



NutriGuide

NutriGuide: Personalized nutrition & allergen management

Problem Statement

Millions of people struggle to manage allergies, dietary restrictions, and chronic health conditions while navigating daily nutrition. Today's apps lack personalized nutrition guidance, forcing users to manually cross-check allergens, decode complex food labels, and guess their meals tailored for their health needs. This may lead to nutritional imbalances, increased stress, or, in some cases, emergencies. The absence of integrated tools for grocery decisions, nutritional support, meal planning, and emergency support calls for an app that handles these situations effectively.

Introduction

A wide variety of nutrition tracking applications are available in the App Store, offering users multiple ways to monitor their daily intake. These apps provide features such as manual entry of food items to track macronutrients, barcode scanning for instant access to detailed product information, and even image

recognition to analyze food from photos. Popular examples include MyFitnessPal, Nutrition Tracker, and Calorie Counter by MyNetDiary.

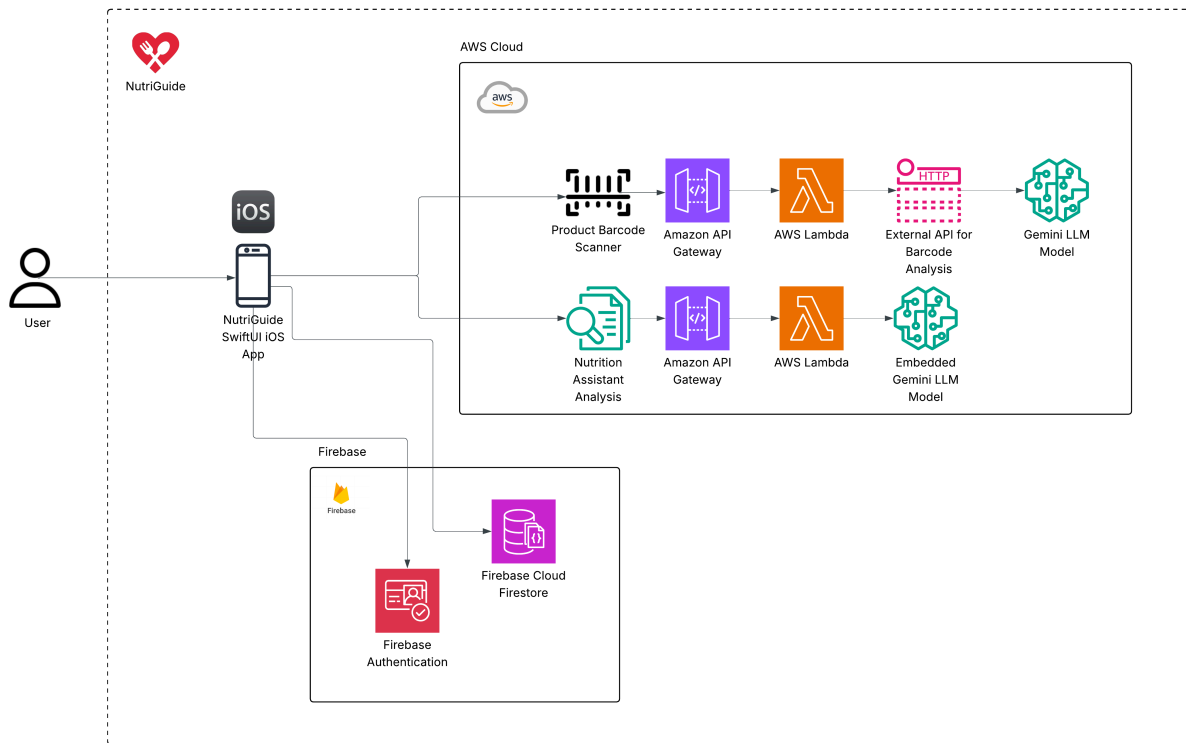
Gaps in these applications

1. While most nutrition tracking apps factor in basic user information such as height, weight, and age to set calorie goals, they often overlook critical elements like allergies, dietary preferences, medications, and food intolerances. As a result, these apps may offer food recommendations that are unsuitable for users with specific health conditions, dietary restrictions, or religious and personal preferences.
2. Some apps require users to manually search and enter food items, which can be time-consuming and inconvenient. Others utilize AI to analyze food images, but this approach can sometimes produce inaccurate results. Barcode scanning remains the most reliable and efficient method for accurately identifying and logging packaged food products.
3. Although many apps feature AI assistants, they typically do not provide personalized guidance for users with allergies, dietary restrictions, medication interactions, or food intolerances, limiting their usefulness for individuals with specialized dietary needs.

To address these issues, NutriGuide:

1. Provides recommendations based on the current allergies and conditions of the user
2. Provides grocery assistance with allergen and condition management
3. Provides seamless connection with Apple Watch, syncing required data that might be useful for the first responders in emergencies.
4. Provides a virtual nutrition assistant that determines whether a particular food at a fast food joint is suitable for the user, given the allergies, conditions, dietary preferences, and medications.

Architecture Diagram



This architecture diagram illustrates the technical design of **NutriGuide**, a nutrition analysis application leveraging both AWS Cloud and Firebase services to deliver intelligent, personalized nutrition insights to users.

User Interaction with the iOS SwiftUI Mobile App

- Users engage with NutriGuide through an intuitive SwiftUI-based iOS application.
- The app acts as a central hub, enabling users to scan product barcodes, access personalized nutrition insights, and manage their profiles seamlessly.
- During onboarding, the app securely authenticates users and collects all essential information—such as dietary preferences, allergies, and health data—to tailor the NutriGuide experience to each individual's needs.

Firestore Authentication and Cloud Firestore

- NutriGuide leverages Firebase Authentication to securely register and log users into the app. All password management and data encryption are handled by Firebase, ensuring robust privacy and protection of user credentials and sensitive information. This approach allows NutriGuide to provide a seamless and secure user experience while maintaining high standards of data security and compliance.
- Cloud Firestore is a scalable NoSQL database utilized by NutriGuide to securely store and manage essential user data collected during the onboarding process. This includes personal information, dietary preferences, allergies, and other relevant details, enabling real-time synchronization and seamless access across devices. By leveraging Firestore, NutriGuide ensures that user profiles are consistently updated and readily available to deliver personalized nutrition recommendations.

AWS Cloud Services

Product Barcode Scanner

- When a user scans a product barcode, the app sends the data - the user's allergies, medications, conditions, dietary preferences, along with the barcode number - to the AWS Cloud.
- The request is routed through the Amazon API Gateway, which triggers an AWS Lambda function.
- The Lambda function calls an external API for barcode analysis via HTTP.
- The result is processed by the Gemini LLM (Large Language Model), which provides detailed product insights.

Nutrition Analysis

- For nutrition guidance, the app sends a request to the Nutrition Assistant module.
- This request also passes through the Amazon API Gateway and AWS Lambda.

- Here, an embedded Gemini LLM Model processes the request, providing personalized nutrition analysis and recommendations.

Methodology

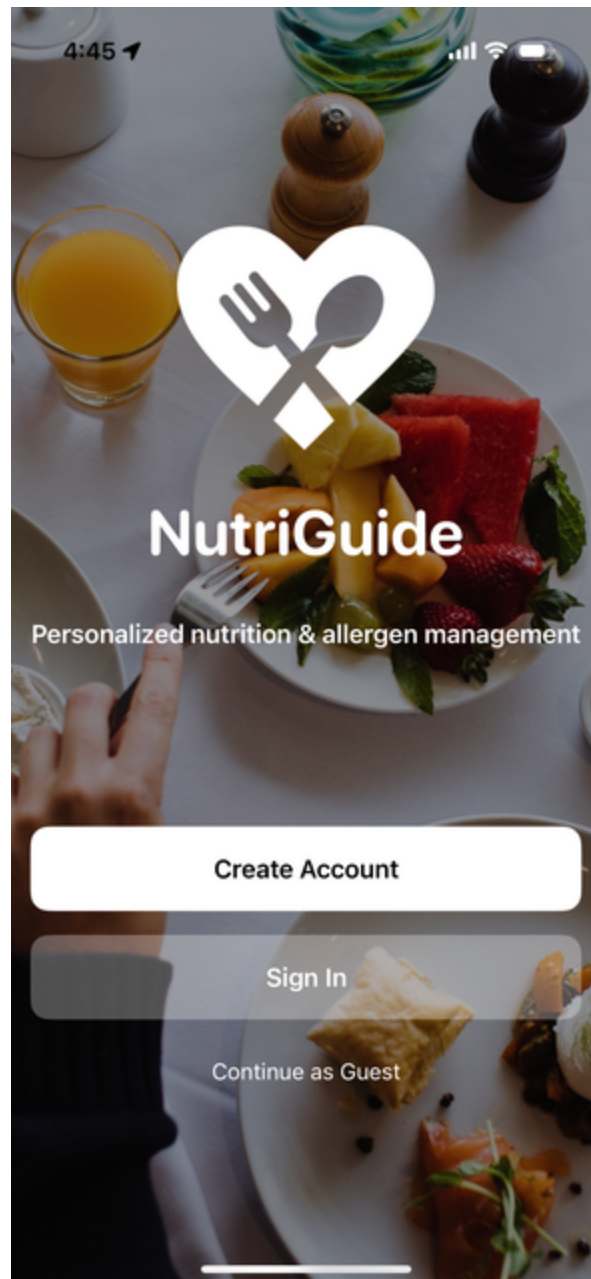
The development of NutriGuide followed a practical, results-oriented approach:

