



SMART PANTRY: A MOBILE APPLICATION FOR INVENTORY AND NUTRITION INTAKE MANAGEMENT

GROUP
fyp24069

Pratik Bhattacharjee

Supervisor: Dr. Zhao Hengshuang

INTRODUCTION

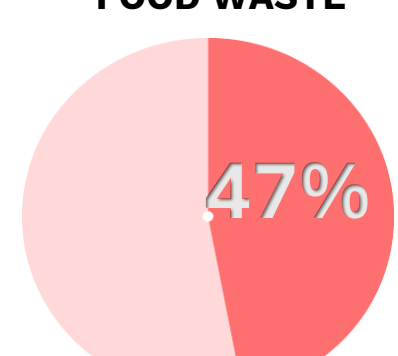
TARGET PROBLEM

Household food waste is a global issue, with millions of tons of food discarded annually. In the United States alone, food waste generated annually could fill **1 million dump trucks**. Studies reveal that **47% of food waste occurs at the household level**, primarily due to poor inventory management, confusion about meal preparation, and busy lifestyles. This not only impacts the environment but also represents a substantial financial loss for families.



The image above illustrates the scale of the issue across USA and its contribution to landfills. Source – MITRE/Gallup Study 2024

HOUSEHOLD CONTRIBUTION TO FOOD WASTE



The Pie chart illustrates 47% waste contribution at household level. Source – MITRE/Gallup Study 2024

PROJECT OBJECTIVES

Minimize Household Food Waste:

Provide innovative tools for efficient grocery tracking and management.

Enhance Meal Planning:

Inspire users with personalized recipe suggestions using existing groceries.

Promote Healthy Lifestyles:

Offer nutritional insights to encourage informed dietary choices.

Foster Sustainability:

Empower users to make conscious decisions for reducing their environmental footprint.

Introducing...

