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SMART CANTEEN AUTOMATION SYSTEM USING ANDROID

[1]Pranav Bochare, [2]Mohit Bawankar, [3]Prathamesh Auti, [4]Vaibhav Harane,

[1,2,3,4]Student, Department of Computer Engineering, ZCOER, Pune, Maharashtra,

Abstract: This research aim the Smart Canteen App, an innovative digital solution aimed at modernizing the conventional canteen experience within educational and corporate settings. Leveraging cutting-edge technology, the application optimizes the ordering, payment, and food pickup processes, enhancing convenience and efficiency for both customers and canteen operators. With a focus on addressing the demand for swift and efficient service in today's fast-paced environment, this study emphasizes the development of a streamlined smart canteen management system. By enabling students and employees to place orders via a mobile application and providing real-time updates on order progress, the system aims to reduce paperwork, minimize waiting times, and enhance overall customer satisfaction. The app's intuitive interface allows for easy navigation and customization of orders to accommodate dietary preferences and allergies. Furthermore, the integration of secure cashless payment options ensures a seamless and hassle-free transaction experience. Through this research, we aim to demonstrate the significant benefits of adopting technology-driven solutions for optimizing canteen operations and improving the dining experience for all stakeholders.

Index Terms **- Android, Firebase, table reservation, notification, and recommendation system.**

I. Introduction

The Smart Canteen App introduces a groundbreaking digital solution aimed at transforming the dining experience within canteens and food service establishments. By harnessing cutting-edge technology, the application revolutionizes the ordering, payment, and food management processes, offering unparalleled convenience for both customers and canteen operators. Traditional canteen systems often grapple with long queues, inefficient food preparation, and inventory management challenges. The Smart Canteen App addresses these issues by providing a seamless platform for customers to access their favorite meals while empowering canteen operators to optimize their operations. It represents a fusion of technology and gastronomy, offering a smarter and more enjoyable way to dine.

In today's fast-paced world, traditional canteen systems frequently result in frustration and wasted time for both customers and canteen staff. With the Smart Canteen App, however, these challenges are mitigated through the integration of technology into every aspect of the dining experience. Customers can conveniently browse menus, place orders, and make payments from their smartphones, eliminating the need for long queues and cash transactions. Meanwhile, canteen operators benefit from efficient order management tools, inventory control, and financial tracking capabilities, enhancing overall operational efficiency and profitability.

The Smart Canteen App offers users a comprehensive menu browsing experience, enabling them to select and customize their meals with ease. By providing secure and convenient payment options, such as digital wallets and credit/debit card integration, the app promotes hygiene and reduces waiting times. Real-time updates on order status keep users informed about estimated wait times, allowing them to plan their schedules accordingly. Furthermore, the app utilizes user preferences and order history to suggest personalized menu items, enhancing the overall dining experience and encouraging exploration of new dishes.

The Smart Canteen App represents a significant advancement in the way people access and enjoy meals in communal dining spaces. By addressing the inefficiencies and challenges associated with traditional canteen systems, this innovative application offers a convenient, efficient, and user-centric dining experience for both customers and canteen operators alike.

II. Problem Definition

Within educational institutions, canteens often contend with lengthy queues and manual inefficiencies, prompting the imperative for an automated solution. This system is envisioned to alleviate operational bottlenecks, minimize wait times, and elevate efficiency levels. By implementing automation, institutions seek to modernize their canteen operations, ensuring a smoother dining experience for students and staff alike. The transition to an automated system aims to optimize resource allocation, customer satisfaction.

III. LITERATURE REVIEW

A plethora of mobile app innovations is accessible on the market, with a primary goal of streamlining various sectors, including dining services. This section offers an in-depth review of existing literature and research conducted in the realm of smart canteen automation systems

Sujata Joshi, Bivek Kasaju, Pratik Karki, et al.; "Smart Canteen Management System" [2022], In this paper author purposes that the study aims to develop an efficient smart canteen management system using radio frequency identification to counter billing delays. The system can be used in large industries, universities, and government offices, offering cost-effectiveness and quick, easy-to-use service. It detects and authenticates users, automatically debits at the end of the month, and is less time- consuming than existing systems.

Misbah Dalal, Zaid Barmare, et al.; "Android Based Canteen Management System" [2021], In this paper author says that as canteen in colleges get extremely crowded nowadays, so in this project, we concentrate on fast service of food to the users to reduce paper work and save the time of the student by avoiding long queue and to keep things organized. This will satisfy all the customers need and overall sale of the canteen will increase. This application program reduces the manual work for managing the Canteen. Students can place their order through the e-menu available on the mobile application which would be further transferred to the canteen. The student can therefore know their order details and the order progress through the mobile application. The canteen manages the students order and keeps updating the progress of the order through their web application. The admin manages the student and canteen through the web application.

