

Messify: An AI-Powered Smart Mess Management System

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Abstract - Managing a college mess traditionally involves manual menu communication, meal-count estimation, subscription records, billing, and repeated coordination between students and mess owners. These activities can create confusion, inaccurate records, food wastage, and difficulty in handling skipped meals. This paper presents MESSIFY, an AI-powered smart mess management system designed to connect students and local tiffin or mess providers through a centralized digital platform. The system provides fresh daily menu visibility, one-tap meal skipping, subscriber management, order tracking, ledger-based billing, and AI-assisted meal suggestions and demand prediction. A dedicated mess-owner dashboard allows providers to update menus, monitor active subscribers, view lunch and dinner skips, and manage earnings. Delivery partners receive assigned routes and can update delivery status and scan QR codes associated with reusable tiffin containers. The proposed system aims to reduce manual work, improve transparency in billing, support better meal planning, and provide a convenient experience for both students and mess owners.

Keywords: Artificial Intelligence, Smart Mess Management, Tiffin Management, Meal Recommendation, Demand Prediction, Meal Skipping, Subscription Management, Digital Billing, Order Tracking, Food Waste Reduction, QR Code, Delivery Management.

I. INTRODUCTION

The entire food-service industry has experienced a major digital transformation as a result of the availability of online food ordering, restaurant discovery services, digital payments, subscription platforms, and recommendation systems. Yet small and medium-sized mess and tiffin providers still tend to rely on informal means of communication and on records that are kept manually. Students who live in hostels, paying-guest arrangements, rented apartments, and working professionals usually enter into monthly mess agreements under which their meals are delivered or collected on a regular basis.

Students and working individuals who depend on hostel messes or local tiffin services often face several practical problems in their daily meal management. Common problems include:

- Unclear or delayed information about daily menus.

- Difficulty communicating meal requirements. manual calculation and maintenance of bills.
- Difficulty recording skipped meals.
- Dependence on phone calls, notebooks, spreadsheets, or verbal communication.

- Lack of centralized records for subscribers, orders, and payments.

MESSIFY solves these problems by using a mess management platform that is centralized. The platform has features for students and for mess owners. The main ideas are information about meals and bills control over meals that can be changed records that are kept digitally managing subscribers and orders in one place suggestions for meals made by AI and predicting what people will want to eat so that food can be planned better. The system is, for students living in hostels, people who live alone local tiffin service providers and small mess businesses. Just being a way to place orders, MESSIFY sees the mess as a service that happens regularly. It includes subscriptions, daily food options, the ability to skip meals, placing orders, and keeping track of money.

II. PROBLEM STATEMENT

Managing a mess or tiffin service can be hard for both students and mess owners. Many daily tasks are done by hand or, through phone apps. Students usually. Text the mess owner to learn the daily menu, subscription details if a meal is ready, payment status or delivery info. Mess owners must keep a list of subscribers calculate how many meals to prepare, note which meals were skipped handle payments and ensure tiffins are delivered each day. When more people sign up these tasks take longer. Can cause mistakes, delays and gaps in communication.

Another major issue is the lack of flexibility in mess systems. Students may not need a meal on every day. Conventional monthly or fixed meal systems may not offer a convenient way to report skipped meals and adjust the corresponding billing. This can lead to food preparation, food wastage and incorrect billing. At the time mess owners need an accurate estimate of how many meals must be prepared and delivered each day.

Delivery management poses another challenge. After tiffins leave the mess students often have little to no updates, about where their tiffin are when they will arrive. Delivery

personnel end up handling stops across different locations without a clear plan or a way to track progress. This makes it hard to stay organized and efficient. Also when the mess is handling a volume of deliveries each day keeping track of which tiffin belongs to which student becomes confusing. Individual tiffin boxes can get mixed up easily. Without a tracking system mistakes happen more often and students may not get their food on time.

III. OBJECTIVE

The main goal of the proposed system is to build an easy-to-use AI-powered Mess and Tiffin Management System that makes it easy to manage mess subscriptions, meals, payments and deliveries on one digital platform.

1. To create a single mess management platform that links students, customers, mess owners, delivery workers and administrators in one system.
2. To make it easy for users to find and subscribe to mess services view details and handle subscriptions online.
3. To give users a simple way to skip a meal so they can tell the mess when they do not need a specific meal, which helps mess owners plan cooking better.
4. To keep billing and payment records online holding subscription fees, payment data and transaction checks in order.
5. To make tiffin delivery better by giving delivery workers customer details and delivery info and by supporting route-based delivery planning.
6. To use QR codes for tiffin identification and tracking so each tiffin box can be linked to the correct user and handled faster during delivery.
7. To send notifications and status updates so users get important news about subscriptions, payments, meals and deliveries.
8. To add an AI helper that gives users basic help, suggestions and answers about the services in the system.
9. To cut down manual work and communication gaps among students, mess owners and delivery workers by putting key operations on one digital platform.

