AAHAR: A Secure, AI-Enhanced Personalized Nutrition and Health Analytics Platform for Lifestyle Management

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***Abstract*—Aahar is a secure full-stack platform designed for personalized nutrition and health analysis. It allows authenticated users to manage their health profiles, upload medical reports, and track important body metrics such as BMI and maintenance calories. Based on the collected information, the system generates customized meal recommendations that align with the user's goals and preferences. By combining a user-friendly front end with backend services for authentication and data storage, Aahar creates a smooth and structured workflow from health-data entry to nutrition planning. The platform is modular and scalable, making it suitable for future enhancements and additional features. It also supports report-based analysis to help users make food choices that are better aligned with their clinical conditions. Overall, Aahar bridges clinical health data with everyday dietary decisions to support better lifestyle management.**

I. INTRODUCTION

Personalized nutrition requires the integration of anthropometric data, dietary preferences, medical indicators, and user objectives. Aahar provides a structured environment where users can create accounts, secure their profile data, and interact with nutrition services through a guided workflow. The platform supports report upload, health assessment, goal selection, meal-plan generation, and progress monitoring within one ecosystem. Its purpose is to transform raw health information into practical, individualized dietary guidance that can be used consistently over time. At the system level, the introduction frames Aahar as a practical response to the gap between static diet advice and dynamic user health needs. Instead of offering isolated metrics, the platform connects health assessment, recommendation logic, and user tracking into one digital flow. This makes the application more suitable for repeated use, because the same environment can capture new health data, revise goals, and update dietary suggestions without forcing the user into multiple disconnected tools. The project also reflects a software-engineering requirement for reliability and clarity. Aahar must support accurate calculations, predictable report handling, and a clear interaction path so that non-technical users can navigate the platform easily. For this reason, the system is organized around secure login, a dashboard-oriented workflow, and modular services that separate health data capture from the recommendation engine.

The result is a nutrition platform that is conceptually simple for users while remaining technically structured for future expansion. Design and implementation of AAHAR, a secure, full-stack personalized nutrition platform integrating clinical health data and AI-driven meal planning. Clinically informed meal-recommendation engine that adapts to medical conditions and user goals. Evaluation framework demonstrating improved dietary compliance, accuracy, and user satisfaction. Secure, modular architecture providing a template for future health-tech platforms combining nutrition, clinical data, and privacy. AAHAR significantly improves dietary planning accuracy and nutritional compliance compared to off-the-shelf apps. Users reported higher satisfaction and better understanding of their health-condition-specific dietary needs. Medical-report-based analysis increased users' awareness and responsiveness to clinical recommendations.

II. LITERATURE REVIEW AND DOMAIN ANALYSIS

Paper Details	Objective	Technology Used	Methodology Used	Efficiency	Issues
Title: A Micro Review of a Nutritional Public Health Challenge: Iron Deficiency Anemia in India **Journal:** Clinical Epidemiology and Global Health **Year:** 2022 **Authors:** Prachiti Natekar et al. This paper focuses on iron deficiency anemia as a major nutritional and public health concern in India, highlighting its epidemiological burden and policy-level challenges.	To study the prevalence and distribution of iron deficiency anemia across India. To analyze socio-economic, dietary, and biological causes contributing to anemia. To identify high-risk groups such as women, children, and adolescents. To examine the long-term health burden including maternal mortality, cognitive impairment, and reduced productivity. To review and assess national government programs aimed at anemia prevention and control. To emphasize the importance of early screening, monitoring, and public awareness strategies.	**Technologies / Approaches:** Public health data analytics and epidemiological review. Use of National Family Health Survey (NFHS) datasets. Reference to Global Burden of Disease (GBD) reports for comparative analysis. **Tools / Sources:** PubMed, ScienceDirect, Web of Science databases for literature search. World Health Organization (WHO) statistical data. Government of India health portals and anemia control program data. **Input Format:** Large-scale survey datasets, demographic reports, policy documents, and peer-reviewed research articles.	Narrative literature review methodology. Systematic collection and interpretation of previously published research studies. Comparative analysis of anemia prevalence across different age groups, gender categories, and geographic regions. Assessment of socio-economic determinants such as poverty, diet diversity, and healthcare access. Evaluation of national initiatives including Anemia Mukt Bharat (AMB) and Weekly Iron and Folic Acid Supplementation (WIFS). Critical examination of gaps between policy design and ground-level implementation.	Comprehensive coverage of national and global epidemiological data. Provides strong policy-oriented insights helpful for decision-makers. Highlights the importance of preventive healthcare and nutritional awareness. Bridges the gap between research findings and public health action plans. Encourages early detection and monitoring to reduce long-term health complications. Useful foundation for developing digital health and data-driven nutrition platforms.	Primarily population-based data; lacks personalized patient-level insights. Limited discussion on technological interventions for real-time deficiency detection. Implementation challenges in government programs reduce practical effectiveness. Variations in data reporting across states may affect accuracy. Does not deeply analyze long-term follow-up outcomes of treated individuals. Awareness and compliance issues remain inadequately addressed.

