



FoodEye

A Food Expiry Date Tracker application using barcode, image and text recognition for consumers

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Problem Statement

- Food wastage due to bad consumption patterns exacerbated by the pandemic
- Low availability of food inventory management applications or systems
- Time consuming to record perishables in household settings
- Lack of reliable reminders for managing perishables

Aim and Objectives

Aim

- To tackle the food wastage problem from the consumer level by providing a mobile application that uses image processing and barcode scanner to simplify managing perishables.

Objectives

- To enable users to manage their food inventory effectively, reducing food waste and promoting sustainable practices.
- To allow users to view their food inventory in a categorized manner
- To implement barcode scanning and image-to-text recognition features for easy and accurate input of food item details.
- To send push notifications to users to alert them of expiring food items in advance.

Deliverables

Target Users

- General public/ average users
- Wide range of consumers with varying needs and preferences related to food management.

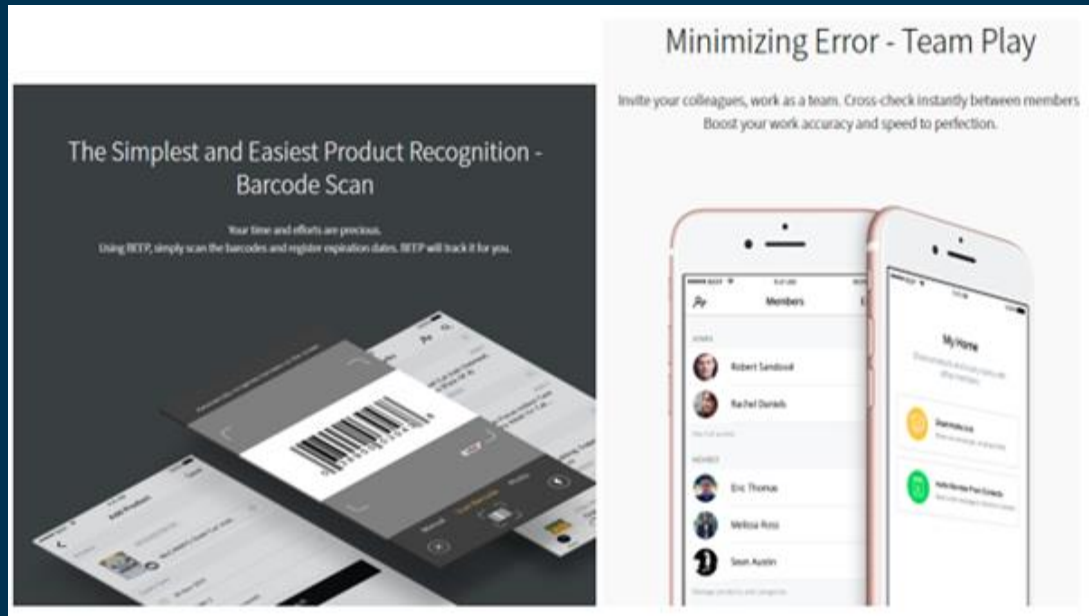
Functionalities

- Users can add, edit, and delete food items with details like name, type, and expiry date and others.
- Built-in barcode scanner for quick retrieval of product names
- Image-to-text recognition for easy input of expiry dates from images
- Personalization options for notification settings
- Various sorting criteria and categorized views for viewing all recorded items

