

# **Design Project Report**

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**FoodGenie**

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# Introduction

Our team has come up with an idea to design a recipe-finding app(Food Genie) that will provide a personalized experience for users based on their dietary restrictions, preferences, and ingredient availability. By analyzing users' profiles, artificial intelligence suggests recipes that fit the user's requirements and provides nutritional information, cooking tips, and reviews from other users. The app's primary goal is to assist users in finding recipes that cater to their specific dietary needs and preferences.

The app allows direct user interaction and artificial intelligence to enhance the user experience. Users can input their dietary restrictions, preferences, budget, and ingredient availability into the app, which analyzes this input to provide tailored recipe suggestions that fit their needs. This level of customization ensures that users can find recipes that accommodate their dietary restrictions, fit their dietary preferences, align with their budget, and utilize the ingredients they have readily available.

The app also includes a community section that fosters user interaction. In this section, users can share their favorite recipes, cooking tips, and reviews of recipes they have tried. This creates a platform for users to engage with one another, exchange culinary knowledge, and discover new recipes.

By combining personalized recipe suggestions, direct user interaction with the AI system, and a community-oriented platform, the app aims to provide users with a holistic and engaging experience. It helps users find recipes that meet their dietary needs and preferences while simplifying the tracking process of their daily nutritional intake. This approach promotes healthy eating habits, facilitates culinary exploration, and creates a sense of connection among users who are passionate about cooking and discovering new recipes.

The inspiration behind our app proposal is MyFitnessPal and HealthifyMe.

MyFitnessPal: A free app that allows users to track their daily food intake and exercise. It has a database of over 11 million foods, which makes it easy for users to log what they eat. The app also calculates calories, macronutrients, and micronutrients based on the food log and allows users to set and track their fitness goals. MyFitnessPal uses an AI algorithm to provide personalized recommendations and guidance to users based on their food logs and goals. HealthifyMe: Another popular health and fitness app allowing users to track their food, exercise, and water intake. It provides personalized diet and fitness plans based on the user's health profile, goals, and preferences. The app also has a "Ask a Coach" feature, where users can get advice from certified nutritionists and trainers.

HealthifyMe also uses AI algorithms to analyze the user's food logs and provide personalized recommendations. These two health and fitness apps could have inspired the

proposed app that helps users find recipes based on their dietary restrictions, preferences, budget, and ingredient availability. The proposed app focuses on personalized nutrition by helping users find recipes that align with their unique dietary needs and preferences.

## References

<https://www.myfitnesspal.com>  
<https://www.healthifyme.com>

# Needfinding

## Users

The Food Genie recipe-finding app caters to a diverse range of users, including those with dietary restrictions, health-conscious individuals, home cooks and aspiring chefs, busy professionals and families, budget-conscious individuals, food explorers and recipe enthusiasts, fitness enthusiasts, and social foodies. The app offers a holistic cooking experience for users with varying needs, preferences, and culinary goals by providing personalized recipe recommendations, nutritional information, and a community platform.

## Initial Design Goals

The recipe-finding app aims to provide a satisfying and personalized user experience by accurately catering to each user's dietary restrictions, preferences, budget, and ingredient availability. It offers relevant recipe suggestions that align with users' needs and provides comprehensive nutritional information. The app promotes engagement and retention through features like social interaction and recipe sharing.

To measure the app's success, metrics such as the number of active users and user feedback play a crucial role. Tracking the daily active user count provides insights into the app's popularity and level of engagement. User feedback, collected through surveys and reviews, helps evaluate the overall user experience, identifies areas for improvement, and ensures that the app continues to meet users' expectations.

## Artifacts of Interaction

Artifacts of interaction encompass the tangible components within a digital system that empower users to engage, interact, and navigate through the application. Within our recipe-finding app, these artifacts include essential features such as search bars, recipe cards, ingredient lists, nutritional information filters, user profiles, favorites, meal planners, and feedback mechanisms. Together, these elements lay the foundation for an enhanced user experience, enabling personalized recipe searches, streamlined meal planning, and fostering community engagement.

- Search Bar: The search bar allows users to interact by entering ingredients, recipes, and even calorie counts to find specific recipes. It enables users to initiate searches based on their preferences and dietary needs.
- Recipe Cards: Interacting with recipe cards allows users to view detailed information about a particular recipe, including ingredients, cooking instructions, and nutritional information. Users can also save, rate, share, and recommend recipes to other users, promoting engagement and knowledge sharing.
- Ingredient List: Users can obtain a weekly ingredient list, simplifying their meal planning and grocery shopping. This artifact helps users organize their recipes and streamline the cooking process.
- Nutritional Information: The app provides nutritional information for each recipe, including calories, macronutrient breakdown (protein, carbohydrates, fats), vitamins, and minerals. This information helps users make informed decisions about their meal choices and supports their dietary goals.
- Filters: Users can interact with filters to refine their search results based on various criteria, such as dietary restrictions, cooking time, and cuisine type. Filters enhance users' ability to find recipes that align with their needs and preferences.
- User Profile: The user profile allows users to interact with their personal information, view their saved recipes, and access their recipe ratings. This artifact provides a personalized experience for users and enables them to manage their recipe preferences and history.
- Favorites: The favorites feature allows users to save their favorite recipes for easy access later. This artifact enhances user convenience and provides a quick way to revisit preferred recipes.
- Meal Planner: Interacting with the meal planner feature allows users to plan their meals for a specific period, such as a week or month. Users can select recipes, create a schedule, and organize their cooking plans. This artifact supports users in meal planning and organization.
- Feedback: The feedback feature enables users to provide feedback on recipes, report issues, or suggest improvements for the app. This artifact promotes user engagement, helps improve the app's functionality, and fosters a sense of community involvement.

## Focus Group Report

### Focus Group Plan:

#### *Defining target participants -*

The target participants for the focus group of our Food Genie recipe-finding app would ideally include individuals who align with the potential user groups previously mentioned. As it may not be possible to find participants representing every user group, we decided to gather feedback from individuals who closely approximate the intended user demographic. Here are some relevant characteristics to consider when selecting participants for the focus group:

- Individuals with specific dietary restrictions: Participants follow specific diets like gluten-free, vegan, vegetarian, lactose intolerant, or have other dietary restrictions relevant to the app's focus.
- Health-conscious individuals: Participants who prioritize their health and nutrition, such as fitness enthusiasts, individuals aiming for weight management, or those with specific health goals.
- Busy professionals and families: Participants who have busy lifestyles and require quick and easy meal options that fit their schedules, including working professionals or parents managing family meals.
- Budget-conscious individuals: Participants who are mindful of their budget and seek cost-effective recipes and cooking strategies to maximize their available resources.

In addition to these characteristics, it would also be beneficial to consider a diverse range of occupations, age groups, and potential users with disabilities to ensure the app's inclusivity and accessibility. Gathering insights from participants with varying backgrounds and perspectives will provide valuable feedback for refining the app's features, usability, and overall user experience.

#### *Recruitment Plan -*

We will implement a comprehensive recruitment strategy to recruit participants for our focus groups considering specific factors relevant to our app's target demographic. Here's our plan to form at least two focus groups, with four people in each:

- Identify potential participants: We will first identify individuals who align with our target user groups based on dietary restrictions, health consciousness, cooking interest, busy professionals or families, budget consciousness, food exploration, and social engagement. This may include friends, family, colleagues, and acquaintances.
- Leveraging Personal Networks and Online Outreach: We will use personal network outreach and online recruitment to find participants for the focus groups. We will leverage personal networks to approach potential participants who meet relevant characteristics and post recruitment messages on social media platforms like Facebook and Instagram to expand the participant pool. We will target specific interest groups related to food, nutrition, cooking, and health. We will encourage interested individuals to reach out directly or complete a survey to assess their suitability for the focus groups. We will explain the purpose of the focus groups to emphasize the opportunity for participants to provide valuable feedback and shape the Food Genie app.
- Consider diversity and inclusion: In our recruitment process, we will aim to ensure diversity and inclusion by considering factors such as occupation, age, and potential users with disabilities. This will help us gather insights from a broader range of perspectives, enhancing the validity and applicability of the feedback received.
- Token of appreciation: To show our gratitude for their time and input, we will provide a small token of appreciation, such as a gift card, to each participant who actively participates in the focus group discussions.

*Introductory script -*

To begin the focus group, we will introduce ourselves and our project. We'll greet our participants and express our gratitude for their time, saying, "Hello and welcome! Thank you for joining us today. Our team is developing a recipe-finding app for individuals with dietary restrictions and preferences. We're eager to hear your opinions on our design goals and feedback on the features you'd like to see in such an app. Please feel free to share your honest thoughts with us."

*Questions -*

We used the following questions in the Focus group:

1. What apps do you use to find recipes, and what do you like or dislike about them?
2. How do you typically track your nutritional intake, if at all?
3. Have you ever encountered challenges finding recipes that fit your dietary needs, preferences, and ingredient availability and are within budget? If so, can you describe them?
4. How significant is it for you to use an app that meets your specific dietary requirements and personal preferences and that is within your budget?

5. What are your thoughts on our recipe-finding app idea? Is it something you would use? Why or why not?
6. What are your thoughts on personalized recommendations based on your dietary preferences, cooking skills, and previous recipe choices?
7. How do you organize and save recipes you find on these apps?
8. How much will you pay for a recipe-finding app with additional features and tools that fit your needs?
9. Do you prefer recipes with step-by-step instructions, videos, or both? Why?
10. What more features would you like to see in an app like this? Are there any specific tools or functions that would be especially useful?

*Focus group overview -*

We conducted the focus groups to get feedback and ideas from health-conscious individuals who enjoy cooking and have specific dietary requirements or preferences. The focus group's main goals were to learn about participants' difficulties while looking for recipes that fit their specific dietary needs and to gain feedback on a proposal for a recipe-finding app. We used both personal networks and social media platforms to find participants.

We conducted the focus group using two groups, each consisting of four people. We introduced ourselves and thanked the participants for their time at the start of the session, encouraging them to provide direct feedback on the proposed app idea. The focus group questions focused on participants' existing recipe-finding apps, tracking their food intake, challenges faced while looking for recipes that met certain dietary requirements, the importance of an app that met these needs, and feedback on the suggested app idea.

*Focus group participants -*

We followed appropriate procedures when deciding on the focus group's goals, recruiting participants through various sources and conducting two focus groups with four participants each. We held the focus group meetings using Zoom and set up cameras to record the participant's facial expressions and emotions. To ensure a variety of opinions, we included people from various ages, geographic locations, professions, and social backgrounds. Our team members, Suchitha and Tejesh(facilitators), led each session independently for 45–60 minutes with Spandana and Preethi(note takers) assistance. For the focus group report, note-takers documented the participants' responses and key points throughout the session.

Eight volunteers were in total, ranging in age from 22 to 29. They comprised professionals from various fields, such as project engineering, software engineering, and healthcare. The other six participants comprised students with various interests, including singing, dancing, cooking, and outdoor activities. It's interesting how many individuals enjoyed the same activities, including traveling and working out. One individual also enjoyed reading,

another enjoyed playing an instrument, and one was passionate about dancing.

\*Please review Appendix, Table 4 for Participant's details for more information.

### *Results -*

When asked about their favorite app for finding recipes, most users mentioned YouTube, Instagram, Cookd, and Hebbars Kitchen because of their convenience and variety. Some users, however, dislike advertisements and the need for ingredient lists or instructions. In addition, several users require assistance finding recipes due to ingredient-limited availability or cost limitations.

Some people use applications like MyFitnessPal to track their food intake, while others struggle. Users face many challenges when searching for recipes that meet their dietary restrictions, interests, and budget. These include missing or costly ingredients, time-consuming preparation, and difficulty finding recipes that meet calorie requirements.

On the other hand, users understand the value of having a personalized dietary app that simplifies meal planning and grocery shopping, saves money, reduces food waste, and promotes healthy eating habits. Personalized recipe recommendations based on dietary preferences, cooking skills, and past recipe selections are beneficial features for a recipe-finding app.

Some users prefer free or inexpensive apps with basic capabilities, while others are willing to pay more for certain features. Step-by-step instructions are the recommended format for cooking tutorials. However, some users prefer videos, and others prefer text. Weight gain/reduction suggestions, dietary requirement filters, ingredient substitutions, nutrition facts, cooking timings, personalized dietary recipes, grocery list generation, and designing meals that reflect the user's favorite dishes were just a few new features users recommended for the app.

\*Please review the Appendix, Table 5&6 for Participants Q&A details for more information.

## **Personas**

Three personas are created from the focus group meeting:

### *Persona 1 -*



**Goals:**  
Mr. Avocado is a college student who is facing financial constraints while trying to maintain a healthy and balanced diet and who aspires of getting a decent job. He likes to consume nutritiously to maintain his fitness.

**Motivation:**  
Mr. Avocado is interested in an app that offers personalized recommendations based on his budget and dietary preferences. He also wants the app to provide information on nutrition and ingredient substitutions.

**Demographics:**

Name: Mr. Avocado  
Gender: Male  
Occupation: Student  
Age: 20-25

**Frustrations:**  
As a college student living independently, Mr. Avocado is highly active, attending classes, and working a part-time job, leaving him with little time to devote to thinking about recipes.

Figure 1: The image of persona 1, designed based on the focus group interview results.

### Persona 2 -



**Goals:**  
Miss Ginger is passionate about becoming a successful advocate and is willing to put in the utmost effort to do so.

**Motivation:**  
Miss Ginger aims to maintain a nutritious and well-balanced diet while seeking an application that can suggest ways to lose weight and track her calorie consumption.

**Demographics:**

Name: Miss Ginger  
Gender: Female  
Occupation: Advocate  
Age: 34-37

**Frustrations:**  
Miss Ginger is a busy professional in her mid-30s who works long hours at a law firm. She has a limited amount of time to plan and prepare her food.

Figure 2: The image of persona 2, designed based on the focus group interview results.

### Persona 3 -



**Goals:**  
Mr. Fit is a web developer and an Entrepreneur who works long hours to develop and launch his own web application.

**Motivation:**  
Mr. Fit, a health-conscious individual in his late twenties, is enthusiastic about fitness and strives to maintain a balanced and healthy diet. He aims to gain weight but is mindful of his calorie, protein, sugar, and fat intake.

**Demographics:**

Name: Mr. Fit	
Gender: Male	
Occupation: Web Developer	
Age: 26-29	

**Frustrations:**  
Despite holding a full-time job, Mr. Fit remains fully committed to his entrepreneurial dreams and spends all his available time working on a web application.

Figure 3: The image of persona 3, designed based on the focus group interview results.

The input from the focus group meetings is used to create these three personas. These personas are classic representations of general users of the FoodGenie app that we proposed by analyzing the common themes and preferences the session participants gave.

Persona 1(Mr. Avocado) is a college student concerned about his health and who keeps track of his dietary intake. This persona is based on the participants who reported a desire for a recipe-finding app that provides personalized dish recommendations based on their dietary requirements and an interest in tracking their calorie and nutritional intake.

Persona 2(Miss Ginger) is a busy professional working in a law firm who wishes to make planning meals and grocery shopping easier. This persona is based on the participants who expressed a desire for a recipe-finding app to lose weight and help them quickly plan meals for the week and create a grocery list based on the recipes. They also wanted a recipe-finding app to help them discover simple and easy-to-prepare recipes.

Persona 3 (Mr. Fit) works as a web developer and entrepreneur concerned about his health and keeps account of his dietary intake. This persona is created with the information by the participants who want to gain weight and a recipe-finding app that provides personalized recipe suggestions based on their dietary requirements, preferences, and an interest in monitoring their calorie and nutritional consumption.

# Design Goals

## Initial Design Goals

Our team proposed the FoodGenie app with several initial design goals to provide a satisfying and personalized user experience. One of the primary objectives is to accurately cater to each user's dietary restrictions, preferences, budget, and ingredient availability. By doing so, the app offers relevant recipe suggestions that align with users' needs, ensuring they can easily find recipes that suit their tastes and requirements. The app's ability to provide personalized recommendations helps to enhance user satisfaction and engagement.

Another important design goal of the recipe-finding app is to provide comprehensive nutritional information. This feature is crucial for health-conscious users with specific dietary requirements. The app provides detailed nutritional information, enabling users to make informed decisions about the meals they prepare and consume.

Furthermore, the app offers weekly/monthly grocery lists that align with users' budgets. This feature not only helps users shop and cook within their budget but also helps reduce food wastage. The app's ability to offer grocery lists tailored to each user's budget further enhances its usefulness and appeal.

In addition to offering personalized recipe suggestions and nutritional information, the app aims to promote engagement and retention through social interaction and recipe-sharing features. These features create a sense of community among users, encouraging them to share their experiences and recipes with others. The social interaction and recipe-sharing features enhance engagement and help the app grow and expand its user base. To measure the app's success, tracking metrics such as the number of active users and user feedback through surveys and reviews is crucial. User feedback helps evaluate the overall user experience, identify areas for improvement, and ensure that the app continues to meet users' expectations. The app can continually improve and provide a better user experience by regularly monitoring these metrics.

## Redefined Design Goal w.r.t Focus group results

The FoodGenie app offers users a user-friendly and convenient experience to identify and make meals that meet their dietary preferences, nutritional requirements, and budget. Participants in the focus groups like the idea of an AI-powered recipe-finding app that immediately generates customized dishes based on their dietary and personal preferences. They also prefer an app that makes personalized recommendations based on their nutritional preferences, cooking abilities, and previous recipe selections. Participants are willing to pay for an app that provides additional features and tools that meet their needs, but the cost should be affordable, ideally between \$40 and \$50 per year. The design goals are related to things that people currently do, such as looking up recipes online and tracking their nutritional intake with various apps.

The focus group also highlighted that users prefer video instructions, ingredients, and measurements in text format. They would like the app to make it easier to track other essential micronutrients and to make a recipe that is low in calories yet tastes like the foods they grew up eating. The team has considered these issues and is working on adding functionality such as tracking micronutrients and allowing users to make recipes under a specified calorie range.

The personalized recipe and grocery list generation were the essential items that needed no revision or redefining. Most design goals need not be revised or refined as they cover all of the essential features stated by the focus group participants. The design goals include the major interaction artifacts users require to navigate the app, which mostly aligns with the user's requirements and expectations. The focus group results helped the team improve the app's operation and features to meet users' requirements and needs. The team added a few more questions, such as the pricing option and recipe organizing, led to good results and participation.

We have considered redesigning/refining the design goals below based on participant/user responses.

*Improving the app's recipe presentation format:* According to feedback, users prefer instructional videos or step-by-step instructions to follow recipes accurately. We should enhance the recipe presentation structure in the app to include video instructions and clear, concise step-by-step instructions.

*Improving the app's recipe organization and saving abilities:* The app should enhance its recipe organization and storage features to allow users to organize and save their recipes via cuisine, dietary restrictions, taste, nutrition, etc... Users currently organize and save recipes in various ways. In response to the users, we will refine the app's features.

*Nutritional information and calorie tracking:* The app's nutritional information and calorie tracking features must include micronutrient tracking so users can more appropriately manage their nutritional intake.

*Evaluating the user's budget when deciding to price:* Users have various ideas about how much they will pay for a recipe-finding app. Adjusting the app's pricing model to account for different user budgets and balance the features offered with the pricing to provide value.

*Including new features:* We will refine the app's features in response to the users. The app should include weight loss suggestions, zero advertisements, dietary requirement filters, ingredient substitutions, nutrition information, cooking timers, creating recipes similar to the user's favorite foods, weight tracking, and region-specific recipes. The ingredient availability should also be taken into consideration by the app.

Along with the above design goals, we have decided to consider other user-centric goals for our app, such as -

- Designing the app based on further user research, testing, and feedback to ensure it aligns with the user's needs and preferences.
- Creating a minimalistic design that focuses on usability and simplicity. Ensure the app's interface is straightforward to navigate and doesn't distract users from the app's main

goal. Use consistent typography, layout, and color schemes to create a cohesive user experience.

