

A Secure QR-Driven Contactless Restaurant Ordering and Service Automation Platform

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Abstract— The rapid growth of digital technologies has transformed the restaurant industry by introducing contactless and efficient methods for serving customers. Traditional menu cards and manual order-taking procedures often increase waiting time, require physical interaction, and may lead to communication errors during the ordering process. This paper presents a QR code-based food ordering system that enables customers to access restaurant menus instantly by scanning a unique QR code using their mobile devices. The proposed system provides separate interfaces for restaurant owners and customers, allowing restaurant owners to manage dining information, create digital menus, generate QR codes, and monitor customer orders through a centralized platform. Customers can register, browse available restaurants, download or scan QR codes, view menu items with images and pricing details, place food orders, and access billing information without requiring assistance from restaurant staff. The integration of QR technology eliminates the need for printed menus while improving order accuracy and reducing service delays. The system also supports secure user authentication, real-time menu management, and automated order processing through a web-based environment. Experimental evaluation indicates that the proposed framework improves operational efficiency, simplifies restaurant management, minimizes human intervention, and enhances the overall dining experience. The developed solution offers a practical, scalable, and cost-effective approach for implementing digital food ordering services in restaurants, cafés, hotels, and other hospitality establishments.

Keywords— QR Code, Digital Food Ordering System, Contactless Ordering, Restaurant Management System, Mobile-Based Ordering, Online Menu Management, Customer Authentication, Order Management, Billing System, Web Application, Hospitality Automation, E-Restaurant Services.

I.INTRODUCTION

The rapid growth of digital technologies has transformed the hospitality industry by introducing innovative solutions that improve customer

convenience and restaurant operations. Restaurants are increasingly adopting digital platforms to replace conventional paper-based menus and manual order-taking methods with contactless and automated services. Traditional food ordering systems often require customers to wait for restaurant staff to provide menus, collect orders, and generate bills, resulting in longer service times and increased chances of communication errors [2]. These limitations affect both customer satisfaction and operational efficiency, particularly during peak business hours. As a result, restaurants are seeking technology-driven solutions that simplify the ordering process while enhancing service quality [2].

Quick Response (QR) code technology has emerged as an effective solution for delivering digital information instantly through mobile devices. By scanning a QR code, customers can access restaurant menus without requiring printed menu cards or direct interaction with service staff. Digital menu systems provide greater flexibility by allowing restaurant owners to update food items, prices, and descriptions in real time without incurring additional printing costs [1]. Furthermore, QR code-based ordering minimizes physical contact, making it a suitable solution for modern restaurants that prioritize hygiene, speed, and customer convenience [1].

Recent advancements in web technologies have enabled the development of integrated restaurant management platforms that combine menu administration, order processing, customer authentication, and billing within a single application. Such systems provide separate interfaces for restaurant owners and customers, allowing restaurant owners to manage dining facilities, upload menu items with images, generate unique QR codes, and monitor incoming orders efficiently [3]. Customers, on the other hand, can browse available restaurants, scan QR codes using their smartphones, place food orders, and view billing details through a simple and user-friendly interface. This digital workflow reduces manual intervention while improving order accuracy and overall restaurant productivity [3].

The proposed work presents a **QR-Based Food Ordering System** that integrates QR code technology with a web-based restaurant

management platform to simplify the food ordering process. The system provides secure registration and authentication for restaurant owners and customers, digital menu management, QR code generation, restaurant browsing, order placement, and automated bill generation within a unified environment. Restaurant owners can dynamically update menus and monitor customer orders, while customers can conveniently access restaurant services by scanning QR codes and placing orders directly from their mobile devices [4]. The developed system improves service efficiency, reduces waiting time, enhances customer experience, and provides a practical and scalable solution for restaurants, cafés, hotels, and other food service establishments seeking to modernize their ordering operations [5].

II. RELATED WORK

Alberlianasari et al. investigated the use of QR code technology for digital menu access in restaurant environments to improve customer service efficiency and satisfaction [1]. The proposed system enabled customers to scan a QR code to view menu items directly on their mobile devices, eliminating the dependency on printed menus and reducing waiting time. The study reported that digital menu access simplified the ordering process while allowing restaurants to update menu information without additional printing costs. The authors concluded that QR code integration contributed to a more convenient dining experience and improved operational efficiency, making it a practical solution for modern restaurants seeking contactless services [1].