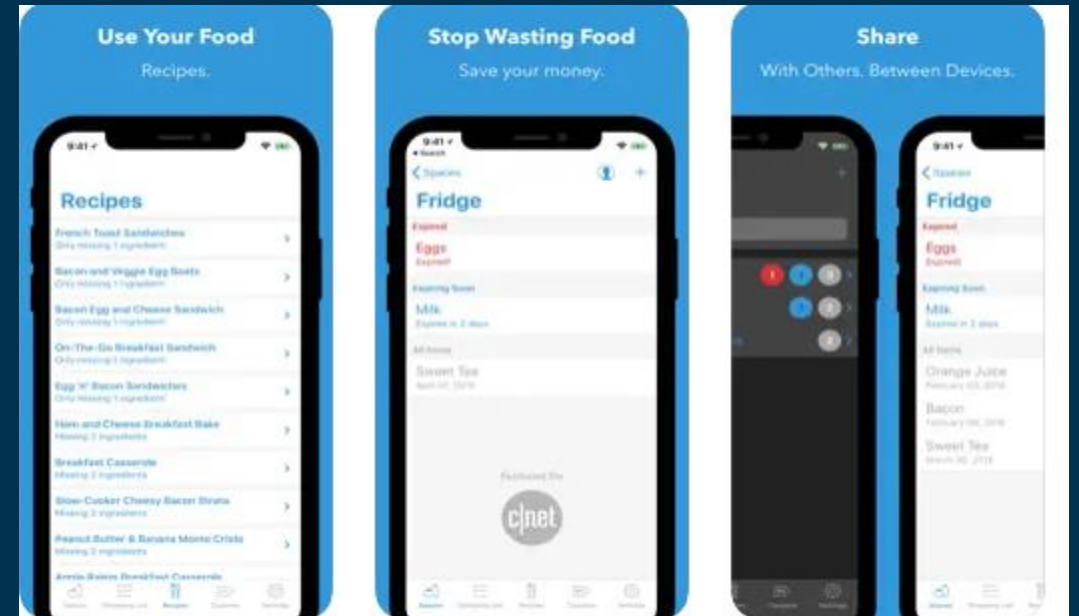
Domain Research

- Food waste as a global problem
- Pandemic worsened food waste
- How consumer behaviors impact waste generation
- Common challenges in managing waste
- Qualities of an ideal food waste management system
- Memory retention and the importance of reminders

Similar Systems



BEEP



Fridgley

Technical Research



ASP.NET Core
(.NET 7.0)



Flutter

Programming
Languages



Visual Studio
2022



Visual Studio
Code

IDE



Microsoft SQL
Server 2019

Database

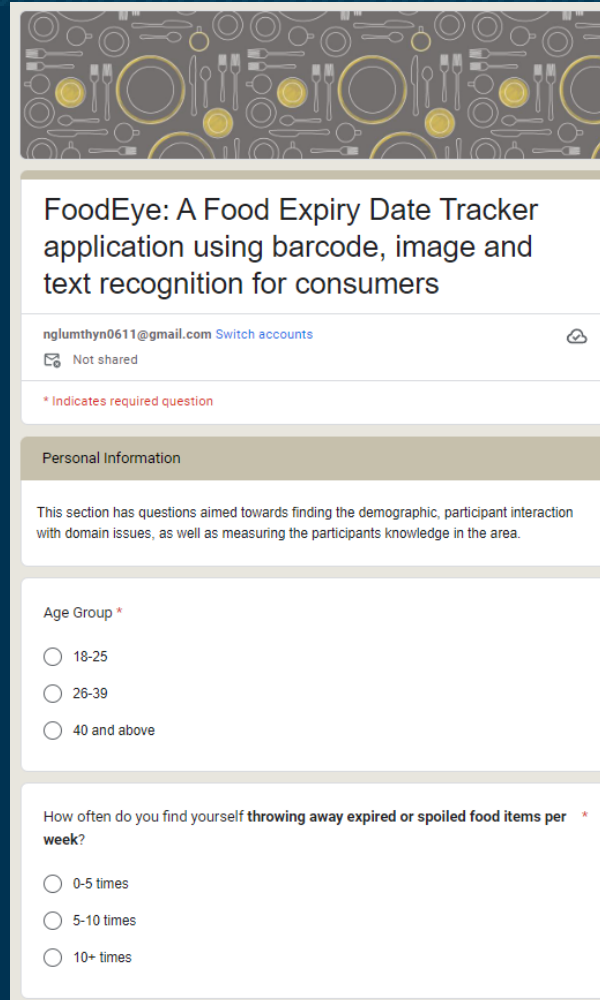


pub.dev
packages

Libraries

Primary Research (Questionnaire)

- Received **34** responses, distributed online
- Positive response to suggested functionalities
- Core features well-received by respondents
- Positive ratings for usability and effectiveness
- Android preferred platform for app



The screenshot shows the 'FoodEye: A Food Expiry Date Tracker' questionnaire. It includes a header with a patterned background, a title, a user email (nglumthyn0611@gmail.com), and a 'Not shared' status. A section titled 'Personal Information' contains a description of the survey's purpose. Below this is the 'Age Group' question with three radio button options: '18-25', '26-39', and '40 and above'. The final question is 'How often do you find yourself throwing away expired or spoiled food items per week?' with four radio button options: '0-5 times', '5-10 times', and '10+ times'.