- To ensure accessibility to users with disabilities, the app's functionality and interface will be designed with various disabilities in mind, such as visual, auditory, and motor disabilities. This can include adding alternative text for images, using appropriate color contrast, and implementing keyboard shortcuts while following the Web Content Accessibility Guidelines (WCAG).
- Prioritizing user security by providing secure login and payment options. Using encryption methods to protect users' personal and financial information and notify users of any potential security risks.
- Providing efficient and responsive customer support to assist users with any issues they may face while using the app. Include a chatbot, email support, or a phone line for users to contact if they encounter any problems. Also, provide detailed FAQs and troubleshooting guides to help users solve problems independently.

## Storyboards

Storyboards are an essential tool for illustrating our design goals and showcasing the user experience of our application. By using a persona we created earlier, we visually demonstrated how users will interact with our app. This helps to understand the necessary design elements. Throughout the process, we prioritize the overall user experience rather than focusing solely on specific functions within the app. We used StoryBoardthat tool to create the storyboard.

*Scene:* Miss Ginger, a busy professional, takes a break from work to use the FoodGenie app. She wants to plan her weekly meals, so she selects her food preferences and dietary restrictions. The app suggests many recipes that match her choices, and she notices a filter for quick recipes. She picks a Gluten-Free Chicken and Vegetable Stir Fry recipe but realizes she doesn't have soy sauce and sesame oil. Thankfully, the app suggests using coconut aminos and olive oil instead. The recipe is updated, and Miss Ginger is happy with the changes. She also finds a calorie info feature that shows the nutritional details of the dish. Miss Ginger adds the missing ingredients to her grocery list within the app. She thinks the app would be useful for her friend who wants to gain weight and track progress, so she plans to recommend it to them.

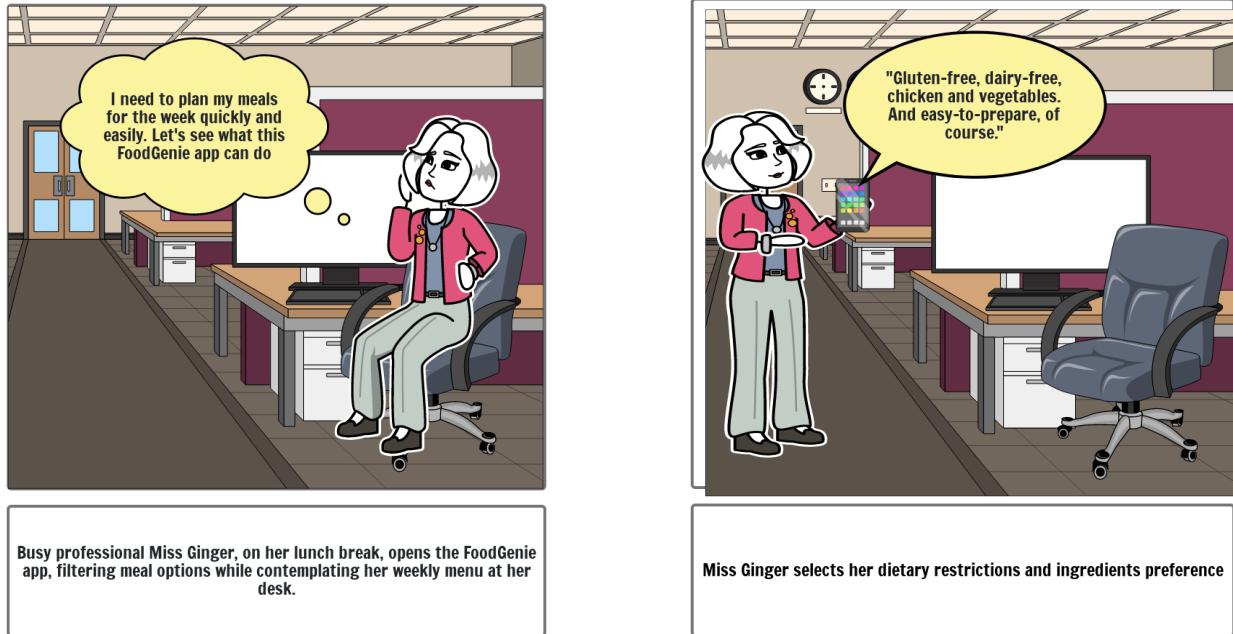


Figure 4: Story board images 1.

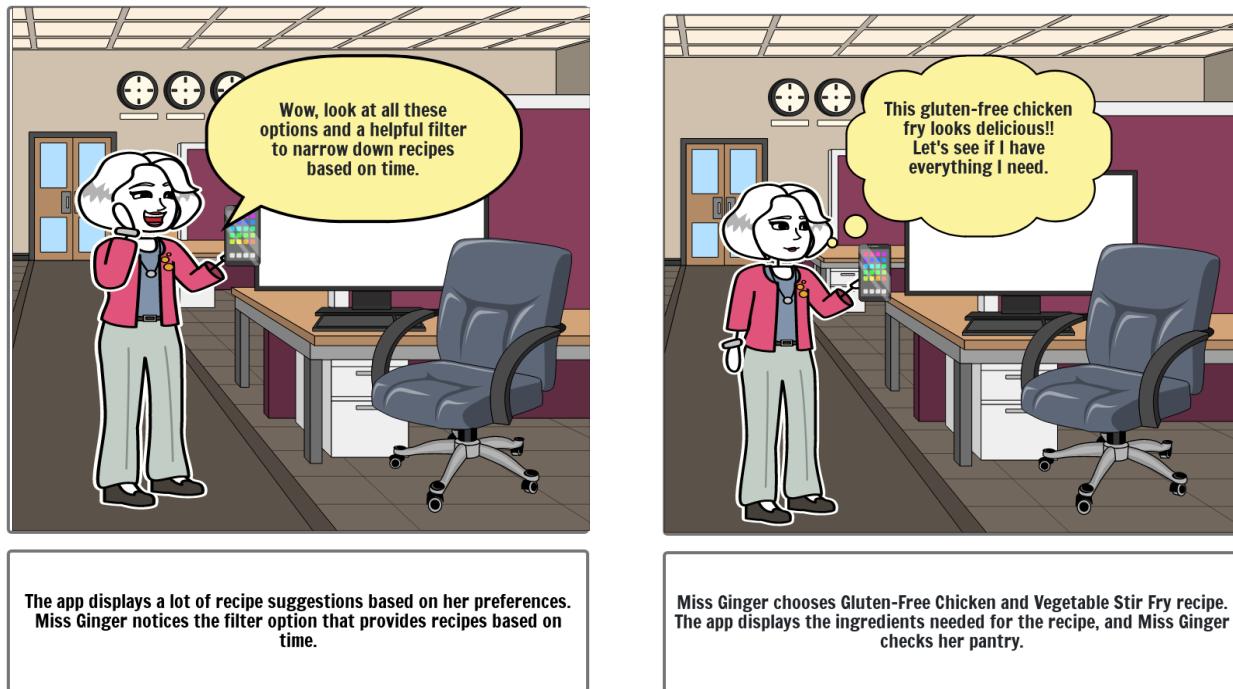


Figure 5: Story board images 2.

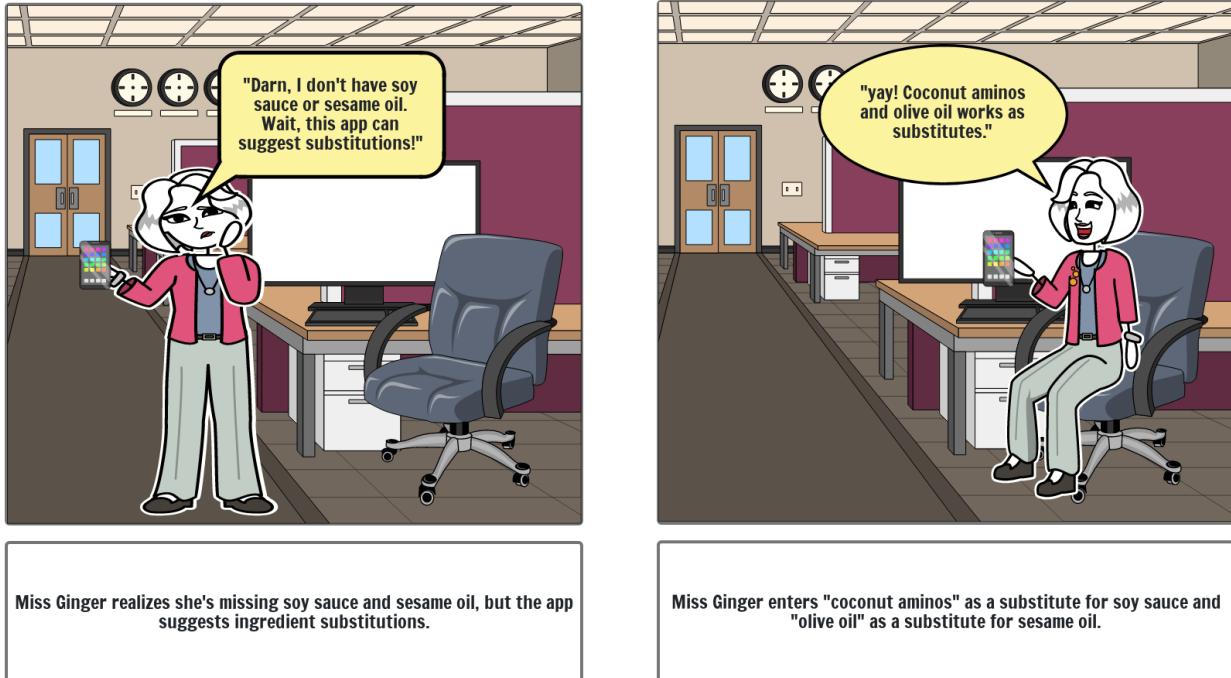


Figure 6: Story board images 3.

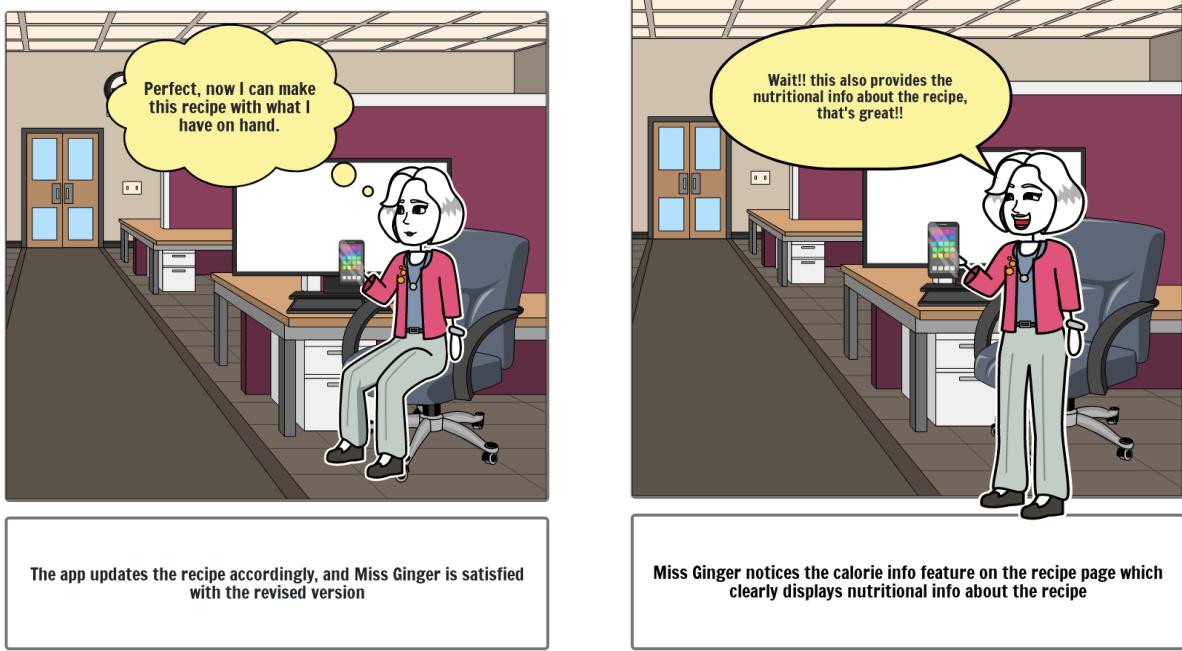


Figure 7: Story board images 4.

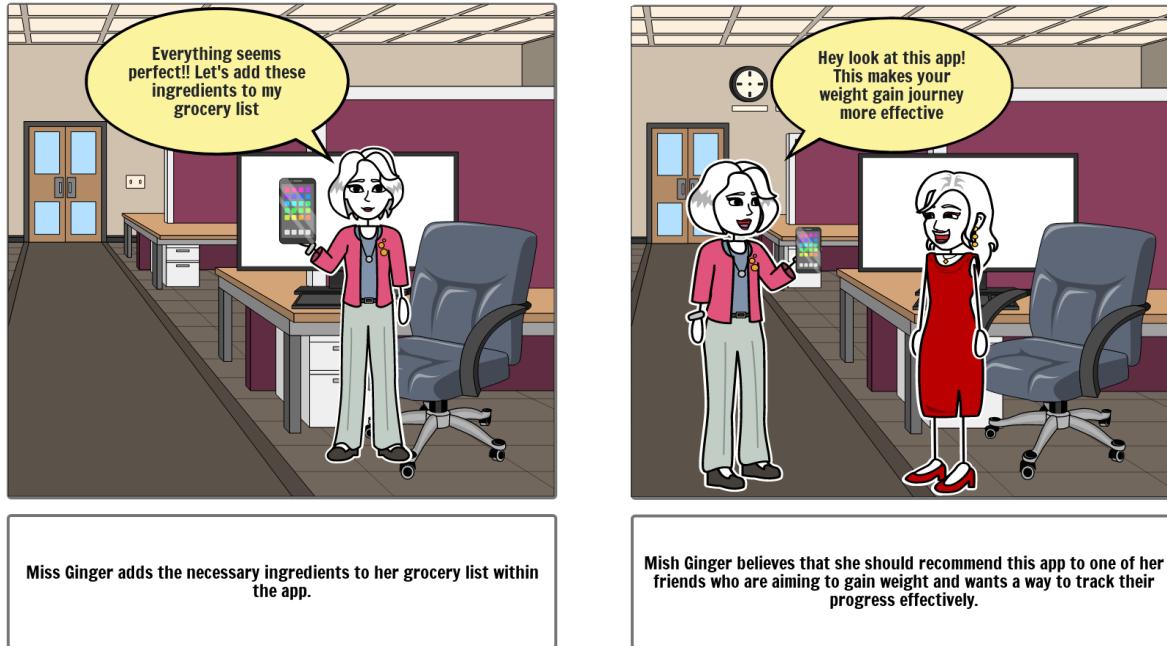


Figure 8: Story board images 5.

## User Journeys

### 1. Title: Effortless Meal Planning and Flexible Ingredient Substitution with FoodGenie

*Persona:* Persona (Miss Ginger) is a busy professional working who wishes to make planning meals and grocery shopping easier. This persona is based on the participants who expressed a desire for a recipe-finding app to lose weight and help them quickly plan meals for the week and create a grocery list based on the recipes. They also wanted a recipe-finding app to help them discover simple and easy-to-prepare recipes.

*Steps:*

#### *Discovery and Goal Setting*

Step 1: Miss Ginger, a busy professional, opens the FoodGenie app on her phone during her lunch break, hoping to plan her meals for the week quickly and easily.

#### *Exploration and Decision-Making*

Step 2: She navigates to the filtering function and selects her dietary restrictions, including a gluten-free and dairy-free diet, as well as her ingredient preferences, including chicken and vegetables.

Step 3: The app displays a list of recipe suggestions that meet her requirements, and Miss Ginger notices the recipe for "Gluten-free Chicken and Vegetable Stir-Fry."

### *Obstacle and Problem-Solving*

Step 4: The app displays the ingredients needed for the recipe, and Miss Ginger checks her pantry but realizes she's missing a few key ingredients.

Step 5: The app suggests ingredient substitutions based on what she has on hand, and Miss Ginger enters "coconut aminos" as a substitute for soy sauce and "olive oil" as a substitute for sesame oil.

### *Action and Implementation*

Step 6: The app updates the recipe accordingly, and Miss Ginger is satisfied with the revised version.

Step 7: She adds the necessary ingredients to her grocery list within the app and feels empowered by how easy and convenient the app makes meal planning and grocery shopping.

### *Sharing and Social Validation*

Step 8: Miss Ginger shares her positive experience with the FoodGenie app with her friends and colleagues, emphasizing how the app helped her save time and reduce stress in meal planning.

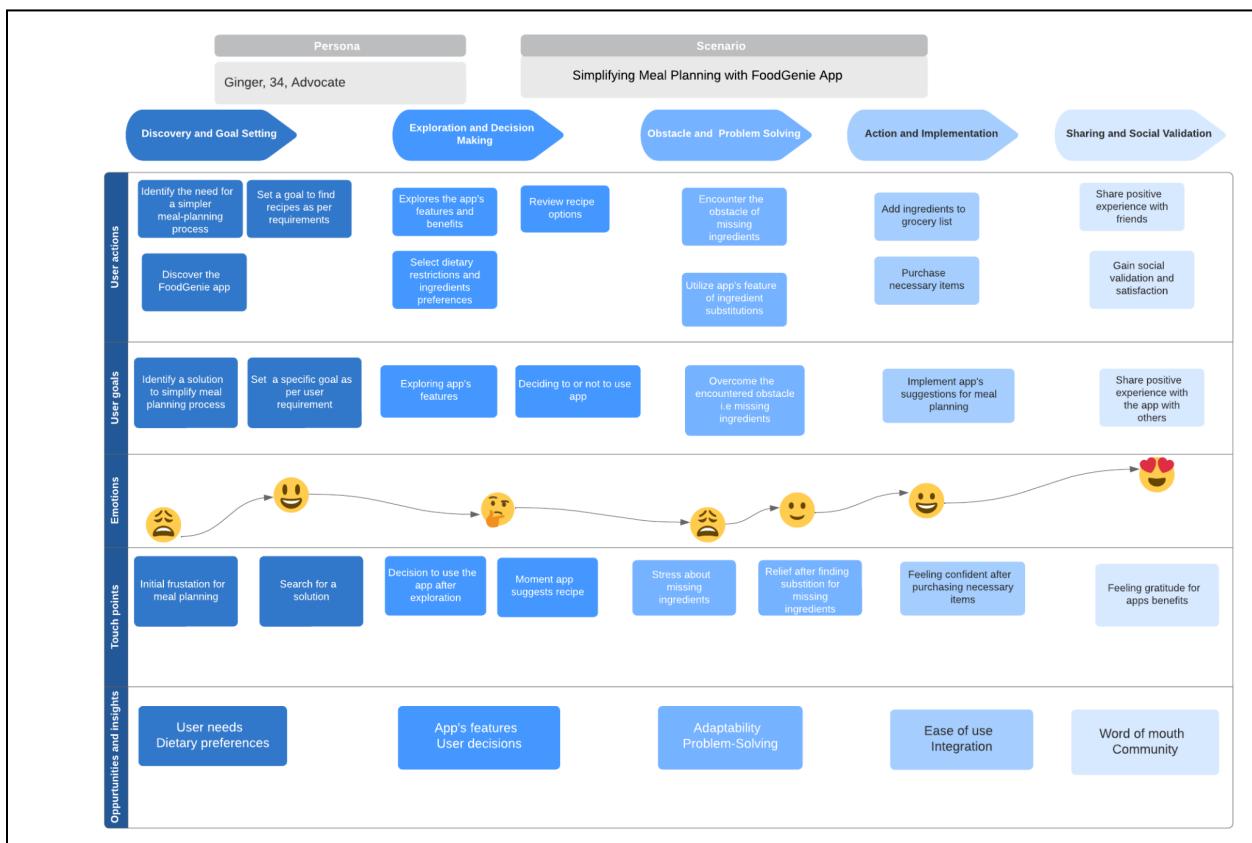


Figure 9: User journey 1 by Spandana.