1. **Market Analysis:** Conducted market survey to identify gaps in existing nutrition and fitness apps, specifically targeting personalized food recommendation needs.
2. **Architecture Design:** Designed a solution using SwiftUI for the iOS frontend, AWS serverless architecture for backend processing, and Firebase for authentication and database management.
3. **Incremental Development:** Built core functionality in sequence - user authentication, profile management, barcode scanning, product analysis, and food diary features.
4. **Testing Integration:** Implemented continuous testing after each feature update to ensure functionality, usability, and performance met requirements.
5. **Iterative Refinement:** Applied test results and user feedback to improve scanning accuracy, personalization, and overall user experience.

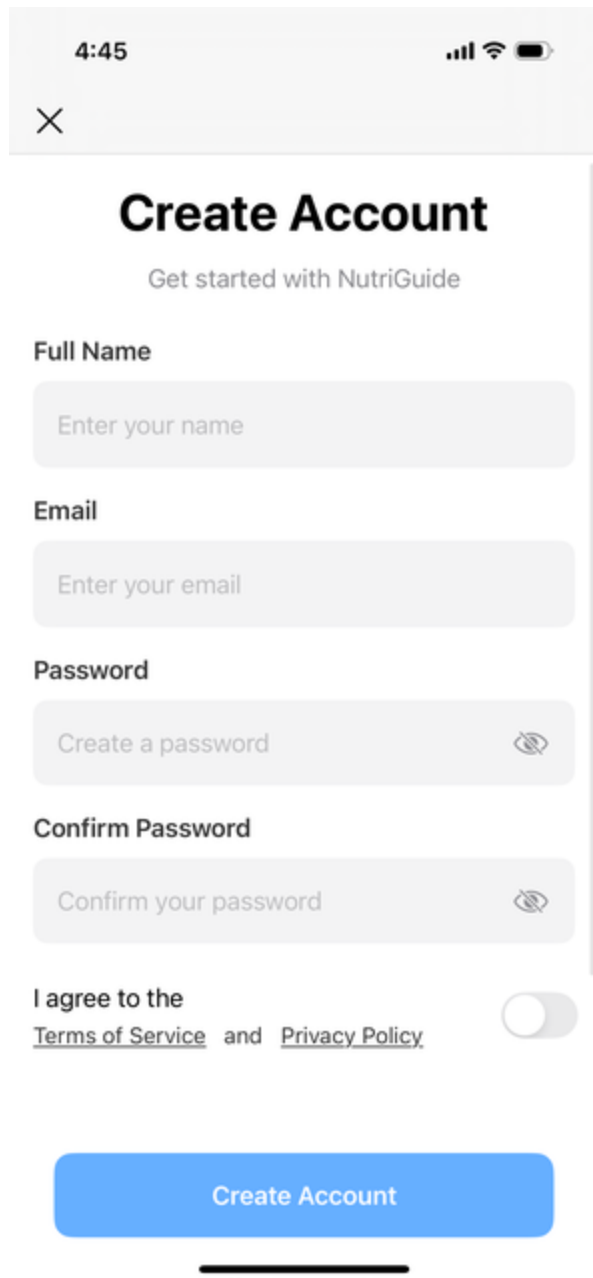
This focused methodology enabled efficient development of a solution that effectively addresses the identified market gaps.

Screenshots

Welcome Page



Sign Up Page Mode)



4:45

✕

Create Account

Get started with NutriGuide

Full Name

Enter your name

Email

Enter your email

Password

Create a password

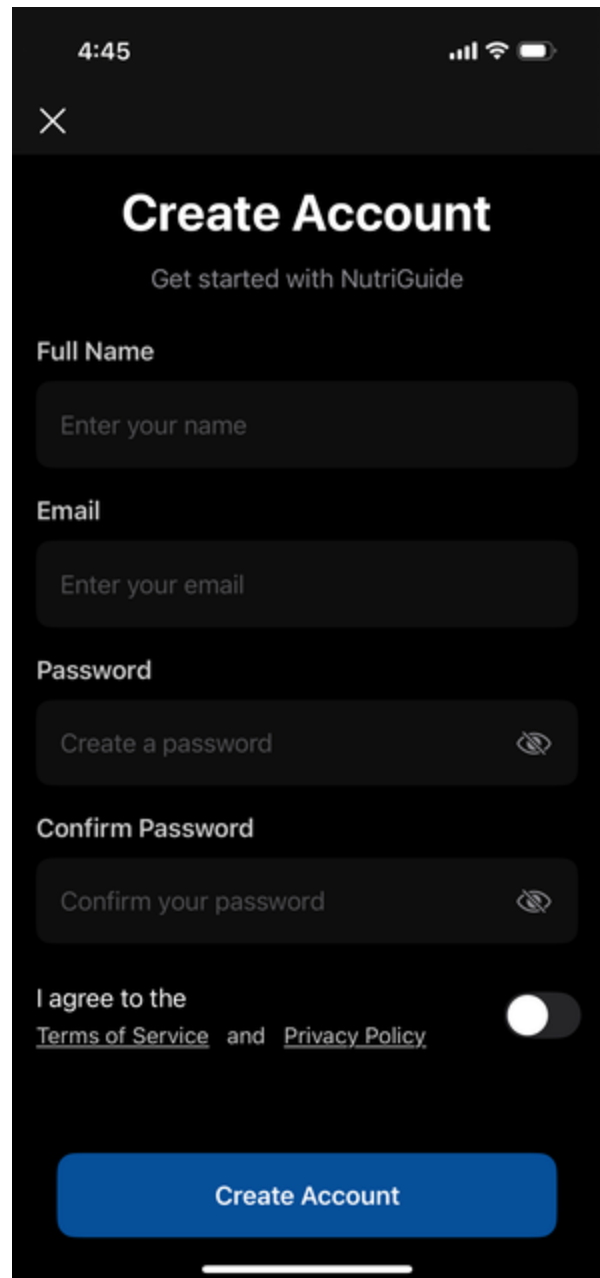
Confirm Password

Confirm your password

I agree to the [Terms of Service](#) and [Privacy Policy](#) ☐

Create Account

Sign Up Page (Dark



4:45

✕

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Get started with NutriGuide

Full Name

Enter your name

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Password

Create a password

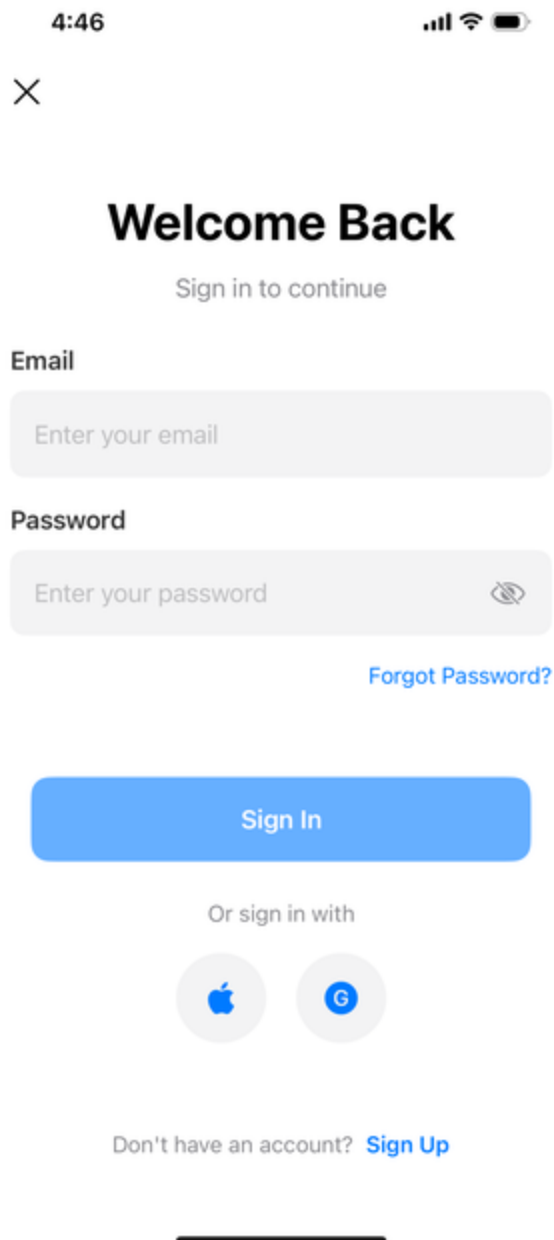
Confirm Password

Confirm your password

I agree to the [Terms of Service](#) and [Privacy Policy](#) ☐

Create Account

Log In Page



4:46


✕

Welcome Back

Sign in to continue

Email



Password

[Forgot Password?](#)

