Touch Pad Based Modern Restaurants Automation using Arduino and Zigbee Technology

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Abstract: The main objective of this project is to develop an embedded system restaurants by using Zigbee technology and touchpad. The project designed here deals with wireless technology in the hotel management area. The present existing system working is very tedious process like ordering to one person, sending that with another person to kitchen and sending the same to the cashier. This total procedure will be wind up by using this project. By using Zigbee technology we can reduce the man power in the hotels and also it reduces the time wastage. The major technology which we are using in this project is Zigbee wireless communication with the interface of the touchpad to the Arduino ATMEGA328 controller. By the usage of touchpad with audio announcement may even reduce the difficulty to the blind and illiterates about the dish and the information can be sent to the kitchen in the restaurant by using Zigbee Technology where the details of the dish along with table number will be displayed in the LCD at the receiving section by activating an alarm as an acknowledgement. The main purpose of using this project is to give assistance to the blind and illiterates by which they can order the food by themselves. For this a toggle switch is placed in the transmitting section, which is to be activated to order the food and when de-activated, the selected food item through the touch pad will be announced. So, the blind people can listen the food item and can order. In this project we are using a device that helps them in placing the order to the concerned staff of restaurant by displaying in the LCD. The major technology which we are using in this project is Zigbee wireless communication with interface of touch pad with the Arduino controller.

I. INTRODUCTION

Today's menu ordering methods includes more human efforts for getting an order from the customer, waiter gives the customer a menu card on their table and also billing needs special observation need to pay for every table and their orders. Hence, the menu ordering through an electronic system interface will get an ultimate response from the users due to the time saving methodology and smarter way to communicate.

In this project we use wireless communication interface which will provide a faster and accurate data transmission in a low cost. This project consists of two setups, table setup and kitchen setup. The main aim to implement this touchpad ordering system is its user-friendly interface as well as to reduce human efforts. The implementation of touchpad menu ordering systems may have some differences in interface design and methodology. The Zigbee communication is used as wireless interface and the voice announcement with touch pad is used as customer interface. The table setup consists of Zigbee transmitter and Kitchen setup consists of Zigbee receiver which enables the wireless communication between both the setups. In the recent past there was evolution in ordering and serving system but the results are not very much promising. With the advancement in communication technology the issues of being late entertained can be solved. In order to run a restaurant efficiently, time saving and cost optimizations are very important. By reducing the time taken for each table by few seconds order processing speed can be increased, which increases efficiency and profits.

II. PRELIMINARIES AND RELATED WORKS

A. Menu Representation

In this project we use Touch pad sensor Technology to make it easy even to blind and illiterate people as it is also included with voice announcement, which indicates the needs. Voice Recorder cum playback chip helps in recording the voice. The images of the items present in the menu are displayed adjacent to the touch pads on the setup. The customer can place the order by touching the touchpad. LEDs are connected above the touch pads which will glow when the respective touch pad is touched. Immediately after the user touches the touchpad, they can listen their order through the speaker, where they get to know the details of the item they ordered like item name, calories, time taken to prepare the order, cost of the item etc. The speaker is connected to the voice recorder, the touch pads and voice recorder are connected to microcontroller as inputs and outputs respectively.

Voice Recorder using IC APR33A: This recorder doesn't need any microcontroller or any memory chip. The voice is itself stored in IC. It can store the audio of maximum 11 minutes.

Touch Pad Sensor: The switch keeps charging and discharging its metal exterior to detect changes in capacitance. When a person touches the touchpad, their body increases capacitance and triggers the switch. It is a Digital Sensor TTP223B Module Capacitive Touch Switch. The Digital Sensor TTP223B Module Capacitive Touch Switch is based on a touch-sensing IC (TTP223B) capacitive touch switch module. When we touch on the circular marked region, it gives output as high and switches to quick response state.

B. Efficient Order Management

To enable wireless communication, we use Zigbee technology. In this project Zigbee wireless communication system is used which transmits the wireless signals according to the input given to the touch pad by the user. At the receiver (kitchen) end the information will be displayed on LCD by activating the alarm to alert the staff. Here when user sends his need through touch pad, then micro controller transmits that information through Zigbee transmitter. The information received by the Zigbee receiver will be displayed in the LCD. To eliminate confusion, we have a module in the table setup which is used to transmit information to the kitchen. At first the module will be in recorder mode when the user touches the touchpad and listen what he ordered and the if he decides to order the item then he can change the mode of the module from recorder to the kitchen. This module helps to eliminate miscommunication while ordering.