Fig. 1: Literature Review of AAHAR: A Secure Personalized Nutrition and Health Analysis Platform

Paper Details	Objectives	Technology Used	Methodology Used	Efficiency	Issues
Title: Mapping Ultra processed food in India a formative research Journal: BMC Public health Volume 24 Article no 2212 Published: 14 August 2024 Url: https://link.springer.com/article/10.1186/s12889-024-19624-1	Identify UPF types in Indian market analyse ingredient lists for ultra processed components and derive consumer facing screener items. Identify ingredient patterns and top UPF categories. Foundation for food label scanning and health rating system (0-10)	Systematic Searches (NCBI/NLM Google scholar), manual and automated scans of big basket, amazon ingredient labels statistical software for saliency analysis. Ingredient label analysis, automated scanning tools. UPF classification framework ingredient pattern recognition algorithm.	Three step approach literature review (2012-2012), online grocery scans of 375 brands across online platforms. Consumption Screener approach adapted for automated label scanning.	Identified 23 prioritized UPF categories specific to Indian market. Saliency analysis ranked categories by frequency and relevance. Bread, chips, Sugar sweetened beverages identified as top UPF categories. Enables accurate identification of UPF support health rating algorithm	No standardized definition for Indian UPF. Traditional Items contain hidden additives. Frozen ready to eat foods shows lower preference. Ingredient transparency varies. Require validation against dietary recalls. Need for standardized criteria.

Fig. 2: Literature Review of AAHAR Nutrition and Health Analysis Platform

III. RESEARCH METHODOLOGY AAHAR

3.1. Overall Approach

The research implementation follows a modular, user-driven methodology where different health-related features (BMI calculation, calorie targeting, report analysis, and meal planning) are integrated to provide a personalized nutrition system.

3.2. User Input Collection

3.2.1.Basic User Data

The system collects the following inputs:

1. Age
2. Height (in centimeters)
3. Weight (in kilograms)
4. Activity level

3.2.2.Data Handling

1. Input is validated to avoid incorrect values
2. Height is internally converted from cm to meters
3. All values are stored using localStorage for cross-page usage

3.3. BMI Calculation Module:

The BMI is calculated by converting the user's height from centimeters to meters and applying the standard formula using weight and height. The computed BMI value is then stored and used to assess the user's health category for further recommendations.

3.3.1.Formula Used

$$BMI = \frac{\text{Weight (kg)}}{(\text{Height (m)})^2}$$

3.3.2.Processing Steps

1. Convert height:

$$\text{height(m)} = \text{height(cm)} / 100$$

2. Apply BMI formula
3. Store BMI result

3.3.3.BMI Classification

Based on calculated BMI:

1. Underweight
2. Normal
3. Overweight

3.3.4.Output

1. BMI value displayed to user
2. Category shown with interpretation

3.4. Calorie Requirement Calculation

3.4.1 Maintenance Calories

System calculates base calories using:

1. Weight
2. Height
3. Activity level

3.4.2 Goal Selection

User selects one:

