AI Summer of Code: Mess Management App

💡 Introduction

In the fast-paced life of university hostels, an effective mess management system is essential to ensure a smooth and enjoyable dining experience for students and administrators. The current manual, pen-and-paper approach is outdated and inefficient, requiring students to physically interact with mess attendants to record meals. This leads to long queues, billing errors, and a lack of transparency, all of which detract from the dining experience. To modernize this process, we propose the **Mess Management App**—a digital solution designed to streamline meal tracking, billing, and communication. This app will save time, reduce errors, and enhance satisfaction for all stakeholders, revolutionizing hostel dining.

⚠️ Problem Statement

The traditional mess management system faces several critical challenges:

- **Inefficient Meal Recording:** Meal records are handwritten, leading to inefficiencies and errors such as lost entries or misrecorded data. Sometimes, students do need to queue to provide their hostel room and roll numbers, which are manually recorded by attendants. This causes delays, particularly during peak hours like noon and dinner.
- **Error-Prone Billing:** Monthly bills are calculated by compiling handwritten records, a process that often results in misplaced entries, miscalculations, or overlooked transactions.
- **Limited Transparency:** Students cannot access their current bill in real time, leading to confusion and disputes at the end of the month.
- **Guest Meal Tracking Issues:** Guests dining at the mess pay on the spot, but tracking these transactions by manually noting them down in the record book is cumbersome.
- **Menu Communication Gaps:** Updates to the daily meal schedule are not effectively communicated, leaving students uninformed about available options.

These inefficiencies create frustration for students and overburden mess staff, highlighting the urgent need for a digital overhaul.

✅ Proposed Solution

The **Mess Management App** offers a comprehensive, user-friendly solution to these challenges by digitizing the mess system. Key features include:

1. **User Authentication and Profiles**
    - **Secure Login:** Students access the app using their roll number and a secure authentication method (e.g., OTP or university credentials).
    - **Profile Details:** Each student's profile includes their name, roll number, hostel room number, and a detailed billing history.

2. **Dual Meal Marking System**
    - **Advance Marking:** Students can pre-mark meals just after dining time starts if they plan to dine, offering flexibility and reducing unusual rush-hour congestion.
    - **On-the-Spot Marking:** Mess attendants can mark meals at the point of service, within the app according to the available chosen diet (need not be meal) chosen by the student.

3. **Real-Time Bill Tracking**
    - **Live Updates:** The app updates a student's bill instantly after each meal is marked, displaying a running total.
    - **Full Visibility:** Students can view their expenses anytime, eliminating surprises and fostering trust.

4. **Guest Meal Management**
    - **Manual Price Entry:** Guest meals are logged with a manually entered price, and payment is collected in person (no payment system integration planned for now, can be integrated in future releases).
    - **Transaction Tracking:** The app sums up total guest meal prices, providing mess staff with clear sales data.

5. **Daily Meal Routine**
    - **Real-Time Menu:** A dynamic menu displays the day's offerings, updated instantly if changes occur (e.g., ingredient shortages or special dishes).
    - **Improved Communication:** Students stay informed without relying on physical notices or word of mouth.

6. **Admin Panel for Mess Management**
    - **Central Dashboard:** Mess staff can monitor meal records, generate bills, and review guest meal sales through an intuitive interface.
    - **Automation:** Monthly billing is automated, reducing manual effort and errors.

7. **Security and Data Privacy**
    - **Data Encryption:** Student and billing data are protected with industry-standard encryption protocols.
    - **Access Control:** Only authorized personnel can access the admin panel, safeguarding sensitive information.

8. **Integration with University Payment System**
    - **PU payment portal:** Lets students pay their mess bills directly in the app using the PU's payment system.
    - **Maintains ease:** Speeds up payments, reduces paperwork, and makes life easier for everyone.

👥 Meet Our Team

Our skilled and dedicated team is ready to deliver:

- **Devanshu Kumar Singh (Leader)**
  - **Branch:** IT 2nd Year
  - **Email:** singhdevanshu0803@gmail.com
  - **Mobile no:** 9798830805
  - **Github:** @Devanshu1603
  - **Role:** Backend Developer

- **Shivam Kumar**
  - **Branch:** Mechanical 2nd Year
  - **Email:** shivamkumar147369@gmail.com
  - **Mobile no:** 9229133107
  - **Github:** @shivam-1810
  - **Role:** Frontend Developer

- **Sehaj**
  - **Branch:** Mechanical 2nd Year
  - **Email:** bansalsehaj528@gmail.com
  - **Mobile no:** 9996004323
  - **Github:** @sehajbansal
  - **Role:** UI/UX Designer and Frontend Developer

- **Neeraj Verma**
  - **Branch:** IT 2nd Year
  - **Email:** neerajjnv2015@gmail.com
  - **Mobile no:** 8173970847
  - **Github:**
  - **Role:** Backend Developer

Together, we bring a balanced mix of technical expertise, design flair, and quality focus.