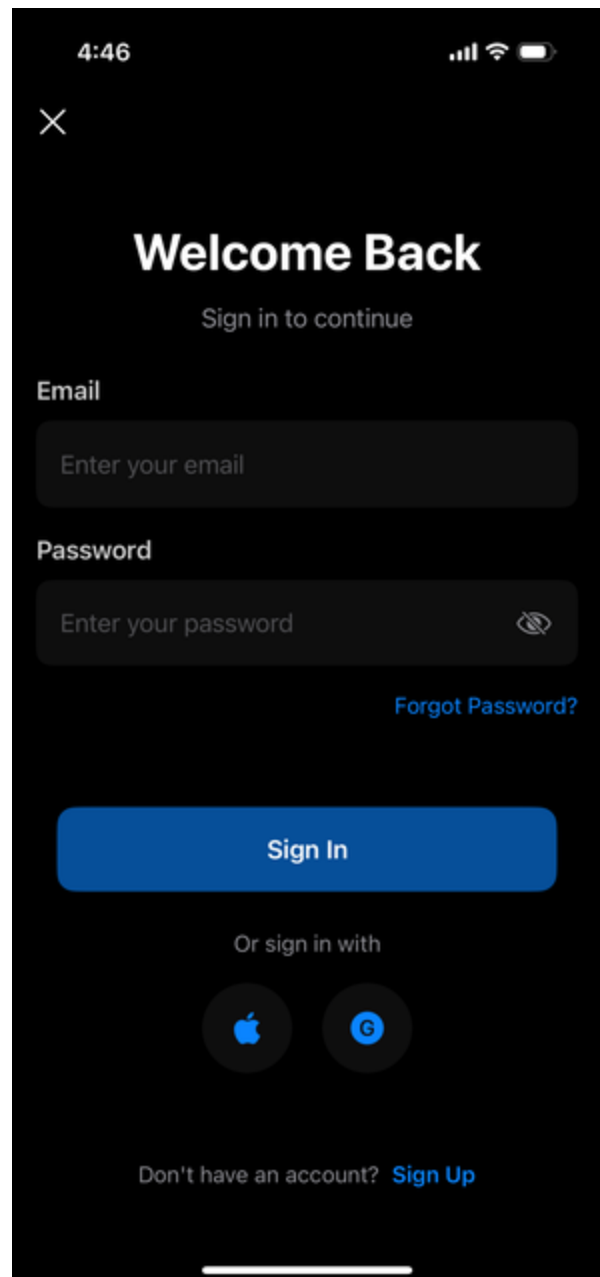
Sign In

Or sign in with



Don't have an account? [Sign Up](#)

Log In Page (Dark Mode)



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✕

Welcome Back

Sign in to continue

Email



Password

[Forgot Password?](#)

Sign In

Or sign in with



Don't have an account? [Sign Up](#)

Onboarding Page

6:10 2/7

Personal Information

We'll use this information to calculate your nutritional needs and personalize recommendations.

Gender

Select Gender ☒ Male ☐ Female

Age

25 years

Height

< Back

1 2 ABC 3 DEF
4 GHI 5 JKL 6 MNO
7 PQRS 8 TUV 9 WXYZ
0

Onboarding Page

6:10 3/7

Allergens & Sensitivities

Select any food allergies or intolerances you have. This helps us identify foods you should avoid.

Common Food Allergies

☐ Peanuts ☐ Tree Nuts ☐ Milk ☐ Eggs
☐ Wheat ☐ Soy ☐ Fish ☐ Shellfish
☐ Sesame ☐ Other

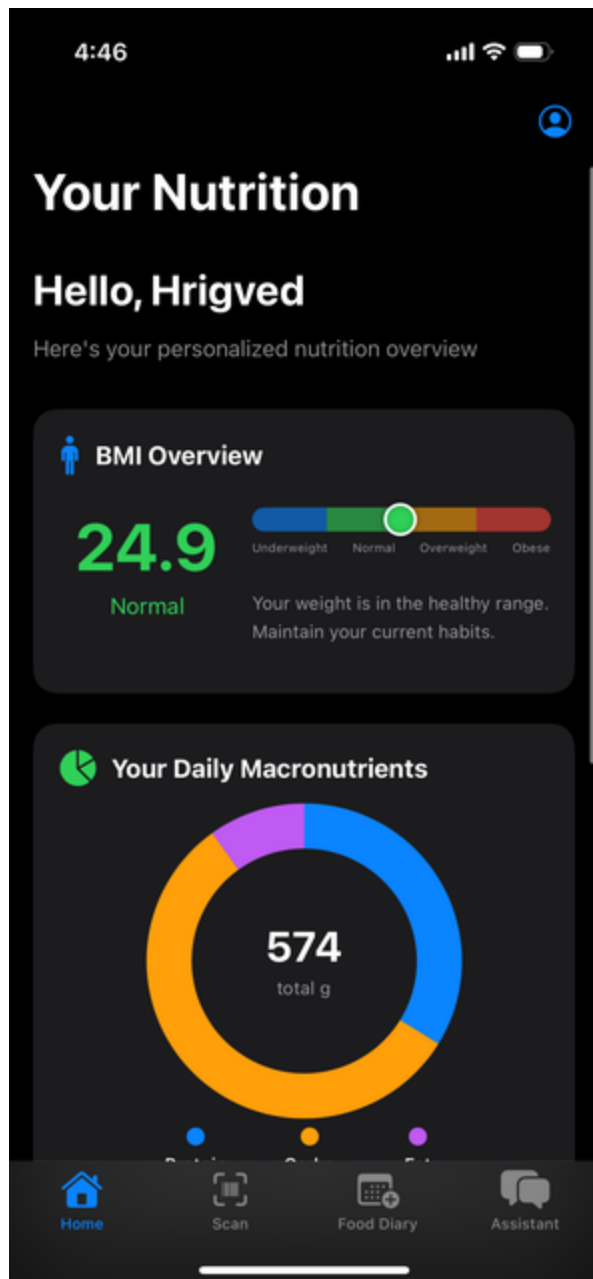
Food Intolerances

☐ Lactose ☐ Gluten ☐ FODMAPs ☐ Histamine
☐ Caffeine ☐ Salicylates ☐ MSG ☐ Sulfites
☐ Fructose

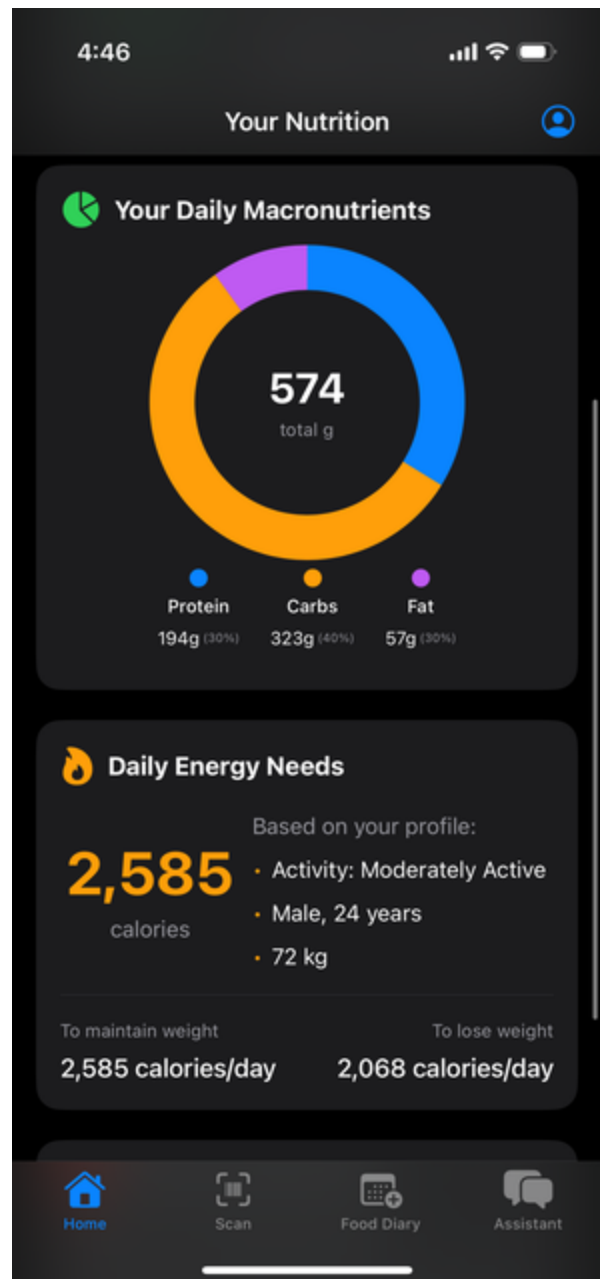
What's the difference?
Food allergies can trigger immune system reactions that can be severe or life-threatening.