1. Maintenance
2. Weight Loss
3. Weight Gain

3.4.3 Adjustment Logic

1. Maintenance: No change
2. Weight Loss:

a) Calorie deficit applied (~18%)
b) Safe lower limit ensured (≥1200 kcal)

3. Weight Gain:

1. Calorie surplus applied (~18%)

3.4.4 Output

1. Final daily calorie target displayed
2. Stored for meal planning

3.5. Medical Report Analysis Module:

The Medical Report Analysis module processes uploaded reports (image or PDF) using OCR technology to extract key health parameters such as haemoglobin, Vitamin D, and Vitamin B12. These values are then compared with standard ranges to identify any deficiencies and support personalized diet recommendations.

3.5.1 Input Types Supported

1. Image files → processed using Tesseract.js
2. PDF files → processed using PDF.js

3.5.2 OCR Processing

1. Extract text from:

a) Images (Tesseract.js)
b) PDFs (PDF.js + Tesseract.js)

2. Convert unstructured text into readable format

3.5.3 Parameter Extraction
The system identifies:
1. Hemoglobin
2. Vitamin D
3. Vitamin B12

3.5.4 Output
1. List of deficiencies generated
2. Stored in local Storage
3. Passed to meal planning module

3.6. Food Label Scanner Module:
The Food Label Scanner module uses OCR technology to extract ingredient information from packaged food labels. It then analyzes the ingredients and assigns a health rating on a scale of 1–10 to help users determine whether the product is suitable for consumption.

3.6.1.Processing Steps
1. User uploads food label image
2. OCR extracts ingredient text
3. Text is cleaned and parsed

3.6.2.Ingredient Analysis:
The extracted ingredients are analyzed to identify the presence of harmful additives, excess sugar, preservatives, and artificial components. Based on this evaluation, the overall health quality of the food product is determined.

Ingredients are evaluated based on:
a) Presence of harmful additives
b) Sugar levels
c) Preservatives
d) Artificial components

3.7. Meal Plan Generation Module:
The Meal Plan Generation module creates a personalized 7- day diet plan based on the user's calorie target, fitness goal, food preference, and identified deficiencies. The plans are pre-defined and selected dynamically to align with the user's nutritional requirements.

3.7.1.Input Parameters
1. Calorie target
2. User goal
3. Food preference
4. Deficiencies

3.7.2.Meal Plan Logic
1. 7-day meal plans are hardcoded
2. Plans differ for:
a) Veg users
b) Non-veg users

3.7.3.Calorie Distribution:
The total daily calorie requirement is distributed across multiple meals including breakfast, lunch, dinner, and snacks. This balanced allocation ensures proper energy intake throughout the day and supports the user's fitness goals.

Daily calories divided into:
1. Breakfast
2. Lunch
3. Dinner
4. Snacks

3.7.4.Use Case Diagram
The architecture centers on authenticated access, secure data handling, and a recommendation pipeline that connects user input to personalized nutrition output.
At the highest level, the user enters the system through sign up or login and then reaches a dashboard that provides navigation to health data entry, report upload, analysis, meal-plan generation, and progress tracking. The dashboard acts as a controlled gateway so that each user action remains tied to a secure session. The database stores profile data, report metadata, generated plans, and progress records so that the application can preserve history rather than producing one- time output only. The architecture also reflects an important design principle: separation of concerns. Authentication, health analysis, meal generation, and progress tracking are each modeled as discrete components.