## 2. Title: A Speedy and Nutritious Meal Recipe

*Persona:* My user journey is based on Mr. Avocado, a full-time graduate student. He is always busy juggling between assignments and a part-time job. He is a highly motivated person who likes to be fit and healthy. He likes to cook but finds it difficult to find easy recipes and purchase groceries within his budget. He is a person who would benefit from using the FoodGenie app.

*Steps:*

### *Identifying an Issue*

Step 1: Mr. Avocado is a full-time graduate student with a part-time job who has a busy schedule and little time to cook. He wants to cook something quick and yet nutritious. He has no clue about such recipes and doesn't want to spend much time searching.

### *Exploring Solution*

Step 2: He wants to eat healthily but needs help finding nutritious recipes for his dietary preferences. He needs to find a solution to the issue.

### *Making a Decision*

Step 3: He has been searching for a solution to simplify his meal planning and save time while maintaining a healthy diet. He has come across the FoodGenie app.

### *Get, Set, Go / Implementation*

Step 4: Mr. Avocado has decided to try the FoodGenie app after hearing about its personalized recipe recommendations and grocery list feature.

### *Reviewing and Reflecting*

Step 5: After using the FoodGenie app for some time, Mr. Avocado reflects on his experience and considers whether the app has helped him achieve his goals.

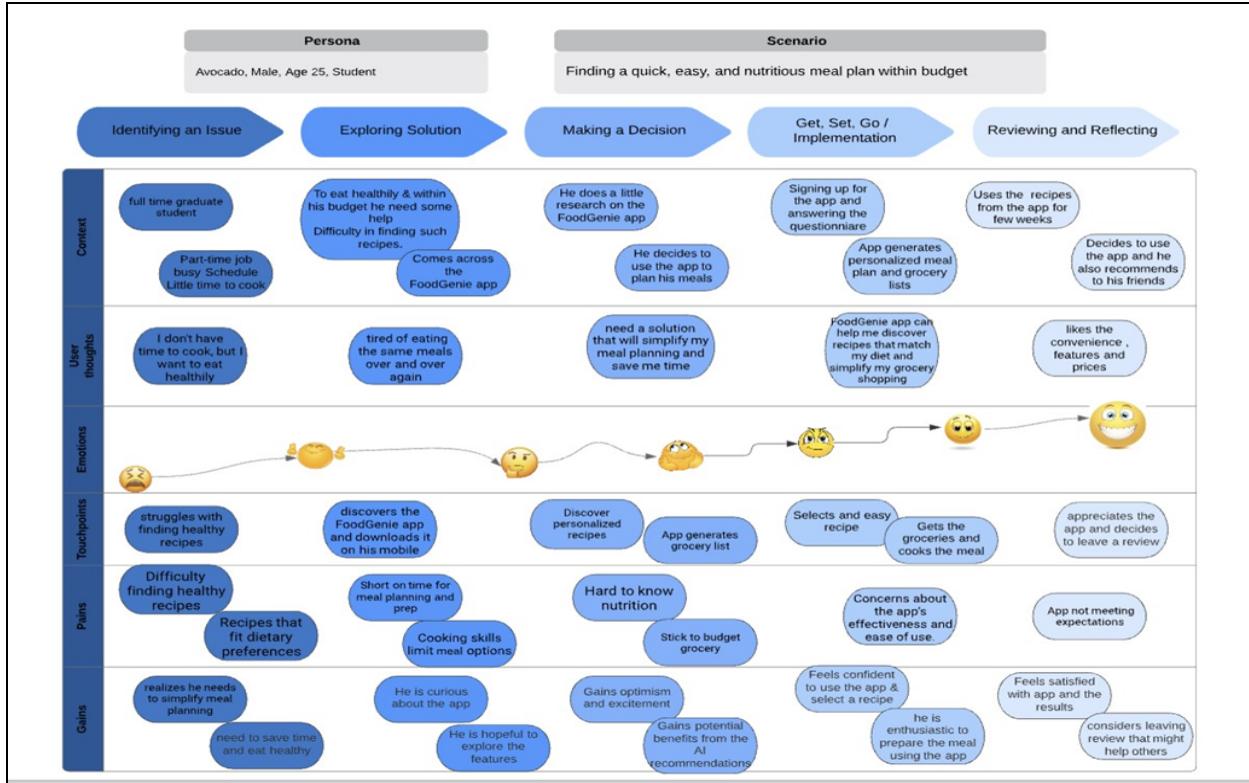


Figure 10: User journey 2 by Suchitha.

### 3. Title: The Food Genie App's Time-Saving Features for Grocery Shopping and Meal Planning

**Persona:** Miss Ginger is a busy professional working in a law firm who wishes to make planning meals and grocery shopping easier. This persona is based on the participants who expressed a desire for a recipe-finding app to lose weight and help them quickly plan meals for the week and create a grocery list based on the recipes. They also wanted a recipe-finding app to help them discover simple and easy-to-prepare recipes.

Steps:

#### *Consideration*

Step 1: Miss Ginger had no time to think about recipes and prepare her food. She was looking for an app to suggest recipes based on her preferences.

#### *Adding preferences*

Step 2: Adding her preferences and requirements such as weight loss diet, calorie count, and budget, makes it easier in generating the recipes based on her preferences.

#### *Generating grocery list*

Step 3: Generating the groceries list based on the choice such as weekly or monthly according to the preferences she added.

### *Generating recipes*

Step 4: Generating a list of recipes after adding all the preferences and the recipes list also have calorie count mentioned for every recipe.

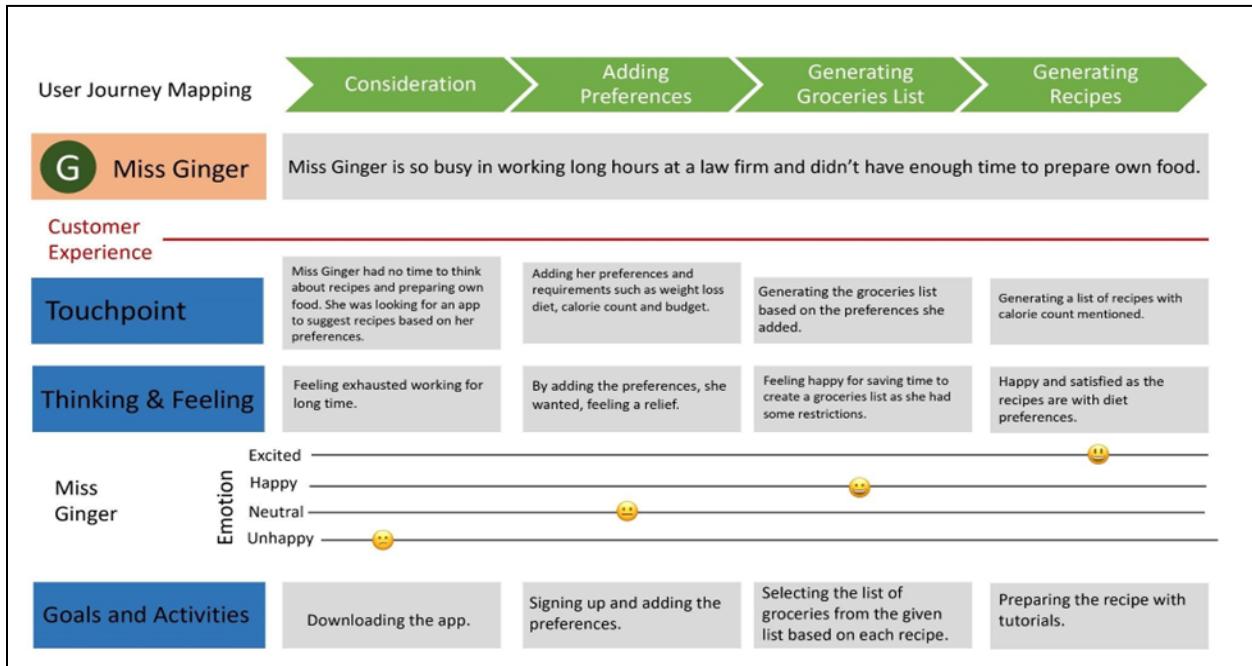


Figure 11: User journey 3 by Tejesh.

#### 4. Title: Healthier Eating - Using FoodGenie's Calorie-Counting

**Persona:** As a web developer and entrepreneur, Mr. Fit is constantly on the go and often finds himself sitting in front of a computer screen for extended periods of time. He is concerned about his health and fitness; he makes it a priority to maintain a balanced diet with a count of calories and nutritional intake regularly on a daily basis. This persona is based on the participant who wants to weight gain in a healthy and nutritional way with a calorie count.

*Steps:*

#### *Discovery & Sign-Up*

Step 1: Mr. Fit researches different health and fitness apps, evaluates their features, and signs up for the FoodGenie app by providing the basic information such as name, email address, and password.

#### *Personalization & Recipe Discovery*

Step 2: Mr. Fit enters his health and fitness goals, sets up his profile, and discovers recipes that fit his dietary preferences, nutritional goals, and cooking skills. The app displays the nutritional information for each recipe, such as calorie count and macronutrient/micronutrient breakdown.

### *Tracking & Progress*

Step 3: Mr. Fit logs meals and snacks including the type of food and the portion size with the nutritional information for each item, as well as the daily calorie count and macronutrient/micronutrient breakdown. The progress tracking page allows Mr. Fit to monitor his progress toward the fitness goals, including weight gain and also displays charts or graphs to show Mr. Fit's progress over time.

### *Motivation & Referrals phase*

Step 4: Mr. Fit stays motivated and shares his success by receiving feedback and encouragement from the app, sharing his progress on social media, and recommending the app to others. The referral program in the FoodGenie app encourages Mr. Fit to invite his friends and colleagues to use the app by offering rewards or discounts.

		<p>As a web developer and entrepreneur, Mr. Fit is constantly on-the-go and often finds himself sitting in front of a computer screen for extended periods of time. He is concerned about his health and fitness; he makes it a priority to maintain a balanced diet with the count of calories and nutritional intake regularly on daily basis.</p>		
Stages	Progression			
Discovery & Sign-Up	Personalization	Recipe Discovery	Tracking & Progress	Motivation & Referrals
Touchpoints	Researching & evaluating the health fitness app and signing up.	Entering health and fitness goals, setting up his profile, discovering recipes that fit his dietary preferences & goals	Logging meals and snacks, tracking his exercise and activity levels	Receiving feedback and encouragement from the app, sharing his progress on social media, recommending the app to others
Thinking & feeling	Mr. Fit is concerned about his health and fitness	Mr. Fit is motivated to achieve his fitness goals	Mr. Fit is focused on monitoring his progress	Mr. Fit wants to stay motivated and share his success
Emotions				
Goals	Find a health and fitness app that can help him track his progress	Create a personalized profile and discover healthy recipes that fit his nutritional needs	Track his calorie intake, nutritional information, and exercise routine	Stay motivated and recommend the app to friends and colleagues

Figure 12: User journey 4 by Preethi.

## Prototype

A prototype is a preliminary model or version of a product that designers create to test and refine their design ideas. It simulates how the final product will function and allows designers to identify potential problems early in the design process.

## Low-fidelity prototype

Low-fidelity prototyping is a method that quickly and inexpensively creates tangible and testable models, with a focus on testing functionality rather than visual aesthetics. We have created a low-fidelity prototype using the PowerPoint tool which allows users to use some of the key features of our Food Genie app.

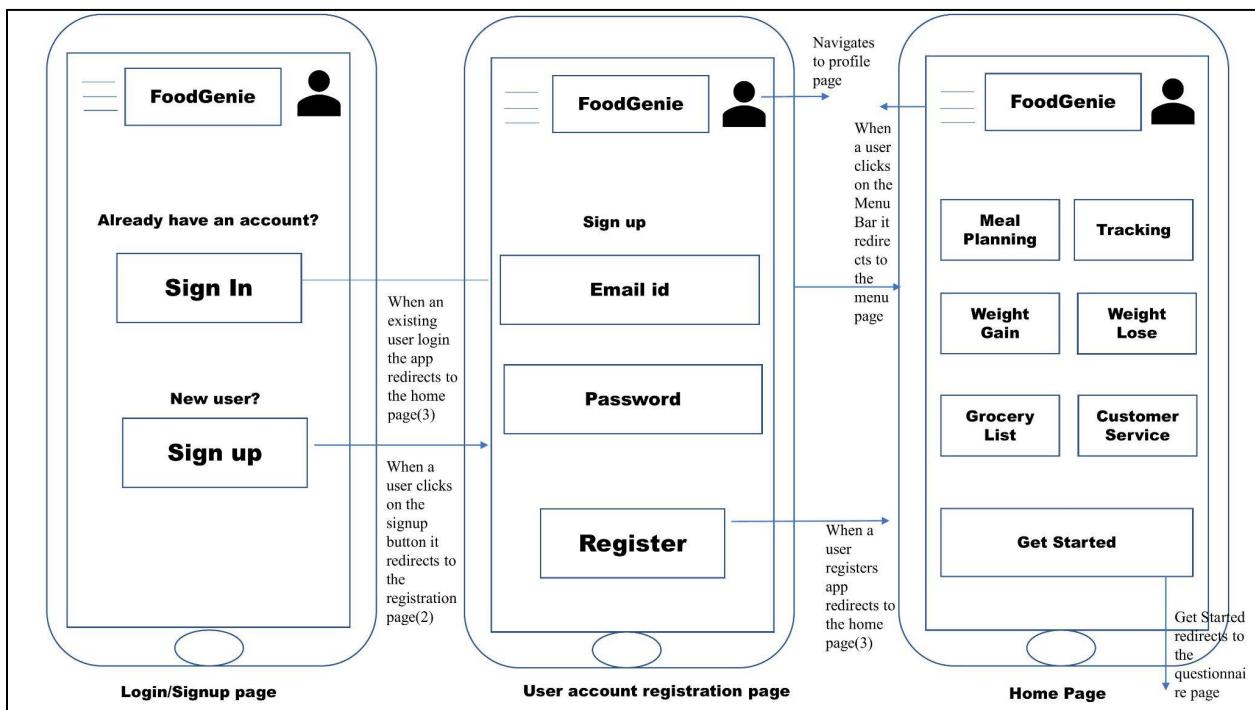


Figure 13: Low fidelity prototype flow image 1.

When they log in/register to the FoodGenie app they will be redirected to our Home Page as shown in the above figure. From the home page start their meal planning through the get started button which is redirected to the Quotonnarie Pages.

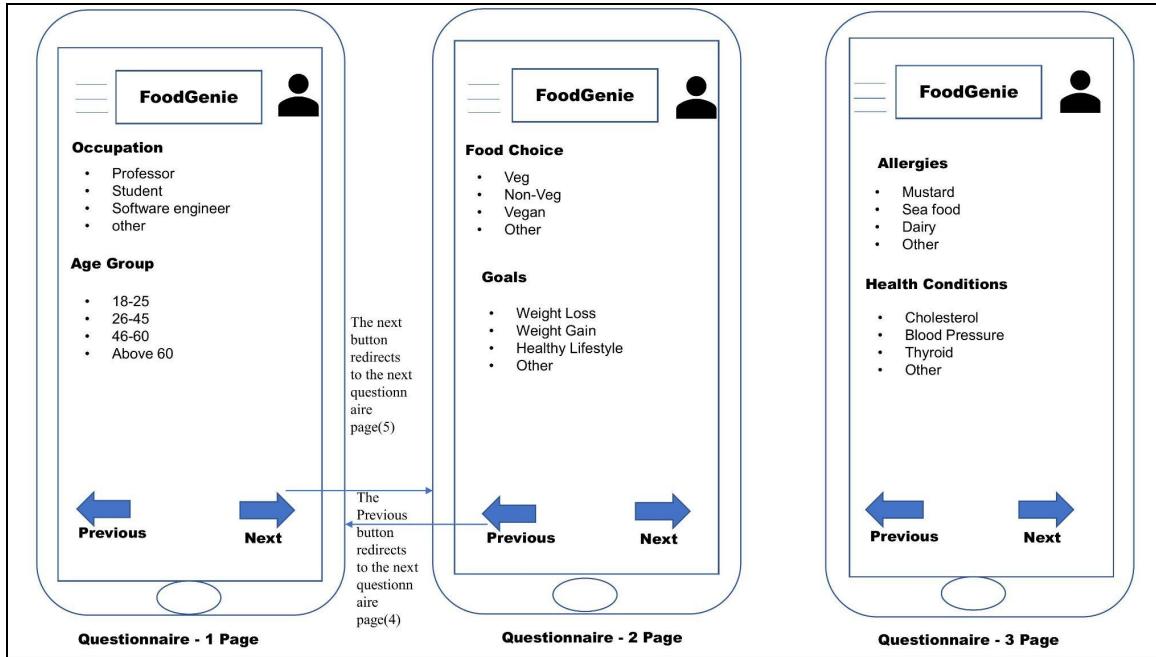


Figure 14: Low fidelity prototype flow image 2.

After filling the all the preferences, health conditions, dietary restrictions, etc user then gets an option to choose his/her budget for the generation of the recipe.

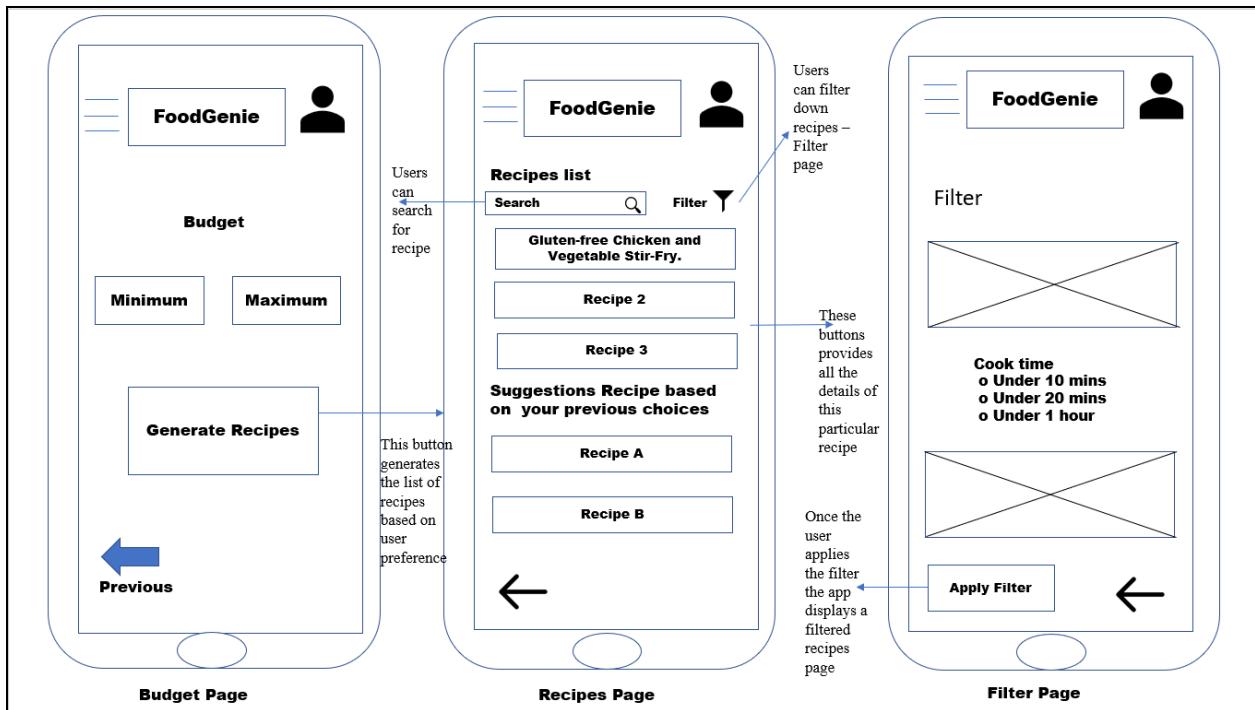


Figure 15: Low fidelity prototype flow image 3.

When the user inputs all the data then the AI integrated with the app generates a list of recipes based on user choices. Along with the recipes it also displays a list of suggested recipes based on the user's previous usage. From the Recipes Page, the user can narrow down the recipes based on the time filter as shown in the Filter Page. The app generates a narrow-down list of recipes(Filtered Recipes Page).

