



# TechSprint



Leveraging the power of AI



## Team Details

**Team name:** SmartMess: Crowd-Aware and Data-Driven Mess Management System

**Team leader name:** Aryan Sisodiya

**Team Members:** Aryan Sisodiya (B25126), Daksh Rathi (B25132)

**Problem Statement:** Open Innovation

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**Team leader name:** Aryan Sisodiya

**Problem Statement: Open Innovation**

### Team Member Details:

**Aryan Sisodiya** (Leader):

- B25126
- [aryansisodiya091107@gmail.com](mailto:aryansisodiya091107@gmail.com)
- <https://github.com/InfinityxR9/>

**Daksh Rathi:**

- B25132
- [iamdakshrathi@gmail.com](mailto:iamdakshrathi@gmail.com)
- <https://github.com/dakshrathi-india/>

## Brief about your solution and problem statement addressing

SmartMess is an intelligent mess management system designed to improve food quality, reduce wastage, and enhance the student dining experience using real-time data. The primary aim of the project is to analyze crowd levels in the mess by comparing live attendance with available seating capacity and predict the best time for students to have their meals. This helps avoid overcrowding, ensures smoother meal distribution, and prevents sudden high demand that often degrades food quality.

In addition, SmartMess enables students to provide food feedback, helping mess authorities continuously improve meal quality. The provided constructive and meal-specific feedback allows the mess to prepare food more accurately and significantly reduce wastage. Daily menus can be created and displayed digitally for easy access. Overall, SmartMess creates a more efficient, transparent, and sustainable mess ecosystem for both students and managers.

## Opportunities

- a. How different is it from any of the other existing ideas?
  - Our idea of SmartMess is different because it is a Data-Driven Solution, It predicts the crowd for next 15 minutes, using a simple Regression model, thus providing students an optimum time to go to the mess and prevent over-crowding problems.
  - SmartMess, is not just a plain review system meant for increasing mess quality, but a comprehensive solution that integrates major aspects to address the problems of students, regarding over-crowding and food quality with a sophisticated feedback system, and a beginner friendly UI.

## Opportunities

### b. How will it be able to solve the problem?

- SmartMess solves the problem of overcrowding in a very unique way. It does so by collecting the data for the number of students going inside the mess in a slot of 15 minutes, and using the Machine Learning algorithm for that specific mess and slot, it trains the model using that data.
- It makes use of this trained model to predict the crowd levels for next 15 minutes slot, thus effectively showing the “optimum” timing for mess-visit, and reducing the chances of over-crowding at mess.

## List of features offered by the solution

1. Attendance Marker
  1. Students can mark attendance via a QR Code generated by Manager. This QR code is valid for a period of 15 minutes Slot only and can be generated.
  2. However, in case there is some problem in marking the attendance by QR, a manual Attendance marker is also setup.
  3. This feature ensures **Mess isolation** (eg, attendance marked by student of alder mess doesn't show up in oak's manager Analytics)
  4. This is achieved by creating an Authentication service, and having different login pages and UI for both students and Managers
  5. This attendance can be used as a counter for students inside the mess (for a period of 15 minutes), and perform Analytics and ML crowd predictions

## 2. Crowd Prediction

1. The ML model incorporated performs crowd prediction in the interval of every 15 minutes, using the data collected by marking attendance in that period
2. The predicted crowd level is shown in student's UI indicating the “best” time for Mess visit
3. The underlying logic is optimized so that the predictions are available for “mess-open” timings only.

### 3. Review System

1. A separate, independent and anonymous review system is integrated
2. Students can give reviews for that specific slot of mess (Breakfast, Lunch, Dinner), which will be displayed on the Analytics section of Manager's UI
3. The review will be anonymous and the underlying logic Ensures there is **Mess Isolation**.