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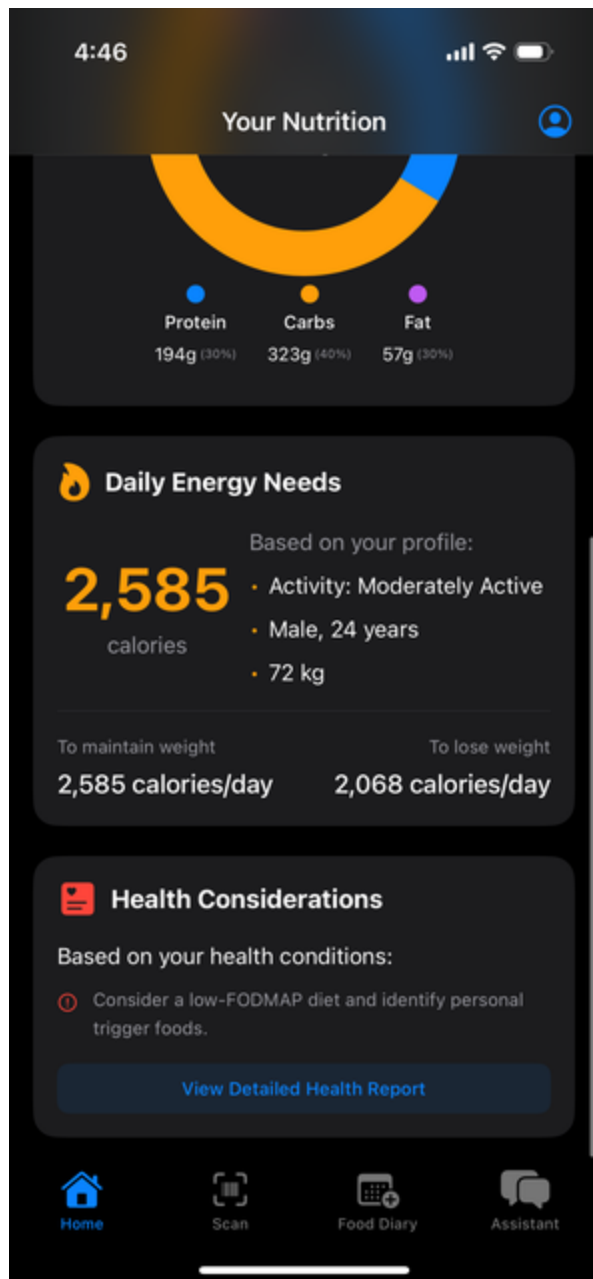
Home Page



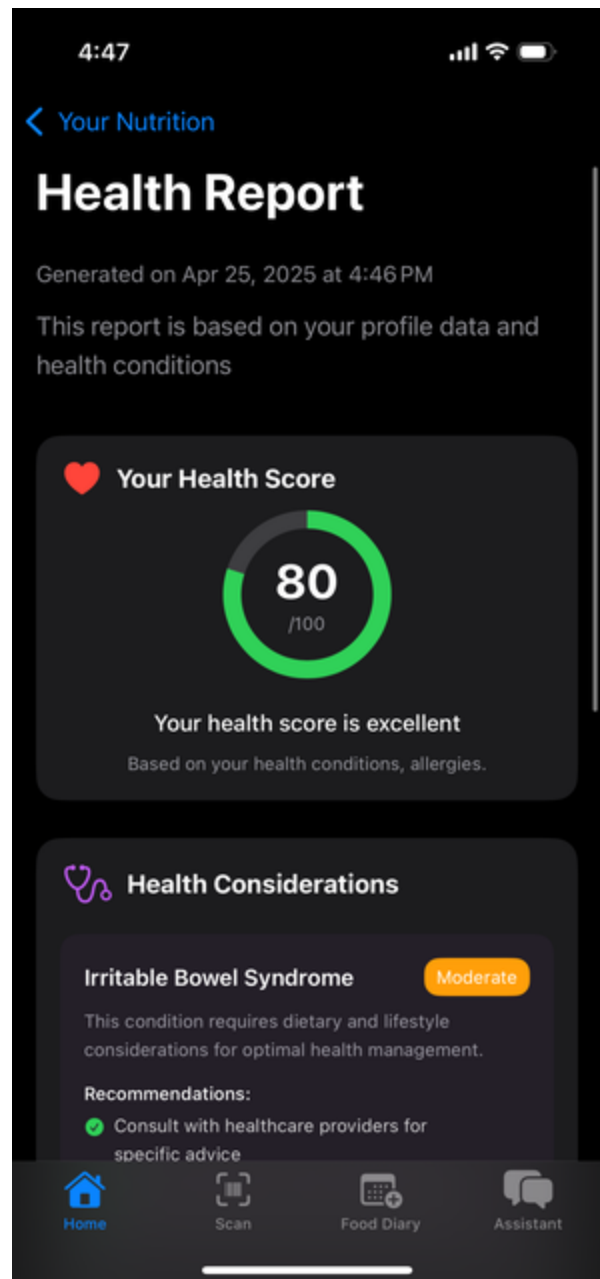
Home Page (contd)



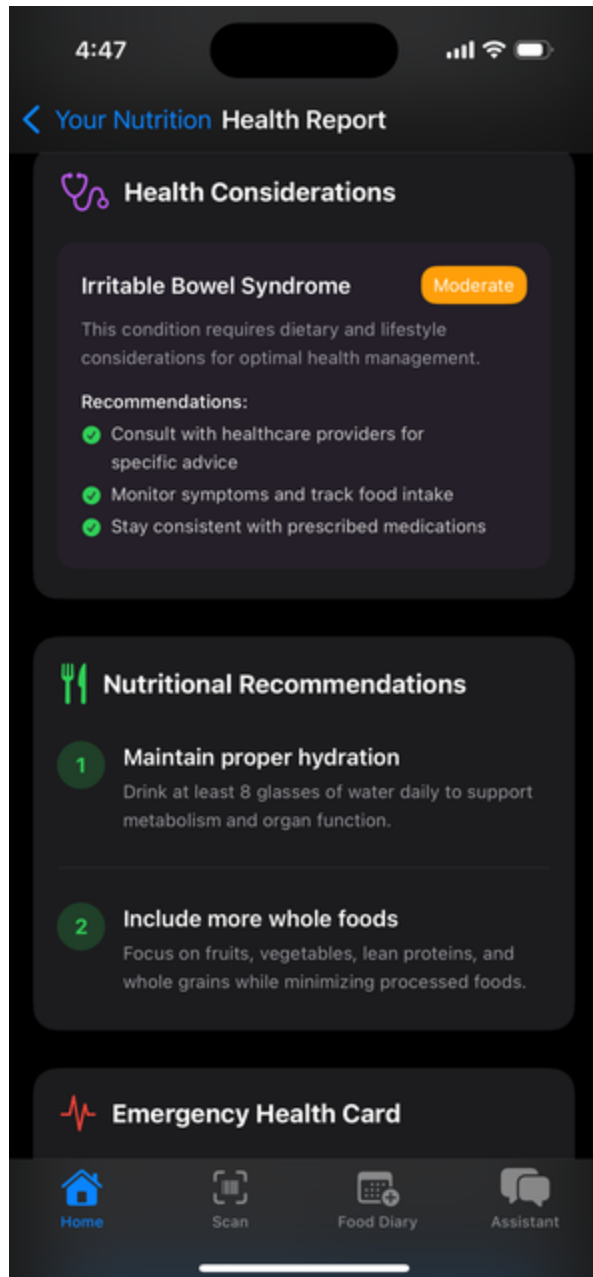
Home Page (contd)



