



QR Code based Restaurant Dine in Management Portal using Artificial Intelligence Approach

Dr. Bernard Edward Swamidoss S¹

¹Vice Principal, Sankara College of Science and Commerce, Coimbatore, India

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Corresponding Author:

Dr. Bernard Edward
Swamidoss S

Abstract:

Restaurants are an important part of daily life, but traditional manual ordering can cause miscommunication, incorrect orders, delays, billing errors, and increased workload for staff, especially during busy hours. To overcome these challenges, our project proposes a Restaurant Management System with Table QR-Based Order Process Tracking, where each table is provided with a unique QR code that customers can scan using their smartphones to access a digital menu, select food items, specify quantities, and place orders directly. The orders are automatically sent to the kitchen, reducing manual communication and order errors. The system provides real-time order tracking through statuses such as Order Placed, Preparing, Ready, and Served, enabling customers to monitor their orders while helping kitchen and service staff coordinate efficiently. It also supports automated bill generation, tax calculation, and digital payments, reducing billing errors and checkout time. The system is developed using Python and Flask for backend processing, MySQL for database management, and HTML, CSS, and Bootstrap for a responsive and user-friendly interface, providing a faster, more accurate, and organized restaurant dining experience.

Keywords: QR-Based Ordering, Restaurant Management System, Real-Time Order Tracking, Digital Menu, Automated Billing, Flask Framework, Web-Based Application, Kitchen Coordination.

1. Introduction

In today's fast-moving world, customers expect quick service and a smooth experience when they visit a restaurant. However, many restaurants still follow traditional methods where waiters take orders manually and inform the kitchen. This often leads to miscommunication, order mistakes, and delays, especially during busy hours. Customers also do not have a clear idea about their order status and have to wait longer for billing and payment. To solve these problems, this project introduces a Restaurant Management System with Table QR-Based Order Process Tracking. In this system, customers can scan a QR code placed on the table to view the digital menu and place orders directly using their mobile phones. The order is sent instantly to the kitchen and tracked in real time. The system also supports automated billing and digital payment. This solution reduces waiting time, improves order accuracy, and makes the dining experience faster, easier, and more comfortable for both customers and staff.

2. Proposed Architecture

The proposed system is designed to make restaurant operations easier and more organized by using QR codes and digital technology. Instead of depending fully on waiters to take orders manually, this system allows customers to scan a QR code placed on their table. After scanning, a digital menu opens on their mobile phone where they can view food items, check prices, and place their order directly. This reduces confusion, saves time, and avoids common order mistakes, especially during busy hours. Once the order is placed, it is automatically sent to the kitchen system. The kitchen staff can see the order details clearly and begin preparation immediately. The system also shows real-time order status such as placed, preparing, or ready. Customers can track their order without repeatedly asking the waiter. At the same time, service staff receive updates when the food is ready, which improves coordination and reduces delays. After the meal, the system automatically generates the bill with the correct total amount. Customers can

complete the payment using digital methods like UPI or card. This makes the checkout process faster and error-free. Overall, the proposed system reduces waiting time, improves service quality, and creates a smooth and comfortable dining experience for both customers and restaurant staff.