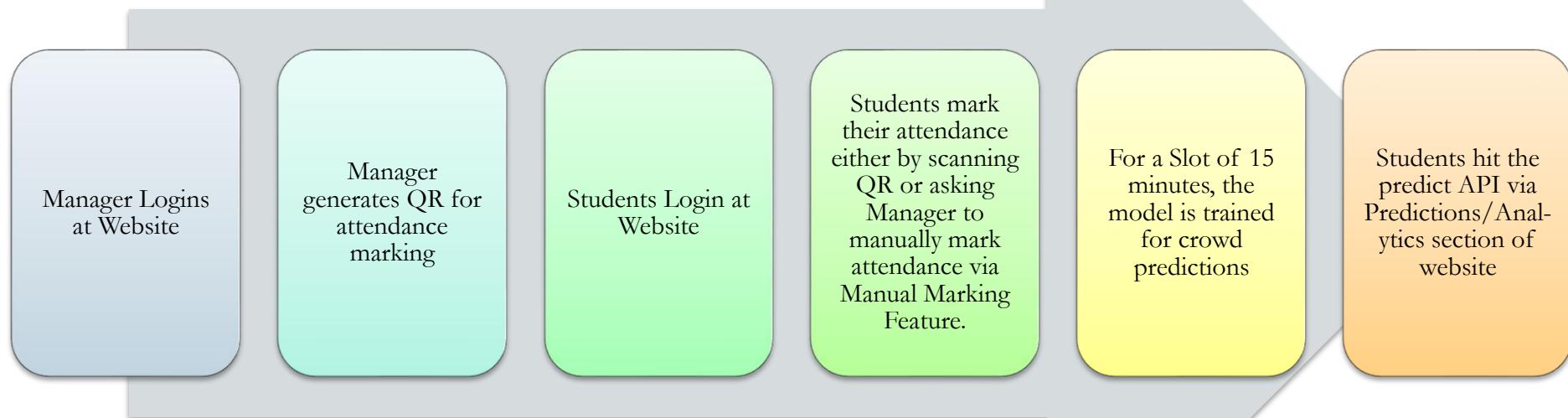
### 4. Menu Creation

1. The Managers can create the menu for specific slot of the day (Breakfast, Lunch, Dinner).
2. The Standard Menu of Mess is always displayed, and can be modified in times of Special Dinner.
3. This menu will be displayed on the student's UI for that mess only, thus ensuring **Mess Isolation**

## Google Technologies used in the solution

- Flutter and Dart (For Frontend UI)
- TensorFlow (For ML Crowd Prediction Model)
- Firebase Firestore (For Database)
- Firebase Hosting (For Hosting)

## Process flow diagram or Use-case diagram



# Architecture diagram of the proposed solution

ML Model

- /train API to train the model with parameter passed for the mess information using the Linear Regression algorithm
- /predict API to predict the crowd level for next 15 minutes slot

FrontEnd Student

- Student Login System by fetching data from Firebase Firestore Database in loginCredentials collection.
- Student Features include marking attendance via QR code, submitting meal review, viewing menu and analytics including Predictions.

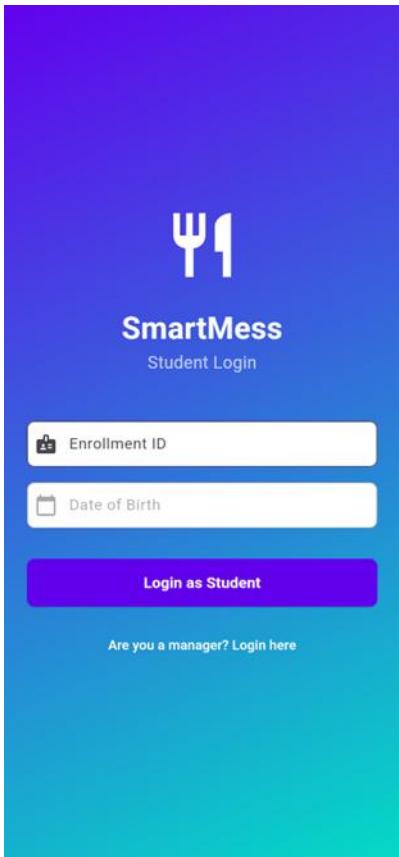
FrontEnd Manager

- Manager Login System by fetching email and raw password (currently without hashing for simplicity) from Firebase Firestore Database in the same collection.
- Manager features include QR code generation, manual attendance marking, creation of menus and viewing analytics including predictions.

