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DIGI DINE

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Abstract: *The limitations of conventional canteen operations—such as manual order handling, inconsistent inventory tracking, and lack of real-time communication—necessitate a robust digital framework. Digi Dine is a full-stack web-based canteen management system engineered to automate end-to-end ordering workflows using modular architecture and database-driven operations. The system integrates secure user authentication, dynamic menu rendering, automated promo-code generation, real-time order status management, and an admin dashboard supported by analytical reporting. Backend processes are optimized through structured data models that ensure accurate transaction handling and scalable performance. The application eliminates redundancy, reduces processing time, and enhances decision-making through systematic data insights. This paper presents the system architecture, data flow models, methodologies, implementation strategies, and performance evaluation of the Digi Dine platform.*

Keywords: Digital Canteen System, College Canteen Automation, Full-Stack Web Application, Automated Order Processing, Database-Driven Architecture, Real-Time Order Tracking, Analytical Dashboard

I. INTRODUCTION

The rapid advancement of digital technologies has transformed service delivery across multiple domains, including education, retail, and hospitality. However, many college canteens still rely on traditional manual processes for order placement, billing, and inventory updates. These outdated methods often lead to long queues, delayed service, inaccurate order tracking, and inefficient resource utilization. As campus populations increase, the need for a streamlined, automated, and data-driven solution becomes essential.

Digi Dine is a web-based digital canteen automation system designed to modernize the end-to-end workflow of college canteen operations. By integrating real-time order processing, digital menu management, secure authentication, and automated promo-code handling, the system significantly improves user experience and operational efficiency. The platform incorporates a structured backend architecture with database-driven logic to ensure accurate inventory updates, sales tracking, and administrative control.

The solution aims to reduce manual effort, minimize human error, accelerate service time, and provide analytical insights for better decision-making. This paper presents the motivation behind Digi Dine, analyzes limitations of conventional canteen systems, and outlines the technical approach adopted in designing a scalable college canteen automation platform.

II. METHODOLOGY

The methodology adopted for the Digi Dine Canteen Management System follows a structured, modular, and scalable development approach based on the principles of the Software Development Life Cycle (SDLC). The system design integrates data modelling, architectural design, interface design, and procedural workflows, ensuring smooth interaction between students, administrators, and backend services.

The system uses the MERN (MongoDB, Express.js, React.js, Node.js) stack, enabling efficient handling of real-time orders, OTP verification, promo-code generation, and order lifecycle operations. The frontend manages all

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user-facing activities, including menu browsing, cart management, and order tracking. The backend handles business logic such as authentication, order validation, promotion rules, and communication with MongoDB.

Data design relies on flexible document-based schemas to support high-volume transactions, maintain data integrity, and deliver rapid responses during peak hours. Procedural workflows are defined for user login, order placement, admin order processing, and promo-code validation. This methodology ensures optimized performance, accurate data handling, minimal manual intervention, and a seamless automated canteen experience.

III. LITERATURE REVIEW

Technological advancements in web and mobile applications have inspired several automated food-ordering and management systems. Existing research primarily focuses on digital menu systems, queue reduction mechanisms, and centralized order processing. Many studies propose the use of web-based or mobile-based ordering platforms to minimize manual intervention; however, these systems often lack real-time tracking, intelligent promo-code handling, and comprehensive admin dashboards.

Earlier canteen automation projects were limited to basic ordering, with minimal features for inventory updates, cancellation workflows, or user authentication protocols. Some research works emphasize improving user experience but fail to incorporate structured backend validation for OTP-based login or secure promotional logic. Similarly, many cloud-based food-ordering models offer dynamic menus but do not provide a complete order lifecycle or integration with student-specific workflows in campus environments.

The gaps identified include the absence of centralized data models, lack of transparent order-status communication, weak admin control, and no compensation method for cancellations. Digi Dine addresses these shortcomings by impleme nting a full-stack architecture that supports real-time updates, database-driven OTP and promo mechanisms, role-based access, and a robust administrative interface designed specifically for college canteens.