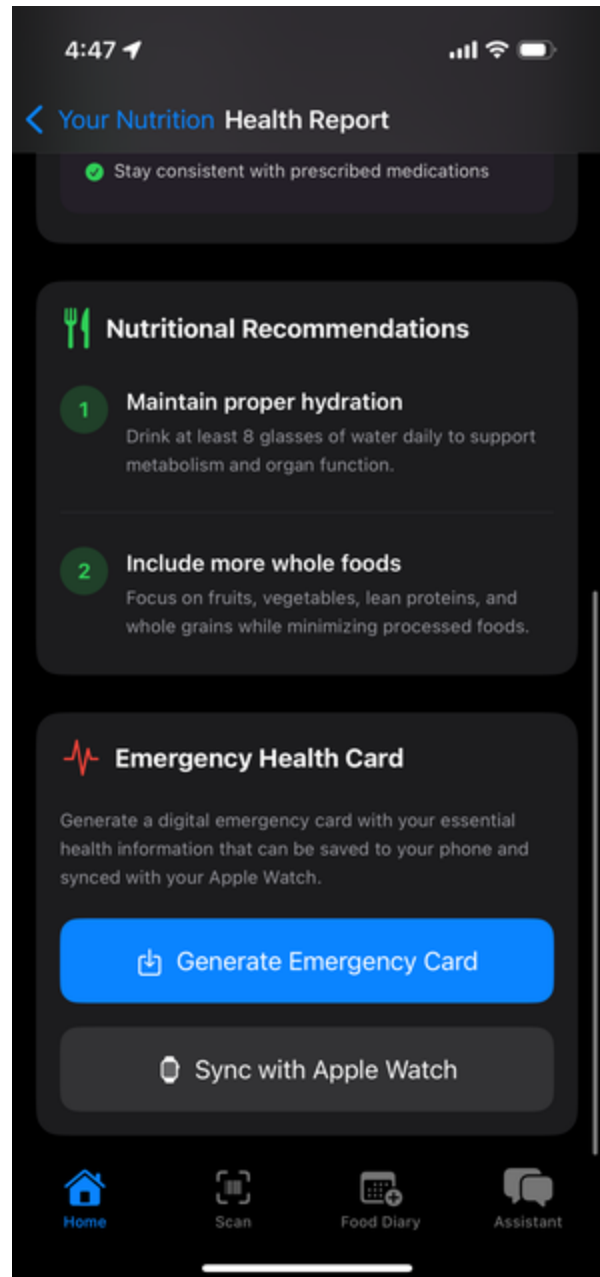
Health Report



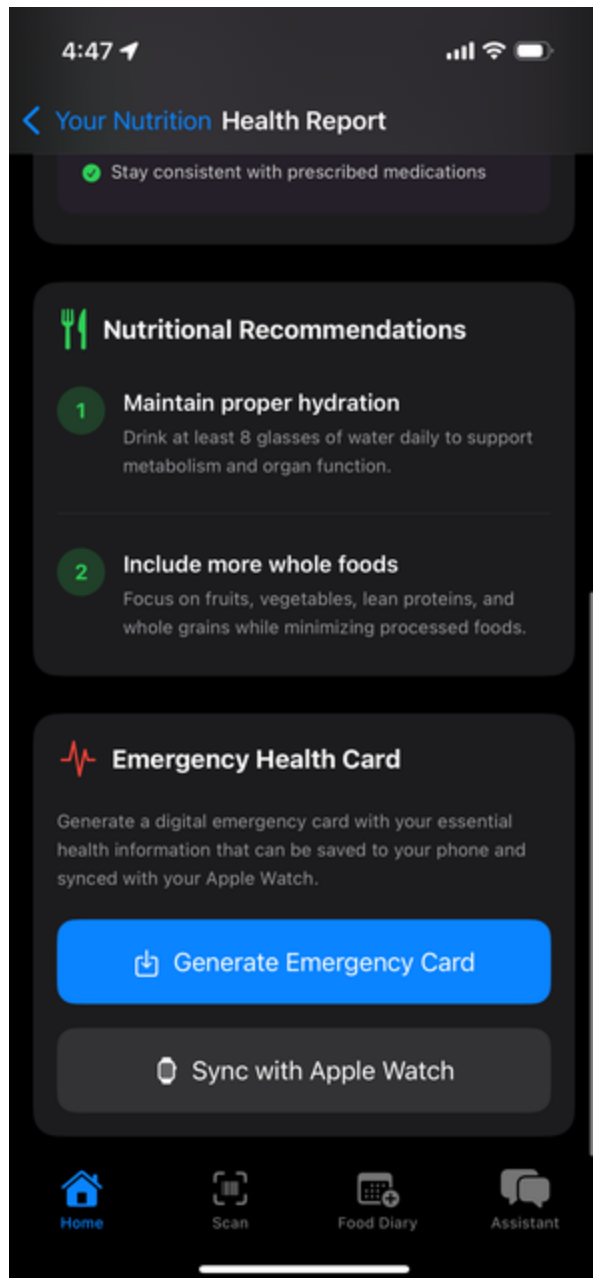
Health Report (contd)



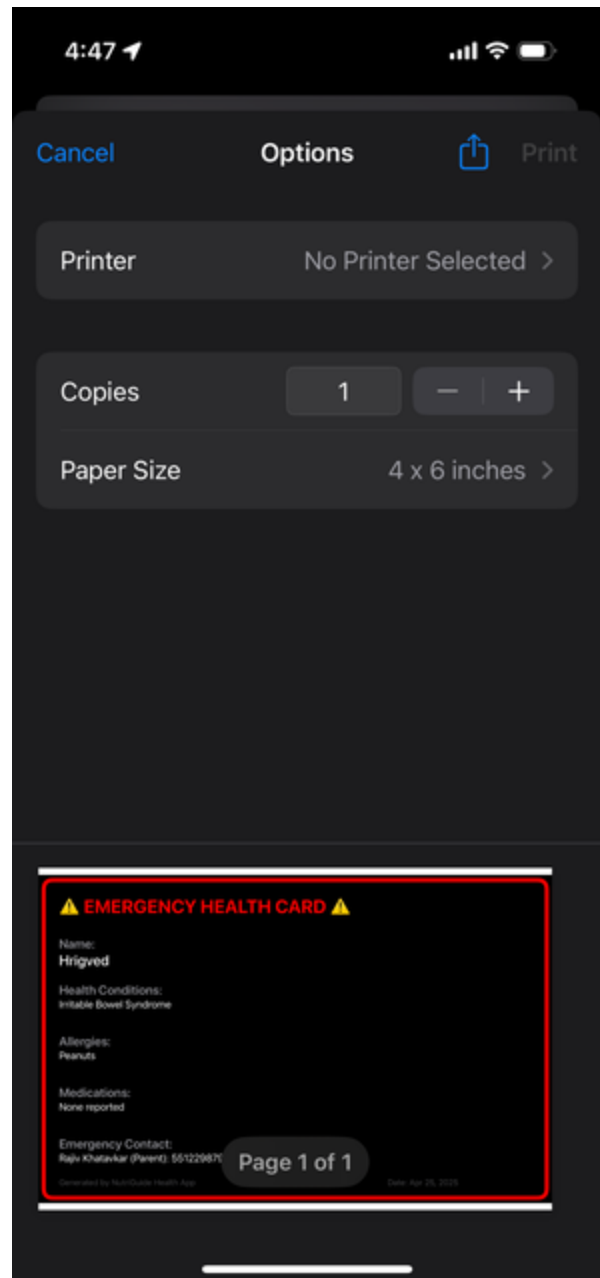
Health Report (contd)



Health Report (Emergency Card)

