1.1 Problem Statement and Proposed Idea

In daily life, many people face challenges managing dietary restrictions due to reasons such as weight-related issues, lactose intolerance, or veganism. Existing mobile applications in this domain have different limitations, ranging from excessive details to cluttered features or slow performance. These solutions lack a straightforward approach and fail to offer a focused, efficient, and user-friendly application solely for identifying labeled ingredients as per requirements without providing unnecessary information.

The proposed solution involves designing and developing a specialized mobile application that focuses solely on the specific problem of identifying certain items and ingredients but will help in a diverse way. The application will be intuitive, efficient, and accessible, especially for users with limited technological familiarity. The goal is to provide users with a straightforward tool that caters to their specific informational needs, such as discerning sugar content or identifying allergens.

1.2 User Requirements

The user requirements focus on personalization, inclusivity, ease of use, and real-time functionality.

   i. <u>Specific Needs for Mobile Application:</u> Users require an application that can offer a wide range of alerts, from tracking glutens to allergic items. Features should consider customized options.
   ii. <u>Design Elements and User Interface:</u> The application is expected to be user-friendly, with less colorful design, customizable notification alerts, and straightforward interfaces.
   iii. <u>Ideal App Functionalities:</u> Users desire personalized profiles, detailed scanning options, tracking nutritional intake, and receiving real-time allergen alerts. A dedicated list for individual user requirements or preferences is also preferred.
   iv. <u>Visual Presentation and Usability:</u> Visual presentation is crucial, along with well-organized interfaces, clear icons, and a minimalistic design. Color-coded categories and other visual cues are also suggested for quick identification.
   v. <u>Prioritizing Features</u>**:** Essential features include the ability to handle dietary restrictions and conditions, search with a photo, receive real-time allergen alerts, customize daily meal plans, and share dietary preferences. Scanning and real-time translation of ingredient information are considered necessary.

2.1 Iteration 1

2.2 Design Goal

The main objective of this design iteration is to establish the foundation of user interface for our application and implement the basic structure. In this iteration, our emphasis will be on addressing the research questions related to fundamental requirements rather than delivering outputs related to the detailed user requirements obtained in phase 2 of our project work.

We Need to Find Out

   i. <u>Functionality:</u> We will try to find out all the necessary functions that our target users require initially. This includes the ability to sign in, sign up, manage profiles, and scan food items for dietary information.

ii.   Usability: The app should be easier to navigate and use, even for those with limited technological expertise.
iii.   Clarity: We will try to build as if the app's outputs, especially after scanning a product, easy to understand and actionable for users with dietary restrictions.

Research Questions and Design Decisions

In this first iteration, the three research questions outlined the core structure of the application by influencing the various aspects of the application's design, ensuring it meets the real needs of the end-users. Detail of research questions are added to Appendix A.

i.   Understanding Daily Challenges: While trying to work with the User Experience Design, the understanding of users' challenges will guide the development flow. It will be ensured that, the design should offer a UX design that streamlines access to crucial information, such as allergen warnings or ingredient lists rather than unwanted data.
ii.   Evaluating Existing Apps: After assessing the limitations of the existing application, and market gaps for the improvement, we tried to gain detailed insights about how to avoid those shortcomings, similar pitfalls, and sluggish performance.
iii.   Identifying Key Features and Design Elements: In this design we will try to implement two key features, the ability to create a customized alert list and the functionality to scan products to trigger those notifications. These two will focus on establishing a foundation for user experience. Though we also anticipate to gain insights into non-functional requirements.

2.3 The Prototype

While we were trying to design our application, we tried follow some design rules, like:

i.   User-Centered Design: We tried to prioritize user needs, creating an intuitive and engaging experience, considering users' feedback from part 2.
ii.   Gestalt Principles: We followed Gestalt principles like proximity and similarity, where the layout and information were organized coherently for enhanced user understanding.
iii.   Consistency: We tried to follow uniformity of color and typography underscored the importance of design consistency, aiding users in easy navigation.