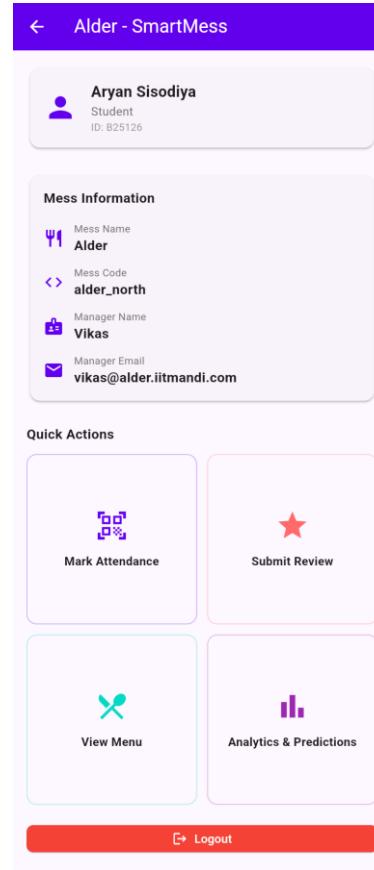
BackEnd

- Runs at the flask Backend server.
- Handles the ML Model APIs including /predict and /train APIs.
- Additionally, Handles the Analytics API for showing Different Analytics.

# Snapshots of the MVP (Web App)

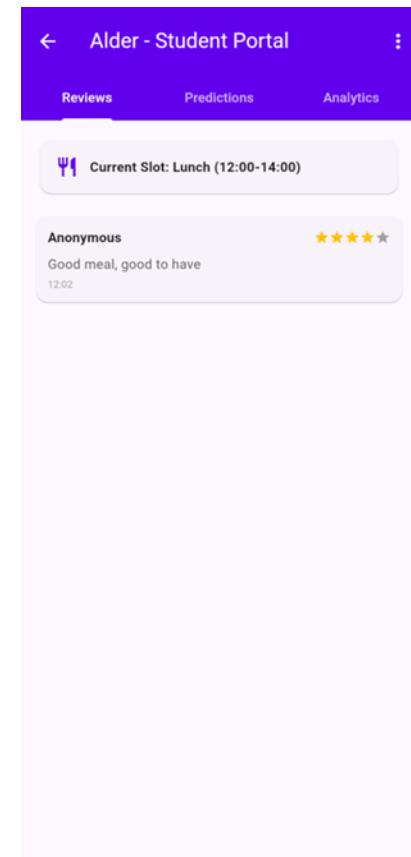


Student Web Login Screen



The Student Home Screen has a purple header bar with the text "Alder - SmartMess". Below is a card for "Aryan Sisodiya, Student, ID: B25126". The main content area is titled "Mess Information" and lists: "Mess Name: Alder", "Mess Code: alder\_north", "Manager Name: Vikas", and "Manager Email: vikas@alder.iitmandi.com". A "Quick Actions" section contains four cards: "Mark Attendance" (blue square), "Submit Review" (red square with a star), "View Menu" (cyan square with a fork and knife), and "Analytics & Predictions" (purple square with a bar chart). A red "Logout" button is at the bottom.

Student Home Screen

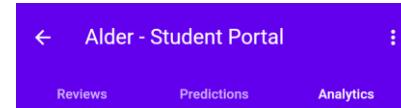


The Student Review View Screen has a purple header bar with the text "Alder - Student Portal" and three tabs: "Reviews", "Predictions", and "Analytics". Below is a card for "Anonymous" with the review "Good meal, good to have" and a timestamp "12:02". A rating of "★★★★★" is shown next to the review. The header also shows the current slot "Lunch (12:00-14:00)".