FoodEye: A Food Expiry Date Tracker application using barcode, image and text recognition for consumers

nglumthyn0611@gmail.com [Switch accounts](#)

Not shared

* Indicates required question

Personal Information

This section has questions aimed towards finding the demographic, participant interaction with domain issues, as well as measuring the participants knowledge in the area.

Age Group *

☐ 18-25

☐ 26-39

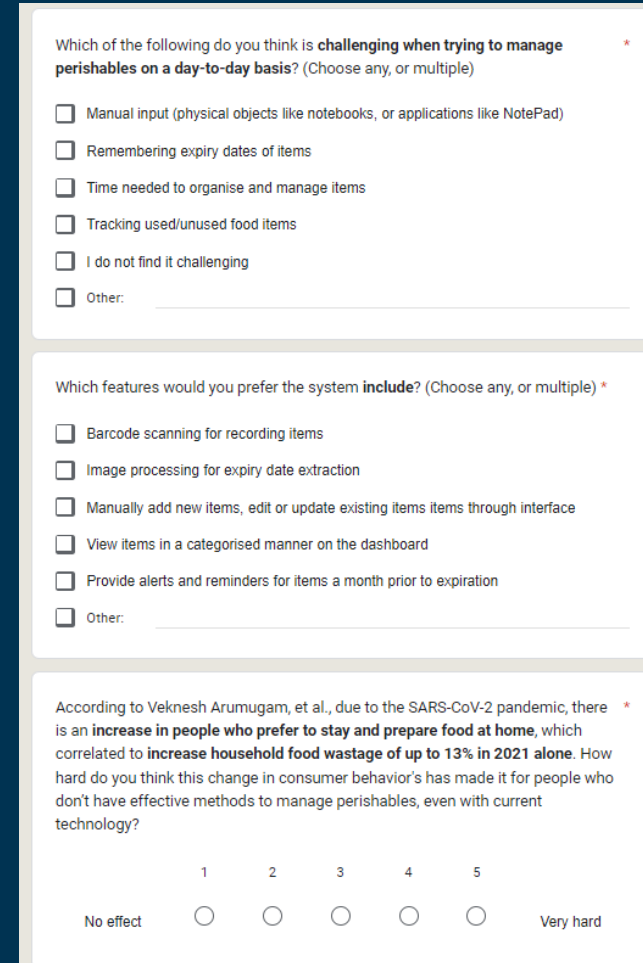
☐ 40 and above

How often do you find yourself **throwing away expired or spoiled food items per week?** *

☐ 0-5 times

☐ 5-10 times

☐ 10+ times



The screenshot shows the 'FoodEye: A Food Expiry Date Tracker' questionnaire. It includes a header with a patterned background, a title, a user email (nglumthyn0611@gmail.com), and a 'Not shared' status. A section titled 'Personal Information' contains a description of the survey's purpose. Below this is the 'Age Group' question with three radio button options: '18-25', '26-39', and '40 and above'. The final question is 'How often do you find yourself throwing away expired or spoiled food items per week?' with four radio button options: '0-5 times', '5-10 times', and '10+ times'.

Which of the following do you think is **challenging when trying to manage perishables on a day-to-day basis?** (Choose any, or multiple) *

☐ Manual input (physical objects like notebooks, or applications like NotePad)

☐ Remembering expiry dates of items

☐ Time needed to organise and manage items

☐ Tracking used/unused food items

☐ I do not find it challenging

☐ Other: _____

Which features would you prefer the system **include?** (Choose any, or multiple) *