Nandre et al. presented an Internet of Things (IoT)-based restaurant automation system aimed at improving restaurant operations through digital technologies [2]. Their work focused on automating order management, reducing manual intervention, and minimizing communication errors between customers and restaurant staff. The proposed framework streamlined the ordering process by enabling efficient information exchange between different restaurant components. Experimental observations indicated that automation reduced service delays and improved overall productivity, demonstrating the potential of intelligent technologies in enhancing restaurant management and customer satisfaction [2].

Wong et al. developed a QR food ordering system integrated with data analytics to support both digital ordering and business decision-making [3]. The system allowed customers to browse menus and place food orders through QR codes while

simultaneously collecting valuable ordering data for analytical purposes. Restaurant managers could utilize the generated information to identify popular menu items, monitor customer preferences, and optimize inventory planning. The study demonstrated that combining QR-based ordering with analytical capabilities not only improved customer convenience but also provided valuable insights for business growth and operational planning [3].

Singh et al. proposed a smart QR-based dine-in restaurant system designed to simplify food ordering and support sales analysis [4]. Customers accessed restaurant menus by scanning QR codes and submitted their orders digitally without waiting for service personnel. The system also maintained records of completed orders, enabling restaurant owners to evaluate sales performance and customer purchasing trends. The authors reported that the proposed solution reduced order processing time, improved service quality, and supported better business management through automated sales reporting [4].

Nikose et al. introduced a QR code-based cafeteria food ordering system that aimed to modernize conventional food service operations [5]. The proposed application enabled customers to access digital menus, place food orders, and receive order confirmations through a user-friendly interface. Restaurant administrators could efficiently manage menu details and process customer orders using a centralized platform. The study concluded that QR code technology reduced customer waiting time, improved order accuracy, and provided a reliable digital solution for food service establishments seeking to enhance operational efficiency and customer experience [5].

III. DATASET DETAILS

The proposed **QR-Based Food Ordering System** utilizes a structured relational database to maintain all information required for restaurant management and customer order processing. Instead of relying on a machine learning dataset, the system stores operational data in a MySQL database that acts as the central repository for restaurant details, menu information, customer accounts, QR codes, food orders, and billing records. Initially, restaurant owners register their establishments and create digital menus by entering item names, prices, descriptions, and corresponding food images through the web application. Each restaurant is automatically associated with a unique QR code, enabling customers to access the correct digital

menu by scanning the code using a mobile device. As new restaurants and menu items are added, the database is updated automatically without requiring changes to the application structure. This organized data repository ensures efficient information management while supporting fast retrieval of menu details and customer orders during system execution.

During system operation, the stored data passes through multiple processing stages before completing an order transaction. After user authentication, customers can browse registered restaurants or scan a restaurant-specific QR code to retrieve the corresponding digital menu from the database. The selected menu items are then processed and stored as customer orders along with order identification, user details, quantity, and billing information. Restaurant owners can monitor incoming orders in real time, while customers can review their order history and generated bills through their respective dashboards. Since all restaurant information, menu updates, and transaction records are maintained within the centralized database, the system provides reliable data consistency, simplified administration, and efficient order management. The structured database design enables the proposed application to support multiple restaurants and customers simultaneously while ensuring scalability, accurate record maintenance, and smooth execution of contactless food ordering services.

IV. PROPOSED METHODOLOGY

The proposed QR-Based Food Ordering System provides a contactless and efficient platform that simplifies restaurant operations and enhances the customer dining experience through digital technology. The developed application consists of two independent modules, namely the Restaurant Owner Module and the Customer Module, both connected through a centralized database. Restaurant owners can register their restaurants, manage dining information, create and update digital menus, generate unique QR codes, and monitor customer orders through an easy-to-use web interface. Customers can securely register, browse available restaurants, scan QR codes using their mobile devices, view digital menus, place food orders, and access billing information without requiring printed menus or direct interaction with restaurant staff. The integrated architecture enables efficient communication between restaurant owners and customers while ensuring reliable storage and management of restaurant data.