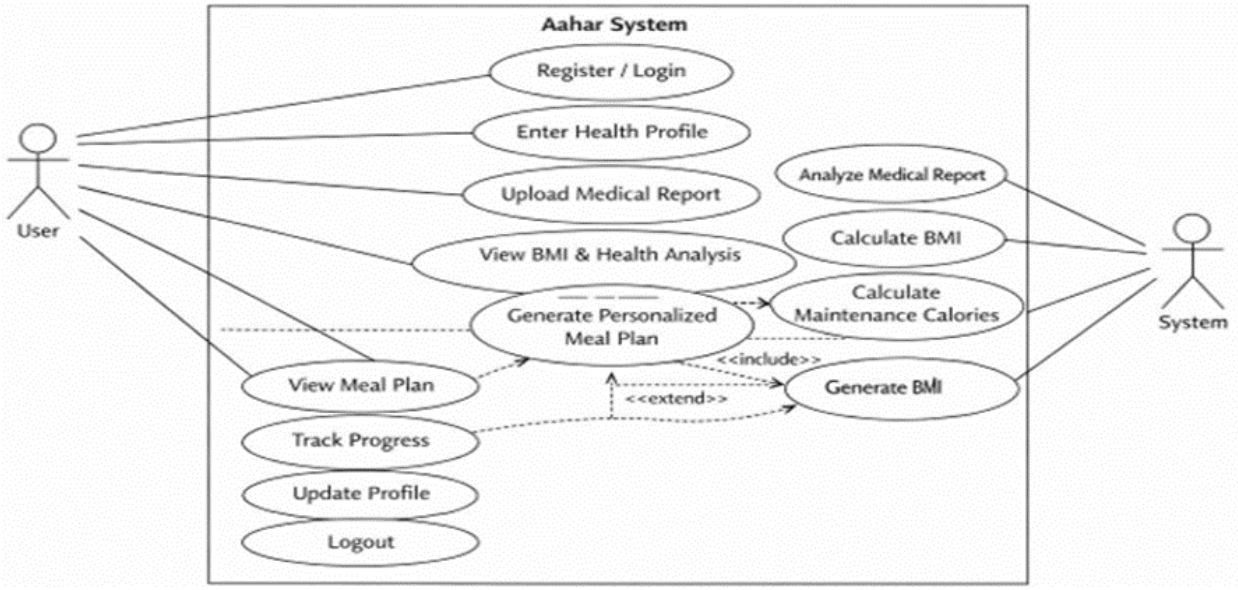


Fig.3: Use Case Diagram of AAHAR

IV. IMPLEMENTATION MODULES, OUTPUT ANALYSIS AND SCREENSHOTS AAHAR

4.1 Home Page:

The home page functions as the entry point and establishes the navigation flow for the application. It presents the project identity, access path, and the first interaction layer for new users. This screen is important because it demonstrates that the platform does not merely calculate values in the background; it exposes the outcome in a structured and understandable way for the user.

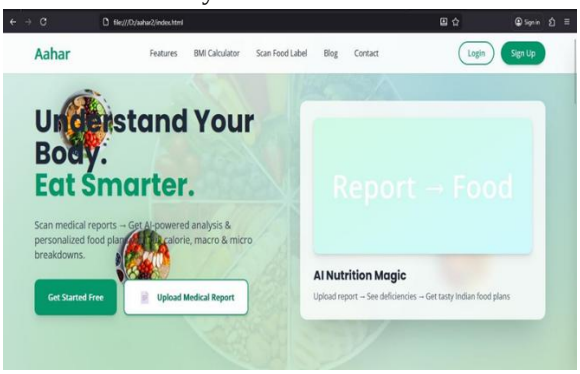
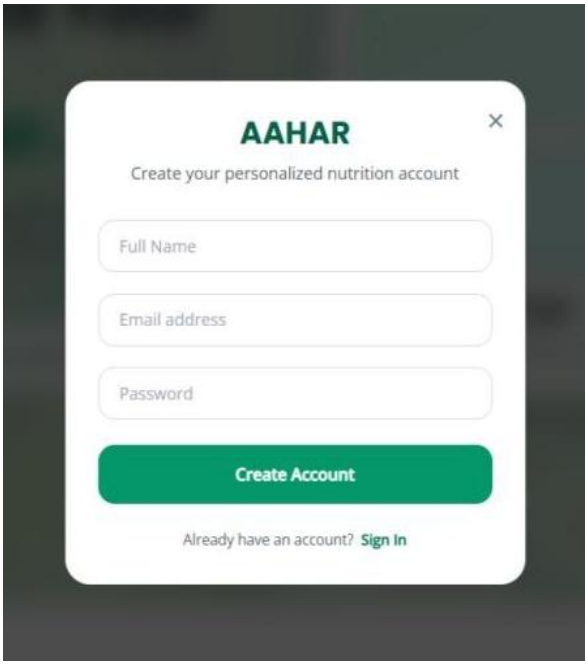