☐ Barcode scanning for recording items

☐ Image processing for expiry date extraction

☐ Manually add new items, edit or update existing items through interface

☐ View items in a categorised manner on the dashboard

☐ Provide alerts and reminders for items a month prior to expiration

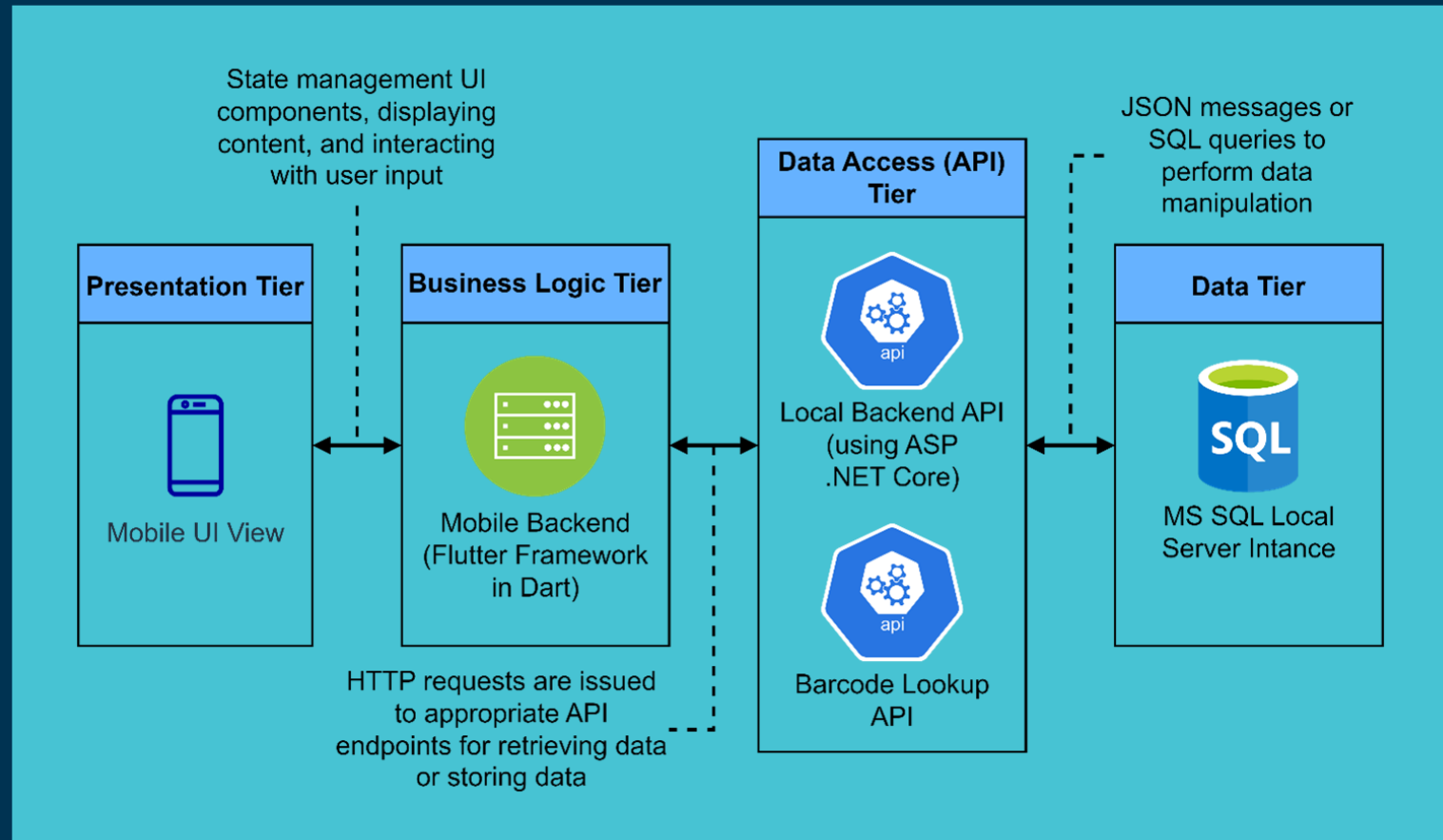
☐ Other: _____

According to Veknesh Arumugam, et al., due to the SARS-CoV-2 pandemic, there is an **increase in people who prefer to stay and prepare food at home**, which correlated to **increase household food wastage of up to 13% in 2021 alone**. How hard do you think this change in consumer behavior's has made it for people who don't have effective methods to manage perishables, even with current technology?

