AUTOMATIC RESTAURANT ORDER SYSTEM USING ZIGBEE

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INTRODUCTION

Automation is the Technology Concerned with Application of Mechanical, electronics & computer based systems to operate & control production. Due to advancement in technology we have seen atomization of many things. We have seen an atomized vending machine which will serve a hot or soft drinks, Chocolates &many things. There is automation of tickets on railway station. So into day's world due increased demand and competition we need to serve the people as user friendly as fast as possible. In restaurants menu cards are available on each table .we can refer it & place our order to waiter. But we never noticed disadvantages of this conventional method. You need to wait for the waiter to attend to you. Even it becomes difficult for the restaurant manager to keep the changing prices on menu card. At the same time adding the new menu to the same card becomes tedious job for anyone who is responsible for this job since changing menu card within less time may result in cost rise. To overcome these problems, this system installed on every table for ordering the menu. These units will work as slave units & will be connected to central unit which can be kept at managers table.

PRINCIPLE

This project provides a low-cost, convenient and easy to use system for automating order placement system for restaurants. Each table of restaurant has a menu display unit which is powered by microcontroller. The client will scroll menu list using keypad provided along with. Customer could order his food or drink just using this keypad.   Our aim is to build an automated order system using ZIGBEE. We shall provide each table with a microcontroller based order placement unit. The unit shall have a keypad to browse through the menu. The menu items, their cost and information shall be displayed on the LCD connected to microcontroller. User can navigate through menu using keypad provided. The data for the menu can be written on an EEPROM connected to each such microcontroller based unit, so that portable data updating is possible (by changing only the EEPROM). Upon finalizing the order the user will be able to place it using keypad. The order placed shall be transmitted to the central server (PC) which will also have a ZIGBEE module connected to it for data reception. Multiple such slave units can be installed.

KEYPAD

Keypads are a part of HMI or Human Machine Interface and play really important role in a small embedded system where human interaction or human input is needed. Matrix keypads are well known for their simple architecture and ease of interfacing with any microcontroller. In this part of tutorial we will learn how to interface a 4x4 matrix keypad with AVR and 8051 microcontroller.