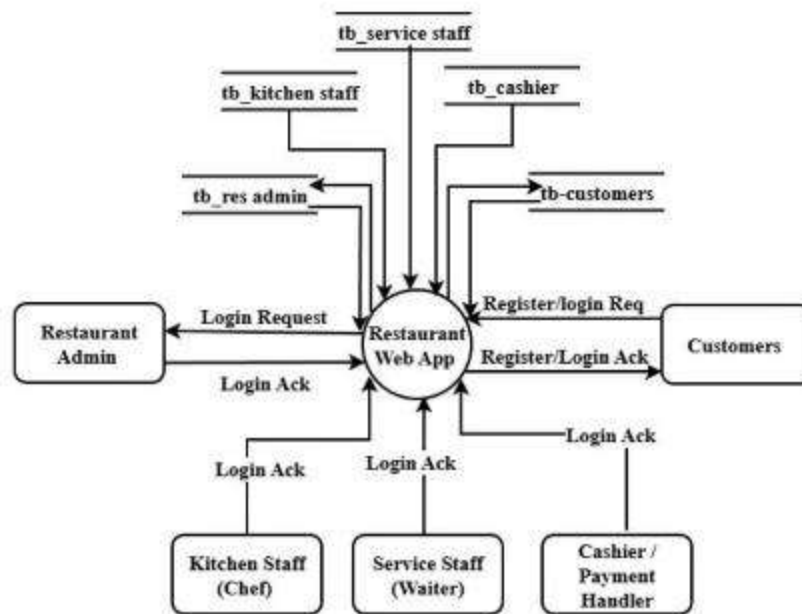


Figure-1 System Architecture

3. Case and Methodology

System Initialization: When the system starts, the backend server connects to the database and loads all the important details like menu items, table information, and staff accounts. Each dining table is given a unique QR code. These QR codes are generated in advance and placed on the tables so that customers can easily access the digital menu when they arrive.

Customer Interaction: When a customer comes to the restaurant, they simply scan the QR code placed on their table using their mobile phone. After scanning, the system automatically identifies the table number and shows the digital menu on their screen. Customers can browse through the food items, check prices, select quantity, and place their order directly. This reduces

the need to wait for a waiter and also avoids order-taking mistakes.

Order Processing: Once the customer places the order, the system stores it in the database with the status marked as “Placed.” The order is immediately sent to the kitchen dashboard. Kitchen staff can view the new orders, arrange them based on priority, and start preparing the food. They update the status to “Preparing” so that everyone knows the food is being made.

Real-Time Order Tracking: The system tracks the order through different stages such as “Placed,” “Preparing,” “Ready,” “Served,” and “Completed.” These updates are shown in real time to customers, kitchen staff, and service staff. This makes the process transparent and avoids confusion. Customers do not need to repeatedly ask for updates because they can see the status directly on their phone.

Service & Table Management: When the food is ready, service staff receive a notification. They deliver the food to the correct table and update the status to “Served.” The system also helps monitor which tables are occupied and tracks service progress. This helps staff manage multiple tables smoothly and reduces customer waiting time.

Billing & Payment: After the meal is completed, the system automatically generates the bill based on the confirmed orders. Customers can pay using cash, UPI, card, or mobile wallet. Once the payment is successful, the order status changes to “Completed.” This ensures a smooth and quick checkout process without delays.



Figure-2 Proposed System Architecture

4. Results & Analysis

After implementing the Restaurant and Management System with QR-Based Order Tracking, the results show a clear improvement in restaurant operations. Customers were able to place orders quickly by scanning the QR code without waiting for a waiter. The system successfully sent orders directly to the kitchen, and the order status was updated in real time. This reduced confusion and improved communication between customers, kitchen staff, and service staff. The billing process also became faster and more accurate because the system automatically calculated the total amount. Digital payment options made checkout smooth and convenient. Overall, the system reduced waiting time, minimized order mistakes, and improved service efficiency. Both customers and staff experienced a more organized and comfortable workflow.



Figure-3 Results of the proposed system

5. Conclusion

In conclusion, the comprehensive design and development of the project is centred on a user-focused and automation-driven approach. The system employs Python and Flask for efficient back-end processing, MySQL for structured data management, and Bootstrap with responsive web interfaces for an intuitive front-end accessible on both mobile and desktop devices. Key features such as QR-based table ordering, real-time order tracking, kitchen workflow management, service staff monitoring, automated billing, and digital payment integration collectively streamline restaurant operations. The system's modules including Restaurant Web Application, QR-Based Table Management, Digital Menu & Order Placement, Order Process Tracking, Kitchen Order Management, Service & Table Monitoring, Billing & Payment, and Reporting & Analytics work cohesively to enhance operational efficiency, reduce manual errors, improve customer satisfaction, and optimize staff workload. By enabling seamless coordination between customers, kitchen staff, and service personnel, the proposed solution modernizes traditional dining processes while ensuring transparency and reliability. Overall, the project stands as a scalable, secure, and robust platform that transforms conventional restaurant operations into a digital, efficient, and customer-centric experience, paving the way for future enhancements such as AI-based recommendations, inventory integration, and multi-branch cloud deployment.

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