IV. RESULTS AND DISCUSSION

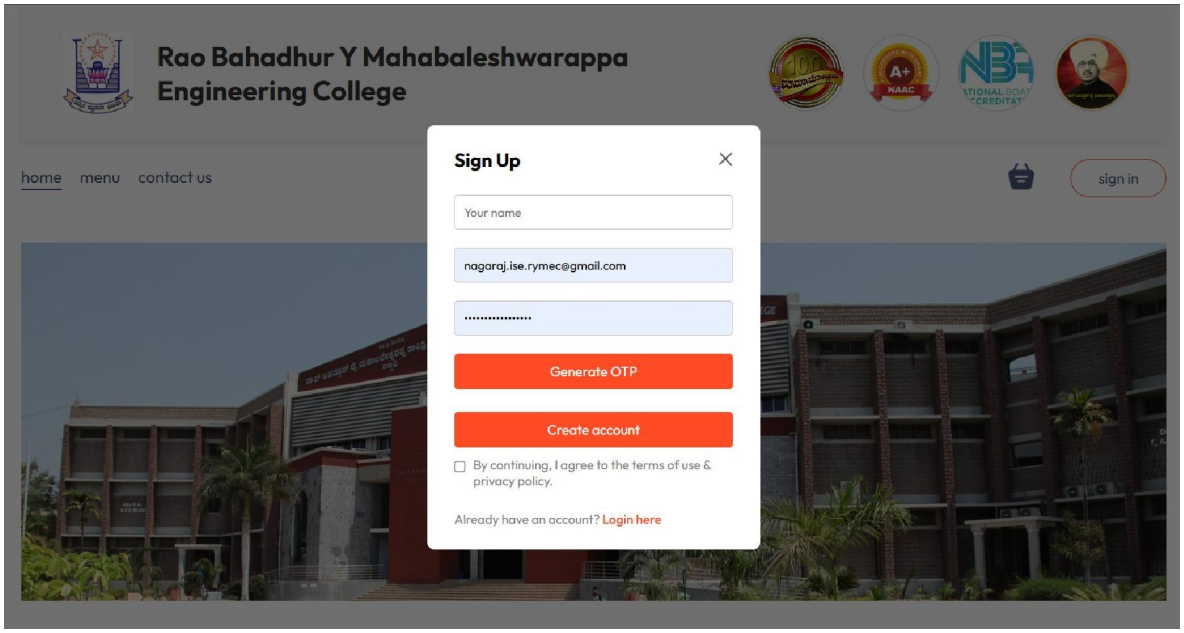

Fig. 1. Login Page for user

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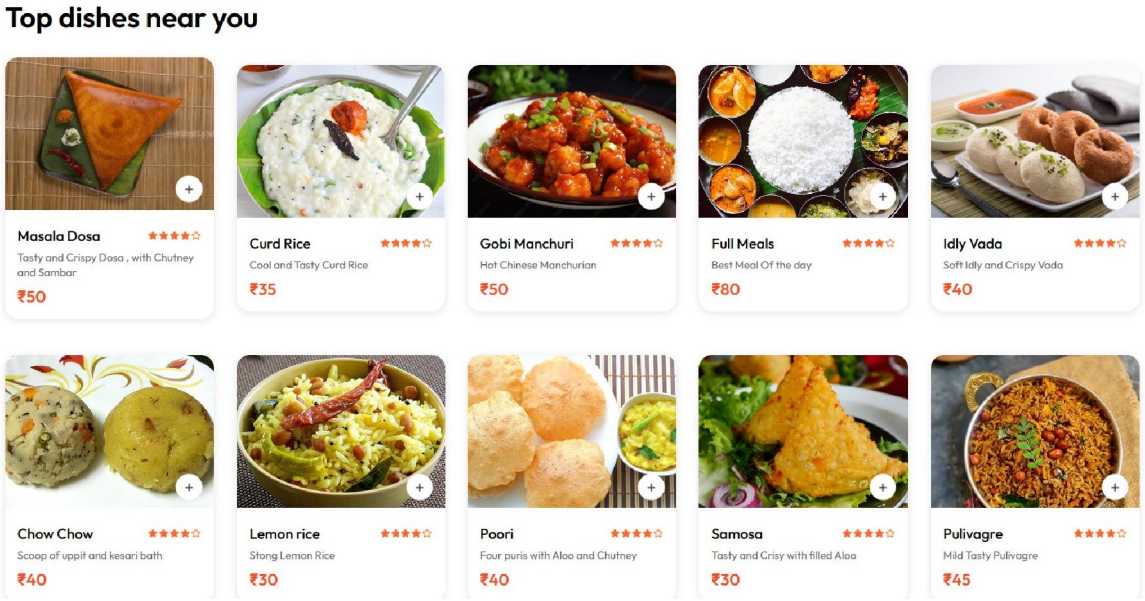

