

Smart Canteen Management System

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Abstract— As college campuses are growing nowadays, there is more need for smart, efficient, and contactless facilities.

This project proposes a Smart Canteen Management System (SCMS) that automates school meal ordering.

Using IoT-based technologies like NodeMCU, the Blynk IoT app, and Firebase Realtime Database, our system enables students to order through a mobile app, select payment modes (cash or online), and track order status in real time.

The system supports mixed payment checks, admin order management, and auto-saving data. By reducing human interaction, improving workflow, and making orders traceable in real time, SCMS aims to improve service speed and customer satisfaction in college canteens.

Keywords— Smart Canteen, IoT, Firebase, Mobile App Interface, Hybrid Payment System.

I. INTRODUCTION

Canteens in academic institutions and colleges often suffer from a host of operational issues that can severely obstruct their performance, such as the incidence of long queues that enrage students, delayed payments that inconvenience them, manual order mismanagement that generates errors, and inadequate in-real-time order tracking that puts customers in the dark regarding status of their orders. With growing needs for automation and touchless services, it has become absolutely crucial for these institutions to shift towards the installation of digital canteen systems that are capable of effectively solving these issues.

Smart Canteen Management System, or SCMS, successfully addresses these common issues by harmoniously combining Internet of Things (IoT) devices, cloud-based databases, and easy-to-use mobile interfaces, all mixed together to provide an immensely efficient and well-designed solution.

In this groundbreaking project, the Blynk IoT app is utilized to create a straightforward and user-configurable interface for users and administrators.

The orders are automatically passed on to a NodeMCU (ESP8266) microcontroller when students place orders, which runs the logic necessary and then passes on the gathered data to the Firebase Realtime Database to store and manage. The system has been made to support multiple payment modes, both online payments and offline cash payments, with a hybrid logic that provides confirmation to only online orders once successful payment verification has been completed.

Administrators can successfully monitor each order and collection through a specially created administrative panel that enables effective monitoring and management.

This system enhances transparency, minimizes traffic jams, improves sanitation, and lightens the workload of staff and improves the efficiency of canteen operations.

II. LITERATURE REVIEW

- L. V, M. K, S. A and K. G, "E-Canteen Management System based on Web Application," IC3IoT, Chennai, 2022: This paper outlines a web-based system for digital food ordering and admin-side order monitoring using PHP and Bootstrap, offering an early version of contactless service.
- S. Mishra, R. Singh, "IoT-based Smart Canteen Automation," IJITEE, 2020: Explores the use of microcontrollers and mobile interfaces to automate order handling and reduce time and manual errors.
- G. Verma et al., "Automation of College Canteen using Cloud and IoT," IRJET, 2021: Focuses on integrating IoT with cloud platforms to maintain hygiene and improve service delivery with real-time updates.

III. METHODOLOGY

A. Materials/Components/Flowchart/Block Diagram/Theory

The primary components include:

- NodeMCU (ESP8266)
- Arduino IDE
- Blynk IoT App (New Version)
- Firebase Realtime Database
- Wi-Fi Connection
- Smartphone (for UI)

Given is the flowchart of the process that will take place:

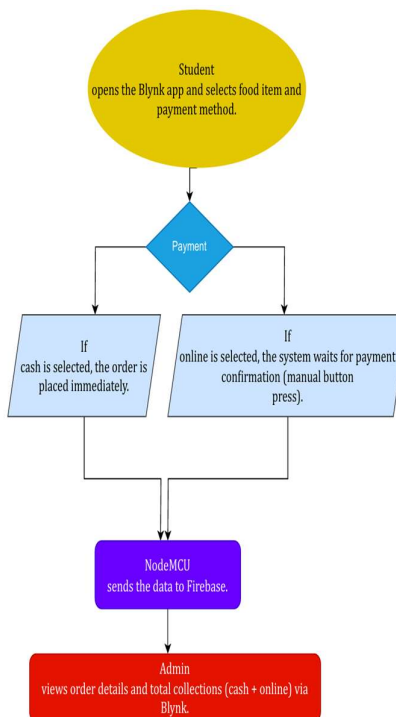


Fig 1

IV. RESULTS AND DISCUSSIONS

Initial mock order and data testing (20-30 dummy entries) indicates successful operation of the whole order flow. Orders arrive at Firebase in 1-2 seconds since ordering, with payment method and order status correctly tagged. Admin terminal indicates live updates. Hybrid logic works as designed, preventing unpaid orders from entering the system unless manually confirmed.

Overall, the time to stand in queue is reduced significantly as the customer has to collect his/her order once the food is cooked till then they can just carry out other tasks.

V. FUTURE SCOPE

- Integration of UPI-based real payment gateway.
- Switch from Blynk to dedicated app which will lead to multi user capability which lacks in Blynk as of now
- Integrate Razor pay (payment gateway) once switched to full stack app. Blynk doesn't support payment gateways.
- QR-based pickup notifications for students.
- Data analytics dashboard for admin insights.
- Sustainability indicator to promote eco-friendly menu choices.

V. CONCLUSION

The Smart Canteen Management System is a low-cost and modern solution for school canteen food ordering automation. With Blynk-enabled mobile UI, NodeMCU backend, and Firebase cloud storage, it provides users and canteen staff with real-time monitoring and control. The project proves that with fewer hardware components, high automation levels are achievable, and this enables future features and scalable canteen solutions.

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