We used Figma to deliver our low-fidelity prototype design in Iteration 1, aiming to establish a robust foundation, emphasizing on simplicity, and core application structure to allow rapid iterations and efficient modifications after testing and feedback.

i.   Fidelity Levels: We deliberately chose low-fidelity approach to establish a clear groundwork for subsequent iterations.
ii.   Usability Testing and Interactivity: We used Figma to offer interactive protype design to our users before developing it and this allowed users to understand the application flow and basic functionalities from the "Preview" option and they provided valuable insights into the early stages about design elements, the effectiveness of navigation structures, and user comprehension.
iii.   Iterative Design: We tried to align our prototype with an iterative design process so that it can undergo iterative refinements based on feedback. This approach ensured that user interface and functionality improvements will be systematically integrated.

The design is attached to Appendix A.

2.4 Evaluation

Evaluation Methods and Justification

The evaluation method was a mixture of Semi-structured interview and Cognitive Walkthrough because I had the interview with one of my friends who had working experience in IT industry and we could avail several advantages of both of the methods. It offered a qualitative depth of understanding with the prototype's strengths and weaknesses.

 i. <u>Comprehensive Exploration and Targeted Feedback:</u> Because of the hybrid method, we could avail in-depth exploration, providing a platform for targeted feedback tailored to the unique needs and challenges faced by our user, "Y." This exploration ensured the app's direct target user's relevant feedback.

 ii. <u>Adaptive Conversation and Insightful Suggestions:</u> The hybrid approach offered us flexibility of adaptive conversation and enabled us to delve into deeper concerns and areas of confusion, such as the recommendation to use Google ID for a short Log In.

 iii. <u>Real-World Application and Identifying Usability Issues:</u> Y's interaction gave us real-world perspective aided in identifying potential usability issues.

 iv. <u>Direct Impact on Design Iterations:</u> Y raised multiple concerns like color scheme, clearer instruction, feature labeling and so I believe, this method will have a direct impact on design choices in the subsequent iteration.

 v. <u>Leveraging Qualitative and Structured Insights:</u> The hybrid approach seamlessly blended the qualitative depth of the interview's targeted feedback with the structured insights and ensured a more complete and nuanced evaluation that considered both subjective user experiences and specific usability challenges.

2.5 Results

Following the interview with Y, several observations were noted, and Y provided a series of suggestions.

 i. <u>Understanding Daily Challenges:</u>
   ➢ <u>First Impressions:</u> We had a clean and straight cut interface and functionalities. Y appreciated it. He suggested to change the color grade.
   ➢ <u>Sign-Up Process:</u> There should be more than one option to sign up. And why Sign In and Sign Up were necessary, we needed to clarify it.
   ➢ <u>Scanning Feature Expectations:</u> The bar code image was little bit confusing as we could scan both barcode and ingredient list.

 ii. <u>Evaluating Existing Apps:</u>
   ➢ <u>Scanning Feature Expectations:</u> While going through the demo, Y hoped that, the image processing would be faster and he also suggested that, there could be more than one option for notification or alert like audio option.
   ➢ <u>User Manual Option:</u> There can be an option as application usage guidance for the new users.

 iii. <u>Identifying Key Features and Design Elements:</u>
   ➢ <u>Post-Scan Information:</u> It was appreciated that, this feature aligned with the users' expectations while providing relevant information.

> ➢ Adding Dietary Preferences and Complete Preference List This feature also fulfilled the most important requirement which was customized dietary alert list. But at the same time, he showed his confusion about users' hesitation about not having clear idea regarding the 'Add item' instruction. Y advised that, there should be a complete view of previously saved preferred dietary alerts.