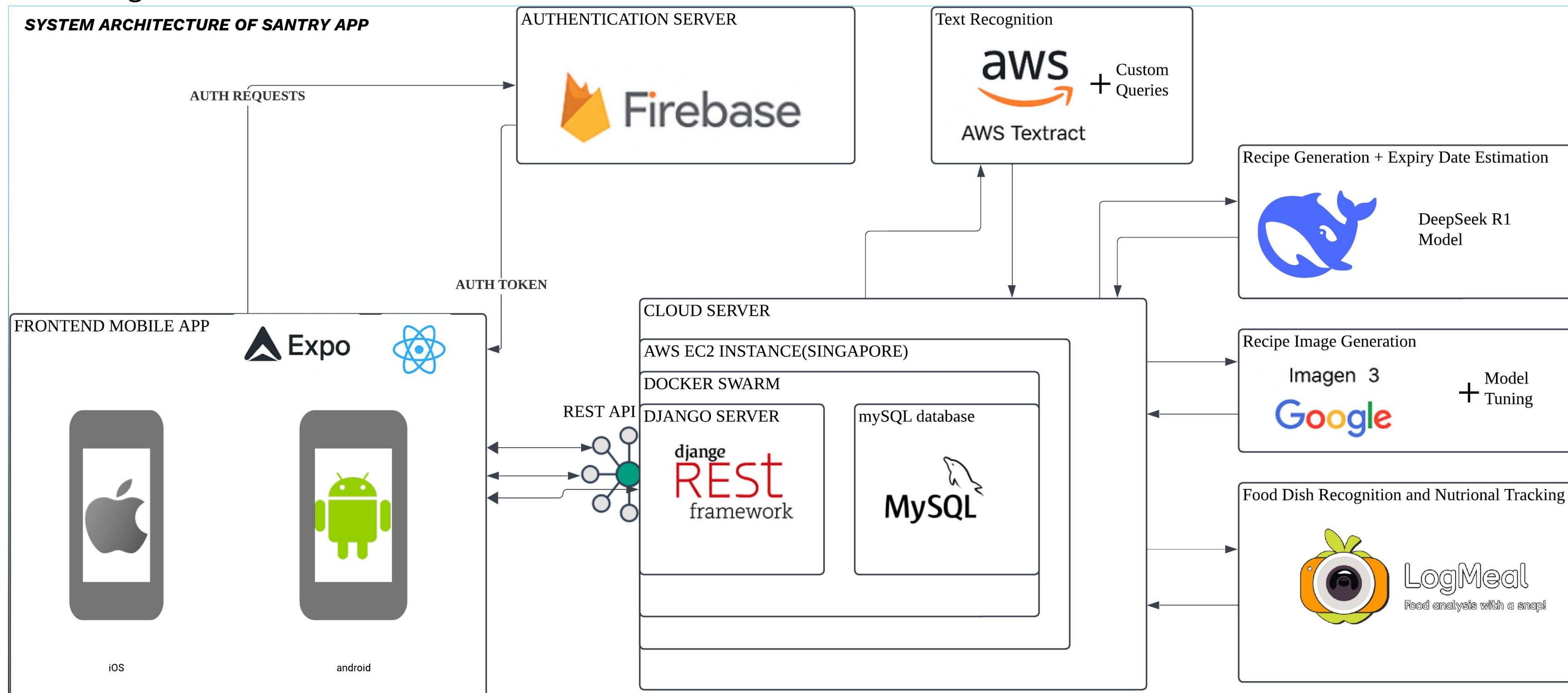


The image above is the Logo for the Santry Mobile Application.

METHODOLOGY

Overall Architecture

The **Santry** mobile app is developed using **Expo** and **React Native**, offering seamless support for both iOS and Android platforms to ensure cross-platform compatibility. User authentication is securely managed by **Firestore**, which handles login and registration processes efficiently. The app's **Cloud Server** is hosted on **AWS EC2 instances**, with containerized services orchestrated using **Docker Swarm** for enhanced scalability and reliability. The backend leverages the **Django REST Framework**, which provides RESTful APIs to handle app requests and streamline data processing. For data storage, **MySQL** serves as the primary database, storing critical information such as user data, grocery inventory, and recipe details. The architecture incorporates additional advanced features and services, which are elaborated on in the following subsections.