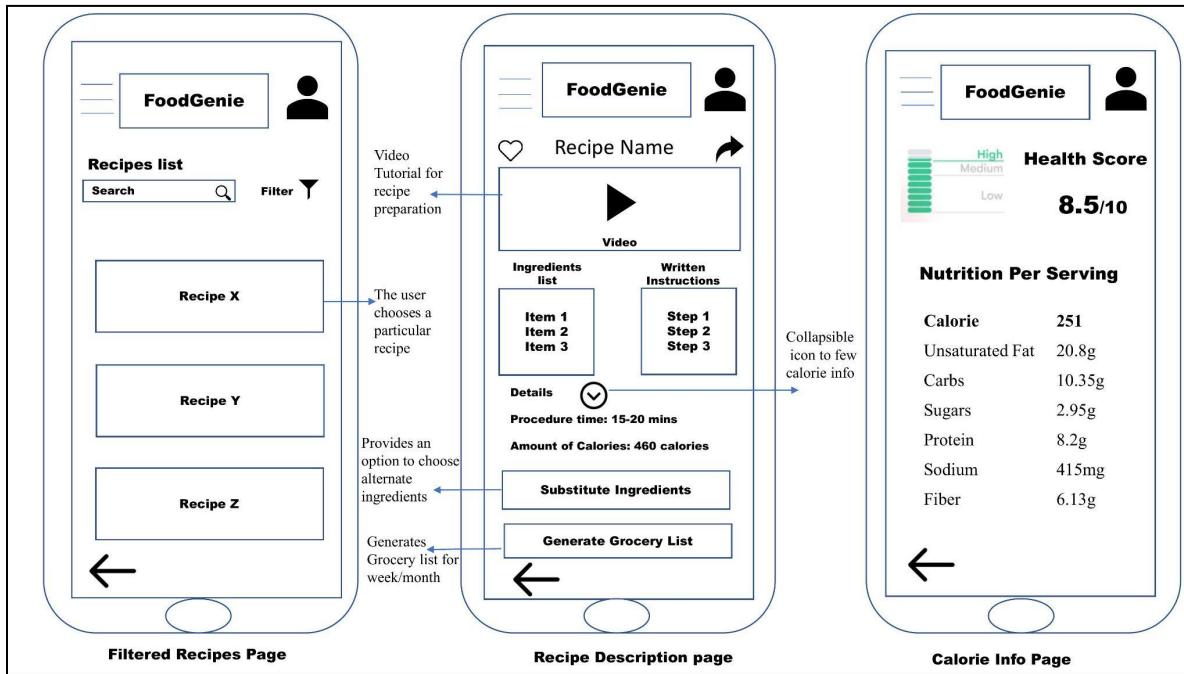


Figure 16: Low fidelity prototype flow image 4.

From the generated list user chooses a particular recipe and the user can find detailed information about that particular recipe in the Recipe Description Page. From this page user views the detailed nutritional information of that particular recipe(Calorie Info Page) through the collapsable icon.

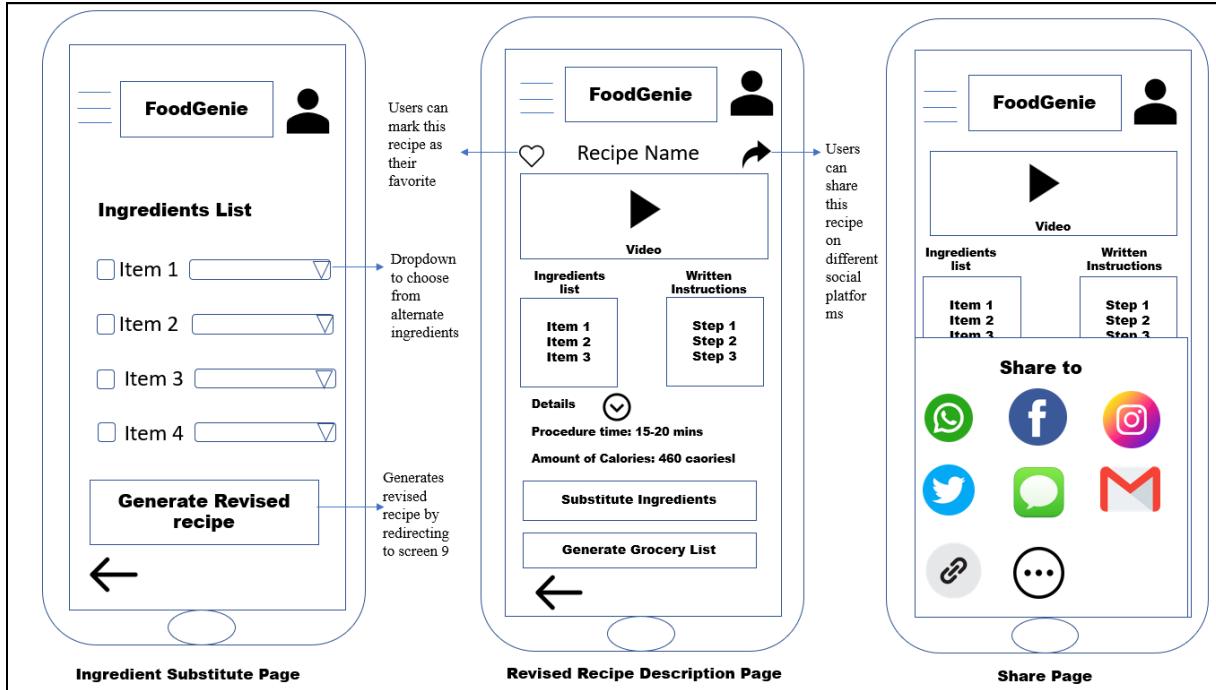


Figure 17: Low fidelity prototype flow image 5.

When the user visits the Ingredient Substitute Page by clicking on the substitute button from the previous page he/she gets the option to choose alternate ingredients for the current recipe. Based on the Input app generates a revised recipe(Revised Recipe Description Page) based on the new ingredients. User also gets to share the recipe (if wanted) on different social media platforms(Share Page).

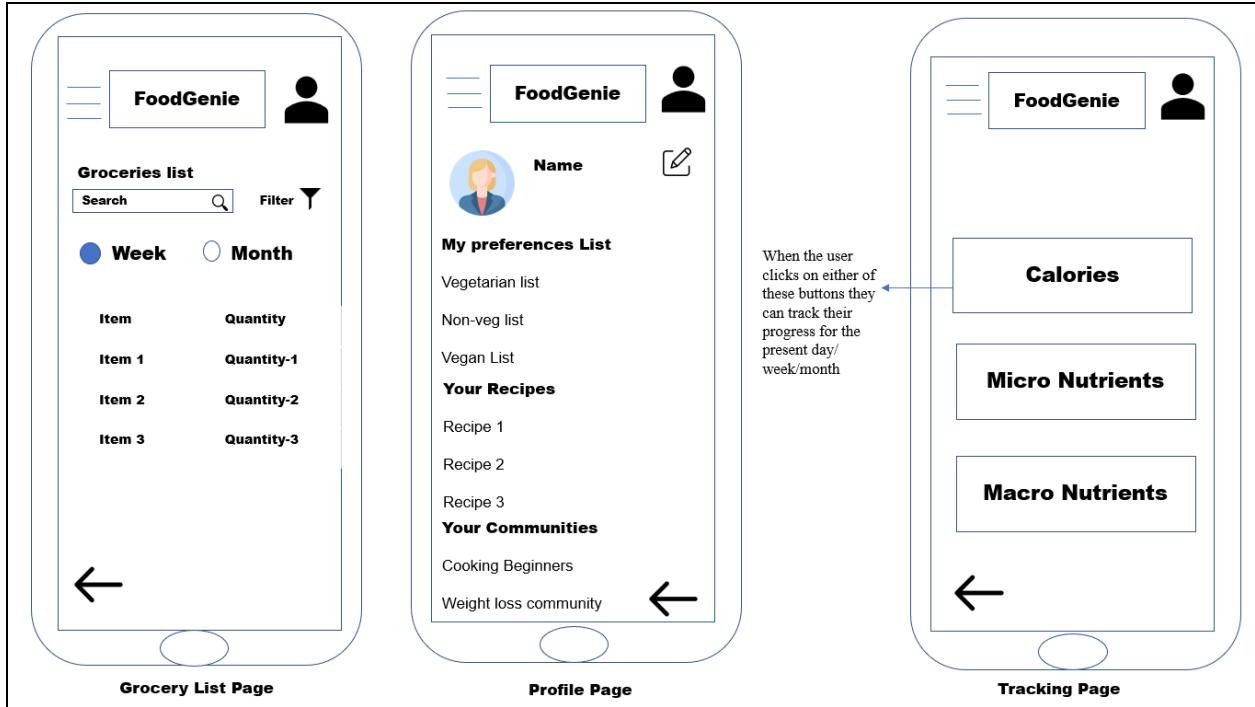


Figure 18: Low fidelity prototype flow image 6.

After selecting the recipe user can use the grocery list feature of the app by clicking on generate grocery list button and the app generates the grocery list (for the week/month). From the menu bar user can visit the Profile page to view their information and also Track(Tracking page) their nutritional progress in multiple categories.

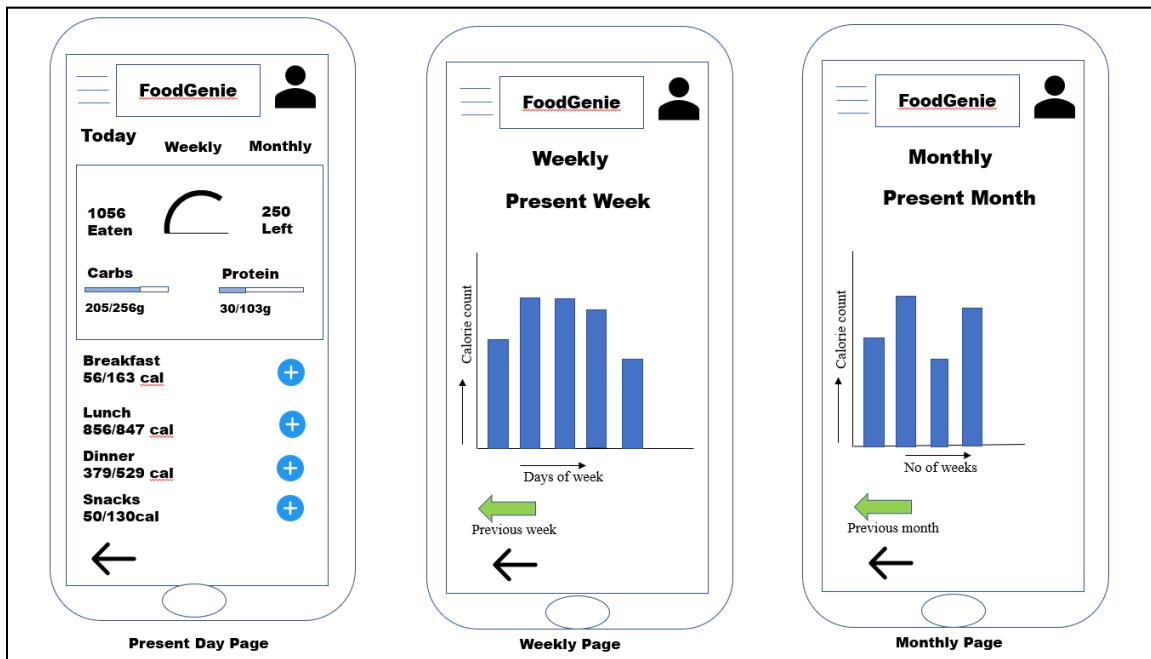


Figure 19: Low fidelity prototype flow image 7.

Through the FoodGenie user can track their progress for the current day, week, and month as shown in the above Present Day Page, Weekly Page, and Monthly Page respectively.

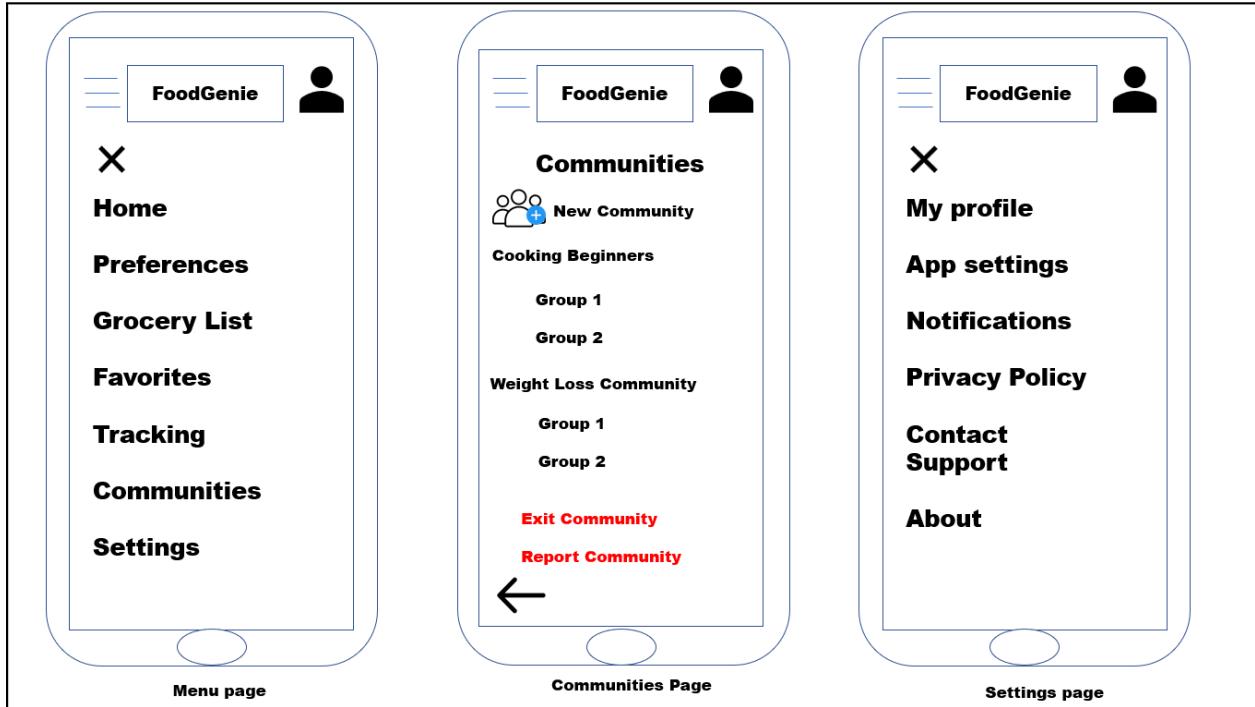


Figure 20: Low fidelity prototype flow image 8.

Above are the additional screens available on our FoodGenie app. The Menu Page allows users to navigate to some key features directly instead of moving forth and back on the app. The communities page shows the list of communities users joined and The Settings Page manages all settings related to the app.

## High-fidelity prototype

A high-fidelity prototype is a clickable and interactive user interface design that simulates the final product with real visual hierarchy, automatic response to user actions, and all the content that would appear in the final design. Our team used Figma to build a high-fidelity prototype, which allowed us to work and test the program's functionality concurrently, ease of use, and appearance without worrying about fixing it while being tested. High-fidelity prototypes are advantageous because they feel like the real thing, make it easier to test the program, and are less likely to have errors caused by humans.

## Design Justification



Figure 21: Filters page.

**Match between the system and the real world:** The buttons Apply and Back follow the heuristic principle as their functionality represents the same as their names from the real world.

**Aesthetic & minimalist design:** The screen utilizes plenty of white space, resulting in a neat, uncluttered appearance that facilitates user navigation. Green is the primary color used throughout the application, with other colors being used less frequently.

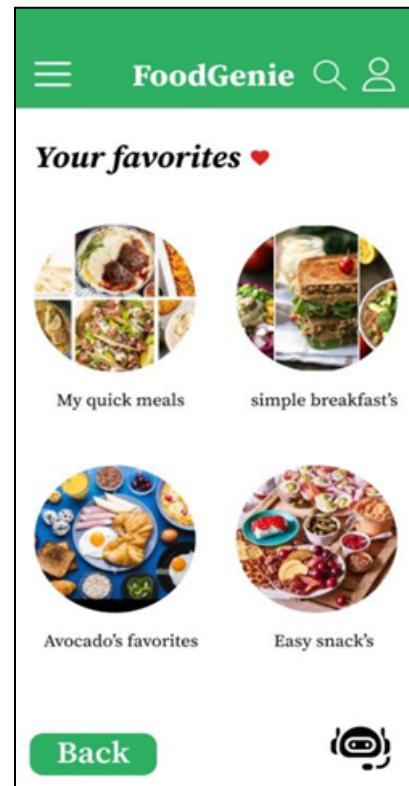
**Grid and Alignment:** The design incorporates gutters to create a clear differentiation between the rows and columns of the items. This visual separation helps to enhance the readability of the text and other components by enabling the user to easily distinguish between them.

**Consistency and standards:** The options and checkboxes on the website have an outline color that matches the main application color. This consistency in color creates a cohesive design and reduces user stress when reading options or selecting checkboxes.

**Affordance:** When a user clicks on the search icon located at the top of the screen, it provides an affordance for the user to search for a specific screen or item within the application. The profile icon affords showing the user account details which provides users with a convenient way to access their profile information, such as personal details and preferences, without having to navigate through multiple screens.

**Signifier:** The search icon signifies the search and the profile icon signifies the user profile details.

Figure 22: Favorites page.



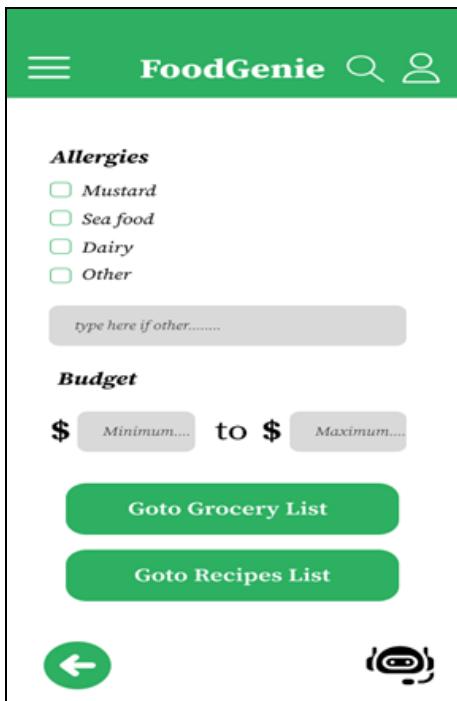


Figure 23: Preferences page.

**Recognition rather than Recall:** heuristic principle has been considered by making options like search, and account on every screen of the application as they are frequently accessed and it will be easy for the user to access them anytime.

**Help and Documentation:** The application has integrated an AI-based chatbot tool for customer support which is common for all the screens of the application. This chatbot is designed to address user queries and issues effectively and is located at the bottom of the screen, allowing users to access it easily.

**Affordance:** The two buttons, "Goto Grocery List" and "Goto Recipes List," are designed in a way that they provide a clear affordance to the user for accessing the grocery list and recipe list screens, respectively.

Figure 24: Detailed recipes page.



**Signifier:** The two buttons, "Goto Grocery List" and "Goto Recipes List," are designed in a way that they clearly represent and signify the grocery list and recipe list, respectively. By using these buttons, users can easily access the specific feature they are looking for without having to navigate through the website.

**Consistency and Standards:** The layout of the screen is consistent and well organized making it easy for readers to understand easily, as we can see on the screen that the video description, ingredients, and instructions are arranged in a list manner where the customer can easily understand the recipe description and making instructions.

**Typeface and Emphasis:** The screen employs the sans-serif font, which is widely used across various applications because of its easy readability. Consistently using the same font throughout the screen enhances user focus and creates a clean and appealing appearance.

**Affordance:** The heart symbol at the top of the screen near the video description allows users to add the recipe to their

favorites, while the share option located beside it allows users to share the recipe on various social media platforms. These features make it easy for users to save and share their favorite recipes. Along with these, the collapsible icon beside Other Details suggests to users that it can be expanded to view additional details.