Data Analysis Process

i. Semantic and Thematic Analysis: Using semantic analysis we tried to extract information explicitly from Y's feedback and interview. At the same time, the thematic analysis, we tried to have themes and patterns from the comments and conversation with Y regarding our application.

ii. Categorization According to Research Questions: The insights acquired from the interview were systematically categorized based on the three research questions. This offered us to construct a structured examination of how each piece of feedback related to the overarching objectives. We also integrated each specific piece of information, advice, or observation with its corresponding research question.

iii. User-Centric Considerations: We emphasized on the importance of understanding Y's own perspective, preferences, and potential areas of confusion and employing user-centric lens. These two attitudes ensured that the analysis was not solely dependent on Y's perspective, but also represented common users' viewpoints.

3.1 Iteration 2

3.2 Design Goal

For the design iteration 2, our primary goal will be enhancing user engagement and functional clarity by implementing specific feedback and observations obtained during the initial phase of our design and the issues which were discussed as findings of part 2, of our project development work. During iteration 1, our focus revolved around core functionalities and design of our application, daily challenges, evaluation of existing apps and identifying key features to implement. At this point of our design phase, we focus on creating a fully functional and user-friendly app by incorporating various functional and non-functional requirements.

We Need to Find Out and Implement

i. Home Screen Design Adjustment: Exploring how changing the color grade and incorporating animations on the home screen, as well as other pages, influences user perception and engagement.

ii. Sign-Up Process: Assessing the user experience of implementing multiple sign-up options and the clarifying the importance of Sign In/Sign Up.

iii. Refined Scanning Feature: Investigating user perceptions regarding the clarity of options for both barcoding and ingredient list scanning.

iv. User Guidance and Instructional Clarity: Measuring the effectiveness of the complete user manual option for the new user guidance. Assessing if clarity around 'Add item' instructions reduces confusion among the both old and new users.

v. Complete Preference Access: Determining user response to accessing a complete list of saved dietary alerts.

vi. <u>Iterative Design Impact Assessment:</u> Analyzing how adjustments made from phase 1 feedback positively influence user experience. Measuring the overall impact of iterative design decisions on user satisfaction.

Research Questions and Design Decisions

Now, our research questions related to first impression, overall design and layout will guide us to prioritize visual appeal based on user preferences and feedback and to ensure visually engaging experience. The question on layout and navigation will help us to refine app's layout, making it more intuitive and user-friendly for seamless navigation. Insights from user responses will guide us to improve the clarity and appeal. We have questions about scanning options. We hope the answers will help us to address clarity issues, ensuring users find it straightforward to scan items using camera or gallery options. Research question related to create, to manage and to avail alert feature, will guide us, to provide clean design for multiple alert options and complete list of alert items. We will design to make Sign In and Sign Up options more flexible according to the research question. We have also question related to confusing feature, satisfaction level, color scheme and font choice, and visual comfort. We hope, these questions will directly affect the design choices which are related to non-functional requirements. We will try to enhance adaptability and user satisfaction, and to overcome the shortcomings of previous application. Detail of Research Questions is attached to Appendix B.

3.3 The Prototype

The design rules and concepts we followed:

i. <u>Top-Down and Bottom-Up Design:</u> We tried to maintain the design flow, reflecting both overarching structure (top-down) and detailed elements (bottom-up).

ii. <u>Pop-Out Effect and Font Size and Color Perception:</u> Different and effective use of color and contrast on actionable items, enhanced the users' navigation capability through visual prominence. We utilized font sizes and colors to improve readability and emphasis on critical areas.

iii. <u>Gestalt Laws:</u> We utilized Gestalt principles, grouping related items logically, evident in the organization of sign-up and sign-in form fields.

iv. <u>Recognition vs. Recall:</u> We used common icons, symbols, and labels such as the camera icon for photo capture for users aiding user recognition over recall,

v. <u>Affordance:</u> UI elements suggested functionality, exemplified in clear text fields for input and distinct buttons for submission.

The design is attached as Appendix B.