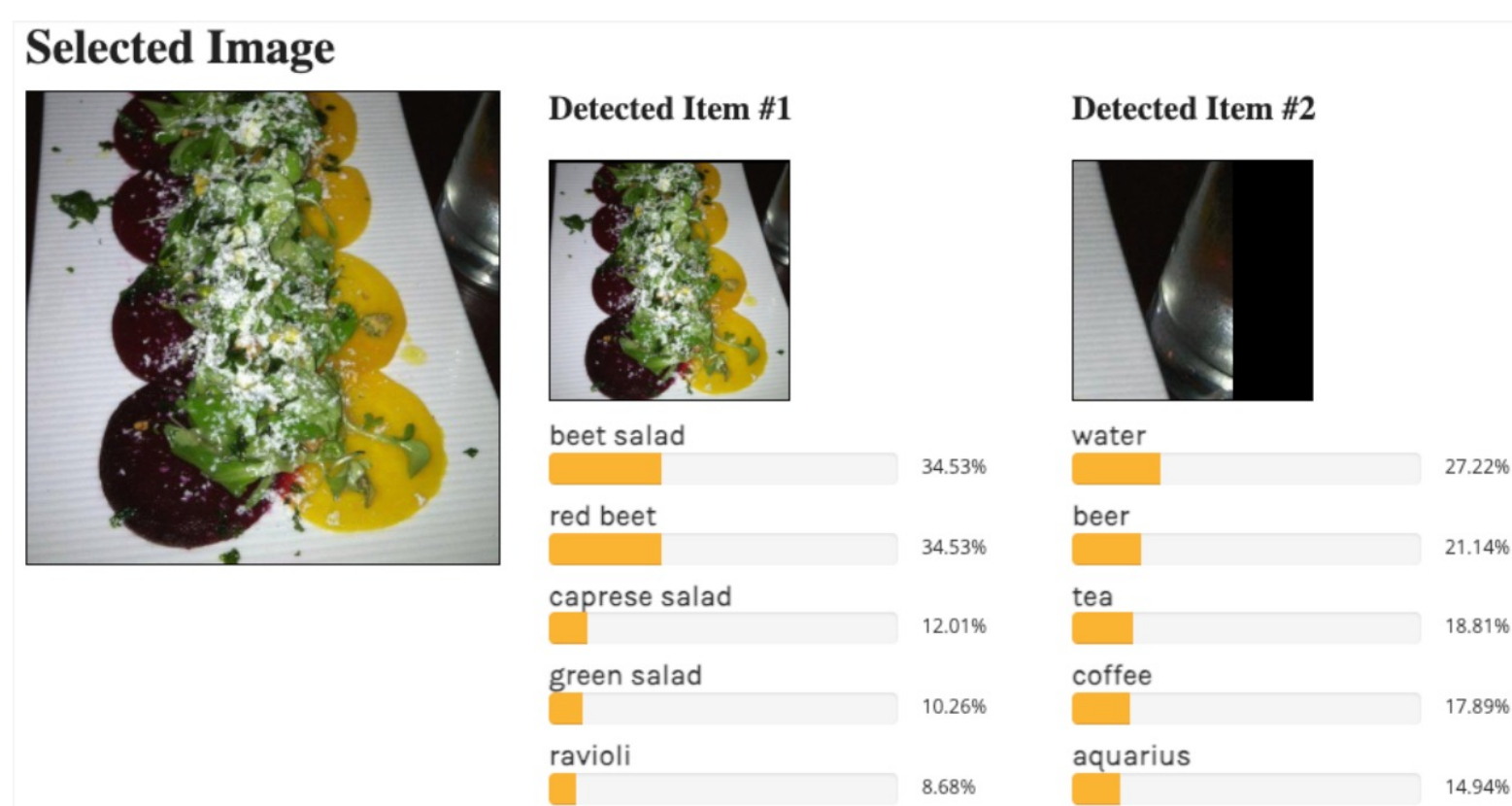


TEXT RECOGNITION TECHNOLOGY

Santry uses **AWS Textract** for ML-based text recognition, extracting food names and quantities from receipts with over **90% accuracy**. Data is categorized, and expiry dates are predicted using **DeepSeek R1** before being sent as a JSON list to the frontend, ensuring seamless inventory management.

DISH IMAGE AND NUTRITION RECOGNITION

Santry integrates **LogMeal** to provide advanced dish recognition capabilities. Once a dish is recognized, users can confirm the result for accuracy. The recognition process is highly efficient, averaging **2.8 seconds**, with an additional **0.8 seconds** required for identifying ingredients, macros, and minerals. Powered by **ML-trained vision AI**, LogMeal ensures precise and reliable dish analysis to enhance nutritional tracking. The following image depicts the recognition capability of Logmeal API.



The image above visualizes the capabilities of Logmeal API food detection. It can detect food items in low-light and with impressively high accuracy.

AI RECIPE AND IMAGE GENERATION

When users update their inventory, the **Django server** triggers a job that sends the inventory and dietary preferences to the **DeepSeek R1 API**. This generates tailored recipes with step-by-step instructions. The recipes are then processed by **Google Imagen 3**, which creates realistic, high-quality images of the dishes, enhancing user engagement and visualization.

FUTURE WORK

Launch on App Stores: Deploy the application on **Google Play** and the **App Store** to reach a wider audience.

Develop Custom Recognition Models: Utilize user-labeled food image data to train our own **food recognition** and **nutrition prediction** models for improved accuracy and performance.

Collaborate with Grocery Chains: Partner with grocery stores to enable **automatic inventory updates**.