**Signifier:** The heart symbol signifies the favorites and the share symbol signifies the sharing of the recipe. The dropdown option signifies the other details of the recipe.

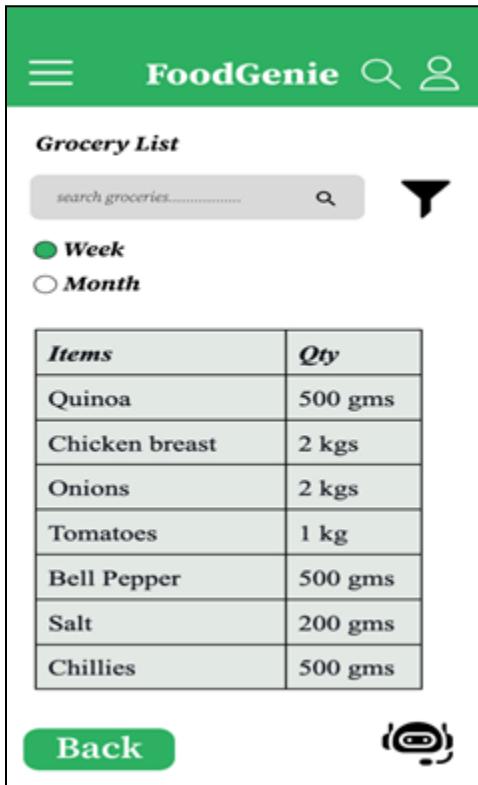


Figure 25: Grocery list page.

**Visualization Modality:** Our app features a visualization modality through the use of a table on the grocery list page. The table is structured with columns displaying food items and their corresponding quantities. This layout provides users with a clear and concise overview of their grocery needs for a given time period.

**Typeface and Emphasis:** The website uses font-weight effectively to improve the readability and organization of information. Specifically, the headings such as "Communities" and "Cooking Beginners" are given a heavier font-weight, which helps them stand out and be easily recognizable as headings. The lighter font weight used for

**Affordance:** At the top right of the screen, there is a filter icon that provides an affordance for users to access the filter screen. By clicking on this icon, the user can access a screen that allows them to filter their search results by various options.

**Signifier:** The filter icon signifies the filtering.

**Gulf of Execution:** If a user wants to search for groceries on the application, they will be looking for a clear and easily accessible search bar. The website provides a search bar at the top of the screen, with a large font size that makes it highly visible and easily identifiable. This allows users to quickly locate the search bar and easily search for the product they are looking for.

Figure 26: communities page.



group names below headings creates a subtle distinction that helps users differentiate between main sections and individual groups within those sections.

**User Control & Freedom:** Our app provides users with the option to create new communities, allowing them to connect with individuals who have similar dietary requirements or interests. Users are also empowered with the ability to exit from communities they no longer wish to be part of. Additionally, users can report communities that violate the app's terms of service, providing them with a sense of control and freedom in using the application. This feature enhances the user experience, making it more personalized and enjoyable.

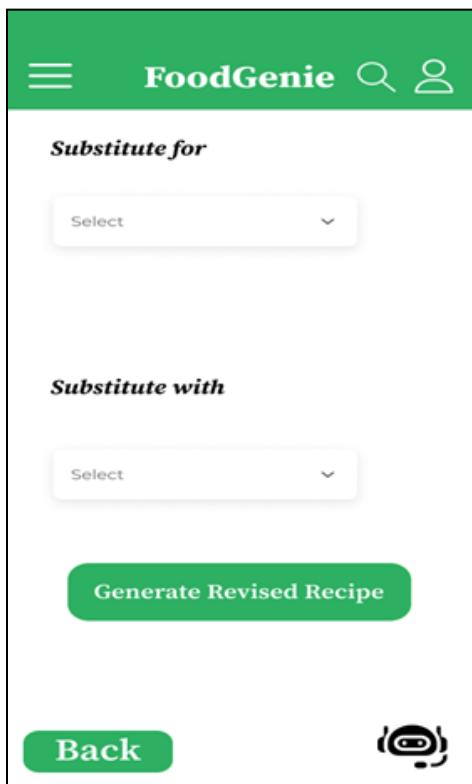


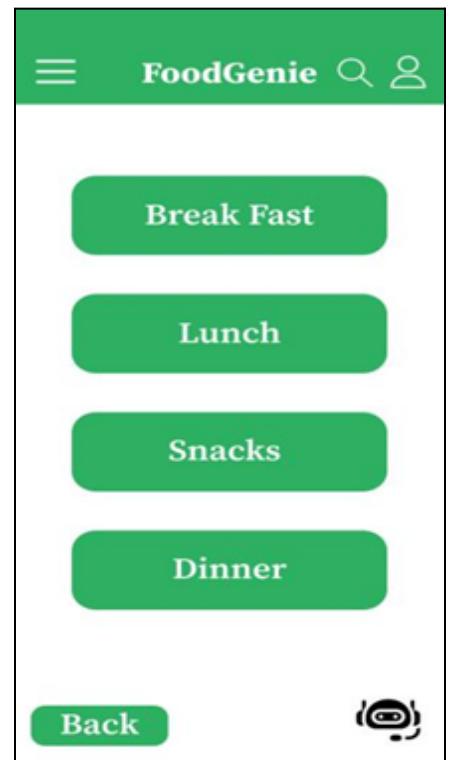
Figure 27: Substitute ingredient page.

**Affordance:** The two drop-down icons, "substitute for" and "substitute with," provide an affordance for users to search for recipe substitutions.

**Signifier:** The "substitute for" drop-down signifies a list of recipes that can be substituted, while the "substitute with" drop-down signifies a list of recipes that can be used as substitutes.

**Flexibility and Efficiency of use:** The drop-down boxes "Substitute for" and "Substitute with" in the Ingredient Substitute page allow users to easily select the ingredient they want to substitute and the substitute ingredient, the app provides a flexible and efficient way for users to find suitable substitutes for their ingredients.

Figure 28: Meal planning page.



**Match between the system and the real world:** The use of common terms like "breakfast," "lunch," and "snacks" in the application makes it easier for users to navigate and find what they are looking for. These terms are commonly used in the real world and across various applications, making them easily recognizable and understandable to users.

**Design:** Columns and rows are used to organize the options, making it visually pleasing and easy to read. Users can quickly scan the page and locate the information they need. Consistent spacing between rows ensures a clean and organized layout. It also

helps balance the overall design of the page, making it visually appealing and easy on the eyes.

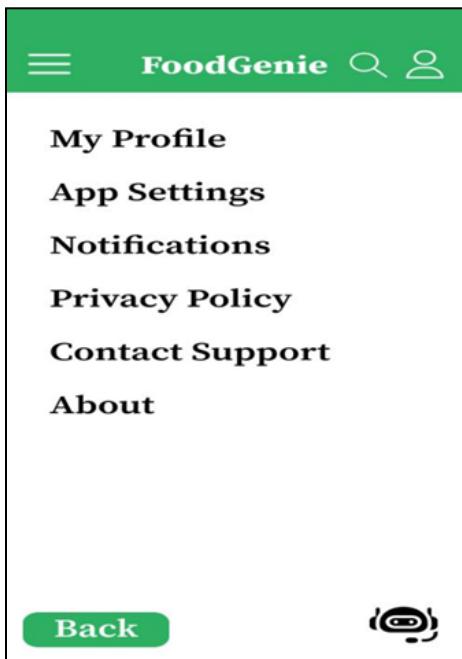
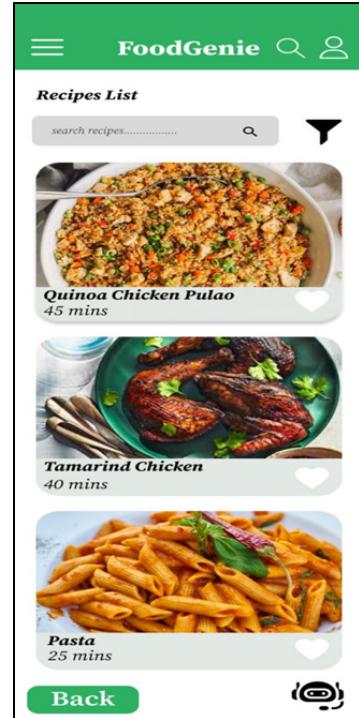


Figure 29: Profile page.

**Interaction type:** The profile screen of the user serves as a central location for all of the user's important account-related information, including personal details, settings for the application, notifications, and customer support. Users can customize the application, manage their notifications, and access help and support resources through this screen. The menu options are organized in a vertical list with plenty of whitespace between each item to make them easy to read and select.

**Interaction types:** The time taken to prepare each recipe is mentioned along with the recipe details. This is a helpful feature for users who have limited time and need to plan their meals accordingly. By providing the time required for each recipe, users can quickly identify which recipes fit their schedule and choose accordingly.

Figure 30: Recipes list page.



**Visual Design:** Visual interactions are an integral part of our app's design and play a vital role in engaging users and facilitating their understanding of the concepts. Our app leverages videos, illustrations, and images to demonstrate specific aspects of a recipe or cooking technique, which not only enhances the overall user experience but also makes it easier for users to learn and follow the recipe.

**Visibility of system status:** The Recipe images provide a visual indication of the recipes generated by AI making it easier for the user to quickly scan and find what they are looking for.

**Affordance:** The "plus" icon beside each item serves as an affordance, indicating to the user that they can add the item to their tracking information. This visual cue prompts users to interact with the icon, and upon clicking or tapping it, they are able to easily and intuitively add items to their tracking information.

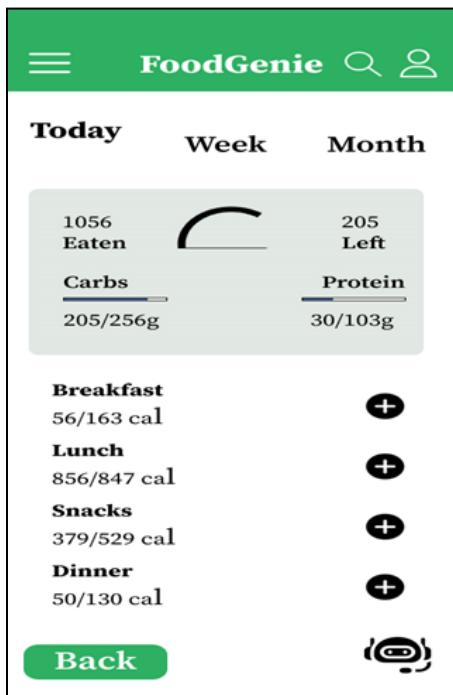


Figure 31: Tracking page.

**Visual design:** We incorporated a graphical representation of the monthly calorie consumption in our app to improve its visual appeal and user-friendliness. This design element is crucial in helping users track their progress and understand their calorie intake. The graphical format presents the information in a clear and easy-to-understand manner, allowing users to quickly observe any fluctuations in their calorie consumption and make necessary changes to their diet.

**Grid and Alignment:** In the graph there is vertical space between adjacent bars which are gutters that is used to create visual separation between bars and improve the readability of the graph. The use of gutters in a bar graph can help to improve the overall visual appeal of the graph and make it easier for users to interpret the data being presented.

**Signifier:** The "+" icon signifies adding the item to tracking information.

**Interaction Modalities:** The tracking information feature in the application allows users to keep track of the number of carbs and proteins they consume on a daily basis. This information is then compiled into weekly or monthly reports that users can view to get a better understanding of their overall diet and nutrition. By providing users with the ability to track their intake of specific nutrients, the application can help users to make more informed decisions about their diet and health.

Figure 32: Monthly details in tracking feature.



**Recognition over Recall:** This bar graph design displaying the data in a visual format that is easy to recognize and understand, rather than requiring the user to recall the information from memory. This helps reduce load and improve the overall user experience.



Figure 33: Home page.

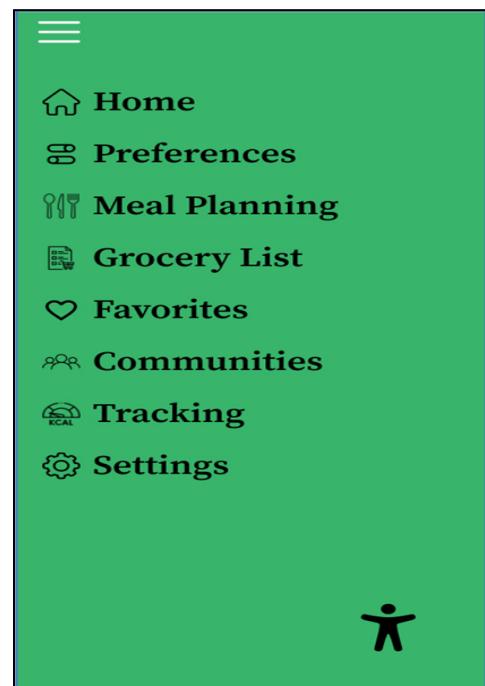
**Match between the system and the real-world:** This principle has been considered by using the names such as which are generalized words used in many applications as easily understandable by any user.

The accessibility icon, which typically depicts a person, is strategically placed at the bottom and serves as a signifier in visual design principles as it conveys the accessibility meaning. The icon was included in the app in a way that is recognizable and distinct, using the human shape to draw attention to it.

**Interaction modalities:** Our app utilizes icons as interaction modalities for its features such as meal planning, tracking, weight loss/gain, grocery list, and customer support. Each icon is designed to represent its corresponding feature, for example, a meal icon represents meal planning, and a grocery bag icon represents the grocery list feature. This makes it easier for users to navigate the app and quickly identify the features they want to use.

**Grid and Alignment:** In our FoodGenie app, we have utilized the grid and alignment to effectively organize the features and content in a visually pleasing and structured manner. This design element creates a visual hierarchy that guides the user's attention to the most important information on the screen. Moreover, the use of gutters between the features ensures consistent spacing, making the layout appear cleaner and organized. It also prevents the screen from looking cluttered, which can overwhelm the user with too much information at once.

Figure 34: Menu bar page.



# Evaluation

## Wizard Of Oz

The Wizard of Oz study is a method used in user research to test the usability of a concept. In this method, one practitioner, the "Moderator," interacts with the user face-to-face. In contrast, another practitioner, called the "Wizard," controls the responses sent to the user through the interface, such as a device or application. The Wizard of Oz method allows researchers to evaluate user interactions without needing a fully functional system. By simulating the interface's responses, researchers can observe user behavior and gather feedback that can be used to improve the interface's design.

## Planning & Reporting Activity

The team has decided to use the Wizard of Oz study method to improve the FoodGenie app without needing a fully functional system. First, we identify the app's key features that need testing, such as personalized recipe suggestions, nutritional information, ingredient substitution, Calorie tracking, etc... Then, we use a developed prototype that simulates the app's interface and functionality to create a realistic user experience. A Moderator(one of the team members) interacts with the user face-to-face, and a Wizard(another team member) simulates the app's responses to the user's actions.

The team conducts user testing sessions with a group of participants. The Moderator asks them to perform specific tasks using the prototype by thinking aloud, and the Wizard simulates the app's responses accordingly. They observe and record user interactions and feedback to improve the app's design, functionality, and user experience. Then we refine the app's design based on the feedback from the testing sessions and repeat the testing process until the app's design and functionality meet the desired objectives. Using the Wizard of Oz study method, the team can gather valuable user feedback early in the development process, resulting in an app that is more user-friendly and aligned with users' needs and expectations.

### ***Introduction***

"Hello and welcome! We are grateful for your involvement in our usability study, primarily intended to gather feedback on the initial design of our latest application, FoodGenie. The primary objective of this application is to support users in searching for recipes and cooking meals that match their dietary preferences, nutritional needs, and budget constraints. We particularly want your thoughts on the app's user interface and usability. We would be grateful for your honest feedback, which will help us improve the app. The app also contains a variety of regional cuisine recipes and a feature that generates grocery lists for users based on their recipe choices, ensuring that all the required ingredients are readily available. We hope this information

is helpful and would be happy to address any further queries. While using the app, please think aloud and share your thoughts and feelings as you navigate through it.

We have decided to perform the Wizard of OZ Activity on four tasks of our app:

### **Task 1: Effortless Meal Planning and Flexible Ingredient Substitution with FoodGenie**

#### *Task Description:*

Task: Finding recipes based on dietary preferences and ingredient availability.

As part of our Wizard of Oz study, please use our app prototype to filter recipe ideas based on your dietary restrictions, preferences, and ingredient availability. After creating a user profile, select your dietary restrictions and ingredient preferences, and the app will display a list of recipe suggestions meeting your requirements. While using the app, think aloud and give us feedback. Test the ingredient substitution feature, which suggests substitutions based on what you have on hand if you're missing a key ingredient. This task will improve the app's design, functionality, and user experience.

#### *Think-aloud summary:*

Pain points:

- Preferences: The participant felt some essential preference options needed to be added to the app. These include meal time preferences (breakfast/lunch/dinner), gender, cuisine, and final weight preferences (weight loss/weight gain).
- Substitute Ingredient: The participant needed help understanding how to use the substitute ingredient dropdown feature provided by the app.
- Multiple food choices: The participant wants the app to update its preferences to select multiple options, including vegetarian and non-vegetarian options.
- Recipes list: The participant wants the app to display recipes in categories for easy understanding.

Joy points:

- Substitute Ingredient: The participant was highly pleased with the "Substitute Ingredient" feature, enabling them to prepare the recipe with the available ingredients.
- Grocery List: The participant happily selected the duration (week or month) and the quantity options available on the grocery list page, making it easier to plan their grocery shopping.
- Customized recipe: The participant was happy to find various recipes based on their preferences, making the application more personalized and tailored to their needs.

#### *Interview Results:*

- Was it clear what options were available to you when selecting your dietary restrictions and ingredient preferences?

Answer: The participant found the options for dietary preferences and restrictions clear

and well-planned, appreciated the various choices available for allergies, health conditions, and diet goals, and considered the option to substitute ingredients conveniently.

- Did you find the suggested recipe list helpful and relevant to your dietary needs and preferences?

Answer: The participant was excited to receive a list of customized recipes from the app based on their preferences. They found the recipe descriptions clear and easy to follow with video and written instructions. However, the participant felt overwhelmed by the calorie count option available for the selected recipe.

- Did you use the ingredient substitution feature during the task? If so, how did you find the feature?

Answer: The participant found the ingredient substitution feature helpful and convenient addition to the app. They appreciated the ability to change ingredients before and after generating a new recipe. Additionally, the participant found it easy to navigate back to the substitution screen from the recipe page if they were unsatisfied with the revised recipe.

- How important is the substitution feature when choosing a recipe?

Answer: The participant praised the Substitution feature, allowing alternative items to be selected based on dietary requirements, availability, and interests. This feature saves time and prevents frustration from constantly changing preferences while enabling better recipe suggestions tailored to their daily needs.

## **Task 2: A Speedy and Nutritious Meal Recipe**

### *Task Description:*

Task: Finding simple and easy recipes by filtering and generating weekly grocery lists based on dietary preferences and budget.

As a participant in our Usability study for the Food Genie app, interact with the app as a fully functioning product. Your task is to find simple and easy recipes that fit your dietary preferences and budget and generate a grocery list. The app provides filtering options to help you find quick and easy recipes. You must sign up and complete a questionnaire about your preferences. The app will generate a list of recipes for you with nutritional content, ingredients, and the ability to generate a grocery list. As you navigate the app and select recipes, think aloud and share your thoughts. Your feedback will help us improve the app to meet user needs. Thank you for participating in this study.

### *Think-aloud summary:*

#### Pain Points:

- Budget Option in filter: The participant suggested adding a Budget option in the filter option to make finding recipes within their budget more manageable.
- Categorized Filters: The participant recommended adding categorized options in the filter to help filter recipes based on specific criteria.

- Ingredient-based Recipes: The participant also suggested a feature that generates recipes based on available ingredients to reduce food waste and simplify meal planning.

