

Executive Summary

FitBite is an Android app that uses machine learning and computer vision to generate personalized 7-day meal plans based on users' biological data, goals, preferences, allergies, and pantry items. It simplifies nutrition tracking through barcode and image scanning while providing a user-friendly interface and secure data storage.

Background

A key need addressed by FitBite is the growing challenge individuals face in maintaining healthy eating habits in a fast-paced, information-overloaded world. Many people struggle to plan balanced meals that align with their health goals, dietary restrictions, and available ingredients, often leading to poor nutrition choices or food waste. This problem is especially significant as rising rates of obesity, diabetes, and other diet-related conditions continue to impact public health. FitBite tackles this broader issue by combining intelligent meal planning with real-time pantry awareness, reducing the burden of decision-making while promoting healthier, more sustainable eating habits. By making personalized nutrition more accessible and convenient, the application contributes to improving overall well-being and encouraging long-term lifestyle changes.

Experimental Setup

FitBite was developed and tested as an Android application using Android Studio on both an emulator and a physical device. Firebase Authentication and Firestore were used for secure user management and real-time data storage, while the FatSecret API provided nutritional data for barcode scanning and meal planning. The application also utilized device camera functionality for barcode and pantry input.

Testing was conducted using simulated user profiles with varying dietary goals and restrictions. Key features evaluated included user authentication, barcode scanning accuracy, pantry-based input, and personalized meal plan generation. Each test followed a structured workflow where users input profile data, scanned or entered food items, and generated meal plans. System performance was assessed based on response time, data accuracy, and successful data storage and retrieval.

Experimental Test Plan

The system was evaluated through functional testing of core features, focusing on accuracy, performance, and usability.

Feature	Method	Metric
Auth	Login	100%
Scan	Barcode	85-90%
Meal	Generate	2-5 sec
Pantry	Input	Input-based

Results indicate that all core features performed reliably within expected conditions.

Experimental Results

The FitBite prototype successfully met its primary functional requirements. User authentication and data storage through Firebase operated reliably, with consistent login and data retrieval across all test cases.

Barcode scanning retrieved accurate nutritional data in most cases, with minor inconsistencies due to limited entries in the FatSecret database. Meal plan generation produced personalized recommendations aligned with user goals and dietary restrictions.

Most system operations, including meal plan generation and data retrieval, were completed within a few seconds, resulting in a smooth user experience. Pantry-based recommendations functioned as expected, though accuracy depended on the completeness of user input.

Overall, testing demonstrates that the prototype is functional, responsive, and effective, with opportunities for improvement in data coverage and recommendation accuracy.

Conclusions

The final design of FitBite closely aligned with the client's original goals of creating a personalized, user-friendly nutrition planning tool. Core features such as meal plan generation, pantry-based recommendations, and barcode scanning were successfully implemented, meeting both functional requirements and usability expectations. Throughout development, challenges such as integrating external APIs, managing real-time data, and ensuring smooth user interaction provided valuable lessons in system design and scalability. While the application meets its primary objectives, future improvements include enhancing recommendation accuracy, expanding food database coverage, and refining the user interface. We acknowledge the support of our client, instructors, and peers, whose guidance and feedback were essential in shaping and completing this project.

References

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