Mrs.A.Gowthami, Ms.T.Banupriya, et al.; "Mobile Application for Canteen Automation System Using Android" [2020], In this paper author purposes that the project "Canteen Automation System Using Android" enables to register online, read, and select the food from E-menu card and the user wants to use android application. The result after choosing the food from the E-menu card will directly seem on the screen near the chef. The gadget is the mixture of android as nicely as internet application. The barcode system is used for reading the products. By the usage of this application the work of the waiter is decreased and we can also say that the paintings are nullified. The benefits of this are that if there is a rush in the canteen then there will be change that the waiter will be unavailable and the user can at once order the food to the chef on-line using this application. The user will have username and password, by using which they can login into the system. This means that the purchaser is the regular consumer of the canteen.

Dando Xiao, in 'Research on the Application of Internet of Things Technology in the Construction of University Intelligent Health Canteen' [2020], discusses the potential of Internet of Things (IoT) technology in shaping the future of university canteens. While IoT offers numerous advantages for creating intelligent health canteens, there are potential disadvantages to consider. Implementing IoT technology may require substantial investments in infrastructure, staff training, and equipment. Additionally, privacy and data security concerns become paramount when handling sensitive health and dietary information through IoT devices.

Giteshri Kale and Sharad Dube's 'Web-based E-wallet Canteen Management System using RFID' [2020] present an innovative system to modernize canteen management, leveraging web-based software and radio frequency identification (RFID). While this system offers multiple advantages, it also has potential disadvantages. It requires users to have access to the internet and smartphones, which could be limiting for some individuals. Implementing and maintaining such a system may also require financial investments and staff training. Privacy and security concerns related to cashless payments and data storage need to be addressed for user trust and data protection. Furthermore, the transition from a manual system to an automated one may face resistance and require time for adjustment.

IV. PROPOSED METHODOLOGY

In creating a smart canteen automation system using Android, simplicity and accessibility are key considerations for users of varying technical abilities. The system architecture comprises three layers: presentation, application, and database. Users access the presentation layer via smartphones or tablets, focusing on a user-friendly interface. The application layer manages system functionality, including order management and menu updates. Data, such as menu items and order status, is sourced from Firebase, serving as the backend database. Firebase integration facilitates seamless updates without requiring changes to the application code, ensuring efficient operation. This approach enhances user experience and streamlines canteen management processes.

A. System Design and Architecture

The planned Order Nosh application will have a two-tier system design, including a customer module and a vendor module. The customer module is designed with features such as signing up and logging into the app with a unique identity, selecting the canteen, ordering dishes that are updated by the vendor, online payment options, and receiving notifications when the order is ready, a 10-minute order cancellation, and seating booking to provide customers with a user-friendly interface for interacting with the application.

In contrast, the vendor module is a limited section that may only be accessed by authorised vendors that have been approved by the college administration. This module includes functionality for controlling the application's content and features. An authorised

vendor can add, edit, and delete meals on a regular basis. The application includes features such as real-time analysis of the most popular dishes, as well as a meal of the day analysis to increase sales.

