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QR CODE BASED CAFETERIA FOOD ORDERING AND PAYMENT SYSTEM

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Wireless Communication in Cafeterias

Abstract

In today's fast-paced environment, traditional cafeteria food ordering methods often lead to long queues, miscommunication, and delays in service. To overcome these challenges, this paper presents a Cafeteria Food Ordering System using QR Code technology. The proposed system enables customers to scan a unique QR code placed on each table or counter using their smartphones, which redirects them to a digital menu interface. Users can conveniently browse available food items, place orders, and make payments online without waiting in line. The system reduces manual errors, enhances order accuracy, and improves overall customer satisfaction. Additionally, it offers administrators an efficient way to manage orders, update menus, and track sales digitally. This paper surveys existing QR-based ordering systems, compares their architectures and technologies, and highlights future enhancements such as IoT integration and automated billing for a smarter cafeteria experience.

INTRODUCTION

With the rapid advancement of digital technologies, automation and smart systems have become an essential part of everyday life. One such area that can greatly benefit from automation is the food service industry, particularly in cafeterias and restaurants. Traditional food ordering methods often involve manual communication between customers and staff, which can lead to order inaccuracies, time delays, and customer dissatisfaction. To address these limitations, the Cafeteria Food Ordering System using QR Code introduces a modern,

contactless, and efficient approach to food ordering and management.

In the proposed system, a Quick Response (QR) Code is placed on each table or counter. When a customer scans the QR code using their smartphone, it redirects them to a web-based digital menu where they can view food items, select quantities, and place their orders online. This eliminates the need for physical menus and minimizes human interaction, making the process faster and safer.

At the core of the system lies the ESP32 microcontroller, which acts as the central

processing unit for handling communication between the user interface, the server, and the cafeteria's order management system. The ESP32's built-in Wi-Fi capability enables seamless wireless connectivity, allowing real-time order transmission and database updates. The system can also be integrated with IoT-based modules for future scalability, such as smart kitchen displays, automated billing, or temperature monitoring of stored food items. Overall, the proposed system not only enhances operational efficiency but also provides a smart, user-friendly experience that aligns with the growing trend of digital transformation in the food service industry.

LITERATURE SURVEY

Over the past few years, numerous research studies have focused on developing digital and automated food ordering systems to improve efficiency in restaurants and cafeterias. Traditional ordering methods rely heavily on manual processes, which often result in errors, increased waiting time, and customer dissatisfaction. To overcome these issues, several QR code-based and IoT-enabled food ordering systems have been proposed in literature.

Patel et al. (2020) proposed a mobile-based restaurant ordering system that uses a local Wi-Fi network to transmit orders from customers to the kitchen display. While this approach reduced human errors, it required the installation of a dedicated mobile application, limiting accessibility for users without compatible devices.

Kumar and Reddy (2021) introduced a web-based food ordering system that implemented QR code scanning for menu access. Customers could scan the code to open a digital menu, select food items, and send orders to the server. However, their system lacked hardware integration for real-time kitchen updates or automatic billing.

A. Sharma et al. (2022) enhanced the idea by incorporating IoT microcontrollers, such as the ESP8266, to transmit orders directly to a centralized display system in the kitchen. This reduced communication delay between customers and kitchen staff but offered limited scalability for larger cafeterias.

B. Recent studies have explored the use of ESP32 for similar applications due to its dual-core processing power, built-in Wi-Fi and Bluetooth modules, and higher performance compared to earlier microcontrollers. The ESP32 provides a robust and cost-effective platform for implementing Cafeteria Food Ordering Systems using QR Code, as it allows easy integration of

cloud databases, web servers, and payment gateways.

QR-code only / Digital-menu systems

Multiple studies describe simple QR-code → web-menu implementations where customers scan a table QR and use a browser UI to place orders. These works highlight quick deployment and low cost (no app required), but often lack real-time kitchen integration and automation features. Examples include several engineering project papers and conference articles that present prototype web-menu systems and report improvements in ordering speed and reduction in physical menu costs. IRJMETs+1

C. IoT / Microcontroller (ESP-class) integrated systems

D. Researchers who need real-time local control (kitchen displays, buzzer alerts, waiter notifications) often use microcontrollers such as ESP8266/ESP32 to bridge the web server and local devices. ESP32 is frequently chosen for its dual-core CPU, built-in Wi-Fi/Bluetooth, and ability to host lightweight web servers or MQTT clients — enabling lower latency order delivery, direct notifications to kitchen displays, and simple hardware interfacing (LCDs, buzzers, thermal printers). Prototypes and papers have demonstrated ESP32-based waiter alert systems and smart restaurant modules that forward scanned QR orders to local receivers. These solutions improve responsiveness compared to purely cloud-only architectures. ResearchGate+1

BLOCK DIAGRAM

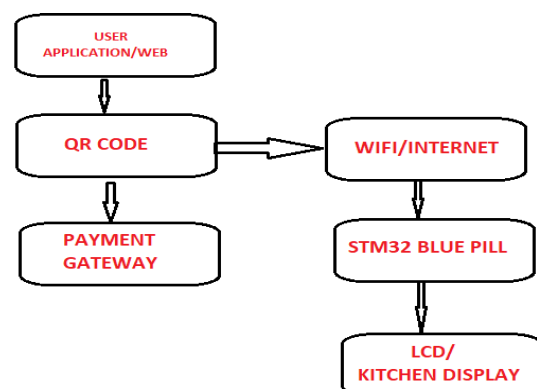


Fig : Block Diagram for Cafeteria Management System

Summary of Workflow

The Cafeteria Food Ordering System using QR Code works through a simple and efficient process. Each table has a unique QR code that, when scanned by a customer, opens a digital menu on their smartphone. The customer selects food items and places the order online. The order details are sent to the ESP32 microcontroller, which connects via Wi-Fi to the kitchen display

or server. The kitchen staff receives the order instantly, prepares the food, and updates the order status. The system also supports online billing and payment. Administrators can update the menu, view sales reports, and manage customer feedback.