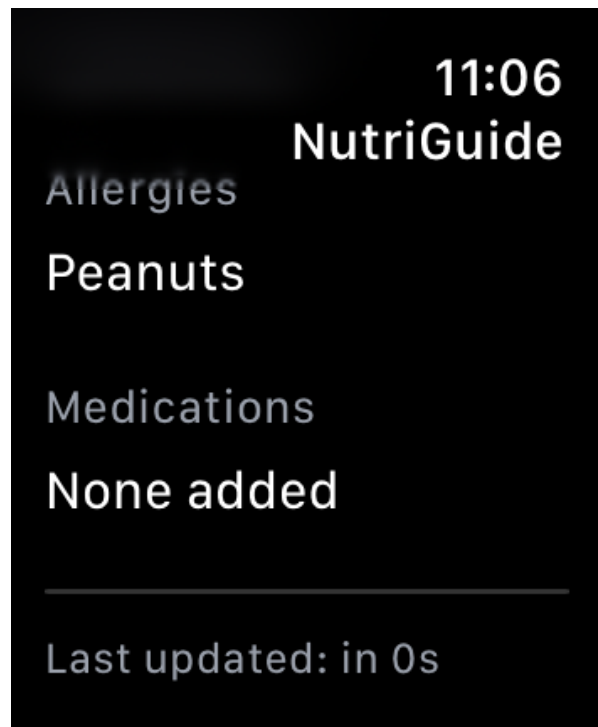
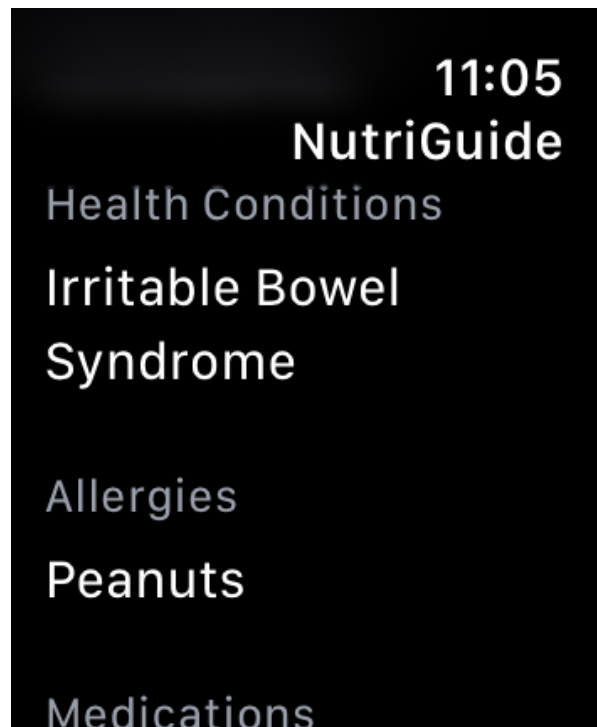
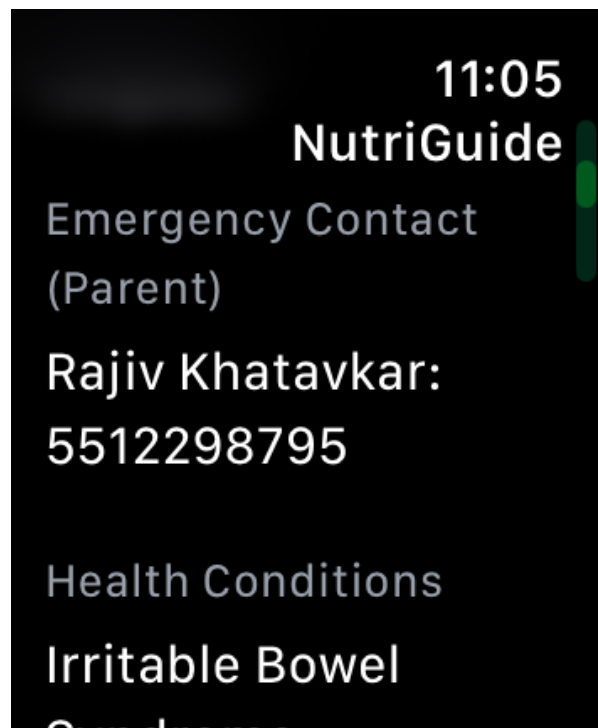
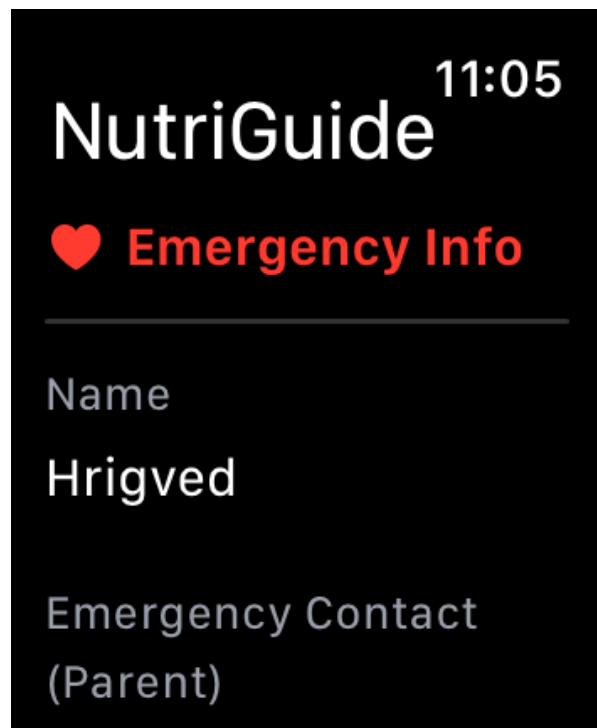


Health Report (Emergency Card)

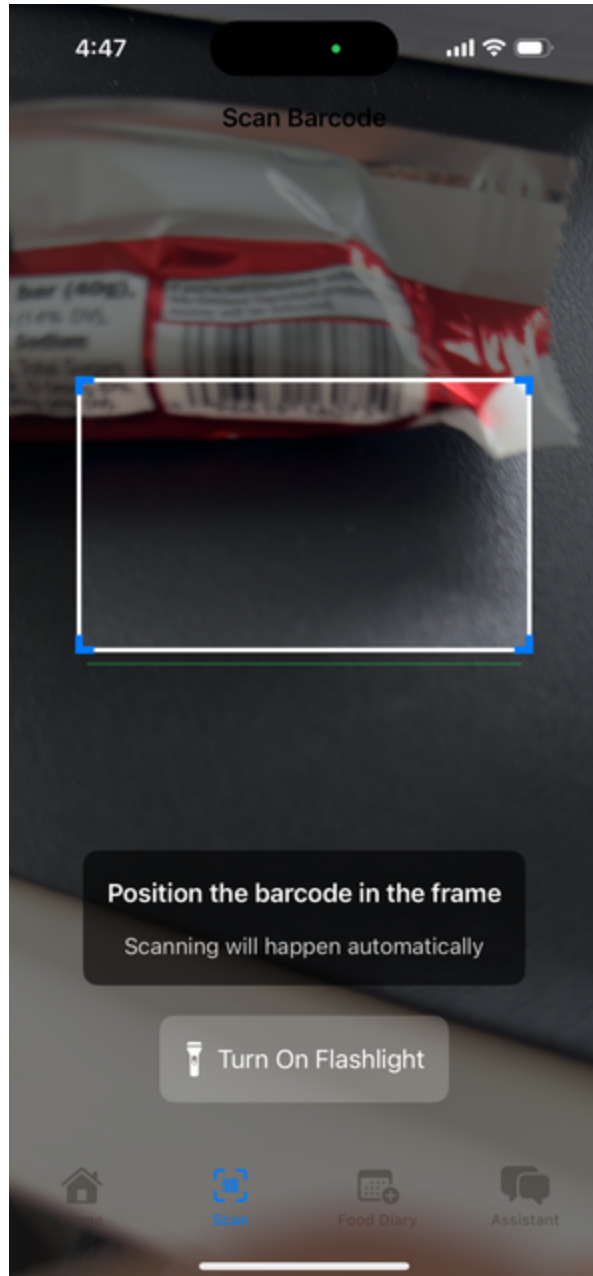


Health Report (Apple Watch Sync)

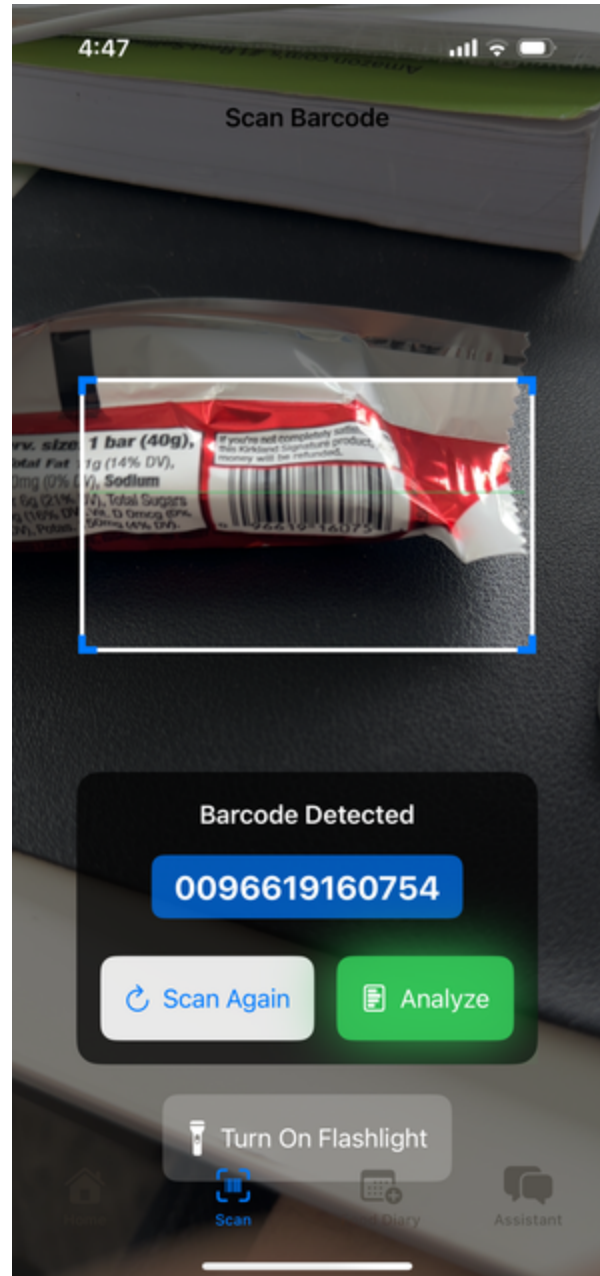
Health Report (Apple Watch Sync)