CONSTRUCTING A MATRIX KEYPAD

Construction of a keypad is really simple. As per the outline shown in the figure below we have four   rows and four columns. In between each overlapping row and column line there is a key.
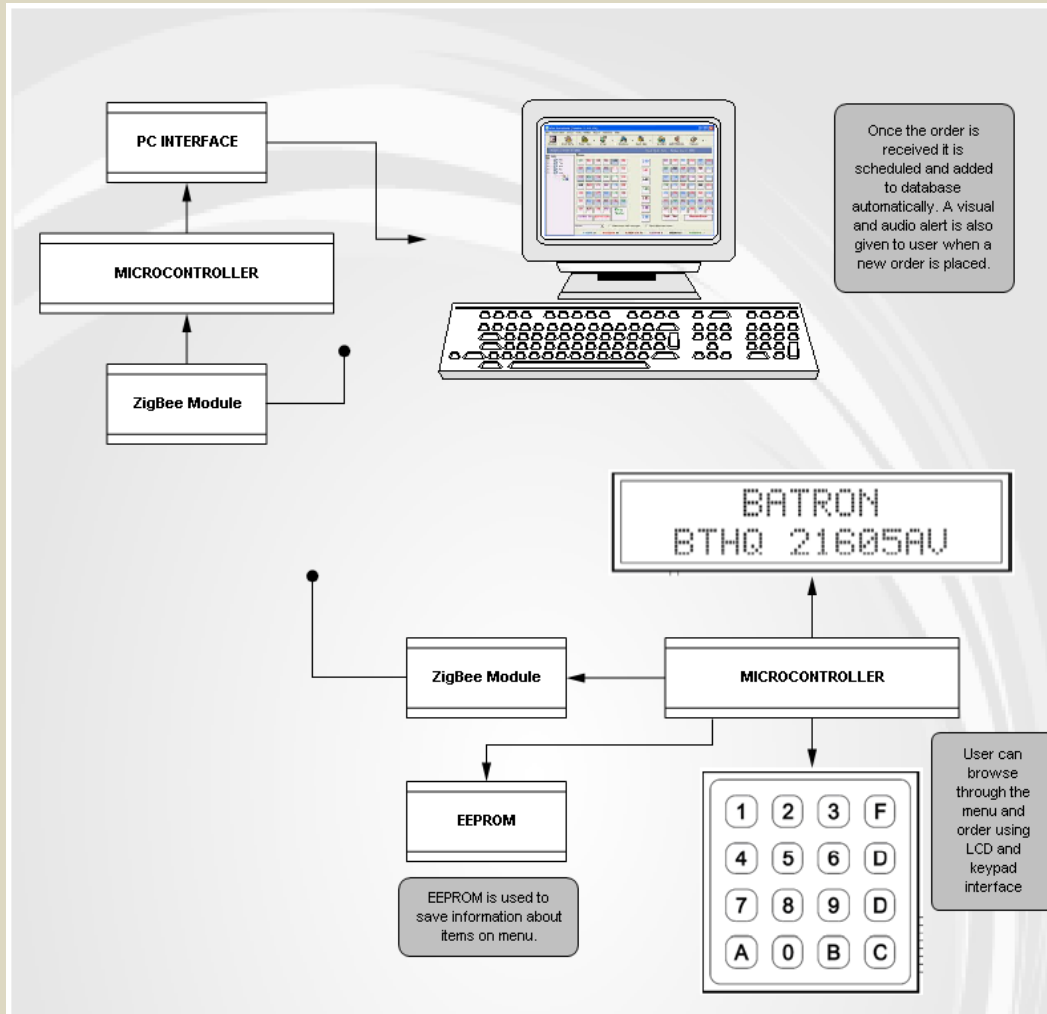
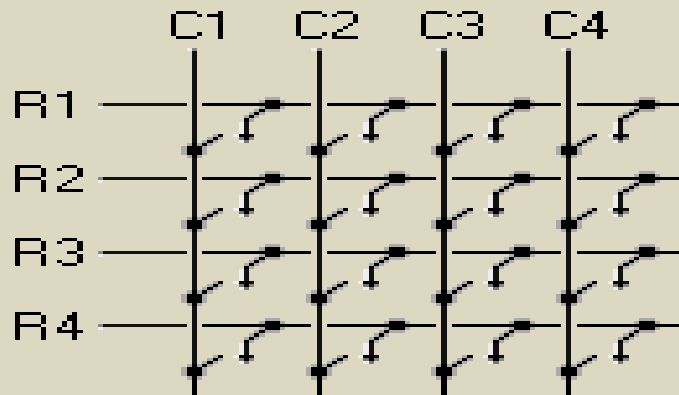*Fig.1 Basic Block diagram of Automated Restaurant Using ZIGBEE Module*

Fig. 2.Matrix Keypad.

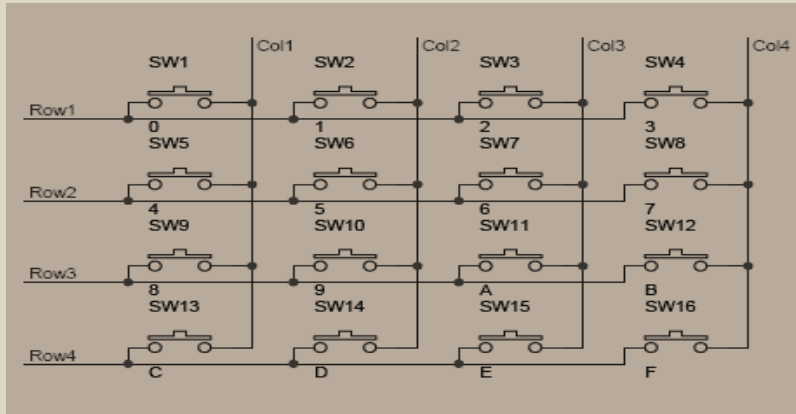So keeping this outline we can construct a keypad using simple SPST Switches as shown below:

Fig.3. Keypad Using SPST.