Zigbee Technology: Zigbee is one of the wireless protocols based on the IEEE 802.15.4 standard for wireless personal area networks (WPAN's). Zigbee is designed to use in embedded applications requiring low data rates and low power consumption. The benefits of using Zigbee technology is to make the design as simple as possible, cost-effective, Robust, low-power wireless connectivity, etc. The main advantage of using this technology is to cover large areas. Zigbee can send and receive data.

III.   LITERATURE SURVEY

1) RESTAURANT MANAGEMENT SYSTEM USING ZIGBEE and IoT, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 5, Issue 4, April 2016.

This paper presents the application of using a simple keyboard to make orders and Bluetooth for transmission. They presented the touch screen based digital menu ordering system using AVR. This method on paper is low cost, efficient and easy to access the system for digital menu ordering system for restaurants. They IoT – based smart ordering system. The smart restaurant ordering system is proposed orders using hand tools with online used to make an order in a restaurant. This can be further extended with Raspberry Pi based E-menu ordering system. Based on the software-hardware platform on Raspberry Pi OS Platform E-menu ordering is developed. This reduces the miscommunication between the waiters and the Kitchen staff.

2) Syed Viquar Ahmed and V. Taj Kiran, "TOUCH SCREEN BASED E-MENU RESTAURANT AUTOMATION USING ZIGBEE, International Conference on Recent Advances in Energy-Efficient Computing and Communication (ICRAECC), 2019 .

The paper explores the problems faced by the customers in restaurants and miscommunications while ordering from the menu and proposed a system which has all the functions in the digital form only which is a microcontroller, Arduino based system which consists of a touch screen which is mounted over a GLCD. The concept is we can see the menu at the table itself at fingertip. The items present on the menu are well described and defined along with the pictures, ingredients etc. wherein the customer places the order by selecting any of the items from different categories present and places the order by using the touch screen and the selected order is being served by the serving staff or it can be a self-service.

IV.   PROPOSED MODEL

The proposed system has been developed for making restaurant ordering system easy. This system is also capable of keeping record of customer's orders. The proposed systems support restaurant operation by performing following tasks:

1) To put, view or change submitted order on the customer's table module.
2) To display menu on customer's module interface.
3) To allow kitchen's module to give feedback about placed order of customer (whether ordered items are available). The proposed system will handle efficiently all problems faced by previous manual systems. Furthermore, system will store and analyze information, which will be provided by customer and kitchen staff and perform task automatically. The proposed system has also following added features that can increase productivity of the system:

4) Data handling with ease and accuracy
5) Reduction in paper work done by restaurant waiters or managers.

V. BLOCK DIAGRAM

A. Transmitting Model

Figure 1 shows the block diagram for transmitting section of the model.
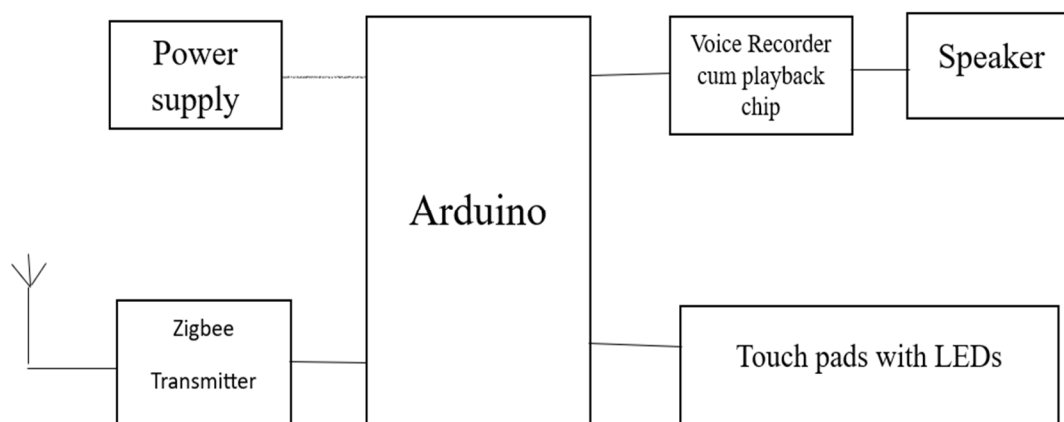

