ZIGBEE BASED RESTAURANT MANAGEMENT SYSTEM

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***Abstract*— A new design scheme of hotel menu card and ordering system applied to all range hotels is proposed in this paper. Automation systems are increasing in day to day life. Applications like home and industrial automation reduce man power while increasing the efficiency.**

The Main Goal here is, in restaurant menu ordering system that lets you automate menu for ordering food in restaurants.In these modern days the number of restaurants 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. Using simple components and programming techniques, an automation system was proposed.Such system is easy to install and gives a rich environment to the hotels or restaurants.

Keywords:

Management of Restaurant, Zigbee, Food Ordering System, Throughput, Network Topology, IEEE 802.15.4, Wireless Sensor Network .

INRODUCTION:

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 LCD for displaying and ordering using Matrix Keypad 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 LCD and Matrix keypad as customer interface.

RESEARCH METHODOLGY:

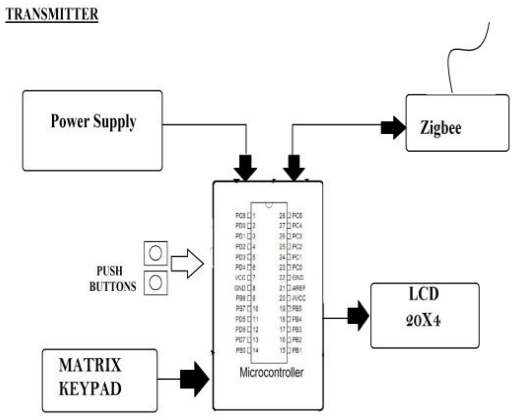
The background methodology involves the study about the wireless technologies in the market, alternatives for display methods and also about the bill processing and claim methods. There are various wireless technologies in the market in their category of communication ranges. While choosing a communication 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. 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.

HARDWARE DESIGN:

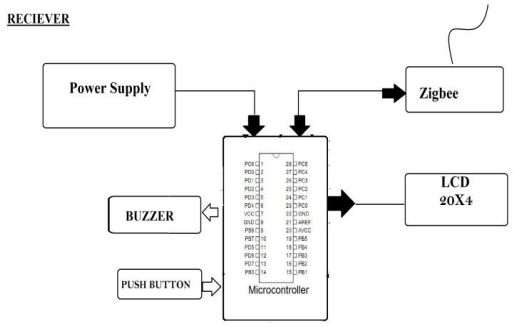
COMPONENTS

- ATmega series Microcontroller
- LCD
- ZIGBEE
- MATRIX KEYPAD
- BUZZER

✓ **Customer section :**

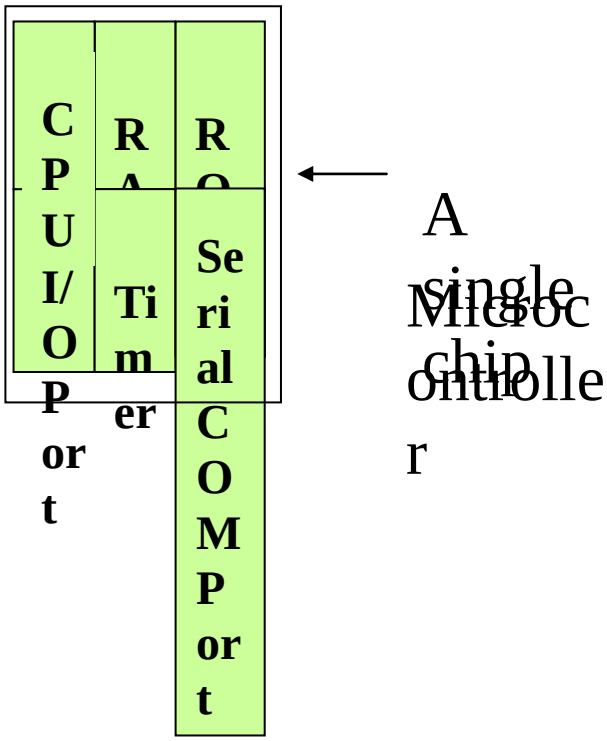


✓ **Billing and Supply section:**

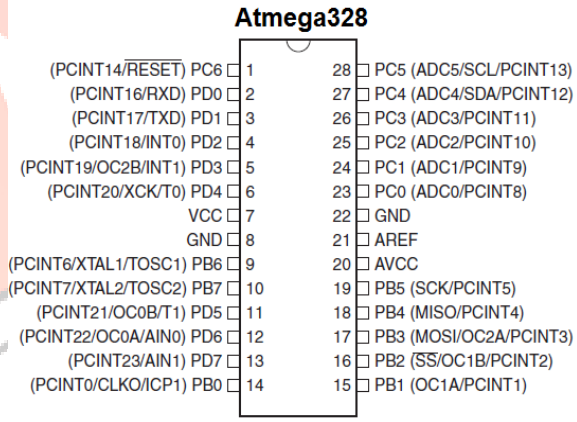


The above block diagrams shows the primary elements involved in two section of the proposed menu ordering system.

✓ **ATmega series Microcontroller:**



Basic Block of Microcontroller

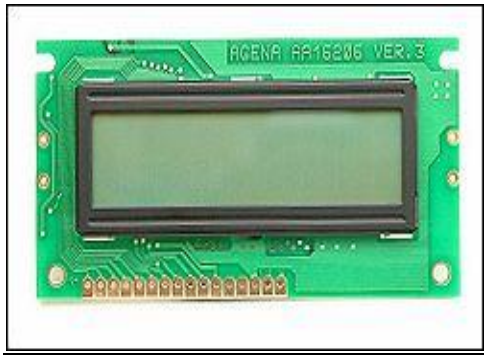


Pin diagram of ATMEGA328

Some prominent features:

- –High Performance, Low Power AVR® 8-Bit Microcontroller
- – Advanced RISC Architecture
- – 131 Powerful Instructions
- – Most Single Clock Cycle Execution
- – 32 x 8 General Purpose Working Registers
- – Fully Static Operation & Up to 20 MIPS Throughput at 20 MHz .

✓ **LCD:**



- **Most common LCDs connected to the microcontrollers are 16x2 and 20x2 displays.**
- **This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.**
- **The standard is referred to as HD44780U, which refers to the controller chip which receives data from an external source (and communicates directly with the LCD.**

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 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.

MATRIX KEYPAD:

Matrix keypad use a combination of four rows and four columns to provide button states to the host device, typically a microcontroller. Underneath each key is a push button, with one end connected to one row, and the other end connected to one column.This 16-button keypad provide1s a useful human interface component for microcontroller projects.Convenient adhesive backing provides a simple way to mount the keypad in a variety of applications.

Specifications:

- Maximum Rating: 24 VDC, 30 mA
- Interface: 8-pin access to 4x4 matrix
- Operating temperature: 32 to 122 °F(0 to 50°C)
- Dimensions:Keypad, 2.7 x 3.0 in (6.9 x 7.6 cm),Cable: 0.78 x 3.5 in (2.0 x 8.8 cm)

SOFTWARE USED:

The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in the programming language Java. It originated from the IDE for the languages Processing and Wiring. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and provides simple one-click mechanism to compile and load programs to an Arduino board. A program written with the IDE for Arduino is called a "sketch".

The Arduino IDE supports the languages C and C++ using special rules to organize code. The Arduino IDE supplies a software library called Wiring from the Wiring project, which provides many common input and output procedures. A typical Arduino C/C++ sketch consist of two functions that are compiled and linked with a program stub main() into an executable cyclic executive program:

After compiling and linking with the GNU toolchain, also included with the IDE distribution, the Arduino IDE employs the programavrdude to convert the executable code into a text file in hexadecimal coding that is loaded into the Arduino board by a loader program in the board's

firmware.Arduino programs may be written in any programming language with a compiler that produces binary machine code. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio, which can be used for programming Arduino.

WORKING:

The ZigBee based menu ordering system starts working from displaying the menu items available in the restaurant on LCD connected to the Microcontroller at every table in the restaurant. The users can choose any of the item by simply tapping the corresponding item using the Keypad. It will send the corresponding instructions about the selected item to the Microcontroller . 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.

CONCLUSION:

The implementation Restaurant Management system will result in time saving and improving the efficiency of the process through which an order is placed. It provides a legitimate workflow for restaurant staff to manage restaurant operations digitally, from ordering to billing precise.Means it is low cost alternative to be used by middle and low level restaurants also 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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