To help with better meal planning and cut waste by using data like meal-skipping requests and active subscriptions

IV. RELATED WORK

The growth of platforms has changed the way food ordering is done delivery is handled payments are made and customer services are provided. Several existing systems have tried to solve problems related to food delivery and management but many of them focus mainly on restaurants or commercial food-delivery services. The proposed system is different because it focuses on the needs of mess and tiffin services

A. Online Food Ordering and Delivery Systems

Existing food-delivery platforms give users features like restaurant discovery, online ordering, digital

payments order tracking and delivery management. These systems have made food ordering easier by connecting customers, restaurants and delivery people through a shared platform. However such platforms are usually made for food orders instead of regular mess subscriptions. They generally do not offer tools for managing monthly mess plans skipped meals, repeated billing or student-focused tiffin services.

B. Meal Skipping and Food Waste Reduction

Food wastage is a problem in regular meal services because the number of meals prepared may not always match the actual number of people eating. Some digital food-management methods try to guess food needs based on how much people eat.. Traditional mess systems often do not have an easy way for students to tell the mess about meals they will not eat.

C. QR-Based Identification and Tracking

QR codes are used a lot in systems for identification, verification and tracking. In food and delivery apps QR codes can link an item to a customer or order. Using QR-based identification in mess and tiffin services can help mess operators and delivery people recognize tiffin boxes and cut down on confusion when giving them out.

D. Assistance, in Food Management

Artificial intelligence and rule-based recommendation systems are being used more and more to offer personalized help to users. These systems can answer questions suggest options and guide users based on the information available. In a mess-management setting an intelligent assistance system can help users learn about subscriptions, meals, payments and other services without needing to talk to the mess administrator for every simple question.

The proposed system includes an AI-based assistance and suggestion part to make user experience better. The current version uses set rules and available system information of saying it has a fully trained machine-learning model.

V. PROPOSED SYSTEM

The proposed system is an AI-based Mess and Tiffin Management System. It aims to digitize and simplify the operations of mess and tiffin services. This system creates a platform that connects students or customers mess owners, delivery personnel and administrators.

Users can discover mess services manage their subscriptions check meal information skip meals when needed view billing details and submit payment information. Mess owners can manage users handle subscriptions, update meal menus,

process payments and oversee all delivery-related tasks through this platform.

A key feature in this system is the meal-skipping option. It allows users to notify the mess when they do not want a meal. This helps mess owners predict how many meals to prepare, reducing food waste and unnecessary cooking.

The system also includes QR-based tiffin identification. This allows delivery personnel to quickly identify the tiffin for each customer. A delivery and route management module gives real-time customer location data and delivery updates to make the delivery process more efficient.

An AI-based assistance component offers guidance and suggestions to users. The current version uses predefined rules and system data. Future versions can include advanced machine learning features like demand prediction and personalized meal recommendations.

In summary the proposed system brings together mess discovery, subscription handling, meal management, payments, billing, QR tracking, delivery coordination, notifications and AI-based help into one platform. This reduces work improves communication, between all parties and makes managing mess and tiffin services much more organized and effective.

major layers, namely, User Layer, Application Layer, Backend and Database Layer, and External Services Layer.

1. The User Interface Layer: This layer enables the end-users such as students, mess owners, and delivery personnel to interact with the system via a user interface. However, each of them can only access the features available to their category.

2. The Application Logic Layer: This layer undertakes various request-processing tasks, including the user's authentication, menu update, subscription, skipping of meals, ordering, and billing functions. In addition, it contains the AI component, which encompasses the rule-based chatbot and an algorithm that recommends meals based on context.

3. The Data Storage Layer: This layer is responsible for storing and providing access to the data used by an application. It consists of the user's personal information, menu, subscription data, orders, and bills depending on the database design chosen to develop the application.

The coordination among the layers of the system architecture commences with an initial request made by a registered user. The application processes the request, which is relayed to the pertinent backend or external service through the application programming interface. The database is queried for extracting or updating the necessary information, and thus, the response is finally delivered to the requesting user.

Therefore, the system architecture offers an integrated system in which the users, application modules, authentication, database backend, AI-based assistance, QR-based services, and delivery services collectively offer mess and tiffin management system services.

VII. METHODOLOGY

The proposed MESSIFY system was conceived using a methodology of structured software development to address the common mess and tiffin activities in a simplified manner. This involved activities such as requirement analysis, system design, development of modules, database inclusion, introduction of intelligent assistance, and system testing. The main aim was to design a central web-based application to address the requirements of the students, mess owners, and delivery personnel in a manner that reduces the manual work required in addressing the daily mess activities.