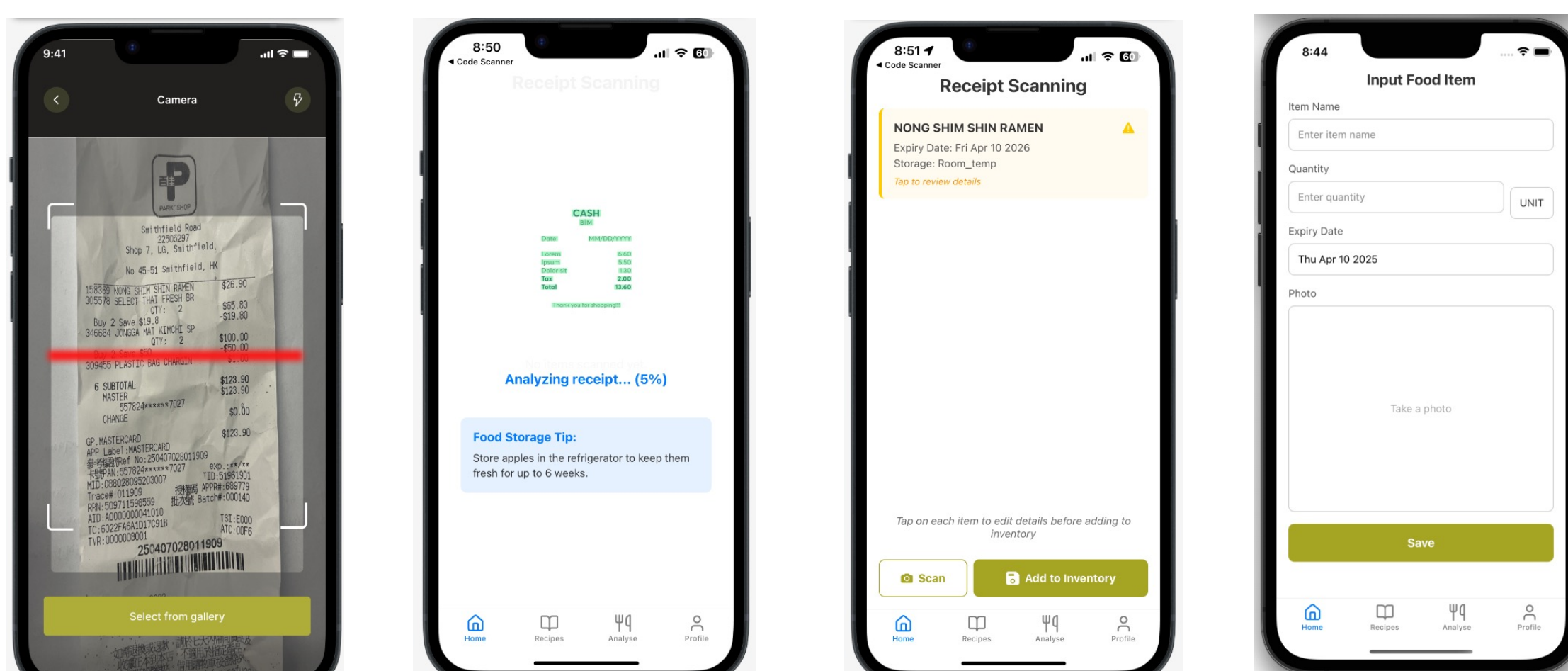
ACKNOWLEDGEMENTS

I would like to express my heartfelt gratitude to my supervisor, **Dr. Zhao Hengshuang**, for his invaluable guidance, support, and supervision throughout this project. I am also deeply thankful to **The University of Hong Kong** for providing me with the opportunity and resources to undertake this work. Lastly, I extend my sincere appreciation to my **parents** for their unwavering encouragement, unconditional support, and belief in my abilities, which have been a constant source of inspiration throughout this journey.