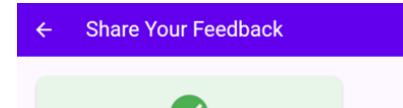
Student Review View Screen



Student Crowd Prediction Screen



Student Analytics Screen



Meal: lunch

Rating

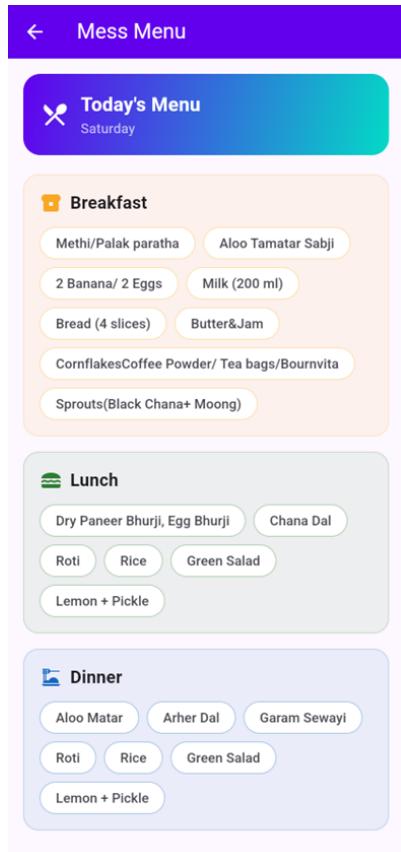


Your Feedback

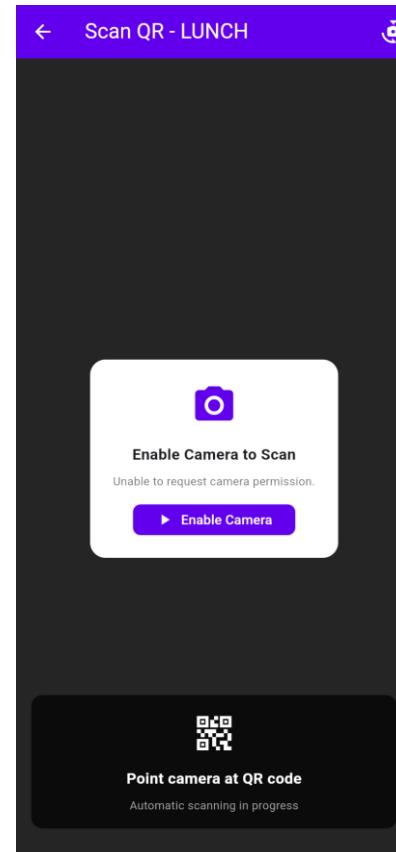
Share your feedback about the meal...

Submit Feedback

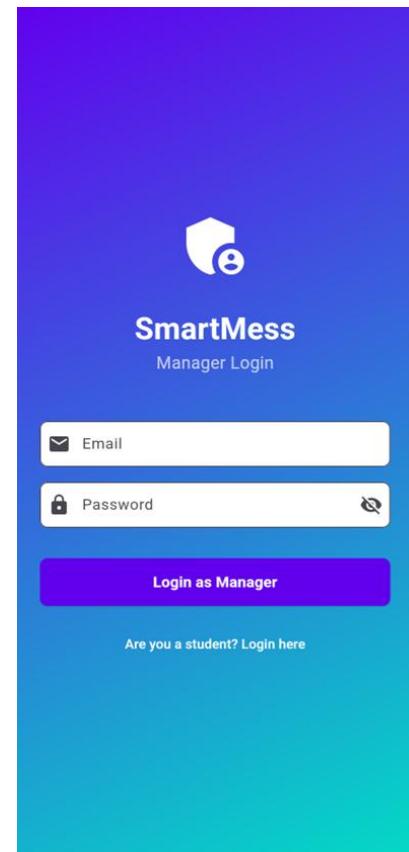
Student Meal Review (Anonymous)



Mess Menu View Screen



Attendance Marking via QR Scan  
(Currently not working)



Manager Web Login Screen

### ← Alder - SmartMess

 **Vikas**  
Manager

**Mess Information**

 Mess Name  
**Alder**

 Mess Code  
**alder\_north**

**Manager Insights**

 Prediction + Analysis

 Generate QR

 Mark Attendance

 Create Menu

[Logout](#)

Manager Home Screen

### ← Generate QR - LUNCH

**QR Code Ready**

Meal Type	LUNCH
Status	Active
Expires In	14:49



QR Code ID: d437adb1...