A. Requirement Analysis: The initial step involved identifying the problems encountered by the students, mess owners, and delivery personnel in mess management activities. This included accessing the daily menu, maintaining subscription records, communicating meal-skip requests, addressing the payment procedures, managing the orders, and tracking the deliveries. From the requirements, the functions that the system needed to address first were identified and included user authentication, mess discovery, menu management, subscriptions, meal skipping, billing, order management, QR-based tiffin identification, and notification among others.

B. System Architecture and Design: From the requirements identified, the system's architecture and user flow were

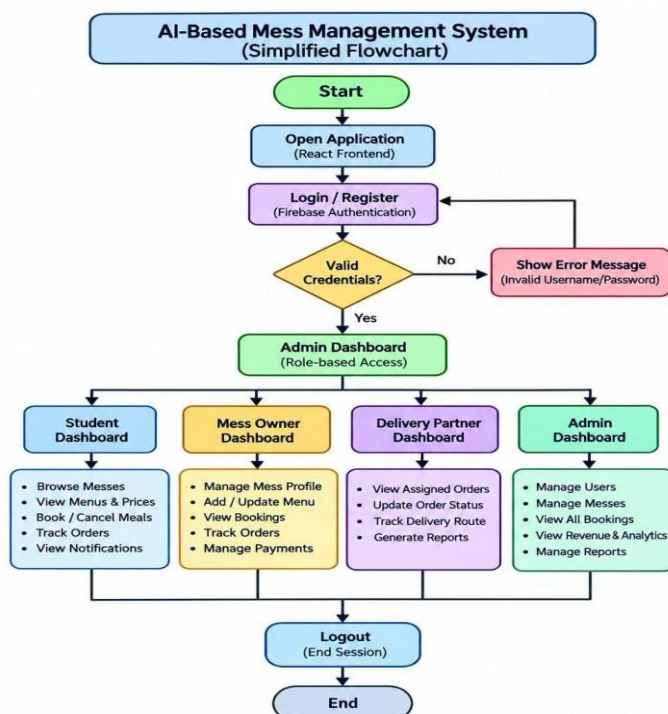


Fig 1. Full detailed flowchart of website

VI. SYSTEM ARCHITECTURE

The system architecture is the overall structure and coordination of the components of the proposed Mess and Tiffin Management System. The architecture comprises 4

designed. This involved breaking down the system into several modules to manage the functionalities in segments. The web application has different interface modules for the students or customers, mess owners, and the delivery personnel where applicable. These define how various users will interact with the application, the processes that will be followed in the systems, and how the information will be stored within the system.

C. User Interface Development: The web application was designed using React.js to develop an interactive interface through which the identified functions will be performed. The interface was designed to enable students to discover messes, manage subscriptions, view the menu, and track the orders. The mess owners' interface involves managing the mess, meal information, and subscribers. The delivery interface is used to manage delivery-related activities if implemented within the system. The interfaces were developed to be responsive and informative to ensure that they are easy to use and navigate.

D. Authentication and Database Management: Firebase was included in the system to manage the authentication and database needs of the application. Firebase Authentication was used to manage the user registration and login system. Cloud Firestore was utilized to store and retrieve the information from the cloud as per the requirements of the various modules of the application. The system was designed to store subscriber information, mess details, menu information, subscriptions, orders, and payments among others based on the database schema selected.

E. Student and Mess Management: The student module enables students to access the mess information and services, including the daily menu, meal plans, subscription options, and order tracking features. Additionally, this segment enables students to update their meal preferences and skip meals where the option is available. The mess owner module enables the mess owners to update their menu and subscriber information and track the meal requests and orders and process the payments. This reduces the need for registers and communication between the students and mess owners.

F. Order, Billing, and Subscription Management: The system also has features that enable students to subscribe to the meal plans and track their orders. The subscription section was designed to store and update student subscription information. Meal-skip functionality was developed to record the students' requests to skip a meal. Additionally, the billing segment was designed to record and update the student's billing information to ease the process of payments. The payment functionalities depend on the payment module that was designed and implemented.

G. Delivery and QR-Based Tiffin Identification: The delivery segment was developed to enable the tracking of the delivery of meals and other related activities. The QR functionality was developed to help identify or differentiate the various tiffin reusable bags. This can be achieved by having a unique QR code for every tiffin bag or a bag that contains a meal. The QR code can be read to retrieve the information related to the specific bag depending on the system set up. The mapping functionality was also developed

to provide directions where location information is available or update location information.