Fig. 2. Menu page of the items

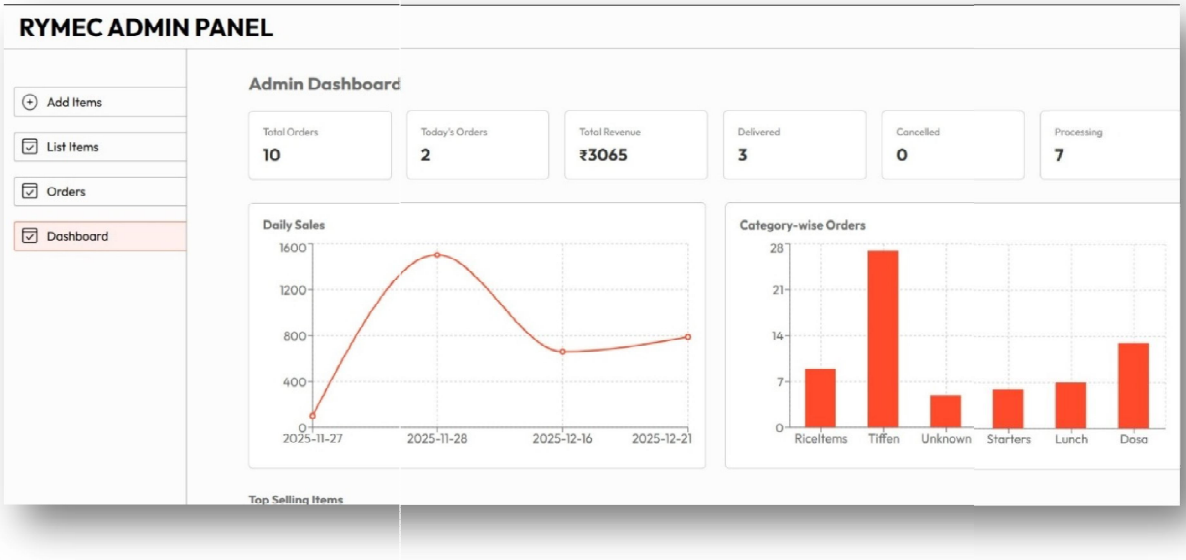

Fig. 3. Data analysis page for the admin

V. CONCLUSION

The Digi Dine Canteen Management System successfully demonstrates how digital automation can transform traditional college canteen operations into an efficient, transparent, and user-centric service. By integrating web-based technologies with structured backend workflows, the system automates critical processes such as order placement, OTP-based authentication, promo-code generation, and real-time order tracking. The implementation reduces manual effort, minimizes errors, and significantly improves service efficiency during peak hours.

The modular architecture and database-driven design ensure scalability, data integrity, and ease of future enhancements. Features such as role-based access control and analytical reporting provide administrators with better operational visibility and decision-making capabilities. Overall, Digi Dine offers a practical, scalable, and

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reliable solution for modern campus environments and highlights the potential of digital systems in optimizing food service management. Future improvements may include mobile application support, AI-driven demand prediction, and advanced inventory automation.

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