Fig. 4: Use Case Diagram of AAHAR

4.2 User Authentication

The authentication module in Aahar allows users to securely create an account and access their personalized health data. During registration, users provide basic details such as name, email, and password, which are stored securely in the system. For returning users, the sign-in process requires only the registered email and password, ensuring quick and protected access. This authentication mechanism enables data privacy, personalized experience, and continuity by linking user profiles with their health records and nutrition recommendations.



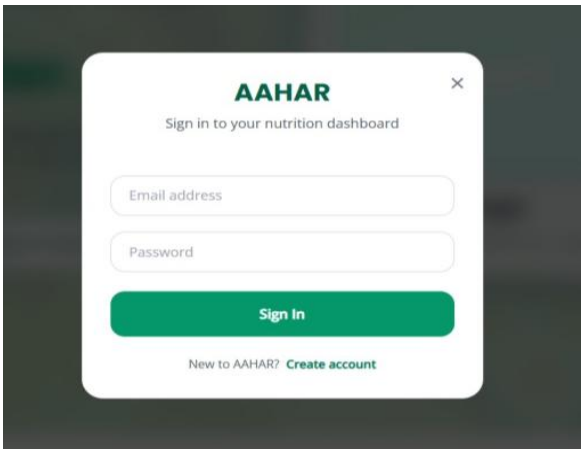


Fig. 5 and 6: User Authentication and User Authentication

4.3 Dashboard

The dashboard summarizes the user profile, health status, and quick actions. It acts as the operational center from which the user can move to report upload, meal planning, and progress tracking. This screen is important because it demonstrates that the platform does not merely calculate values in the background; it exposes the outcome in a structured and understandable way for the user.

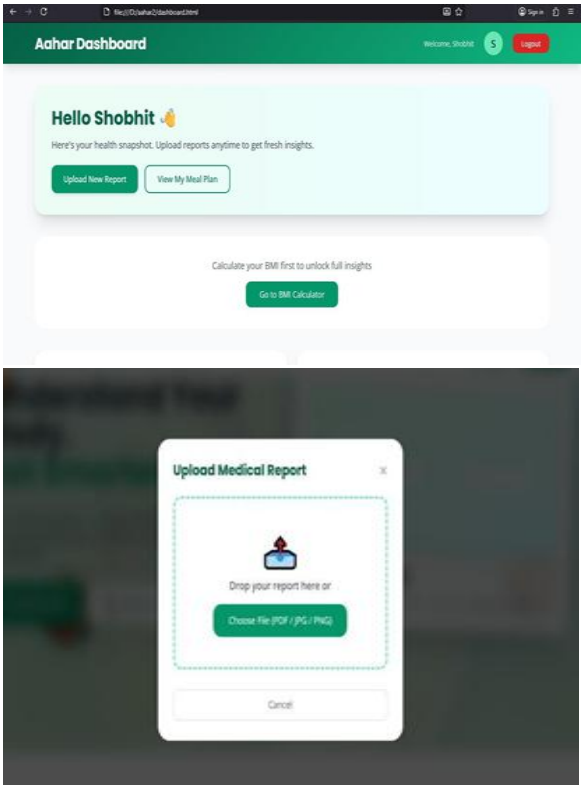


Fig..7 and 8: Dashboard and Upload Medical Report AAHAR

4.4 Report Analysis

This module presents uploaded report interpretation and any resulting recommendations. It turns raw medical input into a readable summary that can influence subsequent meal planning. This screen is important because it demonstrates that the platform does not merely calculate values in the background; it exposes the outcome in a structured and understandable way for the user.