Joy Points:

- Budget Option: The participant expressed joy in setting a budget for groceries and finding recipes within their budget.
- Ingredient Substitution: The participant appreciated the flexibility of substituting ingredients in the recipe according to their preferences or what is available in their pantry.
- Recipe Options: The participant liked the variety of recipe options available on the recipe page.

*Interview results:*

- How easy was completing the questionnaire to specify your dietary preferences and budget to the app?  
Answer: The participant found the questionnaire to specify their dietary preferences and budget to the app effortless and well-designed. It was divided into distinct categories, making it simple to provide the necessary information, resulting in a positive and straightforward experience overall.
- How intuitive was selecting a recipe and generating a grocery list?  
Answer: The participant found selecting a recipe and generating a grocery list intuitive and appreciated the functionality. However, they suggested implementing a real-time feature to track groceries in their kitchen for a more efficient experience and to reduce the risk of buying unnecessary items.
- Is there any information missing from the recipe or grocery list generation process that would be helpful to include in the app?  
Answer: The participant felt additional information was in the app's recipe and grocery list generation process. They found all the information provided necessary and sufficient for their needs. In other words, the app provided all the relevant and essential details required for generating the recipe or grocery list, and the participant had no suggestions for improvement.
- How effective was the time filtering option in allowing you to filter recipes?  
Answer: As a participant, I found the time filtering option quite effective in allowing me to filter recipes, such as "under 30 minutes," to fit my schedule. However, the options were somewhat limited as I would have liked to see more specific categories based on health conditions, etc. Overall, I found the available filters sufficient to find the recipes I was looking for.

### **Task 3: The Food Genie App's Time-Saving Features for Grocery Shopping and Meal Planning**

*Task Description:*

The Food Genie app provides time-saving features for grocery shopping and meal planning, making it a convenient tool for busy individuals who want to eat healthy and save time. In this task for the Food Genie app usability study, you will use the simplified meal planning and grocery shopping list features to generate healthy recipes based on your preferences, such as calorie counts, food allergies, and dietary restrictions. Start by signing in and creating a grocery list, which can be modified and saved for future use. Once the list is generated, the app will suggest recipes with detailed instructions, videos, and calorie counts based on the grocery list. You can also mark favorite recipes and access daily activity details through the app's Activity option.

*Think-aloud summary:*

Pain points:

- The possibility of repetition of various varieties of recipes is suggested, which can make planning meals boring.
- There may be the possibility of mistakes in suggesting grocery lists because of variations in the availability of ingredients in various areas.

Joy points:

- The ability to customize the meals and grocery lists based on their dietary preferences and nutritional needs.
- This app helps with both meal planning and creating grocery lists within the budget, and it also helps me to save time and effort.

*Interview results:*

- Did you find it useful to plan your weekly meals using customized meal suggestions?  
Answer: The participant found it useful. The app's personalized grocery lists and meal ideas could help me spend less time and effort preparing meals. The participant also desires to control his weight and may find the app's capacity to track calories and micronutrients useful.
- How helpful was the function for creating grocery lists to organize your shopping travels?  
Answer: The function for creating grocery lists helps the participant manage time while shopping because, after the suggestions, the participant only needs to shop for the groceries suggested by the app. It helps the participant save a lot of time.
- Did you find it simple to follow the recipe instructions? Which steps did you find to be easiest among written or video instructions?  
Answer: The participant found it simple to follow the recipe instructions. The participant prefers video instructions because following the instructor is more accessible than reading step-by-step written instructions when making recipes.
- How helpful was the calorie-tracking feature in helping you maintain your goals?  
Answer: The app's ability to calculate the nutritional content of each recipe can be

beneficial. It helps the participant maintain fitness because calorie tracking helps decide what food to take.

#### **Task 4: Healthier Eating - Using FoodGenie's Calorie-Counting**

##### *Task Description:*

Use FoodGenie's Calorie-Counting Feature for Healthier Eating. The task involves testing the calorie-counting feature to help users make healthier food choices. To complete the task, you as a user must create an account and input your personal information, including your age, height, weight, and activity level. You can then track the calories and other nutrients you consume and adjust your food choices to stay within your target range. The app's other features, such as meal planning and recipe suggestions, can also be used to plan healthy meals. Combining the app with other healthy habits allows you to achieve your health goals and feel your best.

##### *Think-aloud summary:*

Joy Points:

- I like how the app allows me to input my personal information to get customized calorie goals specific to my needs.
- "The app's tracking feature is easy to use and makes it simple to see how many calories and other nutrients I've consumed."
- "Setting health goals with the app is motivating, and I like being able to track my progress towards those goals."
- "The recipe suggestions are great! They make planning meals that fit my dietary preferences and calorie goals easy."

Pain Points:

- I found creating an account and inputting personal information time-consuming and frustrating. It would have been nice if there was a quicker and easier way to start.
- "The app doesn't have all the food options I eat, so it's difficult to get an accurate calorie count for my meals."
- We may find it difficult to adjust their food choices according to the calorie-counting feature and may need additional guidance or resources to understand how to make healthier choices.

##### *Interview results:*

- Did the app's other features, such as meal planning and recipe suggestions, helpful in making healthier food choices? Why or why not?

Answer: Yes, I found the meal planning and recipe suggestions very helpful. It took much of the guesswork out of meal planning, and I appreciated that the recipes were tailored to my specific needs and preferences. I also liked that the app provided nutritional information for each recipe, which helped me make informed decisions about what to eat.

- How useful did you find FoodGenie's calorie-counting feature to be?  
Answer: I found the calorie-counting feature to be extremely useful. It was eye-opening to see how many calories I consumed each day, and it helped me make more informed choices about what to eat. I also appreciated that the app provided information about other nutrients, such as protein and fat, which helped me ensure that I was getting a balanced diet.
- How useful is the app's filtering function in helping you find recipes that meet your dietary preferences and restrictions?  
Answer: I found the filtering function to be helpful. It allowed me to quickly find recipes that met my dietary preferences and restrictions, which saved me a lot of time in my busy life. I also appreciated that I could filter by specific ingredients, which made it easy to find recipes that used up items I already had in my pantry.

### **App changes w.r.t Wizard of Oz study**

Based on the participant's interview feedback from Wizard of Oz Reporting activity, below changes are to be made to the FoodGenie application to address the pain points and enhance the joy points.

1. Substitute Ingredient: Provide better guidance on how to use the provided dropdown for finding alternate ingredients. Consider adding a search bar to make it easier for participants to find the substitute ingredient they need.
2. Improve App Navigation: Enhance the placement and clarity of navigation buttons to provide easy and transparent access to the questionnaire and improve participant movement throughout the app.
3. Recipe Filtering and Sorting: Improve the recipe filtering options by expanding the database and adding relevant filter options based on participant preferences. Categorize the filters and include subsections to make searching for specific recipes based on cuisine, cooking time, ingredients, and dietary restrictions easier. Adding a budget filter option can also allow participants to quickly modify recipe results.
4. Recipe Management and Meal Planning: For easy search, create a user-friendly recipe system by categorizing recipes according to cuisine type, meal type, and ingredient type. Additionally, include a feature to generate recipes based on available ingredients, reducing food waste and simplifying meal planning. Provide educational resources and tips on healthy eating habits to help participants make healthier food choices with the calorie-counting feature.
5. Invite Friends Feature: Include a feature for adding friends.
6. Improve Accuracy of Calorie Counts: Improve the food database to include more options and allow the participants to input their custom foods to get an accurate calorie count for their meals.

7. Grocery List: To enhance meal planning and grocery shopping for participants, the app could provide the option to display the total number of meals possible per week/month and include a feature to track kitchen groceries. The grocery list's accuracy will be improved by cross-referencing it with the user's pantry inventory and adding commonly used recipe items.

## Experimental Usability Study

### Goal(s) of the experiment

The primary goal of the experiment is to investigate the impact of the ingredient substitution feature on users' ability to prepare meals that meet their dietary preferences and nutritional needs. The primary interface would include a simple list of available substitutions for each ingredient. In contrast, the enhanced interface would include more information about the nutritional value of each substitution option and how it could impact the overall nutritional value of the dish.

<p><b>Substitute for</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Select</td></tr> <tr><td>Ingredient 1</td></tr> <tr><td>Ingredient 2</td></tr> <tr><td>Ingredient 3</td></tr> <tr><td>Ingredient 4</td></tr> </table> <p><b>Substitute with</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Select</td></tr> <tr><td>Ingredient a</td></tr> <tr><td>Ingredient b</td></tr> <tr><td>Ingredient c</td></tr> <tr><td>Ingredient d</td></tr> </table>	Select	Ingredient 1	Ingredient 2	Ingredient 3	Ingredient 4	Select	Ingredient a	Ingredient b	Ingredient c	Ingredient d	<p><b>Substitute for</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Select</td></tr> <tr><td>Ingredient 1</td></tr> <tr><td>Ingredient 2</td></tr> <tr><td>Ingredient 3</td></tr> <tr><td>Ingredient 4</td></tr> </table> <p><b>Substitute with</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Select</td></tr> <tr><td>Ingredient a this will add 15 cal, sugar free</td></tr> <tr><td>Ingredient b this will add 25 cal, gluten free</td></tr> <tr><td>Ingredient c this will add 20 cal, high protein</td></tr> <tr><td>Ingredient d this will add 35 cal, more fibre</td></tr> </table>	Select	Ingredient 1	Ingredient 2	Ingredient 3	Ingredient 4	Select	Ingredient a this will add 15 cal, sugar free	Ingredient b this will add 25 cal, gluten free	Ingredient c this will add 20 cal, high protein	Ingredient d this will add 35 cal, more fibre
Select																					
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Ingredient b this will add 25 cal, gluten free																					
Ingredient c this will add 20 cal, high protein																					
Ingredient d this will add 35 cal, more fibre																					
Basic Version	Enhanced Version																				

Figure 35: Different versions of substitute ingredient feature used in Experiment usability study.

In addition, three other tasks are included in the experiment.

Grocery list: To investigate how the use of personalized grocery lists generated by the FoodGenie app affects users' shopping behaviors and food waste compared to a control group who do not use this feature. The hypothesis is that personalized grocery lists generated by the FoodGenie app would lead to less food waste and more efficient shopping behaviors.

Calorie and Nutrition Tracking: This task aims to determine whether using this feature positively affects users' awareness of their calorie and nutrition intake, their ability to make informed decisions about their food choices, and their overall dietary habits.

Dietary Preferences: This aims to compare the performance of users using the two different interface designs for selecting dietary preferences: one design asks users to enter data (such as dietary restrictions, habits, and allergies, etc.), and the other design presents users with a list of predefined options to select from.

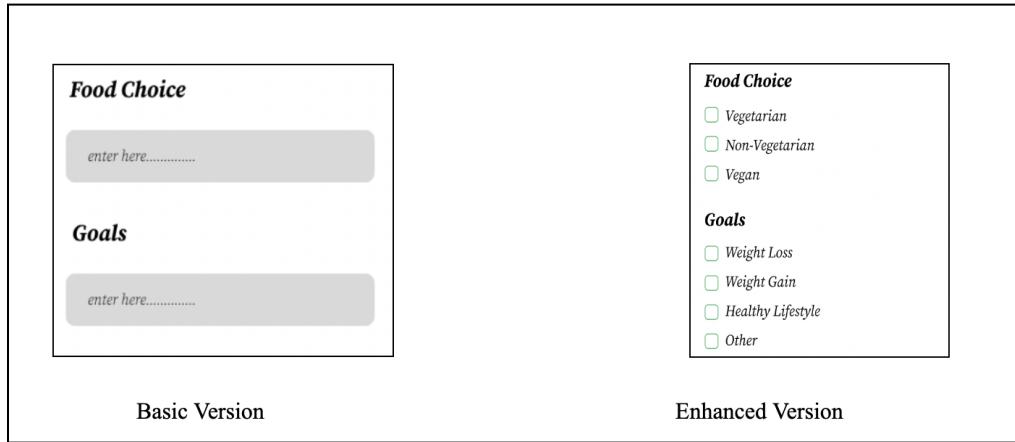


Figure 36: Different versions of answering questions in preferences page.

## Methodology

Our experiment design used a mixed-method approach, combining within and between-subjects designs to address different aspects of the app. A within-subjects design was used to investigate the impact of the interface design on ingredient substitution and calorie-tracking features, allowing for the measurement of changes within individuals over time, making the experiment more precise and reliable. A between-subjects design was suitable for comparing different interface designs for selecting dietary preferences and studying the effects of personalized grocery lists, ensuring any differences between groups were due to the tested intervention, improving the external validity and generalization to a broader population. This provided valuable insights into the effectiveness of different designs in achieving the desired outcomes.

## Participants:

For this design project, we recruited eight individuals aged 18 years or older with experience in meal planning and cooking. We used various recruitment methods, including contacting friends, family, and UNCC college community members interested in food and nutrition. Participants were categorized based on their experience with meal planning and familiarity with meal planning apps. We had 2 participants for each person in our team.

## Protocol:

To ensure the experiment's internal validity, we used counterbalancing to avoid any order effects from using different designs for participants. We generated a random order for completing tasks and used a random number generator to assign participants to each order sequence. The participants were asked to complete four tasks using the FoodGenie app and provide feedback on their experience. The tasks included are:

1. Using two different app versions to find and prepare meals that meet dietary preferences and nutritional needs.
2. Using the personalized grocery list feature and observing how it influences shopping habits and food waste.
3. Using the calorie and nutritional tracking feature on the recipe description page and observing how it affects the ability to monitor daily calorie and nutrient intake.
4. Assessing two different interface designs and determining which is more effective in finding and preparing meals that suit dietary preferences, nutritional needs, and budget.

**Task Instructions:**

1. Use the primary and enhanced interface of the app to search for a recipe that meets dietary and nutritional needs. Select at least three ingredients to substitute and prepare the meal according to the recipe with the substitutions. Provide feedback on the usability and effectiveness of the primary and enhanced interface for ingredient substitution.
2. Shop for a recipe's ingredients twice, once with a personalized grocery list from the FoodGenie app and once without. While shopping, describe how the personalized grocery list affects shopping habits and food waste compared to not using the list while thinking aloud.
3. Use the FoodGenie app to find a recipe that fits dietary needs, view its calorie and nutrient information, prepare the meal, and track daily calorie and nutrient intake while describing how the tracking feature affects you compared to when not using it.
4. Provide dietary preferences in two ways: one using a design that asks to enter nutritional needs manually and one that asks to select from a list of alternatives. As each task is completed, the participant is asked to think aloud and describe which interface design is more effective in finding and preparing meals that suit dietary preferences, nutritional needs, and budget.

Before initiating the study, we conducted a pre-survey to gather demographic information, dietary preferences, nutritional goals, and dietary restrictions to identify any confounding variables that could affect the results. Our research sought to enhance the FoodGenie app's usability for diverse users. We also had a debrief session to gather additional feedback and answer participants' questions.

*\*Please review the Appendix, Table 16 for more information about Interview data collected.*

### **Data Collection**

The data collected from the interview sessions were categorized into three primary forms: verbal data, task timings, and question responses. Verbal data included participants' feedback and comments on various aspects of the app, such as ingredient substitutions suggested by the app, shopping habits, and experiences with the interface design for selecting dietary preferences. Task timings included the time participants took to complete various tasks on the app, such as selecting ingredient substitutions and creating personalized grocery lists. Finally, question responses included ratings or Likert scale responses to questions related to participants'

satisfaction with various app features, such as calorie tracking and personalized grocery list features.

By collecting and categorizing data in this manner, we evaluated the app's effectiveness in meeting its goals, including helping users make informed decisions about their meals, reducing food waste, and improving their overall health and nutrition. The data also helped us identify areas for improvement in the app's design and functionality.

These responses yielded key data points as mentioned below:

- Satisfaction with Ingredient Substitutions
- Impact of Ingredient Substitution Feature
- Effect of Personalized Grocery List
- The Usefulness of a Personalized Grocery List
- Impact of Calorie and Nutritional Tracking
- Effectiveness of Calorie and Nutritional Data Display
- Impact on Willingness to Try New Dishes on their Preferences

In addition to the specific data points mentioned above, we collected demographic information about the participants, such as age, gender, and dietary restrictions or preferences. This additional data was important in understanding potential variations or trends based on participant characteristics.

*\*Please review the Appendix, Tables 7-15, for more information about the raw data collected.*

## Data Analysis

### Numerical Comparison:

We will concentrate on the important data points provided in the raw data table to perform data analysis and contrast conditions A and B based on the study's objectives. The conditions for each task are compared in the following table:

*Table 1: Numeric Analysis*

Data Point	Condition A (Basic Interface)	Condition B (Enhanced Interface)
Substitute Ingredient Task		
Satisfaction with Ingredient Substitution	4.2	4.6
Impact of Ingredient Substitution Feature	3.8	4.4
Grocery List Task		
Effect of Personalized Grocery List	3.6	4.6

The Usefulness of Personalized Grocery List	3.7	4.9
Calorie Tracking Task	4.3	4.8
Impact of Calorie and Nutritional Tracking		
Effectiveness of Calorie and Nutritional Data Display	4.5	4.6
Dietary Preferences Task	3.9	4.2
Impact on Willingness to Try New Dishes		
Difficulties or Issues Encountered	2.7	1.9

Based on the above table, the enhanced interface (Condition B) consistently received higher ratings across most data points than the basic interface (Condition A). Participants found the enhanced interface more effective in all the tasks and it also increased the willingness to try new dishes that meet dietary preferences.

### Aggregation

We aggregate the data and present it using tables, bar charts, pie charts, and summaries to perform data analysis for the data collected.

### Substitute Ingredient Task

Below are the two key data points for the Substitute Ingredient Task: Ingredient Substitution Satisfaction and Meal Preparation Accuracy

#### *Ingredient Substitution Satisfaction*

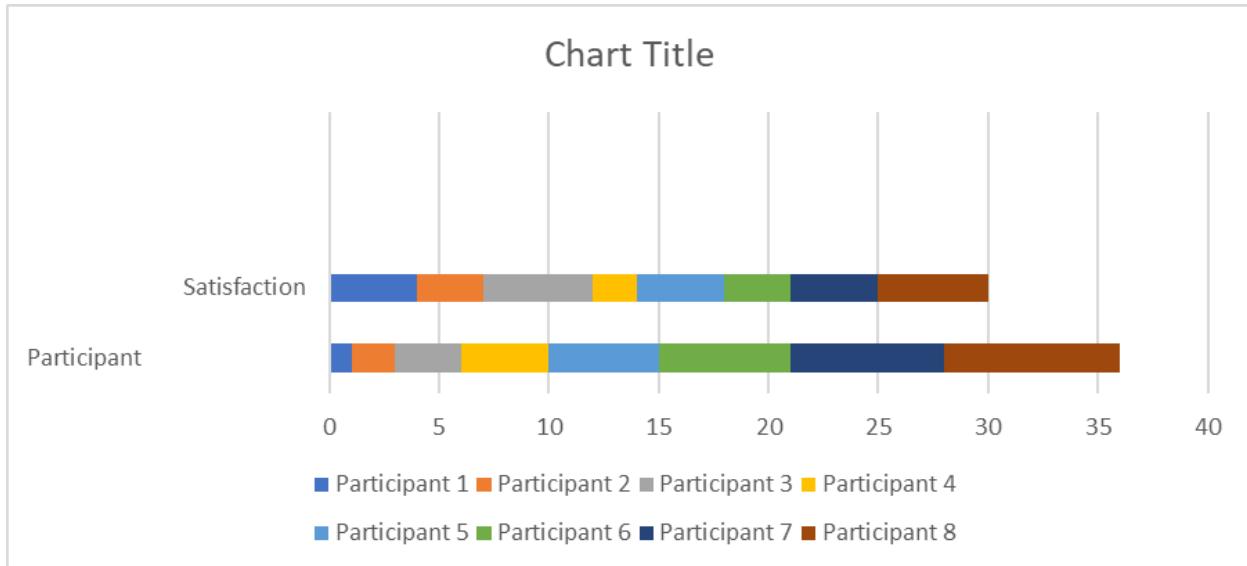


Figure 37: Here, we are using a bar chart to visualize the satisfaction levels with ingredient substitutions (on a scale of 0-5).