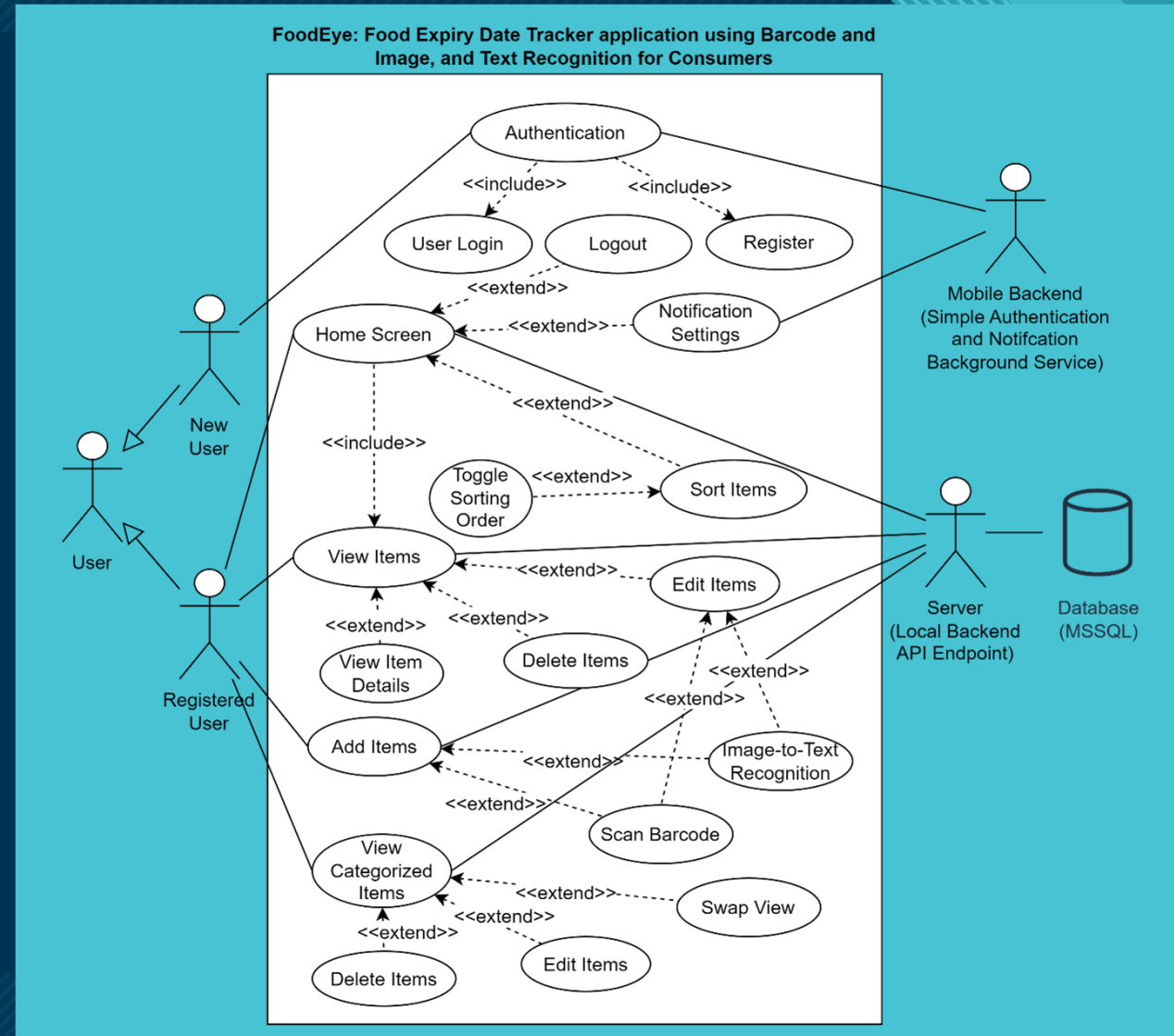
1 2 3 4 5

No effect ☐ ☐ ☐ ☐ ☐ Very hard

Design (Architectural Diagram)



Design (Use-Case Diagram)