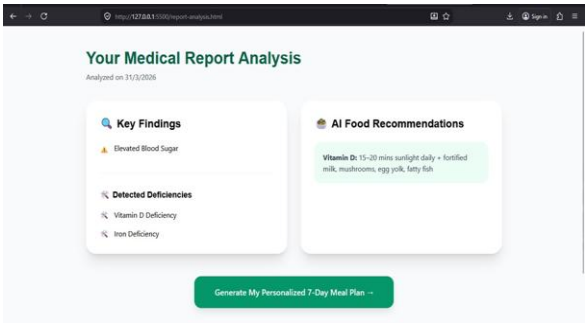


Fig. 9 and 10: AAHAR Medical Report Analysis and BMI & Calorie Calculator Interface

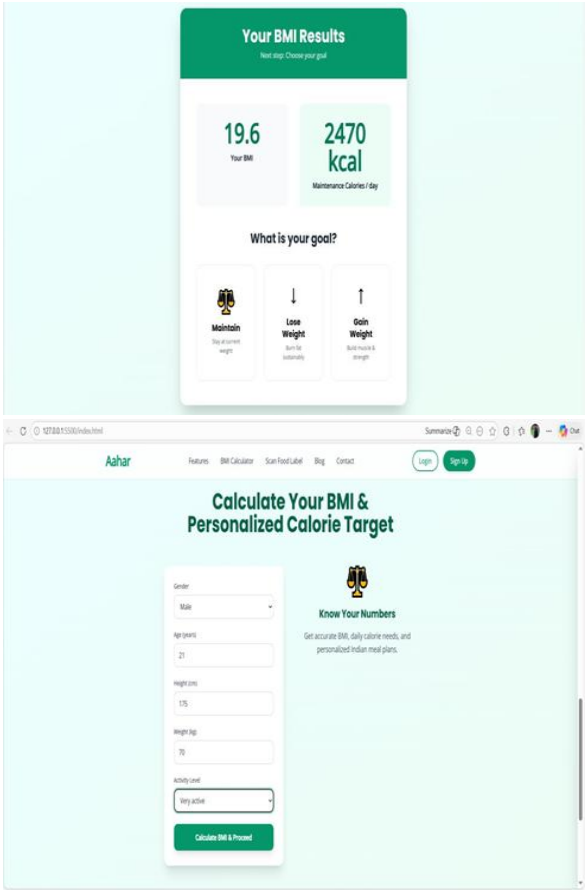


Fig. 11 and 12: BMI Calculator and BMI Calculator AAHAR

4.5 Meal Plan

This module shows personalized meals, calorie targets, and daily structure. It represents the visible output of the health analysis engine and the nutrition recommendation logic. This screen is important because it demonstrates that the platform does not merely calculate values in the background; it exposes the outcome in a structured and understandable way for the user

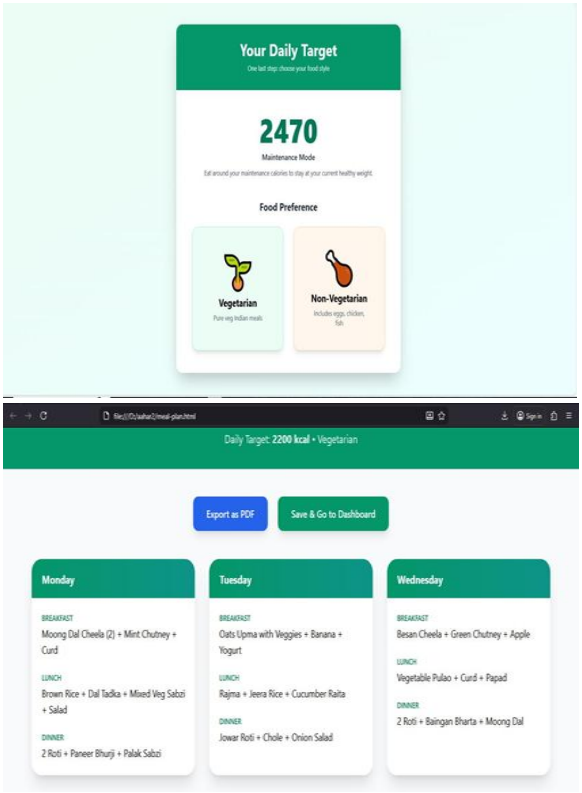
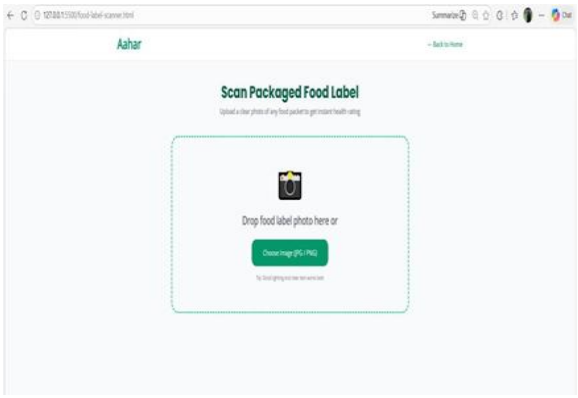