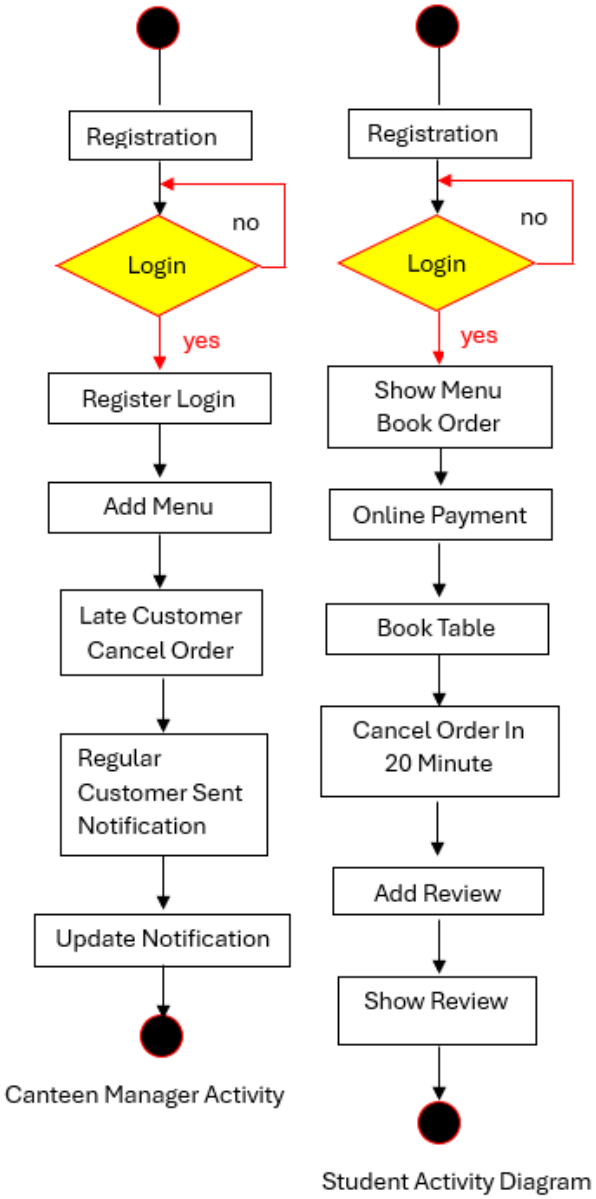

Fig. System Design and Architecture

When a customer or student logs into the Android app, the authentication system securely verifies their identity, ensuring that only authorized users can access the system. Upon successful authentication, users are presented with a list of available canteens to choose from. This list may include various canteens located within the vicinity or affiliated with the institution. The canteen selection interface provides users with relevant information about each canteen, such as location, operating hours, and special offers. Once the user selects a canteen, the app navigates to the menu browsing section, where users can explore the available food and beverage options.

In the menu browsing section, customers can view the comprehensive menu offered by the selected canteen, categorized by food type, dietary preferences, and pricing. The menu interface is designed to be user-friendly, featuring images, descriptions, and filters to help users find their desired items efficiently. After selecting items for their order, users have the option to proceed with table booking if they wish to dine in. The table booking functionality allows users to specify their preferred date, time, and number of guests, and the system checks for table availability accordingly. Once the booking is confirmed, users can proceed to the online payment section, where they can securely complete their transaction using various payment methods supported by the integrated payment gateway. Additionally, customers have the option to provide feedback on their dining experience, contributing to the continuous improvement of the system and the overall satisfaction of users

V. RESULTS

After developing the core functionality of the system, we implemented the features mentioned earlier. Below given figure represents the start screen of the app.

Fig 1. Splash Screen

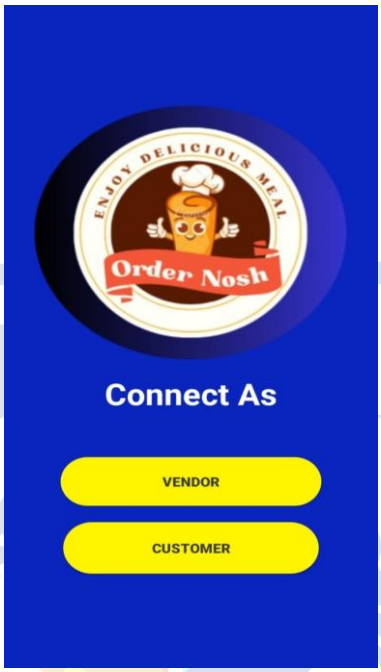

Fig 2. Start Screen

Fig 3. Sign Up

Whenever user opens the application Fig1 show the Splash screen of the application fig 2 shows the start screen of the application. Vendor can select vendor option and student or customers can select the customer option for ordering the food.