### **Impact of Ingredient Substitution: Meal Preparation Accuracy**

The figure below shows the substitution feature's impact on users' meal planning accuracy using the basic and enhanced interfaces.

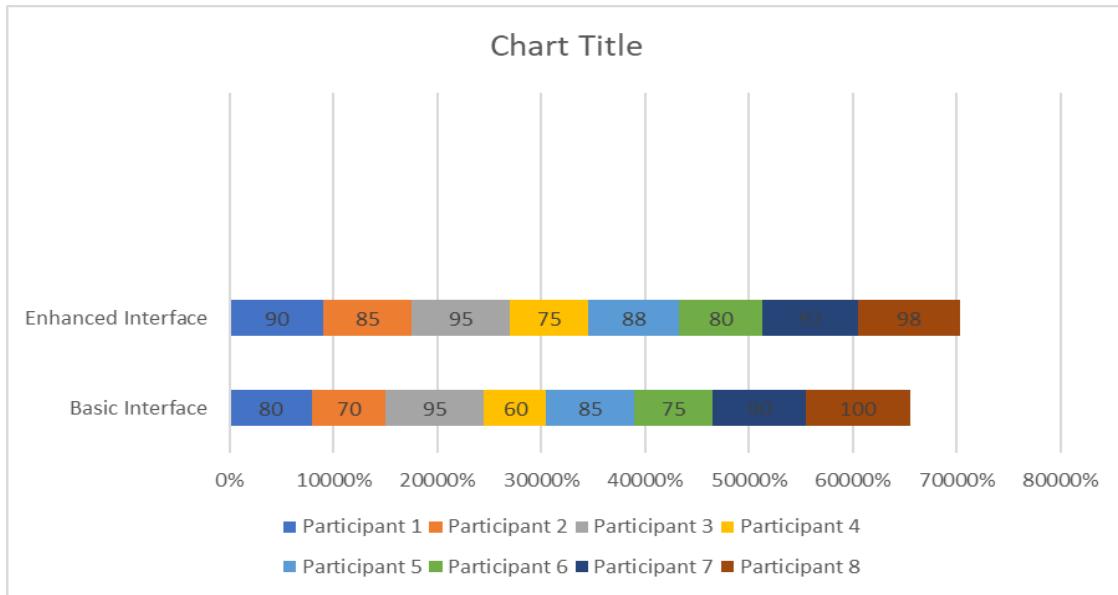


Figure 38: We represent a bar chart format to compare the meal preparation accuracy between the two interfaces (on a scale of 0% - 100%).

### **Grocery List Task:**

Below are the three key data points collected as impact of Grocery List Task: Shopping Habit Impact and Food Waste Reduction and Effectiveness of Personalized Grocery List

### ***Effect of Personalized Grocery List: Shopping Habit Impact***

Let's visualize the impact of the personalized grocery list feature on shopping habits:



Figure 39: Here, we use a Pie-chart chart to visualize the Impact of the Personalized Grocery List feature on Shopping Habits for each participant (on a scale of 0-5).

### ***Effect of Personalized Grocery List: Food Waste Reduction***

Table 2: Food Waste Reduction

Participant	Food Waste Reduction (Yes/No)
1	Yes
2	No
3	Yes
4	Yes
5	No
6	Yes
7	No
8	Yes

### ***The usefulness of a Personalized Grocery List:***

**The usefulness of a Personalized Grocery List**

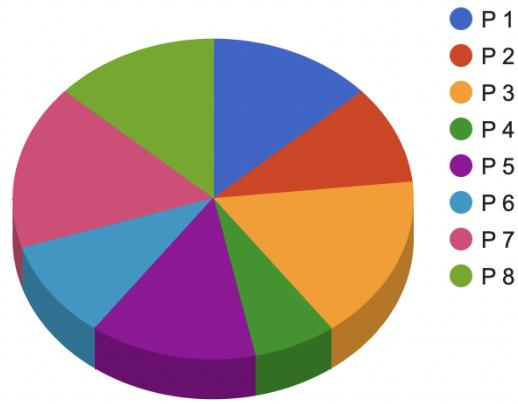


Figure 40: Here we are using a pie chart to represent the statistics (on a scale of 1-5)

### **Calorie and Nutritional Tracking Task:**

Key data points collected as an impact of this particular task are Calorie Tracking and Nutritional Awareness. In addition the Effectiveness of this task is also taken into consideration.

#### ***Impact of Calorie and Nutritional Tracking: Calorie Tracking***

Let's summarize the effectiveness of calorie tracking as an impact of calorie and nutritional tracking features:

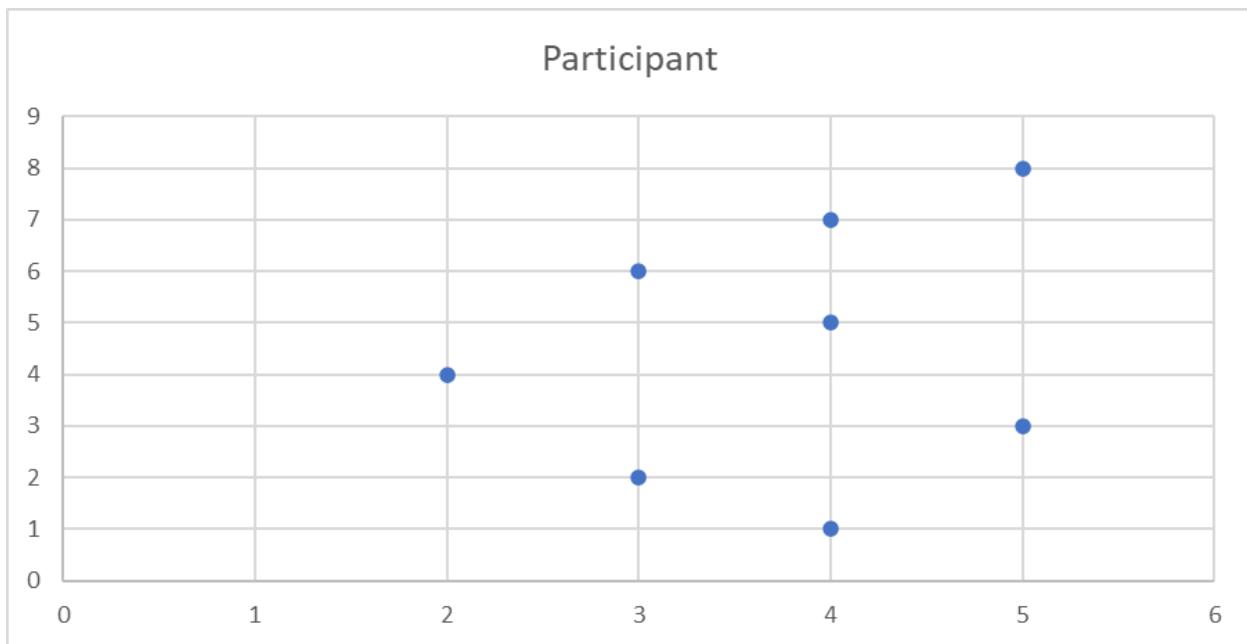


Figure 41: The Scattered representation of the effectiveness of calorie tracking for each Participant (on a scale of 0-5).

### **Impact of Calorie and Nutritional Tracking: Nutrient Awareness Improvement**

Let's summarize the improvement in nutrient awareness as an impact of calorie and nutritional tracking features:

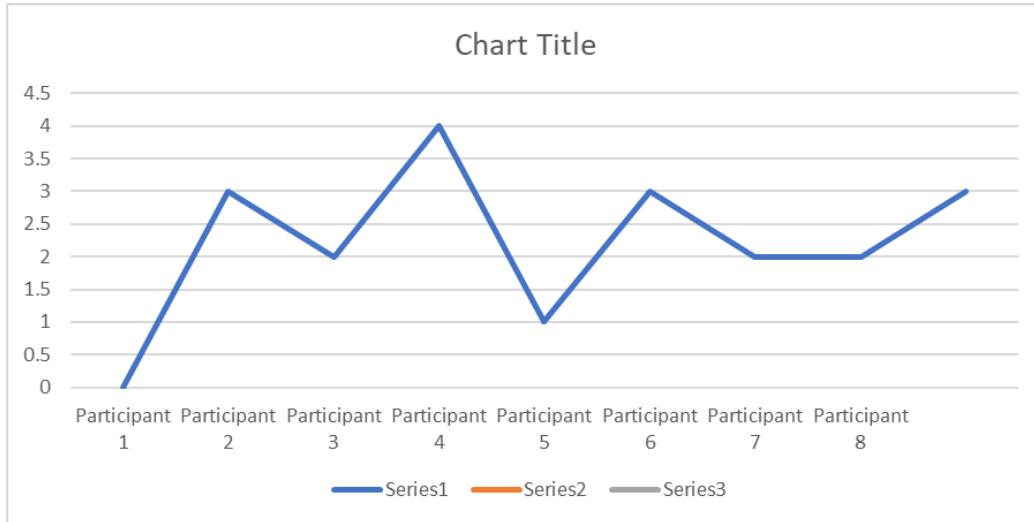
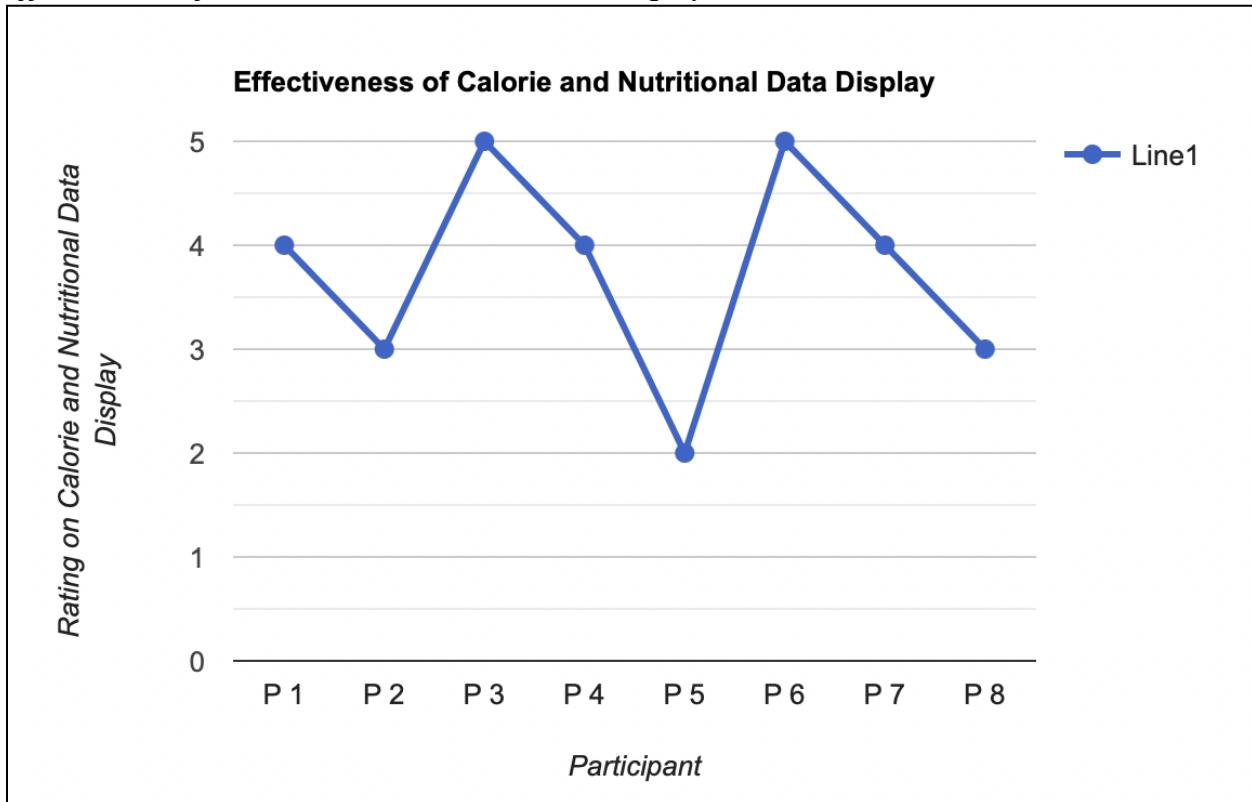


Figure 42: Representing the improvement in nutrient awareness for each participant (on a scale of 1-5).

### **Effectiveness of Calorie and Nutritional Data Display:**

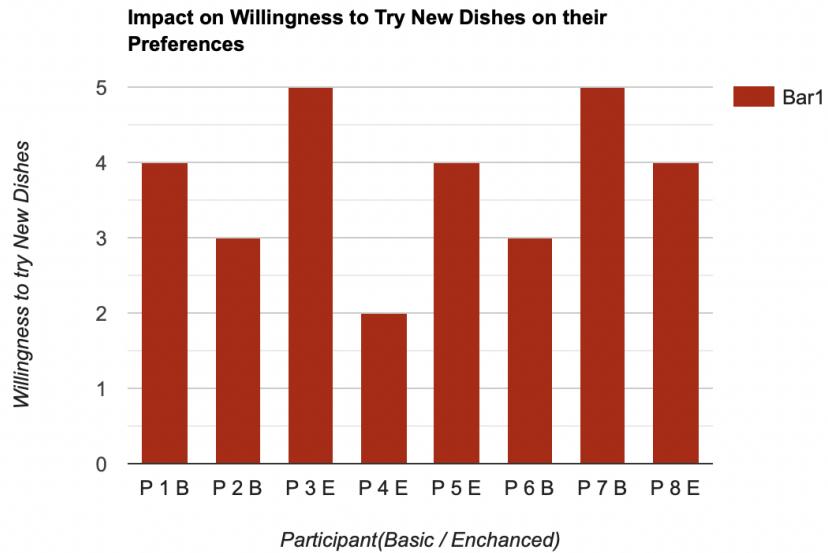


*Figure 43: Representing the effectiveness of Calorie and Nutritional Data Display for each participant (on a scale of 1-5).*

### Dietary Preferences Task:

Based on the preferences interfaces the key point which was collected is Willingness of Users to Try New Dishes

#### *Impact on Willingness to Try New Dishes on their Preferences:*



*Figure 44: Representing the Impact of willingness to try new dishes for each participant (on a scale of 1-5).*

### Demographic data

*Table 3: Demographic Data*

Participant	Age	Gender	Dietary Preferences	Nutritional Goals	Dietary Restriction/Allergies
1	32	Female	Vegetarian	Weight Loss	Lactose Intolerant
2	25	Male	Paleo	Muscle Gain	None
3	28	Female	Gluten-Free	Healthier Eating	Gluten - Intolerance
4	56	Male	Vegan/ Vegetarian	Healthy Maintenance	None
5	22	Female	Keto	Weight Loss with Lean Muscle gain	None
6	27	Male	All	Balanced diet	None

7	25	Female	Pescatarian	Healthier Eating	None
8	23	Male	Mediterranean	Lower Cholesterol	None

### **Thematic Analysis:**

Based on the data collected through interview sessions and the think-aloud method, a thematic analysis was conducted to identify common themes in the participants' answers. Here are the findings based on the data collected:

### **Substitute Ingredient Task**

Satisfaction with Ingredient Substitutions:

- Most participants expressed high satisfaction with the ingredient substitutions suggested by the FoodGenie app, rating them positively on the Likert scale.
- Themes related to satisfaction included improved meal variety, convenience, and discovery of new ingredients or recipes.

Impact of Ingredient Substitution Feature:

- Participants reported that the basic and upgraded interfaces allowed them to create meals aligned with their dietary preferences and nutritional requirements.
- Some participants found the upgraded interface more intuitive and user-friendly, resulting in better outcomes in terms of personalized meal planning.

### **Grocery List Task**

Effect of Personalized Grocery List:

- Participants in the experimental group (using personalized grocery lists) showed positive changes in their shopping habits and reduced food waste compared to the control group.
- Themes related to the personalized grocery list feature included increased efficiency, better organization, and improved ability to stick to dietary goals.

The usefulness of a Personalized Grocery List:

- The personalized grocery list feature was rated highly for its effectiveness in meal-related habits, such as meal planning and preparation.
- Participants appreciated the convenience, time-saving aspect, and ability to customize the grocery list based on their dietary needs and preferences.

## **Calorie and Nutrition Tracking**

Impact of Calorie and Nutritional Tracking:

- After utilizing the calorie tracking feature, participants reported increased awareness and understanding of their daily calorie and nutrient intake.
- Some participants mentioned making healthier choices and feeling more in control of their diet and nutrition.

Effectiveness of Calorie and Nutritional Data Display:

- Most participants found the calorie and nutritional data display on the FoodGenie app's recipe description page effective.
- Themes related to effectiveness included clarity, easy-to-understand information, and helpfulness in making informed decisions.

## **Dietary Preferences**

Impact on Willingness to Try New Dishes:

- Participants indicated that the interface design influenced their willingness to try new dishes or foods aligned with their dietary preferences.
- Some participants mentioned feeling more encouraged to explore new recipes and ingredients, resulting in culinary diversity.

Difficulties or Issues Encountered:

- A few participants reported encountering minor challenges, such as occasional interface lag or difficulty selecting specific dietary preferences.
- However, these issues were manageable and did not significantly affect the overall user experience.

By analyzing these common themes, the study gained valuable insights into the users' perspectives and experiences with the FoodGenie app, providing a basis for further improvements and enhancements.

## **Redefined Design**

Based on the observations and results of the evaluation, the FoodGenie app's design needs several modifications. The app could improve its personalized recommendations by providing more options and incorporating user feedback. Enhancing the app's ability to provide personalized recommendations based on their dietary preferences and nutritional goals would improve the overall user experience.

Secondly, we must expand the personalized grocery list feature to include information about where users can find specific ingredients in local stores. This feature would help users save time and effort in finding the ingredients they need to prepare their meals. Thirdly, the interface design needs to be optimized for different screen sizes to improve user-friendliness and ease of use. This modification would ensure that users have a seamless experience irrespective of their device.

Finally, the app could benefit from additional features or improvements that enhance users' ability to customize their dietary preferences and nutritional goals. The app could include options for users to set specific goals or track their progress toward achieving their nutritional goals. These modifications would help enhance the FoodGenie app's effectiveness in helping users meet their dietary preferences and nutritional goals.

## **Summary**

The Food Genie app is a recipe-finding application that aims to provide personalized recipe suggestions based on users' dietary restrictions, preferences, budget, and ingredient availability. It offers nutritional information, cooking tips, and user reviews to enhance the user experience. With a community-oriented platform, users can interact with each other, share recipes, and exchange culinary knowledge. The app caters to individuals with diverse needs and preferences, such as dietary restrictions, health-conscious users, home cooks, busy professionals, budget-conscious individuals, food explorers, fitness enthusiasts, and social food enthusiasts.

The design goals for the Food Genie app included accurate customization, comprehensive nutritional information, and user engagement. The design team refined the design goals based on the focus group results to include video instructions, improved recipe organization and saving abilities, enhanced nutritional information and calorie tracking with micronutrient tracking, evaluated pricing options based on user budgets, and added new features such as weight loss suggestions and region-specific recipes. In the app's development, we prioritized user-centric goals such as minimalistic design, accessibility, user security, and efficient customer support. The team created three personas to represent different types of users for the FoodGenie app based on input from focus group meetings. The initial design goals focused on providing a personalized user experience by catering to users' dietary restrictions, preferences, budget, and ingredient availability. The app aimed to offer comprehensive nutritional information, weekly/monthly grocery lists, and social interaction features for recipe sharing.

The design team created low- and high-fidelity prototypes using PowerPoint and Figma to refine and test the design goals. The team conducted a Wizard of Oz study to identify pain and enhance joy points. Based on the study, the app needs to provide better guidance on using the substitute ingredient feature and consider adding a search bar to make it easier for participants to find the substitute ingredient they need. We must enhance the app navigation buttons to improve

participant movement and provide easy and transparent access to the questionnaire. Furthermore, we must improve recipe filtering and sorting options to expand the recipe database and add suitable filter options based on participant preferences. We should also create a user-friendly recipe system that categorizes recipes according to cuisine type to simplify recipe management and meal planning.