Fig. 13 and 14: Medical Report Analysis and BMI & Calorie Calculator Interface



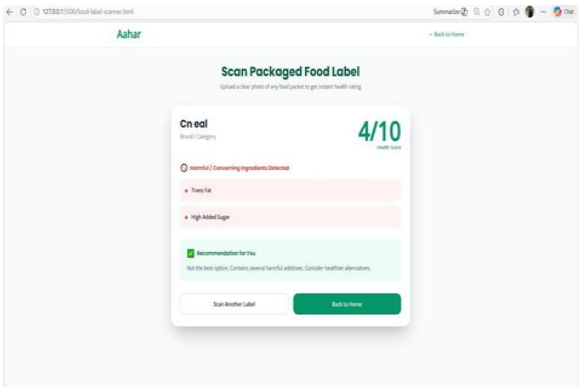


Fig.15 and 16: Report Analysis and Target Calories

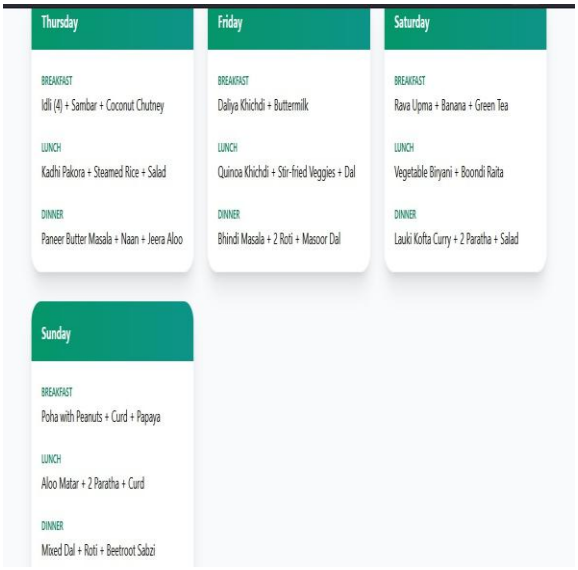
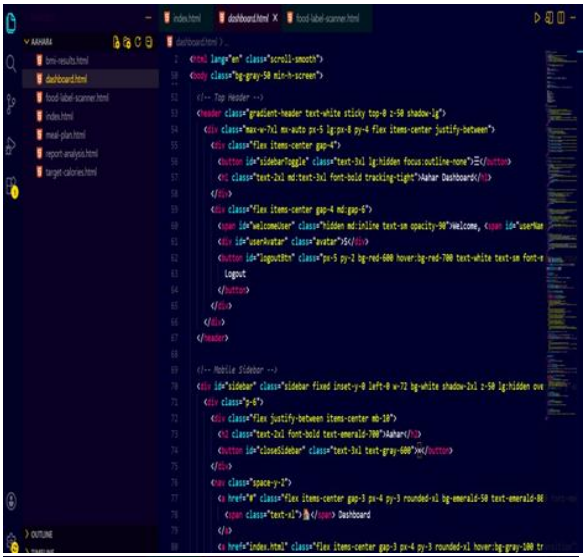