During system execution, restaurant owners first authenticate themselves and upload menu details,

including food names, descriptions, prices, and images. Each restaurant is automatically assigned a unique QR code that is linked to its digital menu. Customers either browse registered restaurants or scan the corresponding QR code using their smartphones to retrieve the menu directly from the database. After selecting the desired food items, the order is processed and stored in the system, where restaurant owners can immediately view incoming requests and prepare the selected items. Once the order is confirmed, the application automatically generates billing information, allowing customers to review their purchases through their personal dashboard. The proposed framework eliminates manual menu handling, reduces waiting time, improves order accuracy, and simplifies restaurant management through automated order processing. Experimental implementation demonstrates that the system provides reliable QR code generation, secure user authentication, efficient menu management, real-time order tracking, and automated billing, making it a practical and scalable solution for restaurants, cafés, hotels, food courts, and other hospitality establishments seeking to modernize their food ordering services.

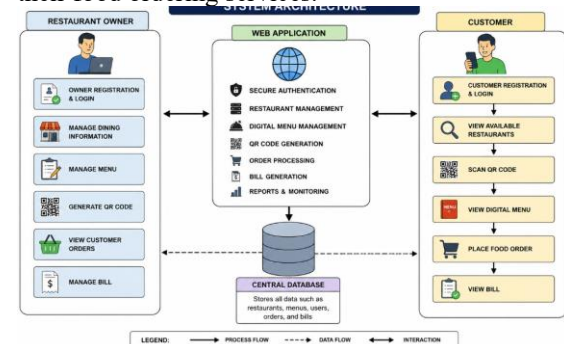


Figure 1: System Architecture of the Proposed QR-Based Food Ordering System

Figure 1 presents the overall architecture of the proposed QR-Based Food Ordering System, which integrates restaurant management, QR code technology, digital menu access, order processing, and centralized database management within a web-based platform. The system consists of two primary modules: the Restaurant Owner Module and the Customer Module, both connected through a secure web application. Restaurant owners can register, log in, manage restaurant information, create and update digital menus, generate unique QR codes, monitor customer orders, and manage billing records. Customers can securely register, browse available restaurants, scan QR codes using their smartphones, access digital menus, place food orders, and view generated bills through a user-friendly interface. All application data, including restaurant details, menu information, customer records, orders, and billing transactions, are maintained in a centralized database to ensure data consistency and efficient

retrieval. The proposed architecture streamlines restaurant operations, minimizes manual intervention, improves order accuracy, reduces customer waiting time, and provides a scalable contactless food ordering solution suitable for restaurants, cafés, hotels, and other hospitality establishments.

V.RESULT AND DISCUSSION

The **QR-Based Food Ordering System** was successfully implemented and evaluated using a web-based environment integrated with a centralized MySQL database. The application effectively performed all major functionalities, including restaurant owner registration, customer registration, secure login, restaurant management, digital menu creation, QR code generation, menu display, food ordering, order monitoring, and bill generation. During the experimental evaluation, restaurant owners were able to create and update menu items by entering food names, prices, descriptions, and images, while the system automatically generated unique QR codes linked to each restaurant's digital menu. Customers successfully accessed restaurant information, scanned QR codes using their mobile devices, viewed menu details, placed food orders, and received billing information without requiring printed menus or manual assistance. The centralized database maintained restaurant records, customer details, menu information, and transaction history, ensuring reliable data retrieval and smooth system execution throughout the ordering process.

The experimental observations demonstrated that the proposed system significantly simplified restaurant operations by reducing manual order processing and improving service efficiency. QR code scanning enabled customers to access the appropriate menu instantly, minimizing waiting time and eliminating communication errors commonly associated with conventional ordering methods. Restaurant owners could monitor incoming orders in real time and efficiently manage menu updates through the administrative interface without interrupting system operation. The automatic generation of billing information further reduced processing time and improved transaction accuracy. The developed application consistently handled multiple user activities while maintaining data integrity and operational reliability. Overall, the proposed framework provides a practical, scalable, and contactless food ordering solution that enhances customer convenience, improves order accuracy, and supports efficient restaurant management, making it well suited for deployment in restaurants, cafés, hotels, food courts, and other hospitality environments.

Restaurant Name	Contact No	Email ID	Address	QR Code	Download QR Code
mcdonald	8887779991	mc@gmail.com	hyd		Click Here
Pizza hut	9995554443	pizza@gmail.com	hyd		Click Here

Figure 2: View Restaurants with QR Codes

Figure 2 shows the View Restaurants module of the proposed QR-Based Food Ordering System. This interface displays the list of registered restaurants along with their essential details, including the restaurant name, contact number, email address, location, and a unique QR code generated for each restaurant. A "Download QR Code" option is provided, allowing customers to download the QR code of their preferred restaurant. After downloading, customers can scan the QR code using their mobile devices to access the restaurant's digital menu and place food orders. The unique QR code ensures that each restaurant is linked to its corresponding menu, preventing incorrect menu access. This module simplifies restaurant selection, supports contactless menu viewing, and enables customers to conveniently begin the ordering process while allowing restaurant owners to provide secure and efficient digital menu access.