Overall, the Food Genie app meets the design goals of providing a personalized and engaging experience for users with diverse needs and preferences. The evaluation reflects the quality of the human-centered design as it involves user research, testing, and refinement to ensure that the app meets the needs and preferences of the target users. To further enhance the app's design, the app needs to consider adding features that cater to the specific needs of each persona, providing better guidance on using the substitute ingredient feature, enhancing the app navigation buttons, and improving recipe filtering and sorting options.

## APPENDIX

*Table 4: Focus group Participants*

Session	Name	Age	Gender	Profession	Interests
Session 1	P1	29	Male	Project Engineer	Working out, Watching movies
	P2	24	Female	Student	Travel, working out
	P3	22	Male	Student	Singing and playing musical instruments
	P4	25	Female	Student	Cooking
Session 2	P5	24	Female	Ob-gyn Student	Outdoor Activities
	P6	23	Male	Student	Workout and Cooking
	P7	26	Male	Student	Dancing
	P8	27	Female	Software Engineer	Traveling, Reading

Table 5: Interview Q&amp;A for Focus Group Session 1

Questions/ Participants	P1	P2	P3	P4
1	I use the YouTube app to find recipes because it offers a vast selection of different recipes in one place. I like how easy it is to follow the videos that show me how to make the dish. Additionally, I like that there are multiple recipes for the same dish, and all the content is free. However, I don't particularly appreciate that there is no list of instructions provided alongside the video, no list of groceries to purchase and their quantity.	Cookd, Hebbars Kitchen and YouTube. They provide several options for choosing the recipes of my interest. There is nothing to dislike about them, except many advertisements.	I use Youtube and Instagram to find recipes. I find them easy to prepare and tasty.	I like to use youtube as it is convenient and easy to use. I like using it because I can find my preferable language, videos will be short duration with clear instructions and measurements.
2	I use the MyFitnessPal app to track my calorie intake and macro-nutrient ratios when trying to lose weight. Specifically, I focus on monitoring my daily intake of carbohydrates, proteins, and fats, which is easier to do using a weight scale and the app. I use this information to plan my meals for the week. However, I would like it if the app offered an easier way to track other essential micro-nutrients the human body needs.	I track it based on the labels provided on the packaging of each item I use for the recipe.	Now, I still need to track my nutritional intake. I tried to track it, but I failed.	I would not track nutritional intake, but I eat protein occasionally.
3	Although I can find recipes that fit my dietary needs and budget, I have not found an easy recipe that meets my calorie goals and is like what I grew up eating. I would like to create a recipe within my calorie limit that tastes the same as the dishes I am used to eating.	No, I faced no challenges finding the recipes that fit my needs and budget.	Yes, in the videos I have seen, I need help finding all the ingredients; if I find them, they are out of my budget.	No. Generally, I consume the food, which is my mother's and grandmother's recipes, and yes, they are in my budget.
4	Having an app that can provide personalized recipes. that meet my dietary and personal requirements would be incredibly helpful and make my life easier.	Using an app that meets my requirements is important as diet is essential.	It is very important for me to have an app to have specific dietary requirements	It can be very significant for individuals to use an app that meets their dietary requirements and personal preferences, especially if they have dietary restrictions or health concerns. This can make meal planning and grocery shopping much

			within my budget and available ingredients.	easier and more efficient. Additionally, using an app within their budget can be important for individuals looking to save money on grocery bills. Overall, having access to an app that meets one's dietary requirements, personal preferences, and budget can lead to a more positive and convenient eating experience. It can be very significant for individuals to use an app that meets their dietary requirements and personal preferences, especially if they have dietary restrictions or health concerns. This can make meal planning and grocery shopping much easier and more efficient. Additionally, using an app within their budget can be important for individuals looking to save money on grocery bills. Overall, having access to an app that meets one's dietary requirements, personal preferences, and budget can lead to a more positive and convenient eating experience.
5	Having an app that can quickly create personalized recipes is a great idea. I would use such an app, as it would allow me to interact with AI and provide the necessary input to create recipes for my favorite dishes based on my dietary and personal requirements. This approach would be more sustainable for weight loss or maintenance since users would eat the food they enjoy while staying within their caloric goals.	Yes, I would use it for sure. It is helpful for people like us, as students, to find the recipes quickly and do them.	Yes, if some recipe-finding app which full fills my requirements is there, I would love and use it.	I don't have personal preferences or needs, but a recipe-finding app could be useful for individuals looking for new and exciting meal ideas. Many recipe-finding apps are already available, but it could be popular and useful if your app offers unique features or a user-friendly interface. In terms of whether I would personally use the app, it would depend on the features and functionality offered by the app. Suppose the app provides a wide range of recipes tailored to different dietary requirements and preferences, allows for easy filtering and searching of recipes, and offers helpful features such as a meal planner and grocery list generator. In that case, I see myself using it regularly. Ultimately, the app's success would depend on how well it meets the needs of its users and how effectively it differentiates itself from existing recipe-finding apps.
6	Providing personalized recommendations based on a user's history would be helpful and save them time by eliminating the need to scroll through recipes that do not match their preferences. For example, I would prefer an app that shows me spicy food recipes rather than all recipes that	The personalized recommendation is important for every person as it varies based on personal preferences and body type (immunity and tolerance).	It will be very useful to have such an app recommending personalized dietary preferences.	I recommend jotting down the recipe in a book or any electronic device that is easy to use while cooking. So that you know your calorie intake per serving and can keep track of that. For instance, some recipes need just 3 to 4 tablespoons while using olive oil. If you can make a note of it would be helpful to keep an eye on how much amount of oil consumption you're

	contain spices, including bland recipes that I would not be interested in.			taking per day.
7	I typically don't save or organize recipes. Instead, I usually revisit recipes that I have previously tried and enjoyed. When searching for a new recipe, I look for ones with positive reviews and high views on the YouTube app, which is my go-to source for finding recipes.	They provide a save for later option to save the videos. And sometimes, I save it on my notes and use it when required.	I will organize them like veg, nonveg, salads, snack items, etc.,	Many recipe-finding apps offer a built-in feature that allows users to save recipes directly within the app. Users can create folders or categories within the app to organize their saved recipes according to their preferences. This makes it easy to access the recipes later when they want to cook a particular dish.
8	I am currently using the MyFitnessPal app to track my calories, but I would be interested in a recipe-finding app that can create personalized recipes for my favorite dishes that fit my caloric goals and are available for cooking time. I am willing to pay \$10-\$20 monthly for this service.	If it is a good one with all my needs in place, I'm ready to spend 100\$ per 2 months; again, it might change depending upon the app functionalities.	I would pay 50-60 USD if such an app is there.	I do not prefer using an app for a price. I cannot afford it and don't think it would be useful for a person with a price tag like me.
9	I want a recipe app that includes video and step-by-step written instructions. This way, I can watch the video for an overview of the recipe and then refer to the written instructions if I have any questions. Also, over time, if I cook the recipe multiple times, I prefer to have the option to quickly look up specific steps in the written instructions rather than scrolling through the video to find what I might have missed.	I prefer both step-by-step instructions and videos. They help me avoid errors in making the dishes I love to eat.	I prefer videos than step by step instructions because I can have a clear idea of how to prepare my food.	Both. Step-by-step instructions can include tips and tricks for preparing the dish that may be obscure from the video alone.
10	It would be helpful if the app could generate a grocery list with the necessary quantities at the end of each week based on the selected recipes. The app should have a feature to create recipes similar to the user's favorite foods while adhering to their dietary requirements and available cooking time. I would like a feature in the app that allows me to enter my current and target weights and track my progress over time. It would be better if the app could recommend recipes to help me reach my goals.	One specific feature I would like to see in an app like this is "zero advertisements."	An app with this feature, like giving personalized dietary recipes, would help a lot.	The ability to filter recipes based on specific dietary requirements, such as gluten-free, vegan, or low-carb, can be very helpful for users with specific needs.

Table 6: Interview Q&amp;A for Focus Group Session 2

Questions/ Participants	P5	P6	P7	P8
1	I Use the YouTube app to find recipes, I like how it shows everything I need clarification on, but I wouldn't say I like the advertisements.	I don't specifically use any apps for finding my recipes; however, sometimes YouTube is my option. Most of the time, it's either I don't have the ingredients they suggest, or it's above my expenses.	I usually watch YouTube and Instagram for interesting recipes. Some channels and profiles easily provide recipes, and I can prepare them quickly. Also, I can find it in my preferable language.	I like to use YouTube to find recipes because the procedure is easy to follow in a video rather than a text format.
2	I don't usually track my nutrition intake but sometimes use a fitness app.	I don't regularly check my nutrition intake or carbohydrates, but I am trying to control my sugar intake and fats. So, I use ingredients without more fat and sugar percentage within my reach.	I usually don't track my nutritional intake. But I try to take as much protein as possible daily.	I typically use hand-method when tracking my nutritional intake. For example, two palm sizes of protein, one hand cupped the size of carbohydrates.
3	I do find recipes hard to suit my taste when I am on a diet as I am a person who loves food, but when I want to be on a diet, I need help to do so.	Sometimes, it's very difficult to find a good recipe. Even if we find one, at least one item will be missing from my side, so I end up buying it for one-time use. It leads to more expenditure, and even some ingredients they suggest to use are not available in my surroundings.	There are times when I am so hungry I need recipes that will be prepared in less time. Very few apps in providing me with these recipes. I am not an experienced cook, and I find it challenging to prepare complex recipes that require advanced culinary skills.	That happens most of the time, that we find a recipe that looks appealing, but when we look at the process, it's tedious to prepare. For some recipes, ingredients are easy to find, but they are expensive, and you have to go to stores that are quite far. For instance, for certain soups, we need different types of soya sauces available in certain stores, and since they are imported to your country, they even turn out to be expensive.
4	I don't know about this because this was the first time I used one, specifically for dieters' food apps.	It will be very useful if I find an app that will use ingredients I have and within my budget. I will use it on a daily basis.	I think using an app that fits within one's budget can also be significant, as it can help individuals manage their expenses and reduce food waste. An app that offers budget-friendly recipes and helps individuals plan their meals can be especially helpful for those on a tight budget.	It is very important for me to have something like this handy because, in the fast-paced world, it is difficult to plan out everything by yourself, and this is one major reason that our health has taken a back seat. If I had an app like this, home-cooked meals would be very easy to

				keep up with, which often is a task, and we end up ordering from outside.
5	It is very interesting to have an app where I can find recipes easily. As a foodie, it looks great from my point of view.	It's a very good idea if it works efficiently and will help all gym lovers and foodies to try new recipes. It's impossible to find new recipes.	A well-designed recipe-finding app that offers personalized recommendations based on one's dietary requirements, preferences, and budget can be very useful for individuals looking to plan their meals and discover new recipes.	This app seems to be interesting as there is AI involved. I would use it because it would provide better suggestions than apps that don't use AI.
6	I would recommend having cooking videos with high quality by recommending the videos based on our searched videos	It would be better that according to my preferences. And for cooking skills, an app can suggest recipes; then I will definitely give it a try.	Personalized recipe recommendations based on dietary preferences, cooking skills, and previous recipe choices can be a valuable feature for a recipe-finding app, offering a tailored and efficient approach to recipe searching that meets the individual's specific needs and tastes.	Personalized recommendations are the best for the daily diet. This is simply because everyone has different health goals concerning the health conditions that one is facing. A person who has diabetes cannot have a diet of a person who isn't having the same problem and vice-versa. Any app should focus on this as this would be crucial in shaping anybody's health.
7	I usually download the recipes I want to follow further and organize them by naming them by categories.	I would love to organize according to the taste of food and nutrient intake.	I prefer to save recipes on recipe-finding apps in a note-taking app such as Evernote or OneNote. I can copy and paste the recipe into a note and organize their notes by category or date.	I would like to organize and save them under different categories. Example, cuisine, veg, non-veg, vegan.
8	I can spend 100\$ on apps that give me nutritional recipes.	I would like to pay 10 USD per month if I find an app that works according to my preferences and the ingredients I have.	I prefer a free or low-cost app that offers basic recipe-finding features and tools, such as a search function and the ability to save and organize recipes.	I would love it if such apps were available for free, but since it's a lot of work to put in, I would pay if the price would be between 40\$ to 50\$ per year.
9	I would like it with instructions and videos, as it would be easy to keep ingredients aside first and then cook by watching the videos.	I would love both ways, that's instructions along with a video of cooking because it's more understandable, and I can simply watch and listen to instructions so that I can concentrate on cooking.	I prefer recipes with both step-by-step instructions and videos. Videos provide tips and tricks on cooking techniques, making it easier for individuals to improve their cooking skills. At the same time, step-by-step instructions provide a detailed and structured approach to cooking,	I would prefer to have instructions in a video format and ingredients and measurements in text format. This is simpler to follow without any confusion.

			with clear instructions on the ingredients needed and the steps involved in the cooking process.	
10	Please add suggestions for people who desire to lose weight along with the calorie counts of the food we will consume.	I think adding features like food according to the regions they are using the app Or providing an option to select the place or country so that app can provide recipes for that particular place.	Ingredient Substitutions, Nutrition Information, and Cooking Timers are some features that could be useful.	The proposed features are unique from the regular ones. I found ingredient availability very useful because it reduces half of the stress behind cooking.

*Table 7: Ingredient Substitution Satisfaction*

Participant	1	2	3	4	5	6	7	8
Satisfaction	4	3	5	2	4	3	4	5

*Table 8: Impact of Ingredient Substitution: Meal Preparation Accuracy*

Participant	Basic Interface	Enhanced Interface
1	80%	90%
2	70%	85%
3	95%	95%
4	60%	75%
5	85%	88%
6	75%	80%
7	90%	92%
8	100%	98%

*Table 9: Effect of Personalized Grocery List: Shopping Habit Impact*

<b>Participant</b>	<b>Impact on Shopping Habits (Likert Scale)</b>
1	5
2	4
3	5
4	3
5	4
6	3
7	4
8	5

*Table 10:Effect of Personalized Grocery List: Food Waste Reduction*

<b>Participant</b>	<b>Food Waste Reduction (Yes/No)</b>
1	Yes
2	No
3	Yes
4	Yes
5	No
6	Yes
7	No
8	Yes

*Table 11:The usefulness of a Personalized Grocery List*

<b>Participant</b>	<b>Rating of Personalized Grocery List Feature</b>
1	4
2	3
3	5
4	2
5	4
6	3
7	5
8	4

*Table 12:Impact of Calorie and Nutritional Tracking: Calorie Tracking*

<b>Participant</b>	<b>Effectiveness (Likert Scale)</b>
1	4
2	3
3	5
4	2
5	4
6	3
7	4
8	5

*Table 13:Impact of Calorie and Nutritional Tracking: Nutrient Awareness Improvement*

<b>Participant</b>	<b>Improvement (Likert Scale)</b>
1	3
2	2
3	4
4	1
5	3
6	2
7	2
8	3

*Table 14:Effectiveness of Calorie and Nutritional Data Display*

<b>Participant</b>	<b>Rating on Calorie and Nutritional Data Display</b>
1	4
2	3
3	5
4	4
5	2
6	5
7	4
8	3

*Table 15:Impact on Willingness to Try New Dishes on their Preferences*

<b>Participant</b>	<b>Interface Design</b>	<b>Willingness to try New Dishes</b>
1	Basic	4
2	Basic	3
3	Enhanced	5
4	Enhanced	2
5	Enhanced	4
6	Basic	3
7	Basic	5
8	Enhanced	4

### **Interview Questions**

1. How satisfied were you with the ingredient substitutions suggested by the FoodGenie app?
2. Does the "ingredient substitution" feature in the app improve your ability to prepare a meal that meets your dietary preferences and nutritional needs?
3. Does the personalized "grocery list" feature affect your shopping habits and food waste compared to not using this feature?
4. How useful is incorporating a personalized "grocery list" feature in the FoodGenie app in meal planning and preparation routines?
5. How did the integration of calorie and nutritional tracking on the recipe description page affect your ability to monitor your daily calorie and nutrient intake?
6. Did you find it practical to have a view of calorie and nutritional data on the FoodGenie app's recipe description page?
7. Does this interface design impact your willingness to try new dishes or foods that meet your dietary demands and preferences?
8. Did you encounter any difficulties or issues while using the FoodGenie app during the tasks? If so, please describe.

Table 16: Results of all participant answers

Question/ Participants	1	2	3	4	5	6	7	8
1	Satisfied with ingredient substitutions.	The feature improves meal preparation for dietary needs.	The personalized grocery list reduces waste and improves shopping.	Saves time and effort in meal planning	Calorie and nutritional tracking helps monitor intake	A practical view of data on recipe pages.	Interface design encourages trying new dishes.	No difficulties were encountered using the app.
2	Very satisfied, useful suggestions for the Paleo diet.	Yes, easier to find recipes that meet dietary preferences .	Improved shopping, less food waste with personalized grocery list.	Incredibly useful, streamlines meal planning and preparation.	Very helpful for monitoring intake and meeting goals.	Practical, aids in tracking and making informed choices.	No impact, app helps discover new recipes within preferences.	No difficulties, app was user-friendly and easy to navigate.
3	Overall satisfaction, especially for gluten intolerance.	Yes, the feature helpful in preparing meals according to preferences .	Personalized grocery list feature positively affected shopping habits and reduced food waste.	Incredibly useful for meal planning and preparation routines.	Very helpful in monitoring daily intake and making informed adjustments.	Practical and informative for making informed decisions.	Yes, app's design encourages trying new dishes within dietary preferences.	No significant difficulties, but some usability issues on small screens. Optimization for different screen sizes would be helpful.
4	Overall satisfied, with a few instances of suggested substitutions	Yes, the ingredient substitution feature is helpful in	Personalized grocery list feature positively affects	Very useful in meal planning and	Very helpful in monitoring daily	Practical and informative, providin	The app makes it easier to find and prepare	No significant difficulties, only minor glitches

	not being ideal.	meeting dietary preferences and needs.	shopping habits and reduces food waste.	preparation routines, saving time and offering tailored suggestions.	intake and tracking nutrition goals.	g valuable information at a glance.	new dishes that meet dietary demands and preferences.	that didn't hinder task completion. Overall, the app is user-friendly and intuitive.a
5	Quite satisfied, found low-carb alternatives for my Keto diet.	Yes, helped meet dietary preferences and nutritional needs with substitutions.	Yes, improved organization, reduced unnecessary purchases and food waste.	Incredibly useful, saved time and money in meal planning and preparation.	Very helpful in monitoring daily calorie and nutrient intake.	Very practical, easy to assess recipe macros for dietary preferences.	Increased willingness to try new dishes that meet dietary demands.	No difficulties, app was user-friendly with clear instructions .
6	Quite satisfied, varied options for flexitarian diet, some substitutions pricey.	Yes, helped find suitable ingredients , informed decisions on nutritional needs.	Reduced food waste, efficient shopping with personalized grocery list.	Incredibly useful, aided meal planning and prevented overspending.	Helpful for monitoring calorie and nutrient intake, informed choices.	Practical , aided informed decision s and tracking progress .	No impact, always open to new options, interface aided exploration.	Occasional slow loading, pricey substitutions challenging for budget.
7	Quite satisfied, practical options, some substitutions pricey.	Yes, customizable options, are helpful for dietary needs.	Reduced waste, efficient shopping with personalized grocery list.	Very useful, saves time and provides organization.	Helpful for monitoring intake, informed choices.	Practical , aids comparisons and informed decision s.	Increased willingness to try new dishes, interface aids exploration.	Minor glitches causing freezing/crashing, quickly resolved.

8	Quite satisfied, suitable alternatives for dietary needs.	Yes, a convenient feature for finding suitable substitutions.	Reduced waste, organized shopping with personalized grocery lists.	Extremely useful, saves time and avoids unnecessary purchases.	Helpful for monitoring intake and meeting nutritional goals.	Practical, aids informed decision s on ingredient choices.	Yes, user-friendly interface encourages exploration of new foods.	No difficulties, app was user-friendly and tasks completed without issues.
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