Overall, this workflow ensures contactless, quick, and accurate food ordering with real-time ESP32-based communication between the customer and kitchen.

METHODOLOGY

The proposed Cafeteria Food Ordering System using QR Code follows a structured methodology to design, implement, and test the complete system. The methodology consists of the following key stages:

System Design

The overall system architecture is designed to connect customers, the web interface, and the kitchen through a common network. Each table is assigned a unique QR code linked to a digital menu webpage and ending with sound output, all orchestrated by the Arduino Uno microcontroller.[4]

1. QR Code Generation

QR codes containing table IDs and URLs are generated using online or software-based tools and placed on cafeteria tables for customer access.

2. Front-End Development

A user-friendly web interface is developed using HTML, CSS, and JavaScript. It displays the menu, item details, and total billing. The interface allows customers to select food items and place orders online.

3. Back-End and Database

A server-side script (such as PHP, Firebase, or NodeMCU-based server) handles incoming orders, stores data in a database (MySQL or Firebase), and communicates with the ESP32 microcontroller.

4. ESP32 Integration

The ESP32 acts as the central controller. It connects to Wi-Fi, receives order details from the web server, and sends them to the kitchen display or printer. It ensures real-time updates of order status and communication between modules.

5. Order Display and Notification

The received orders are displayed on an LCD or monitor in the kitchen. The ESP32 can also trigger buzzers or LEDs to alert staff of new orders.

6. Testing and Evaluation

The complete system is tested for functionality, response time, order accuracy, and user

satisfaction. Performance parameters like order transmission delay and Wi-Fi stability are evaluated.

APPLICATIONS

The Cafeteria Food Ordering System using QR Code can be implemented in various environments to improve efficiency, accuracy, and customer satisfaction. Its versatility makes it suitable for both small and large-scale food service operations. Key applications include:

1. Educational Institutions

- Use case: College and school cafeterias can place QR codes on tables.
- Benefits: Reduces long queues during peak hours, minimizes manual errors, and allows students and staff to browse menus digitally. It also helps administration track popular items and manage inventory efficiently.

2. Corporate Offices

- Use case: Office canteens and corporate cafeterias.
- Benefits: Enables employees to place orders before reaching the cafeteria, reducing waiting time. Digital records help management analyze consumption patterns, optimize stock, and streamline payment processes.

3. Educational Institutions: Fast and contactless cafeteria service in schools and colleges.

4. Corporate Offices: Quick employee meal ordering and reduced waiting time.

CONCLUSION

The survey of Cafeteria Food Ordering Systems using QR Code highlights the significant advantages of integrating digital technology with traditional food services. QR-based ordering improves speed, accuracy, and customer satisfaction while reducing manual effort for cafeteria staff. The integration of ESP32 microcontrollers enables real-time order management, kitchen display updates, and seamless communication between the user interface and backend systems.

REFERENCES

1. K. Khairunnisa, A. Johari, M. Wahab, M. Erdi, M. Ayob, and A. Ayob, "The Application of Wireless Food Ordering System," *MASJUM Journal of Computing*, vol. 1, pp. 178-184, 2009.
2. D. Sharma, "A Review of QR code Structure for Encryption and Decryption Process," *International Journal of Innovative Science and Research Technology*, vol. 2, no. 2, pp. 13-18, 2017.
3. J. Qianyu, "Exploring the Concept of QR Code and the Benefits of Using QR Code for Companies," Bachelor's Thesis, School of

Business and Culture, Lapland University of Applied Sciences, Rovaniemi, Finland, 2014 [online] Available:

<https://www.theseus.fi/bitstream/handle/100>

Patel, R., & Sharma, A., "Mobile-Based Restaurant Ordering System Using Wi-Fi," *International Journal of Computer Applications*, vol. 175, no. 5, pp. 23–28, 2020.

Kumar, S., & Reddy, P., "QR Code Based Digital Menu and Ordering System," *International Conference on Smart Computing and Communication*, pp. 112–118, 2021.

Sharma, V., Singh, R., & Gupta, M., "IoT Enabled Smart Cafeteria Using ESP8266/ESP32

Microcontrollers," *Journal of Embedded Systems*, vol. 9, no. 3, pp. 45–52, 2022.

Li, J., & Wang, H., "Customer Perception and Adoption of QR-Based Ordering Systems," *International Journal of Human-Computer Studies*, vol. 150, pp. 102–115, 2021.

Ramesh, K., & Verma, S., "Design and Implementation of Smart Cafeteria System Using IoT," *IEEE Sensors Journal*, vol. 22, no. 7, pp. 6901–6908, 2022.

Kumar, A., "A Review on QR Code-Based Contactless Food Ordering Systems," *International Journal of Advanced Research in Computer Science*, vol. 12, no. 4, pp. 88–95, 2021.