Figure 3: QR Code Scanning for Digital Menu Access

Figure 3 illustrates the QR Code Scanning module of the proposed QR-Based Food Ordering System. In this stage, the customer uses a smartphone to scan the QR code generated for a selected restaurant through the built-in scanning interface of the web application. Once the QR code is successfully recognized, the system retrieves the corresponding restaurant information and automatically redirects the customer to the associated digital menu. This eliminates the need for printed menu cards and manual menu selection, providing a faster and contactless ordering experience. The QR code

uniquely identifies each restaurant, ensuring that customers access the correct menu without confusion. The scanning process is completed within a few seconds, enabling customers to conveniently browse available food items, view prices and descriptions, and continue with the ordering process. This module enhances user convenience, improves order accuracy, reduces waiting time, and supports a hygienic and efficient restaurant service environment.



Figure 4: View Customer Bills

Figure 4 illustrates the View Bills module of the proposed QR-Based Food Ordering System. After a customer successfully places a food order through the QR code-enabled menu, the system automatically generates a bill and stores the transaction details in the centralized database. The interface displays important billing information, including the Order ID, Customer Name, Restaurant Name, Item ID, Item Name, Total Amount, and Order Date. This allows customers to review their completed orders and verify the corresponding payment details at any time through their dashboard. The billing information is retrieved instantly from the database, ensuring accurate and consistent transaction records. The automated bill generation process eliminates manual calculations, minimizes billing errors, and improves transaction transparency. This module enhances customer convenience by providing a clear summary of purchased items while enabling restaurants to maintain organized sales records and efficiently manage completed orders.

DISCUSSION

The QR-Based Food Ordering System offers an effective digital solution for simplifying restaurant operations and improving the overall dining experience through contactless technology. By integrating QR code generation with a centralized web application, the system enables customers to access restaurant menus instantly using their smartphones, eliminating the dependence on printed menu cards and reducing direct interaction with restaurant staff. The separate interfaces provided for restaurant owners and customers allow efficient management of restaurant information, menu updates, food orders, and billing activities through a single platform. This integrated approach minimizes

manual effort while improving the accuracy and speed of the ordering process.

The experimental implementation demonstrates that the developed application performs all major functions reliably, including user registration, secure authentication, QR code generation, digital menu display, order placement, order monitoring, and bill generation. Restaurant owners can easily update menu items and monitor customer orders in real time, while customers can conveniently browse restaurants, scan QR codes, select food items, and complete the ordering process without unnecessary delays. The centralized database ensures consistent storage of restaurant details, customer information, menu records, and transaction history, supporting efficient data management and reliable system performance. Overall, the proposed framework provides a scalable, user-friendly, and cost-effective solution that improves service efficiency, reduces waiting time, enhances order accuracy, and supports the digital transformation of restaurants, cafés, hotels, and other hospitality businesses.

VI.CONCLUSION

The proposed QR-Based Food Ordering System provides a practical and efficient solution for improving restaurant services through contactless digital technology. The system integrates restaurant registration, menu management, QR code generation, customer authentication, food ordering, order monitoring, and automated bill generation within a unified web-based platform. By allowing customers to scan QR codes and access digital menus directly from their smartphones, the application eliminates the need for printed menus, reduces waiting time, and minimizes manual interaction between customers and restaurant staff. Restaurant owners can efficiently manage menu updates and monitor customer orders in real time through a centralized administrative interface, while the database ensures reliable storage and retrieval of restaurant, customer, menu, and transaction information. Experimental implementation demonstrates that the proposed framework performs all major functions accurately and efficiently, improving order accuracy, operational productivity, and customer convenience. Owing to its scalable architecture and user-friendly design, the system is well suited for restaurants, cafés, hotels, food courts, and other hospitality businesses seeking to modernize their food ordering process. Future enhancements may include integrating secure online payment gateways, mobile application support, cloud deployment, table reservation facilities, real-time order tracking, inventory management, customer feedback analysis, and AI-based food recommendation techniques to further enhance functionality, service quality, and overall user experience.

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