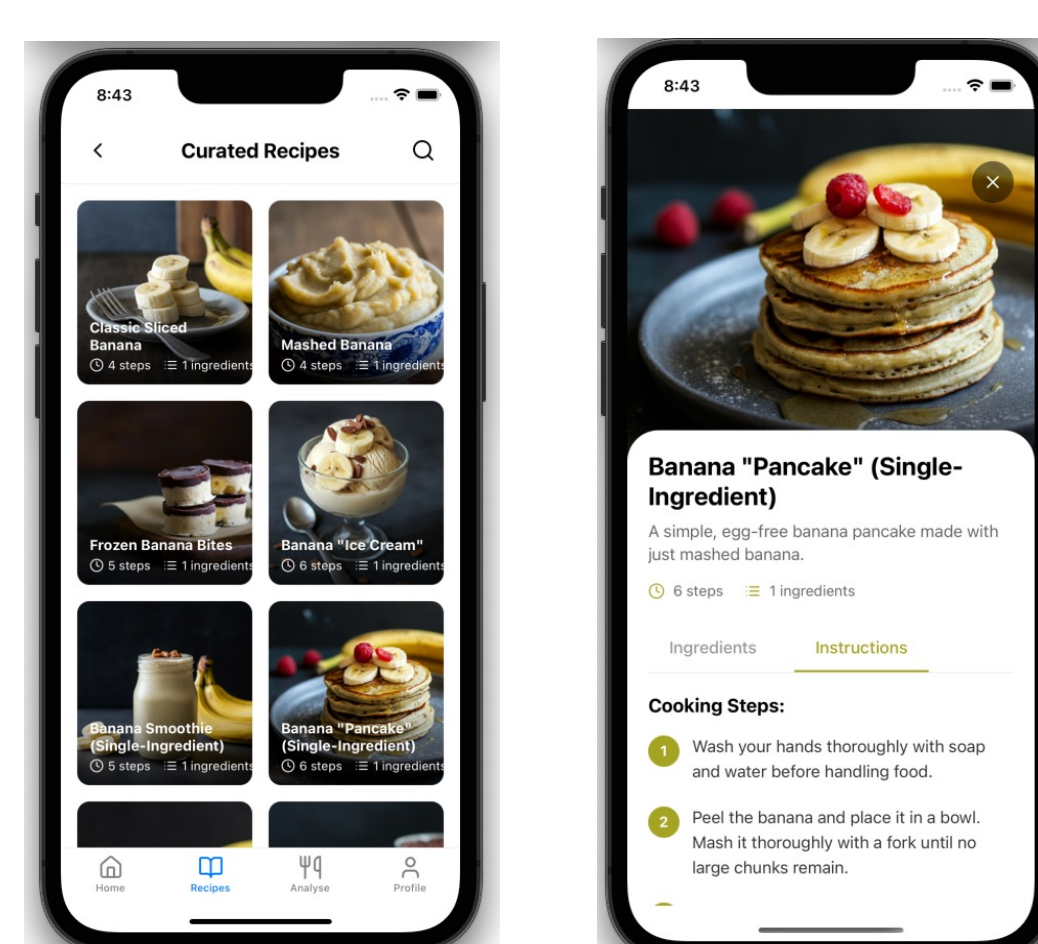
Project Outcome and App Features

Smart Inventory Management