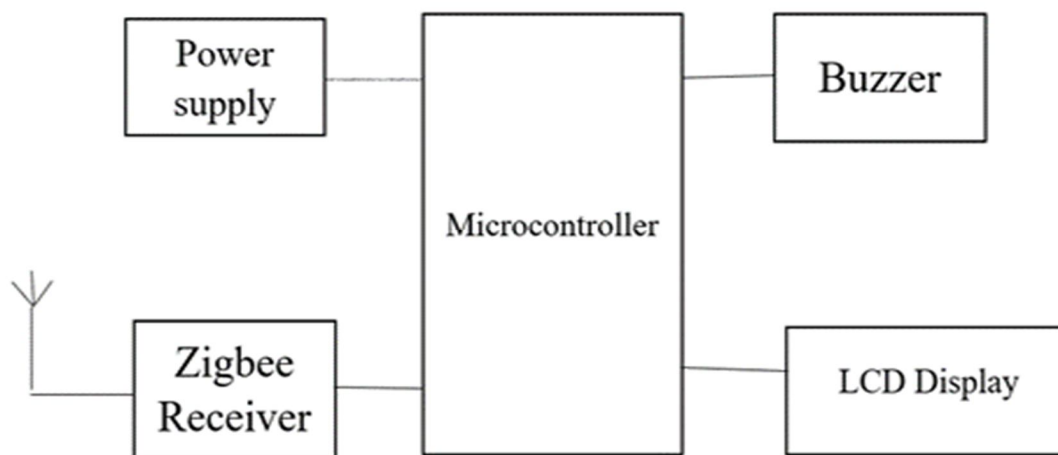Figure 1: Block Diagram of Transmitting section

Figure 2: Block Diagram of Receiver section

VI. RESULTS AND DISCUSSION

A. Hardware Model at Customer Table

Verify that the Arduino board is functioning correctly by uploading a simple test sketch. Ensure that it can communicate with your computer and respond to basic commands. Test the touchscreen to ensure accurate touch detection. Most touchscreen libraries for Arduino include example sketches that can help with this.

Test communication between Zigbee modules. You can use simple programs to send and receive data between two Arduino boards equipped with Zigbee modules. Develop a simple program that reads touch inputs and displays relevant information on the screen. Test each function of the touchscreen to make sure it responds appropriately. Implement a basic communication protocol between different Arduino boards using Zigbee modules. Ensure that data can be transmitted and received reliably.

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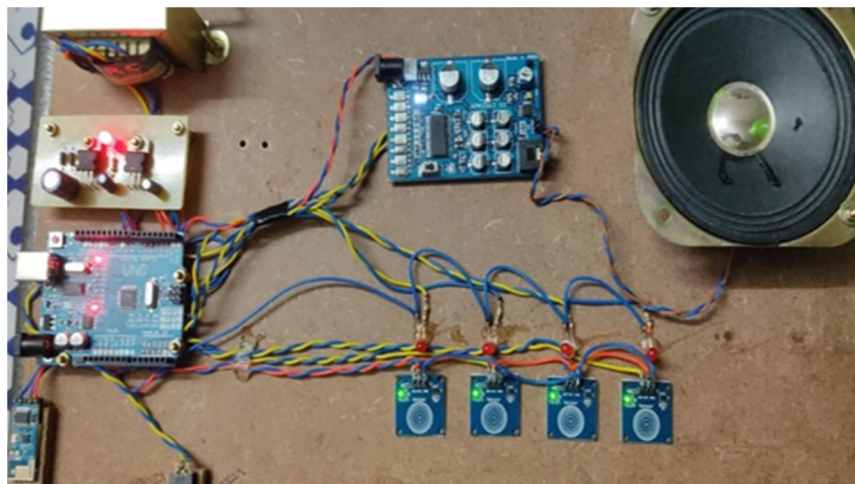Volume 12 Issue IV Apr 2024- Available at www.ijraset.com