Now our keypad is ready, all we have to do is connect the rows and columns to a port of microcontroller and program the controller to read the input.

SCANNING A MATRIX KEYPAD

There are many methods depending on how you connect your keypad with your controller, but the basic logic is same. We make the columns as I/P and we drive the rows making them o/p, this whole procedure of reading the keyboard is called scanning. In order to detect which key is pressed from the matrix, we make row lines low one by one and read the columns. Let's say we first make Row1 low, and then read the columns. If any of the key in row 1 is pressed will make the corresponding column as low i.e. If second key is pressed in Row1, then column2 will give low. So we come to know that key 2 of Row1 is pressed. This is how scanning is done. So to scan the keypad completely, we need to make rows low one by one and read the columns. If any of the button is pressed in a row, it will take the corresponding column to a low state which tells us that a key is pressed in that row. If button 1 of a row is pressed then Column 1 will become low, if button 2 then column 2.
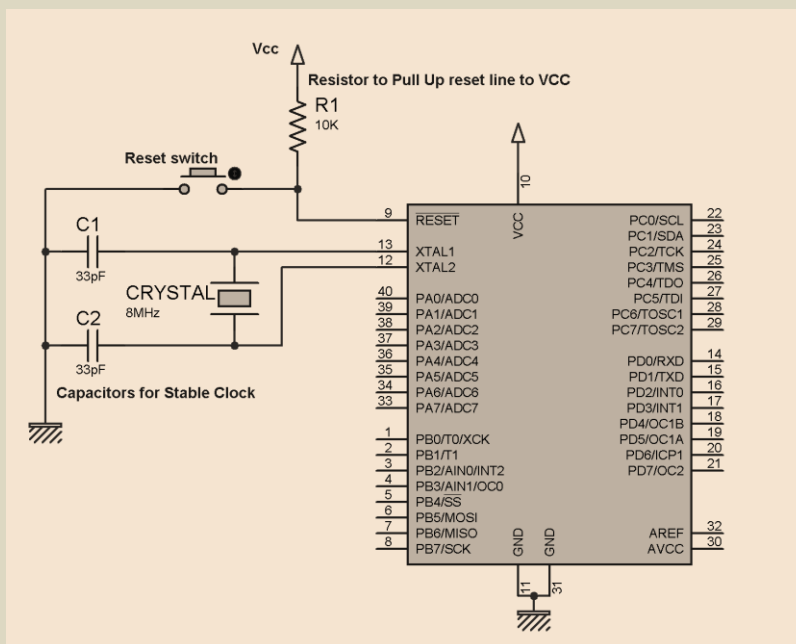

Fig 4. Circuit For AVR Microcontroller

MICROCONTROLLER

Above circuit shows minimum circuit connections for using an atmega16 / atmega32 in a circuit. The   Atmega IC's can run without external crystal oscillator but for better timing performance, use of external crystal is preferred. The circuit shows the Vcc and GND pins of atmega32 which are important.

LCD

The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. In this tutorial, we will discuss about character based LCDs, their interfacing with various microcontrollers, various interfaces (8-bit/4-bit), programming, special stuff and tricks you can do with these simple looking LCDs which can give a new look to your application.