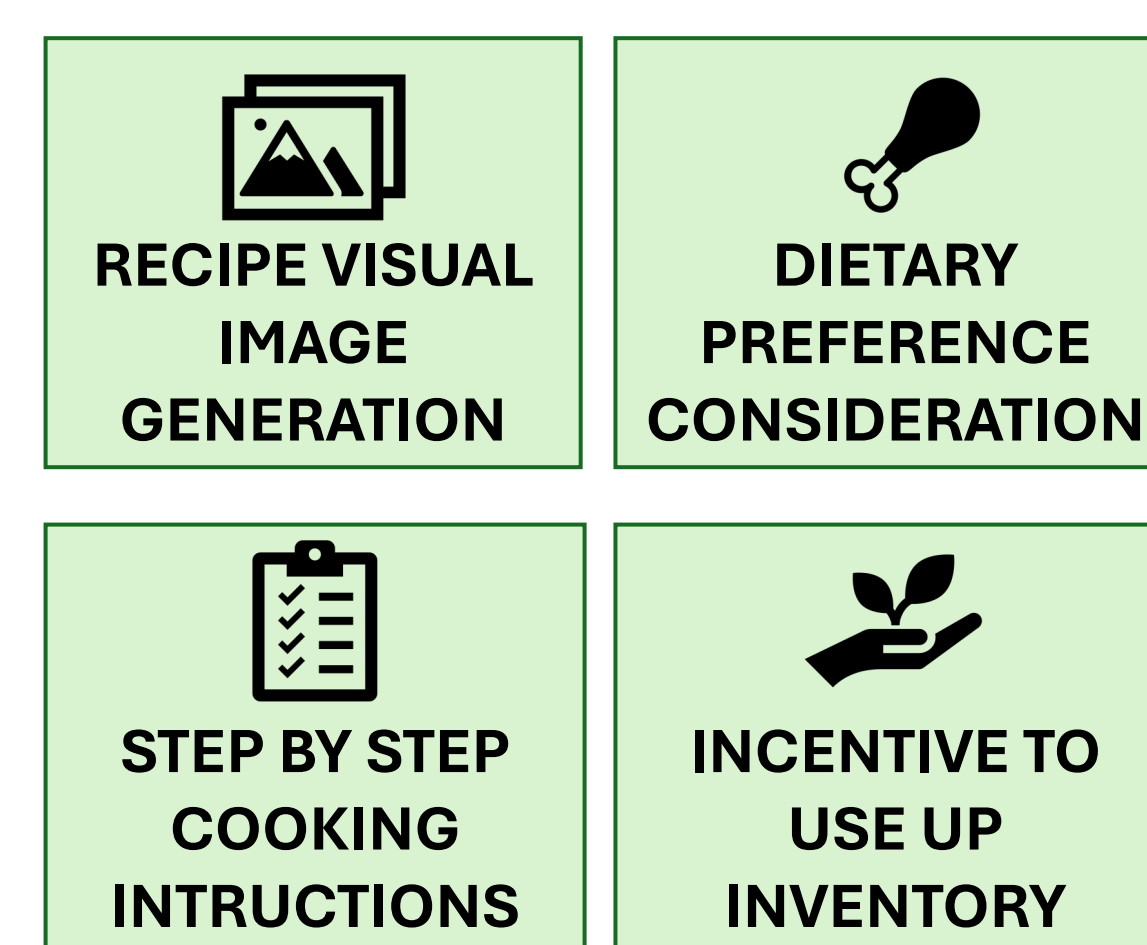
Santry **USERS CAN ADD ITEMS TO THEIR INVENTORY BY:**