H. AI-Assisted Functionality: MESSIFY includes AI-assisted features to enhance the functionality and experience of the application. The assistance module was designed to respond to users' requests and provide appropriate answers or directions depending on the most common problems experienced by the users. The meal suggestion functionality was designed to provide meal recommendations based on the current time, subscription plan, and the menu of the mess selected. The assistant features are simple rule-based features that do not involve extensive training or the use of machine-learning algorithms. Therefore, they cannot be regarded as trained machine learning prediction models.

Finally, the individual modules and complete system were tested to verify functionality, data flow, authentication, payments, meal management, QR operations, delivery features, and user interaction. The completed system provides a centralized platform that reduces manual work and improves the overall management of mess and tiffin services.

VIII. RESULT & DISCUSSION

The proposed system accomplishes the key mess and tiffin management tasks, as well as user authentication, mess finding, subscription, meal and menu tracking, skipping, invoicing, and payments, QR tiffin identification, delivery, notifications, and AI assistance. In addition, it reduces the amount of paperwork involved and facilitates information exchange between students, mess owners, and deliverers.

Moreover, skipping allows students to better plan their meals. Finally, tiffin identification with a QR scanner and delivery management streamline the distribution process. On the other hand, the AI implementation is currently rather simplistic, only offering assistance within the set parameters. Overall, the system seems to accomplish its goals, serving as a convenient platform for organizing messes and tiffins and providing a basis for future development and the implementation of more complex machine learning algorithms.

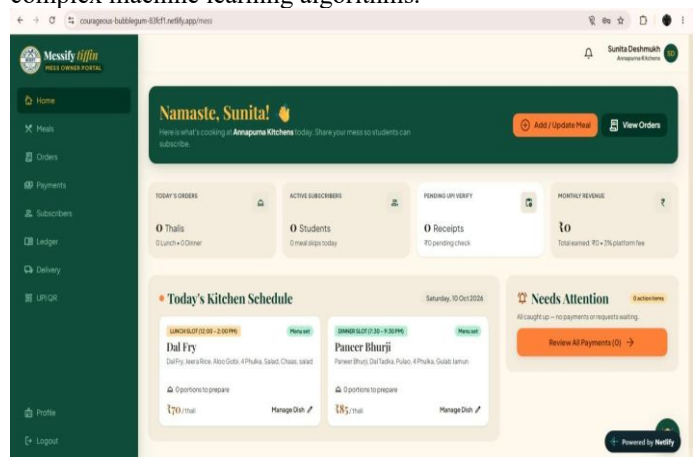


Fig 2. Mess owner dashboard

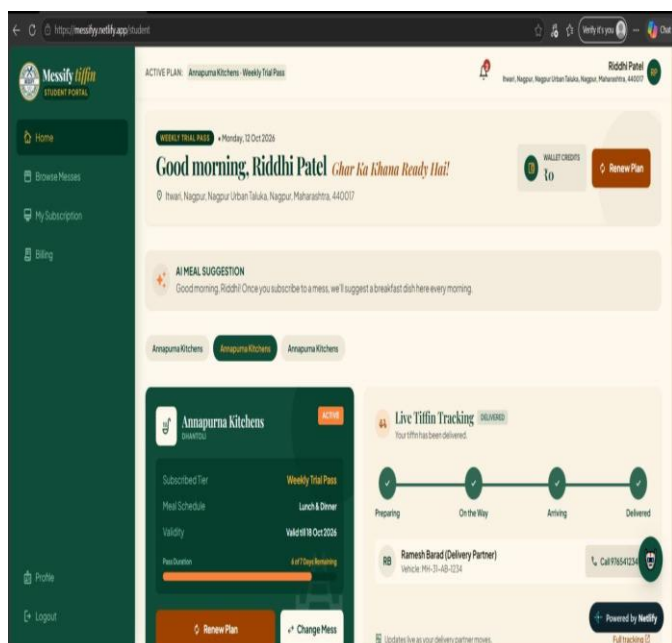


Fig 3. Student dashboard

IX. CONCLUSION

The proposed AI-Based Mess and Tiffin Management System presents a centralized digital solution for handling the crucial activities of mess and tiffin services. The system covers all aspects of mess and tiffin management, including user management, mess discovery, subscriptions, meal management, meal skipping, billing and payments, QR-based tiffin identification, delivery management, notifications, and AI-based assistance. By providing an integrated platform, the proposed system reduces manual work, improves communication, and offers a more organized experience for students, mess owners, and delivery personnel.

The proposed system highlights the potential of digital technologies to enhance traditional mess and tiffin management practices. The current rule-based AI assistance offers fundamental user support, while the overall architecture enables future incorporation of machine-learning techniques for demand prediction, personalized meal recommendations, food-waste prediction, and delivery optimization. Thus, the proposed system sets a practical foundation for building a smarter and more efficient mess management ecosystem.

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