PIN DESCRIPTION:

The most commonly used LCDs found in the market today are 1 Line, 2 Line or 4 Line LCDs which have only 1 controller and support at most of 80 characters, whereas LCDs supporting more than 80 characters make use of 2 HD44780 controllers. Most LCDs with 1 controller has 14 Pins and LCDs with 2 controller has 16 Pins (two pins are extra in both for back-light LED connections).Pin description is shown in the table below.
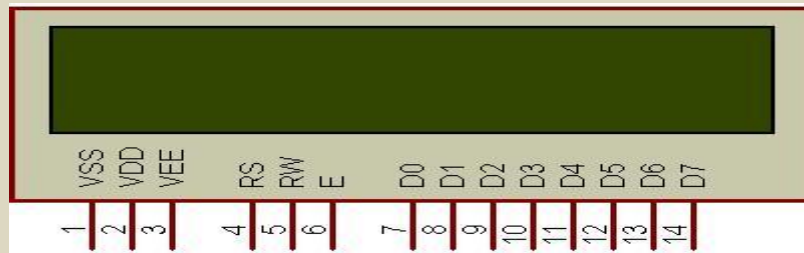

Figure 5 Character LCD type HD44780 Pin diagram

Pin No.	Name	Description
Pin no. 1	**VSS**	Power supply (GND)
Pin no. 2	**VCC**	Power supply (+5V)
Pin no. 3	**VEE**	Contrast adjust
Pin no. 4	**RS**	0 = Instruction input 1 = Data input
Pin no. 5	**R/W**	0 = Write to LCD module 1 = Read from LCD module
Pin no. 6	**EN**	Enable signal
Pin no. 7	**D0**	Data bus line 0 (LSB)
Pin no. 8	**D1**	Data bus line 1
Pin no. 9	**D2**	Data bus line 2
Pin no. 10	**D3**	Data bus line 3
Pin no. 11	**D4**	Data bus line 4
Pin no. 12	**D5**	Data bus line 5
Pin no. 13	**D6**	Data bus line 6
Pin no. 14	**D7**	Data bus line 7 (MSB)

Table 1 Character LCD pins with 1 Controller

DDRAM

Display data RAM (DDRAM) stores display data represented in 8-bit character codes. Its extended capacity is 80 X 8 bits, or 80 characters. The area in display data RAM (DDRAM) that is not used for display can be used as general data RAM. So whatever you send on the DDRAM is actually displayed on the LCD. For LCDs like 1x16, only 16 characters are visible, so whatever you write after 16 chars is written in DDRAM but is not visible to the user. Figures below will show you the DDRAM addresses of 1 Line, 2 Line and Line LCDs.
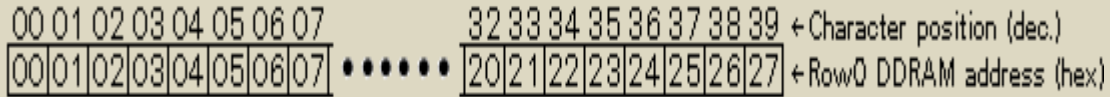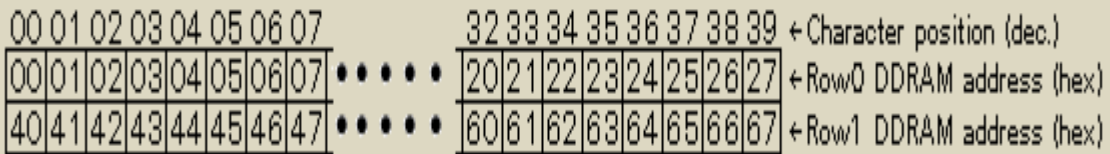

Figure 6 DDRAM Address for 1 Line LCD
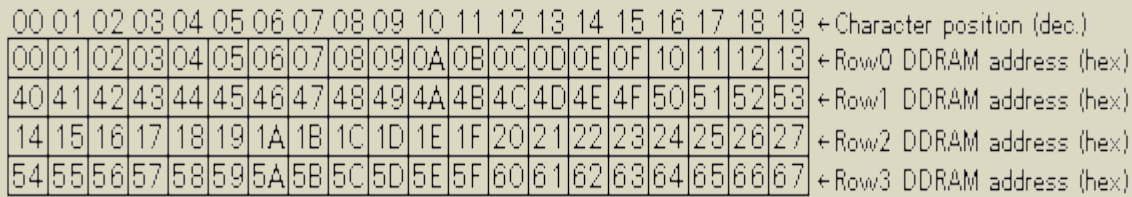

Figure 7 DDRAM Address for 2 Line LCD

Figure 8 DDRAM Address for 4 Line LCD

ZIGBEE MODULE:

ZIGBEE is a specification for a suite of high level communication protocols using small, low-power digital radios based on an IEEE 802 standard for personal area networks. ZIGBEE devices are often used in mesh network form to transmit data over longer distances, passing data through intermediate devices to reach more distant ones. This allows ZIGBEE networks to be formed ad-hoc, with no centralized control or high-power transmitter/receiver able to reach all of the devices. Any ZIGBEE device can be tasked with running the network.

ZIGBEE is targeted at applications that require a low data rate, long battery life, and secure networking. ZIGBEE has a defined rate of 250 kbit/s, best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range wireless transfer of data at
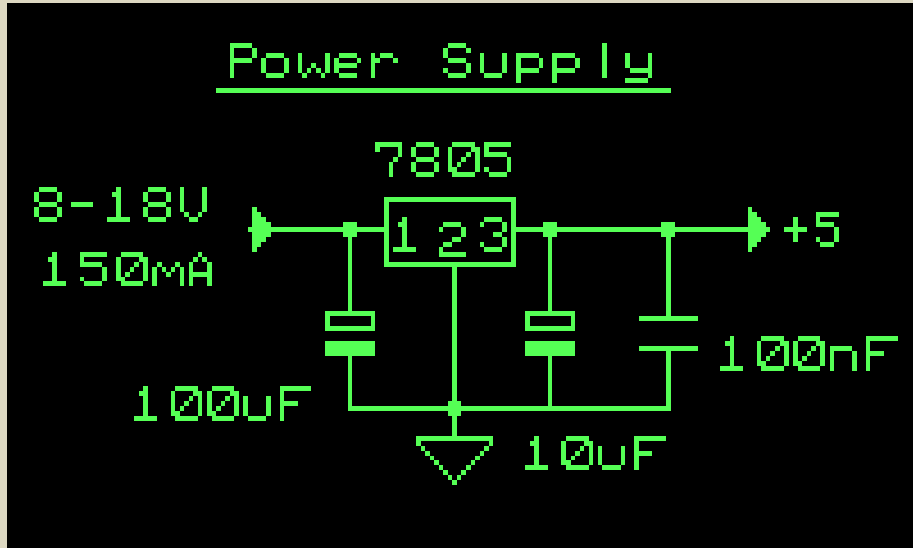
Fig 9 Circuit diagram of power supply.

less expensive than other WPANs, such as Bluetooth. ZIGBEE protocols are intended for embedded applications requiring low data rates and low consumption. The resulting network will use very small amounts of power — individual devices must have a battery life of at least two years to pass ZIGBEE certification. Typical application Home Entertainment and Control, Home automation, smart lighting, advanced temperature control, safety and security, movies and music.

CONCLUSION

Wireless technology is becoming more and more popular because of its low cost and ease-of-use. This technology allows us a faster and more convenient access to the world. ZIGBEE technology provides the world with a variety of wireless applications. The Restaurant Automation not only gives the customers an insight into how their food is being prepared but also the nutritional content that it carries. It is amazing that the customers can actually see their food even before it's delivered to them. The Restaurant automation is a revolutionary concept & is sure to take people by surprise. It will undoubtedly change the way people dine & their dining habits. It would lead to increased revenues; give the customer a better insight into the kind of food they wish to have, give them a great touch experienced.

REFERENCE:

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3. Zonal Location and Asset Tracking with ZIGBEE Technology (using RSSI), Cambridge Consultants (Oct. 12, 2006), www.ZIGBEE.org