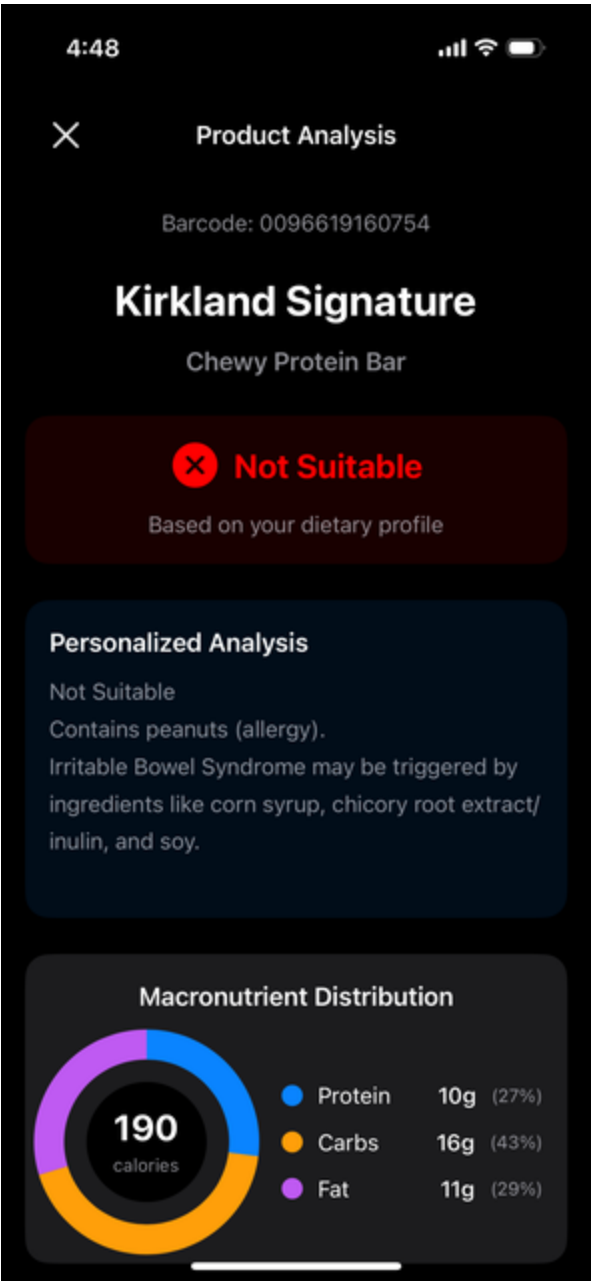
Product Barcode Scanner



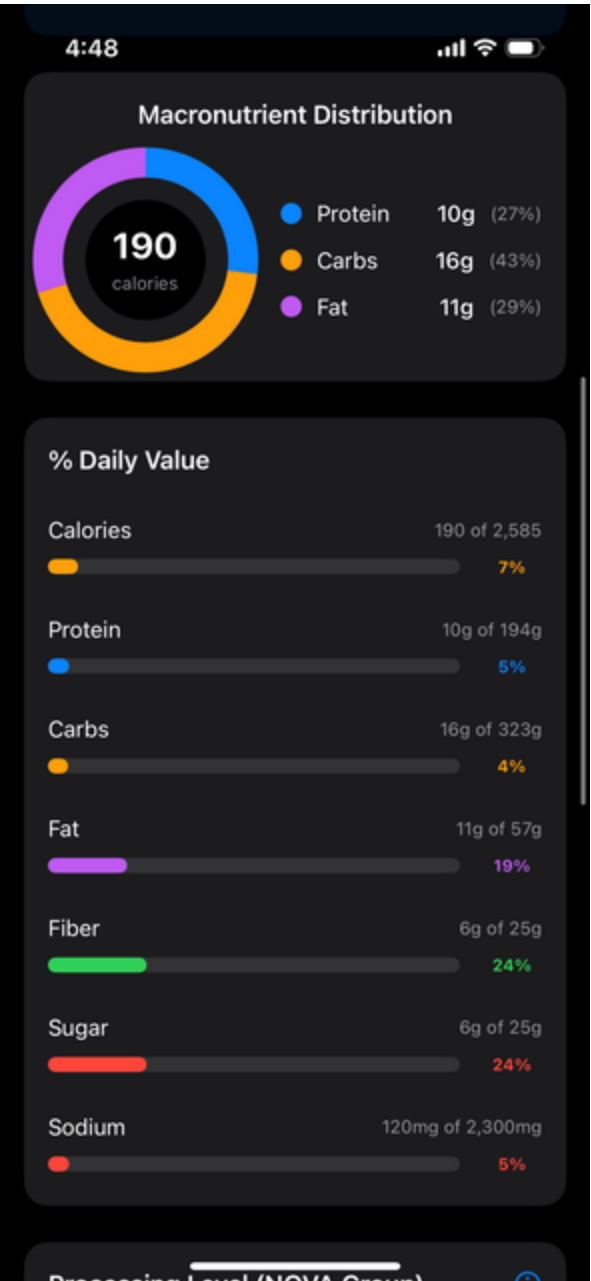
Product Barcode Scanner



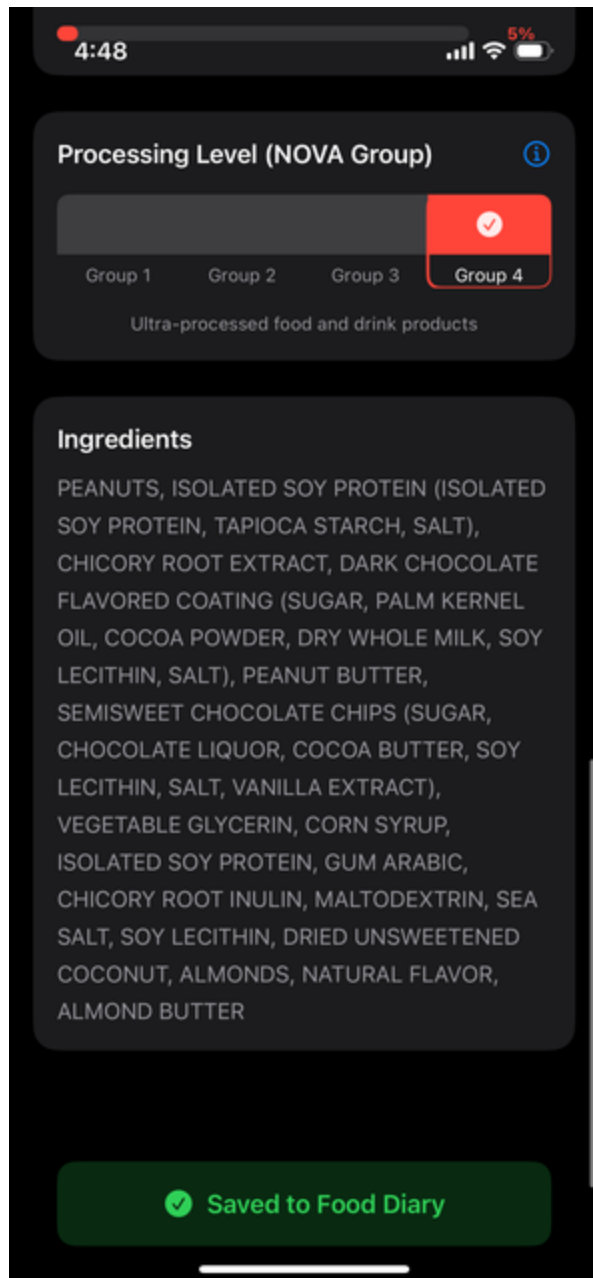
Product Barcode Scanner(Analysis)