💻 Technology Stack

We've selected a robust and scalable technology stack to ensure the app's success:

- **Frontend: Flutter**
  - A cross-platform framework for a consistent, responsive UI on both Android and iOS, built from a single codebase.
- **Backend: Node.js with Express.js**
  - A lightweight, efficient server-side framework to manage API requests and core logic.
- **Database: MongoDB**
  - A NoSQL database optimized for storing and scaling user profiles, meal records, and billing data.
- **Design: Figma**
  - A collaborative tool for creating intuitive and visually appealing UI/UX designs.

This stack leverages our team's skills and meets the project's technical demands.

📅 Timeline and Milestones

The 6-week timeline is broken into key phases:

- **Weeks 1-2: Planning, Setup and Beginning**
  - Gather requirements, finalize designs, and establish frontend and backend infrastructure.
- **Weeks 3-5: Core Development**
  - Build and integrate frontend and backend functionalities.
- **Week 6: Testing and Launch**
  - Test thoroughly, refine, and deploy the app for use.

This schedule balances speed and quality within the given timeframe.

📋 Detailed Plan of Action

To execute the project within the 6-week timeline, we've crafted a structured plan with clear milestones:

- **Week 1: Requirement Gathering and Initial Design**
    - Meet with mess staff and students to gather detailed requirements.
    - Define app scope and prioritize features.
    - Create initial wireframes and prototypes in Figma.
    - Setting up initial flutter setup for beginning frontend development.
    - **Deliverables:** Requirement document, initial UI/UX designs.

- **Week 2: Design Finalization, Backend Setup and Starting up with Frontend**
    - Finalize UI/UX designs based on feedback.
    - Set up backend environment (Node.js, Express.js, MongoDB) and design database schema.
    - Build basic login/signup frontend screens.
    - **Deliverables:** Completed Figma designs, backend server with authentication APIs, initial frontend screens.

- **Week 3: Core Frontend and Backend Development**
    - Build frontend screens (profiles, meal marking and all) in Flutter.
    - Develop backend APIs for meal marking, bill tracking, and guest meal logging.
    - **Deliverables:** Functional frontend screens, core backend APIs.

- **Week 4: Adding features and corresponding UI**
    - Make more screens and complete the frontend work.
    - Implement dual meal marking, bill tracking, admin panel and other suggested features.
    - **Deliverables:** Complete frontend and backend.

- **Week 5: Frontend-Backend Integration and functionality testing**
    - Integrate frontend with backend APIs for real-time functionality.
    - Fix bugs and refine UI/UX if needed.
    - **Deliverables:** Integrated app with key features operational.

- **Week 6: Final testing and Deployment**
    - Incorporate final changes and prepare for deployment.
    - Deploy the app and conduct live-environment testing.
    - **Deliverables:** Fully deployed app, user/admin documentation.

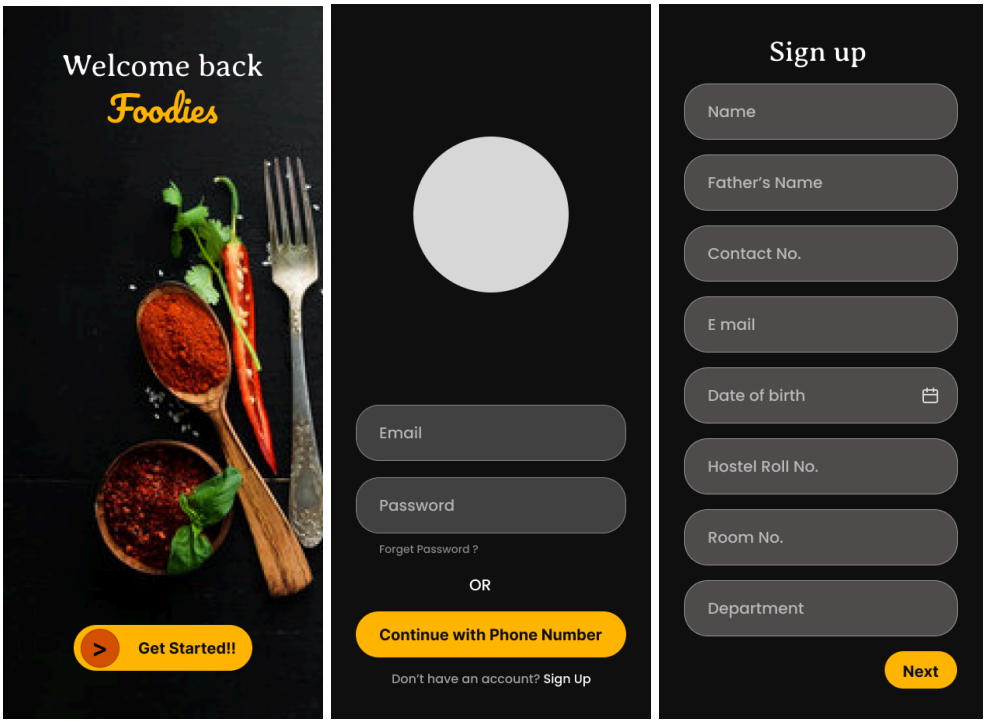
This plan ensures a systematic approach with measurable progress at each stage.