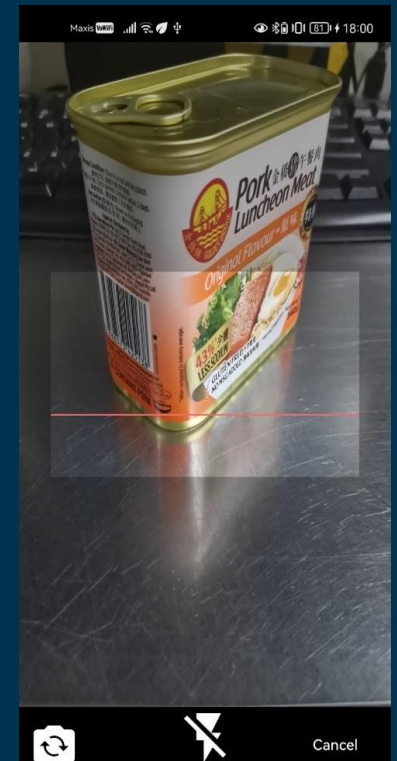
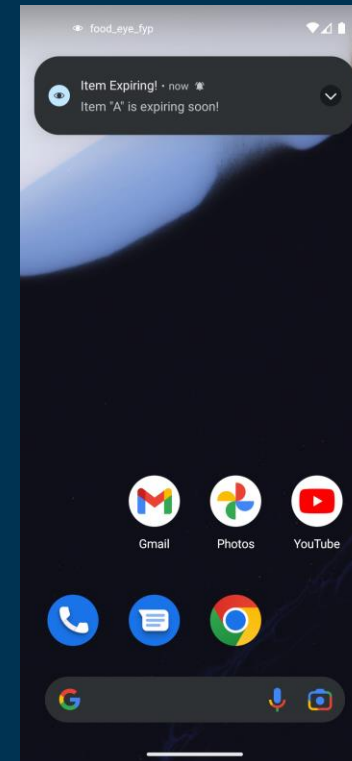
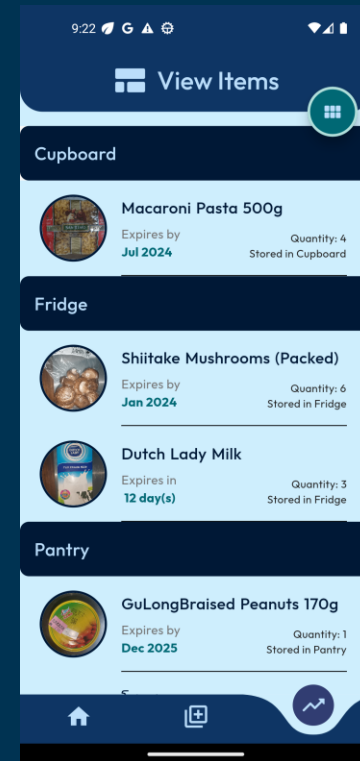
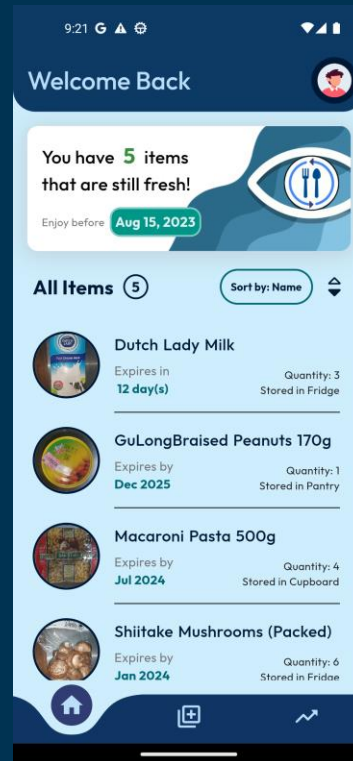
Design (ERD)

- Designed for individual consumers
- Single table efficiently stores food item data
- One table suitable for smaller-scale app

FoodEyeItems Table		
PK	ItemID	int
	ItemName	nvarchar(256)
	ItemType	nvarchar(20)
	Quantity	int
	DatePurchased	datetime2(7)
	DateExpiresOn	datetime2(7)
	ImagePath	nvarchar(256)
	StoredAt	nvarchar(10)
	Description	nvarchar(256)

Implementation

- Target users are not experts
- Focus on user-friendly interface
- Minimalistic approach, consistent colour theming
- Error validation for all inputs
- All core features implemented



Testing (Unit Testing)

- Identified and debugged UI elements and end-to-end flow
- Resolved pixel overflow errors and missing error messages
- Early detection of errors to prevent future disruptions

10.1.5. Home Page					
ID	Description	Test Condition	Expected Output	Actual Output	Pass /Fail
1.1	Open settings tab	Tapping on the avatar icon in app bar	The user should open up a side bar Settings Tab in the right of the screen.	As <u>expected.</u>	Pass
1.2	Successfully display fresh item count and best enjoyed date in card	User redirected to Home Page	The title card will display the total items still fresh, and the soonest it should be enjoyed on.	As <u>expected.</u>	Pass
1.3	Successfully display total item count (regardless of item expired or not) in section header	User redirected to Home Page	Section header will display the total items.	As <u>expected.</u>	Pass
1.4	Successfully display all items in stored in database.	Retrieve items from database	All items are displayed in the list view.	As <u>expected.</u>	Pass
1.5	Successfully account for empty list of items (no items stored in database)	All items (if previously added) removed	An appropriate image is displayed, followed by message "Your list is currently empty" and text button "Add items here".	As <u>expected.</u>	Pass
1.6	Successful redirection to add items page.	Tapping on the "Add items here" text button.	User should be redirected to the add items page.	As <u>expected.</u>	Pass