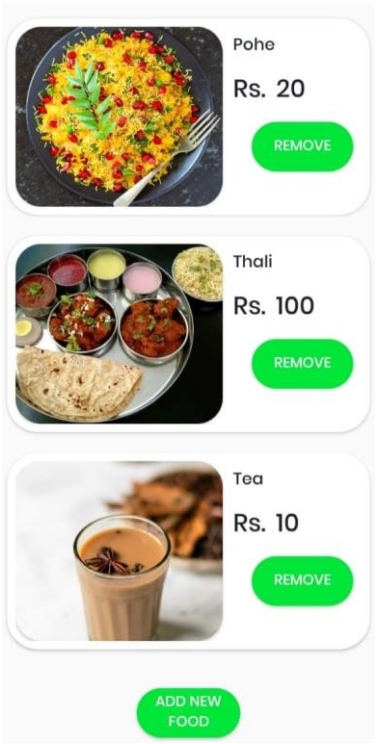

Fig 4. Add new Food

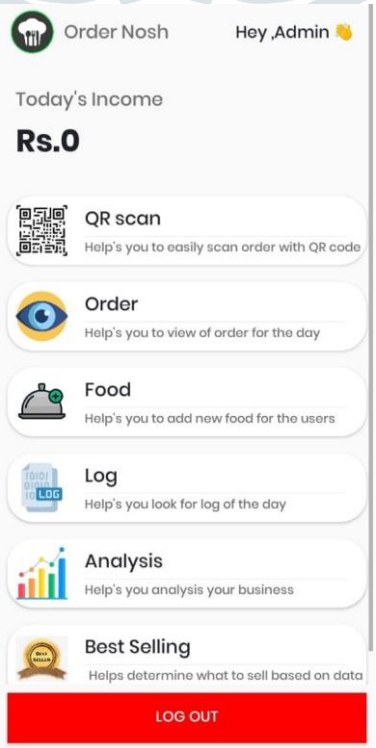

Fig 5. Admin Dashboard

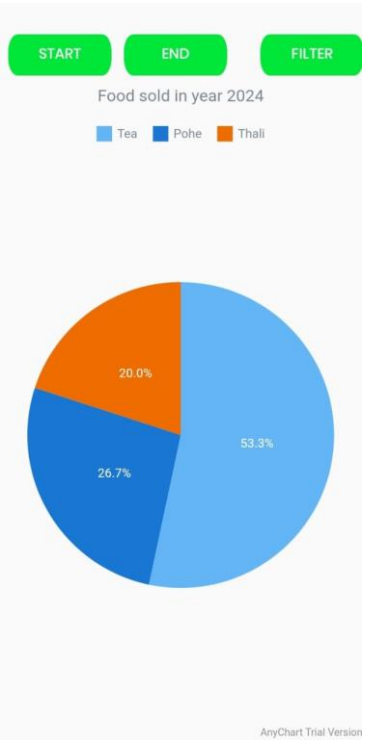

Fig 6. Food Sold

Whenever the vendor login the application after the verifying the authenticated vendor he can able to add whatever the food items available in the canteen with image of food item name and price . As shown in fig. 3 after add food item the food item will be redirect towards customer. And in above fig 4 Admin Dashboard customer can be able to find best-selling food of the day then order and also able to see customers feedback.

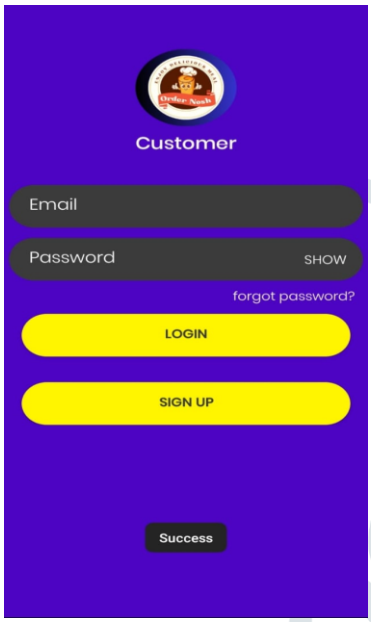

Fig 7. Customer login

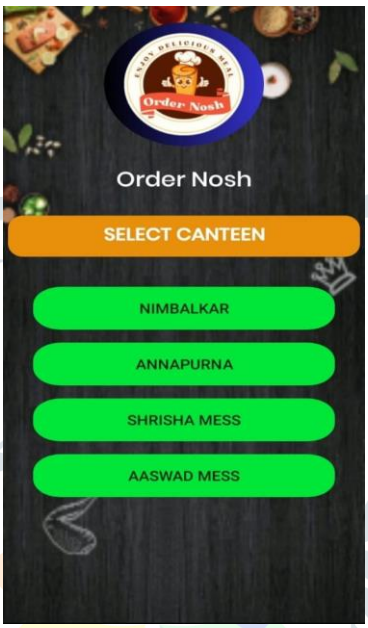

Fig 8. Canteen select

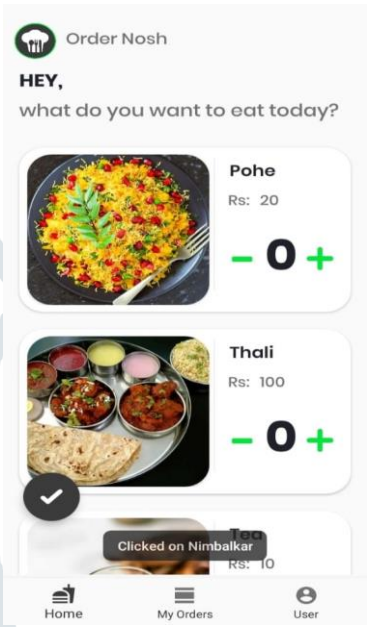

Fig 9. Food Select

After login successfully authenticate customer can able to select the canteen from multiple canteen as shown fig 8 after selecting the canteen customer can able to see the food item added by the vendor and price . Customer can select the food item which he want to order from the given food item. As shown in fig. 9