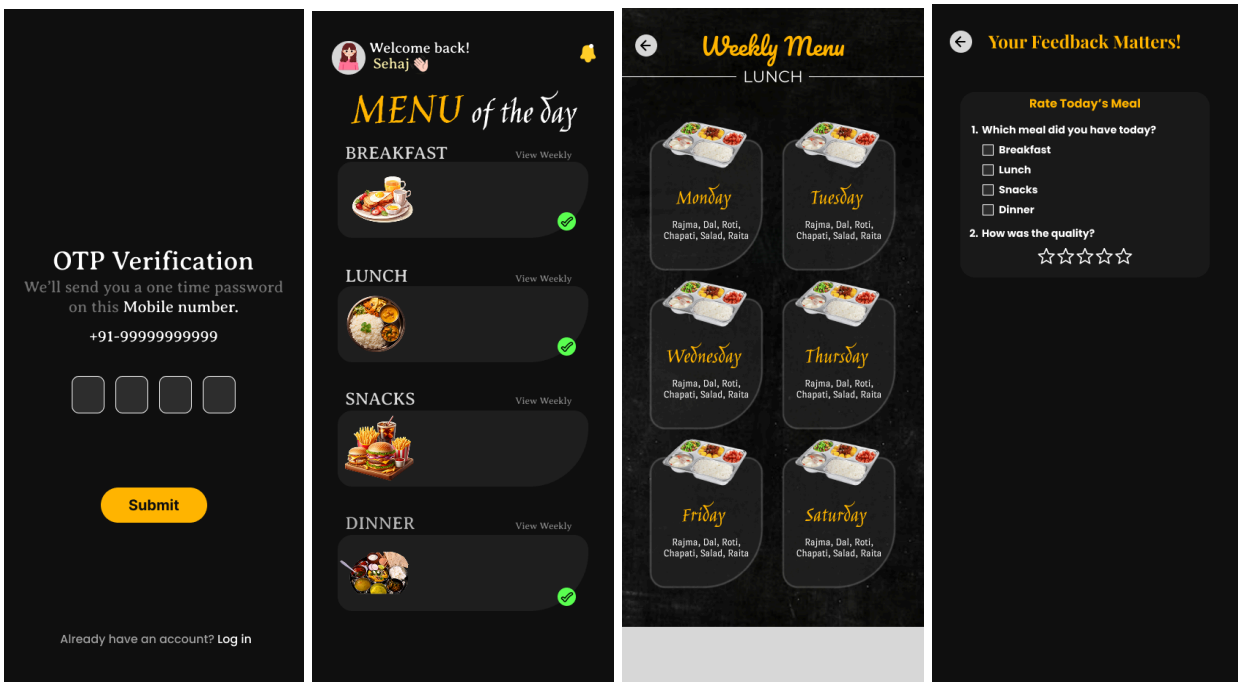
✨ What's different from other apps.?

Some of the points which make our app different from other apps :

- A customized and personalized app for Panjab University.
- Calculation of month-end bills and budgets will be made easier with this app.
- Full transparency of the data of the meals.
- Ease of use for all, including students as well as mess management.
- Easy marking of the meals and real-time updation with any change in schedule.

✨ *Designs and Wireframes*





😊 Benefits and Impact

The app will deliver significant value to all stakeholders:

- **Students:** Faster meal marking, transparent billing, and menu access improve convenience and trust.
- **Mess Management:** Automation and data insights streamline operations and reduce workload.
- **University:** A tech-driven solution enhances the hostel experience and showcases innovation.

🌱 Post AISOC Improvements

We can make the app even more better with some ideas below:

1. **Offline Mode**
    - **What it does:** Lets students use key features like marking meals or checking bills without internet, syncing later when online.
    - **Benefits:** Works even in spotty network areas, keeping the app reliable.

- **Why it's great:** Ensures no one's left out due to connectivity issues.

2. **Predictive Analytics for Meal Demand**
    - **What it does:** Uses past meal consumption data to forecast future demand, helping staff plan food preparation better.
    - **Benefits:** Cuts down on food waste, saves money, and ensures popular meals are always available.
    - **Why it's great:** Makes the mess more efficient and sustainable, which benefits both staff and students.

🏁 Conclusion

The **Mess Management App** is a forward-thinking solution to modernize hostel dining. By replacing manual inefficiencies with a digital system, we aim to save time, eliminate errors, and empower users with transparency. With a skilled team, a proven tech stack, and a detailed action plan, we are ready to deliver this impactful project during AISOC - AI Summer of Code. We look forward to your support in bringing this vision to reality.