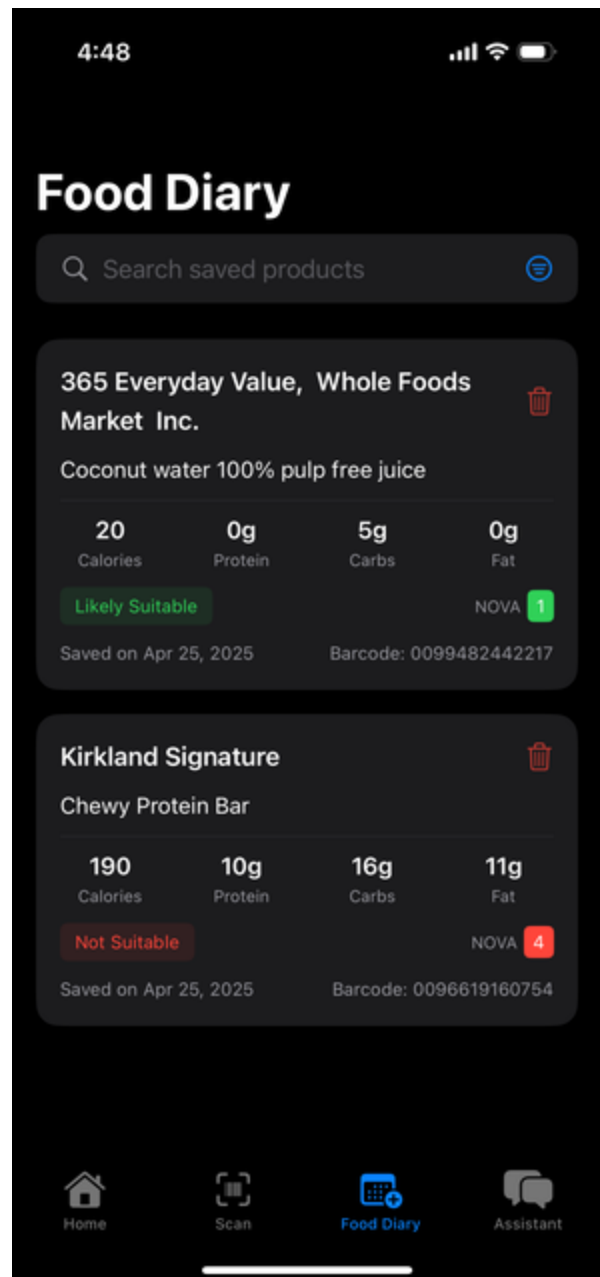
Product Barcode Scanner(Analysis)



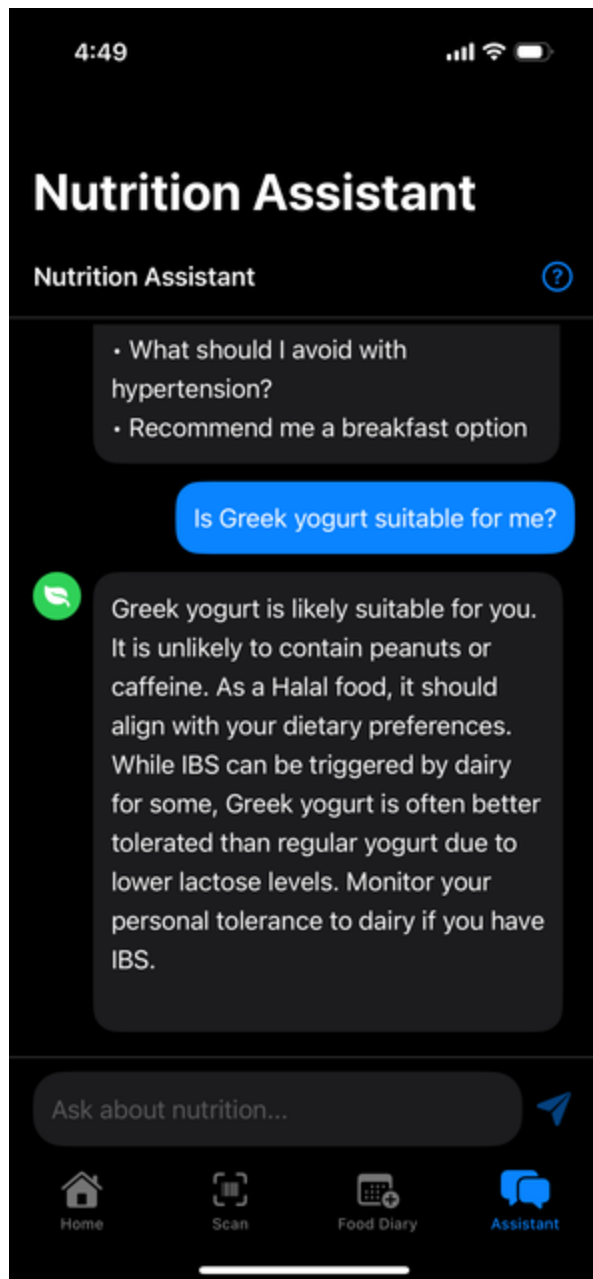
Product Barcode Scanner(Analysis)



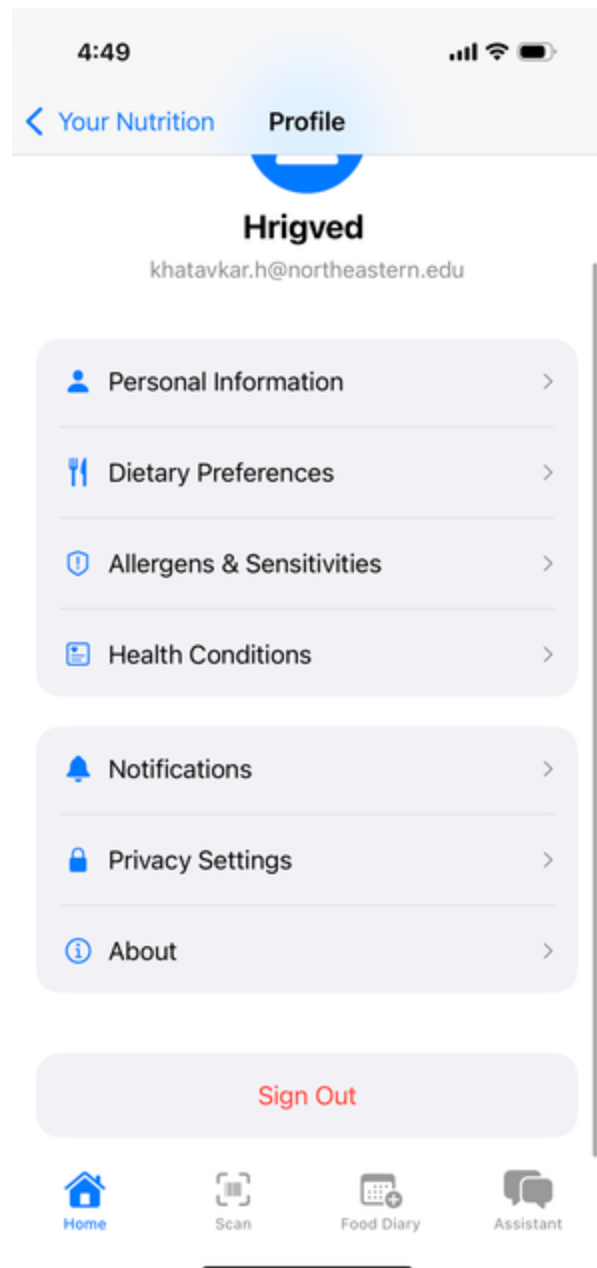
Food Diary



Nutrition Assistant



Profile and Sign Out



Conclusion

NutriGuide represents a significant step forward in personalized nutrition management through mobile technology. By combining barcode scanning functionality with personalized dietary analysis, the application successfully

bridges the gap between food product information and individual health requirements. The project demonstrates how technology can empower users to make informed dietary choices tailored to their specific health profiles.

Key Features Implemented

- **User Authentication System:** Secure login, registration, and guest mode functionality using Firebase Authentication
- **Comprehensive Onboarding:** Multi-step profile creation, capturing essential health metrics, allergies, dietary preferences, and medical information
- **Barcode Scanning:** Real-time product scanning with intuitive UI and visual feedback
- **Apple Watch Integration:** Syncing essential data with Apple Watch for emergencies
- **Personalized Product Analysis:** Advanced analysis of food products against the user's health profile
- **Food Diary:** Storage and management of scanned products with filtering capabilities
- **Nutrition Dashboard:** Visualization of nutritional data including BMI, macronutrient requirements, and health scores
- **Emergency Information Card:** Generation of emergency health cards with vital information

Key Features Implemented

NutriGuide delivers significant value to users through:

- **Personalized Nutrition Guidance:** Tailored recommendations based on individual health profiles
- **Simplified Food Evaluation:** Instant analysis of food products against personal dietary needs
- **Health Management:** Tracking of consumed products and visualization of nutritional patterns

- **Safety:** Identification of potential allergens and contraindicated ingredients
- **Convenience:** Quick access to comprehensive nutritional information through simple barcode scans

Future Scope

While the current version of NutriGuide delivers a robust set of features, several opportunities for future development include:

- **Expanded Product Database:** Integration with additional food databases for greater product coverage
- **Recipe Suggestions:** AI-powered meal planning based on nutritional requirements
- **Product Comparison:** Scanning multiple items and comparing them side by side
- **Localization:** Supporting additional languages and regional food databases