-up resistor. When the switch is open, the 10k resistor supplies very small current needed for logic "1". When it is closed, the micro controller port pin is short to ground. The voltage is 0V and the entire sinking current requirement is met, so it is logic "0". The 10k resistor will pass 0.5 mA (5 Volt /10k ohm). Thus the circuits waste very little current in either state.

3.4. Advantages

- Handheld Wireless systems save time and money.
- Allows faster and more efficient service.
- Possible reduction of wait-staff.
- Creates speed of order taking.

3.5. Limitations

- This system has high initial cost.

- Complex programming for hardware.

IV. CONCLUSION

The system would attract customers and atomized system will reduce chaos and confusion at food pick up counters. Thus, we present an automated food ordering system with features of feedback and wireless communication. This system is convenient, effective and easy thereby improving the performance of restaurant's staff. It will also provide quality of service and customer satisfaction. Thus, the proposed system would attract customers and also adds to the efficiency of maintaining the restaurant's ordering sections.

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