10.1.15. Push Notifications					
ID	Description	Test Condition	Expected Output	Actual Output	Pass /Fail
1.1	Successfully display Push Notification for single item expiring	Notification Settings (days before to notify): 5 Single item expiration date: set to expire within 5 days (current date + 5 days)	Notification will be displayed regardless if app is in foreground or in background with message "(Item Name) is expiring soon!"	As <u>expected.</u>	Pass
1.2	Successfully display Push Notification for multiple items expiring	Scenario 1: Notification Settings (days before to notify): 5 Item expiration date: set 2 items to expire within 5 days (current date + 5 days) Scenario 2: Notification Settings (days before to notify): 5 Item expiration date: set 3 items to expire within 5 days (current date + 5 days)	Scenario 1: Notification will be displayed regardless if app is in foreground or in background with message "You have 2 items expiring soon!" Scenario 2: Notification will be displayed regardless if app is in foreground or in background with message "You have 3 items expiring soon!"	As <u>expected.</u>	Pass
1.3	User successfully changes	Scenario 1: Notification Settings (days before to notify): 5	Scenario 1: User notification settings changes are reflected	As <u>expected.</u>	Pass

Testing (UAT)

	Rating (out of 5)				
	Tester 1	Tester 2	Tester 3	Tester 4	Tester 5
Criteria 1	4	4	4	5	4
Criteria 2	4	5	4	5	4
Criteria 3	5	5	4	5	5
Criteria 4	4	4	3	5	4
Criteria 5	4	3	4	4	3
Criteria 6	4	5	4	5	5
Average Rating	4.2	4.3	3.8	4.8	4.2
Combined Rating	4.3				

- Distributed to 5 Testers with varying demographics
- Functionality improvements suggested
- Some issues with older Android devices
- Login necessity questioned by testers
- Overall rating of 4.3/5

10.2.5. Tester 5						
Name		Chen Yoon Sean				
Occupation		Software Engineer				
Date		23 July 2023				
No.	Criteria	Rating (1 - 5)				
		1	2	3	4	5
1	<u>User Interface</u> <ul style="list-style-type: none"> Well-organized display of food items and expiry dates Easy-to-read content Overall user experience and satisfaction 				✓	
2	<u>Navigation and Accessibility</u> <ul style="list-style-type: none"> Clear and straightforward navigation options Smooth and logical flow of app navigation All features and subcategories easily accessible 				✓	
3	<u>Design and Visuals</u> <ul style="list-style-type: none"> Attractive and visually appealing design High-quality resolution of visuals and image objects Consistent layout, buttons, and color scheme 					✓
4	<u>Functionality and Reliability</u> <ul style="list-style-type: none"> Accuracy and completeness of food expiry tracking features Bug-free operation and smooth performance 				✓	

	<ul style="list-style-type: none"> Clear error messages for any issues or invalid input 					
5	<u>Performance and Efficiency</u> <ul style="list-style-type: none"> Fast processing speed for adding and updating food items Quick loading time of app screens and content Ensuring stability and preventing crashes or freezing 			✓		
6	<u>Sustainability and Environmental Impact</u> <ul style="list-style-type: none"> Promote responsible food consumption and waste reduction Encourage users to manage food inventory effectively 					✓
Feedback and Suggestions		Possibly due to local API endpoint connection issues and older android phone, the application was prone to connection time outs when retrieving items from database. Perhaps the minimum SDK version has to be revised to better accommodate older devices. Otherwise, the application has good potential, personally I would not mind using it.				

Problems and Limitations

- Technical challenges and design limitations due to inexperience
- Image-to-text recognition requires cropping image as intermediary
- Barcode Lookup API availability
- Bugs appearing in lower-end hardware
- Simple external database
- Lack of robust authentication

Future Enhancements

- Improve image-to-text recognition model
- Optimize for lower-end hardware
- Reconsider login process and database implementation
- Deploy as live project (dedicated hosting)
- Additional analytical features or shopping list generation

Conclusion

- Learned a lot about Flutter and ASP .NET Core
- Gained knowledge on barcode scanning and image recognition capabilities and limitations
- Improved time management for project execution
- Developed decision-making skills for technical components

Q & A