**Instructions**

1. Display this QR code on screen or print it
2. Students scan with their phones
3. QR expires in 15 minutes
4. A fresh QR is generated automatically after expiry

[Generate New QR](#)

[View Attendance](#)

QR Code Generation Screen

### ← Attendance - Lunch

**Attendance for Lunch**

Date: 2025-12-27  
Filtered by QR code

**0 students marked**

**Student Details**

No attendance marked yet

Marked Attendance by QR



Student Reviews View Screen

Crowd Predictions Screen

All Marked Attendance

← Update Menu

### Update Menu for One Meal

Choose the date and meal type. Only that meal changes for the selected date.

Select Date  
Saturday, 27/12/2025

Meal Type

Breakfast

Custom Breakfast Menu (optional) —  
Methi/Palak paratha, Aloo Tamatar Sabji, 2  
Banana/ 2 Eggs, Milk (200 ml), Bread (4  
slices), Butter&Jam, CornflakesCoffee

#### Standard Breakfast (Saturday)

Methi/Palak paratha

Aloo Tamatar Sabji

2 Banana/ 2 Eggs

Milk (200 ml)

Bread (4 slices)

Butter&Jam

CornflakesCoffee Powder/ Tea bags/Bournvita

Sprouts(Black Chana+ Moong)

 Save Menu Update

Menu Update Screen

← Manual Attendance - LUNCH

### Mark Attendance Manually

Use this for students who cannot scan QR codes.

Individual Student

Bulk Mark

Enrollment ID

Student Name

Mark Present

← Manual Attendance - LUNCH

### Mark Attendance Manually

Use this for students who cannot scan QR codes.

Individual Student

Bulk Mark

#### Number of Students

1

-

+

This will mark 1 anonymous students as present

Mark All Present

Manual Attendance Marking

Bulk Attendance Marking

## Additional Details/Future Development (if any)

1. Authentication Methodology MUST be improved
  1. Currently, For student's authentication, DOB is used as password and Enrollment ID as login IDs, both the data is currently stored as hardcoded directly in the database without hashing for simplicity and testing purposes.
  2. Same goes for Manager's login too, currently, for testing purposes, a dummy email and dummy password is hardcoded directly in the database
  3. In the real, functioning model of the Project, there will be a dedicated Admin Page, where services like adding Manager's data will be there, and through that mechanism, the passwords will be stored perfectly via hashing.

## 2. Inclusion of Camera-based QR Scanning:

1. While initially planned, Camera-based QR scanning is intentionally excluded from the MVP due to current limitations of Flutter Web's camera APIs and unstable cross-browser behavior.
2. The MVP focuses on validating core attendance logic, while camera scanning is planned as a future enhancement for mobile platforms or dedicated web implementations.

## 3. Google Maps API integration

1. Google Maps API can be integrated to show the allotted mess's location in a web-integrated Map, along with Building details, like A19 3<sup>rd</sup> Floor for Alder Mess.
2. This will increase the ease of locating mess for new students

## 4. History section for manager's UI to see past attendance, crowd levels and reviews.

## 5. History section for student's UI to see their past attendance and submitted reviews.

## 6. Other Minor fixes:

1. Adding service for "Forgot Password" in the Manager's Login Page
2. Showing Mess Menu for whole week using a date-picker, instead of showing it just for the current day.

**Provide links to your:**

- 1. GitHub Public Repository**
- 2. Demo Video Link (3 Minutes)**
- 3. MVP Link**



Google Developer Group  
On Campus

# TechSprint



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Thank you! ←