Figure 3: Transmitter table setup

In the transmitter part from fig: 3 the Arduino digital pins are connected to touch pads, Zigbee and LEDs whereas the analog pins are connected to voice module. Whenever we touch the touch pad the led will glow and the item on the touch pad will be heard in the speaker.
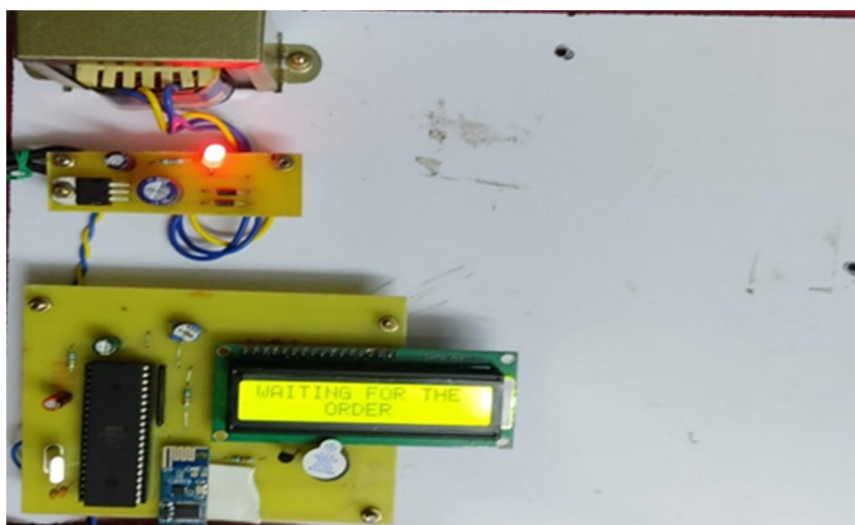

Figure 4: Kitchen setup

In Receiver part i.e. from fig: 4 when the mode switch is selected to the kitchen and when we touch the touch pad the buzzer will be ringing and the item that is need to ordered is shown in the LCD.

VII. APPLICATIONS

A touch pad-based modern restaurant automation system using Arduino and Zigbee technology can find applications in various aspects of restaurant operations. Here are some key applications:
1) *Ordering System:* Customers can use the touch pad to browse the menu, select items, customize orders, and place them directly. The system then transmits orders wirelessly to the kitchen for preparation.
2) *Table Reservation System:* Implement a reservation system where customers can use the touch pad to check table availability, make reservations, and receive confirmation.
3) *Customer Feedback System:* Collect real-time feedback from customers through the touch pad. This information can be valuable for improving service and menu offerings.
4) *Menu Display and Updates:* Dynamically display the menu on the touchscreen, allowing the restaurant to update items, prices, and special promotions easily.

5) *Kitchen Display System:* Use the system to relay orders directly to the kitchen display, improving order accuracy and efficiency in food preparation.
6) *Payment Processing:* Implement a secure payment processing system where customers can settle their bills using the touch pad. This may involve integration with payment gateways.
7) *Customer Loyalty Programs:* Integrate customer loyalty programs, allowing customers to track points, redeem rewards, or receive special offers directly through the touch pad.

VIII. CONCLUSION

A touch pad-based modern restaurant automation system utilizing Arduino and Zigbee technology presents a promising solution for enhancing various facets of restaurant operations. The integration of a user-friendly touch pad streamlines the ordering process, improving accuracy and efficiency. This system not only benefits customers by providing an interactive and efficient dining experience but also offers advantages to restaurant owners and staff through real-time order monitoring, data analytics, and streamlined communication. However, it is crucial to be mindful of potential challenges such as initial setup complexity, ongoing maintenance, and security considerations. With careful planning, thorough testing, and continuous support, this technology can significantly contribute to the modernization and optimization of restaurant management, providing a customizable and cost-effective solution for a diverse range of dining establishments.

REFERENCES

[1] RESTAURANT MANAGEMENT SYSTEM USING ZIGBEE and IoT, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 5, Issue 4, April 2016.
[2] Syed Viquar Ahmed and V. Taj Kiran, "TOUCH SCREEN BASED E-MENU RESTAURANT AUTOMATION USING ZIGBEE, International Conference On Recent Advances in Energy-Efficient Computing and Communication (ICRAECC), 2019 .
[3] "ZIGBEE BASED HOTEL MENU CARD AND ORDERING SYSTEM", International Journal of Technical Research and Applications e-ISSN: 2320-8163, www.ijtra.com Special Issue 39 (KCCEMSR) (March 2016), PP. 12-15 .
[4] "Design of Zigbee Based Wireless Order System for Restaurants", International Journal of Scientific Engineering & Technology Research, Vol.03,Issue.07,May-2014.
[5] A Review Paper on Zigbee (IEEE 802.15.4) Standard, International Journal of Engineering Research & Technology (IJERT), Vol. 3 Issue 4, April – 2014.
[6] Jianpo Li, Xuning Zhu, Ning Tang and Jisheng Sui, "Study onZigBee Network Architecture and Routing Algorithm." 2ndInternational Conference on Signal Processing Systems(ICSPS), p.p. 389-393, Vol. 2, May 2010, Jilin, China.
[7] ZIGBEE BASED E-MENU ORDERING SYSTEM, International Journal of Advanced Technology in Engineering & Science, Vol. No.3, Issue 08, August 2015 .

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