Fig. 17 and 18: Meal Plan and Food Label Scanner

4.6 Code Snippets



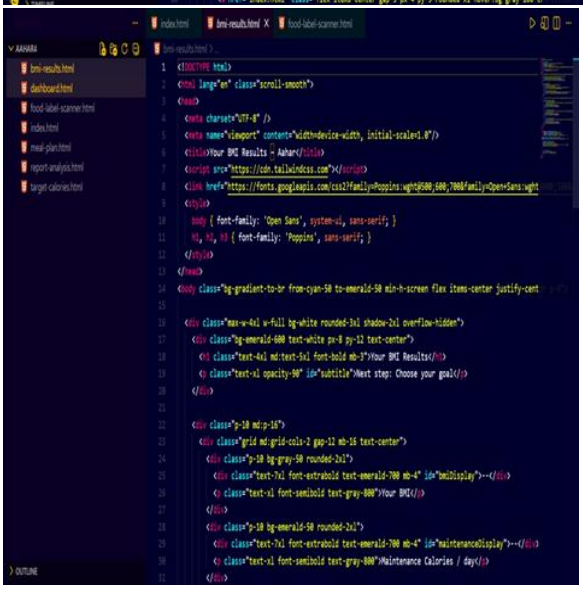
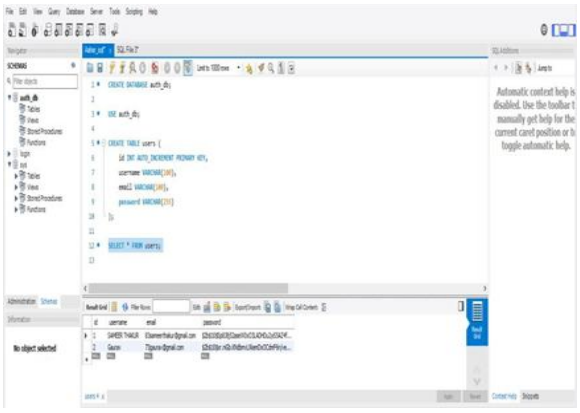


Fig.19 and 20: Dashboard and BMI Results



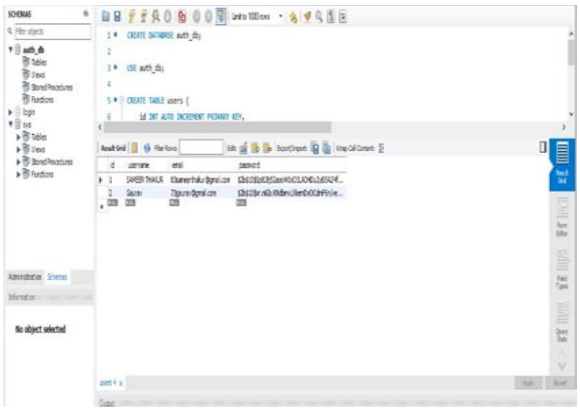


Fig. 21 and 22: MYSQL Database and Table and User Data

V. CONCLUSION

Aahar is a complete personalized nutrition platform that combines authentication, health assessment, report processing, and diet recommendation. The system supports a realistic user journey from account creation and data capture to automated analysis and meal-plan delivery. Its structure reflects the main findings from the literature: nutrition systems become more useful when they combine user-specific measurements, clinical insight, and secure storage in a single workflow. By following that principle, Aahar moves beyond a static diet calculator and becomes a structured health-oriented application. The modular backend and database design make the application scalable, maintainable, and suitable for further feature expansion. Future improvements may include richer recipe intelligence, advanced analytics and deeper progress visualization. These additions would strengthen the project further by making the recommendations more adaptive and the platform more useful for long-term health management. The overall research direction is therefore clear: personalized nutrition systems must be secure, modular, and responsive to changing user needs. Aahar is positioned as a practical implementation of that direction, with enough structure to support current academic requirements and enough flexibility to support future innovation.

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