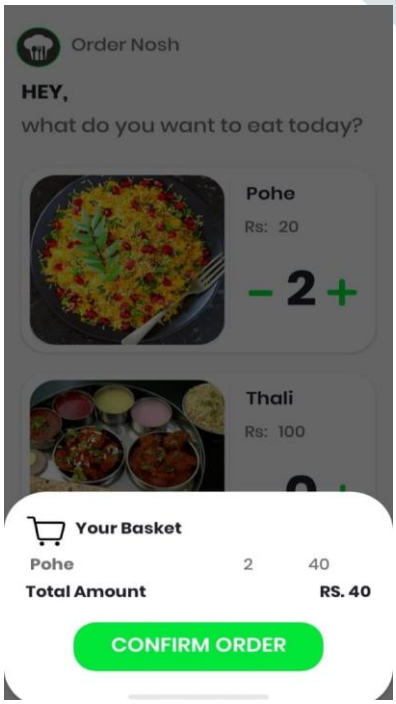

Fig 10. Customer Order

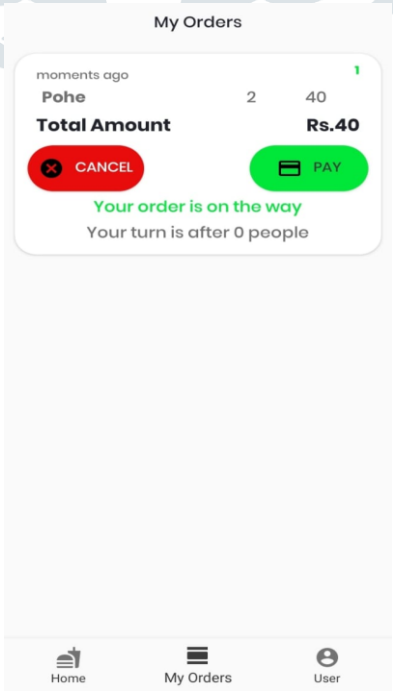

Fig 11. Order Details

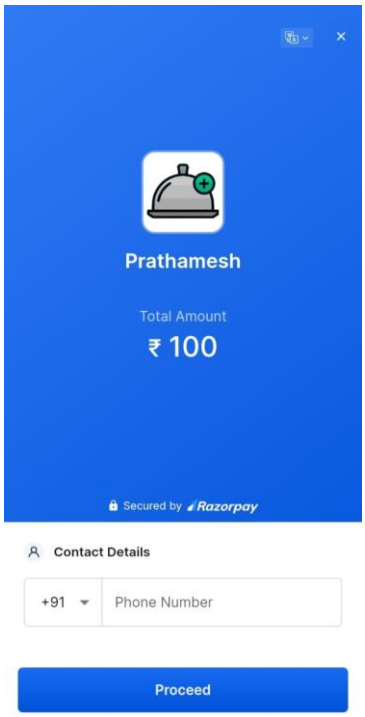

Fig 12. Payment Option

When customer select the food item from given food item customer can able to see food item in basket and also total amount of selected food item as shown in fig. 10 and after the showing the total amount customer can pay the order through online payment option Or cancel the order. After successfully payment order is placed.

VI. RESULT ANALYSIS

ID	Test cases	Expected Output	Actual Output	Pass / Fail
01	User Registration	User can create an account using valid credentials.	User successfully registers and receives confirmation.	Pass
02	Menu Display	User can view the menu items available in the canteen.	Menu items are displayed accurately with prices.	Pass
03	Order Placement	User can select items from the menu and place an order.	Selected items are added to the cart for checkout.	Pass
04	Payment Processing	Users can make payments securely for their orders.	Payment gateway successfully processes transactions.	Pass

VII. CONCLUSION

In conclusion, the "Smart Canteen Automation System using Android" project embodies a forward-looking approach to addressing the evolving needs and expectations of college students. It not only promises to enhance the dining experience but also sets a precedent for technological integration and innovation within the educational sector. By prioritizing efficiency, convenience, safety, and user satisfaction, this project represents a significant step towards modernizing and improving campus dining for the benefit of students and institutions a like

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