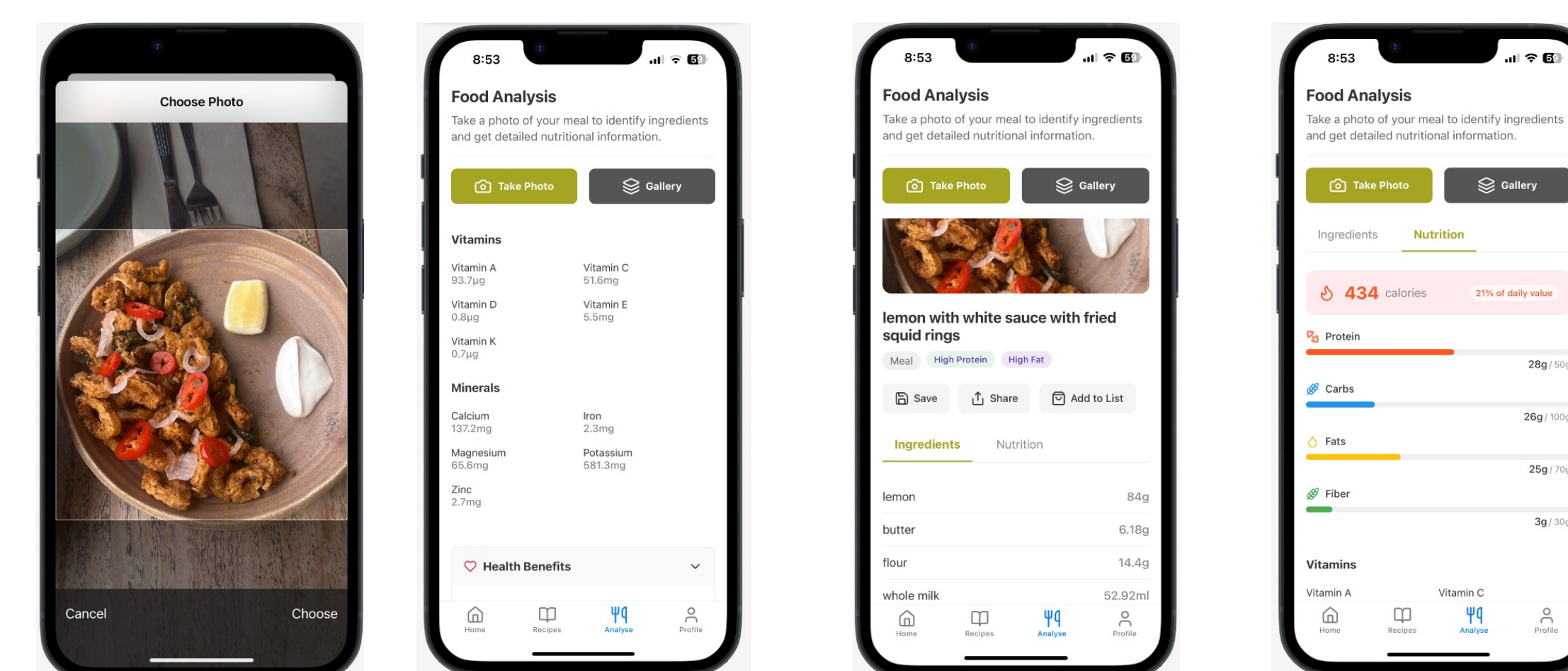
Inventory-based Recipe Suggestion



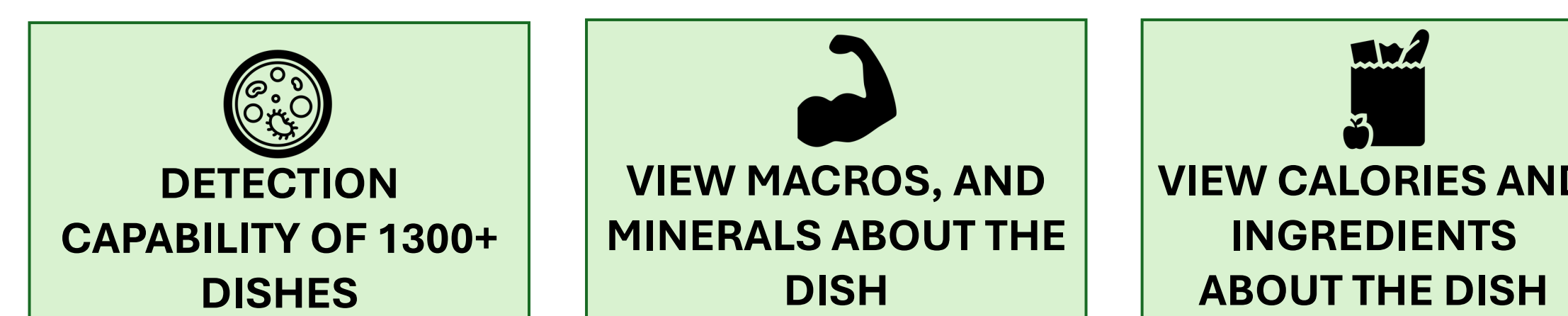
Santry **USERS CAN VIEW AI GENERATED RECIPES BASED ON THEIR INVENTORY ITEMS:**



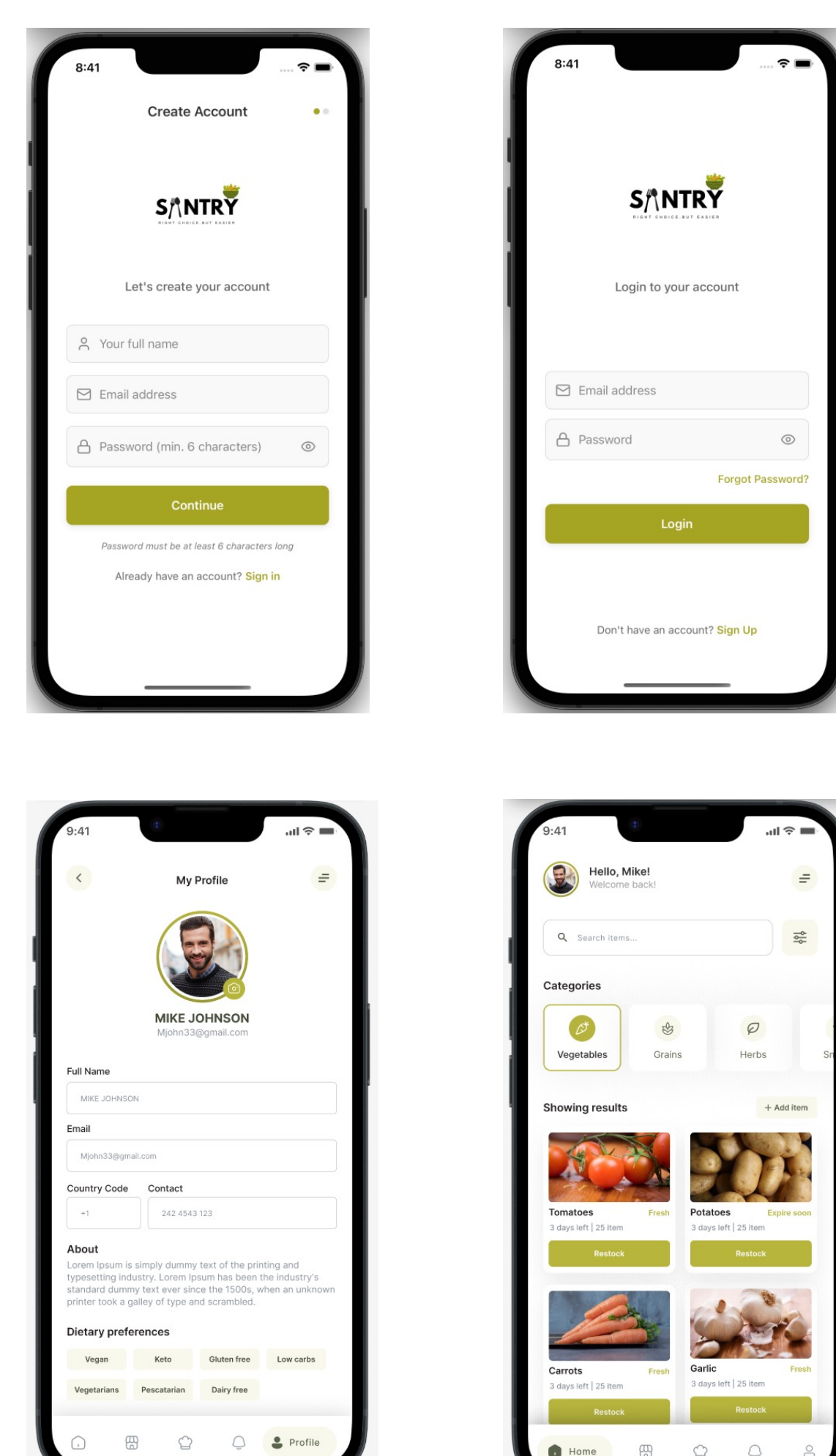
Nutrition Intake Management



Santry **USERS CAN VIEW NUTRITIONAL INFORMATION ABOUT THEIR READY-TO-EAT DISHES:**



OTHER ESSENTIAL APP FEATURES



Santry **USERS CAN EXPERIENCE A MODERN MOBILE APPLICATION EXPERIENCE:**