Prototype Characteristics:

To complete the prototyping, we used Figma to design and explored design space, considered various interaction and technological possibilities and tried to do usability studies.

i. <u>Fidelity:</u> We implemented the high-fidelity nature of the prototype, with detailed UI elements and carefully crafted color schemes, mirrors the envisioned final product.

ii. <u>Integration of Visual Design and Interactivity:</u> We purposefully designed for interactivity, the inclusion of buttons and forms within the prototype to allow

meaningful user engagement during testing, pivotal for assessing the practicality and intuitiveness of the application's features.

iii. Evolution: The prototype's detailed nature indicates integration into an iterative design process, based on feedback from Iteration 1 and reflects a commitment to continuous improvement and adaptation.

iv. Feature Refinement: The prototype allows a deeper dive into features introduced in Iteration 1, refining and polishing them based on real user interaction data, making them more attractive and user-friendly.

3.4 Evaluation

Evaluation Methods and Justification

For iteration 2 design evaluation, we used again user-centered evaluation technique. But this time, we have chosen Survey with Google Form technique eliciting detailed user feedback. Among the survey participants, one of them was Computer Science student and other three were from different background. That's why I consider this approach as a robust one because I could conduct usability testing both for techy and non-techy person. I used it because of:

i. Usability Testing: Though we couldn't closely observe their behaviors, but we had diverse range of task and questions which helped us to mirror the objectives of usability testing. This method ensures direct insight into users' ability.

ii. Qualitative Data Collection: My interview questions were designed to encourage participants to provide detailed, qualitative feedback on their experiences. So, this survey aligned with qualitative data collection and by collecting the users' perceptions, preferences, and challenges.

iii. Analysis of Interviews: After collecting survey responses we tried to extract meaningful information, suggestions, observations, it aligned with the analysis of interviews as a method for gaining deeper understanding and identifying common threads in users' feedback and I could draw actionable conclusions.

3.5 Results

We received satisfactory feedback on deign and layout for visual appeal along with intuitive easier navigation. It had positive feedback for providing a seamless user experience, with no reported confusion during use. The scan function seemed straight forward, simple and clear, while the alert feature was useful and personalized. The sign up process was easier with social-media option. Adding alert items were effective.

From the evaluation we had some observations and suggestions like, adding tagline to clear the functionalities on the home screen, including color choosing option, and editing option for the list like delete or modify. One also advised us to add forum options where users may share ideas.

Data Analysis Process

We used. xl sheet to collect data from the google form.

i. Quantitative Analysis: We analyzed numeric ratings to identify trends and overall satisfaction levels. Like average ratings were computed for visual appeal.

ii. Qualitative Analysis: Open-ended comments provided valuable qualitative insights. Responses were categorized based on recurring themes and specific suggestions.

iii.   <u>Individual Participant Profiles:</u> Each participant's responses were analyzed individually to understand their unique perspectives. This helped in identifying outliers, specific pain points, and areas where participants had consistent feedback.

4.1 Iteration 3

4.2 Design Goal

This iteration is quite straight forward. We will solve the minor issues, which were suggested while evaluating the design in iteration 2.

Research Questions and Design Decisions

The research questions are related to color choice, tagline, and alert list editing options. So, these will affect some easy feature modification. We are considering forum addition as future work.

4.3 The Prototype and Evaluation

The prototype is similar to iteration 2. But now we have an option, where users can choose their own color scheme and can edit as well as delete the alert list. The tagline is also different.

We have semi-structured interview with the same person we had in iteration 1. As we had slight feature modification, we thought it would be easier to have both expert point of view as well as users' perception. The design is attached to Appendix C.

4.5 Results

According to semi-structured interview discussion, the prototyping design was at satisfactory level for this course work. We had some more observations, but we consider them as future work.

5.1 How well do you think that your design is able to solve the problem?

From my perception, the problem I mentioned at the beginning of this report, the problem I wanted to solve related to dietary restriction, my design can address it, by providing a specialized mobile application. The features like simplicity, user-friendly interfaces, personalization option, perfectly align with the identified user requirements. We have used iterative design process which involved user feedback and evaluation and this approach showed a commitment to refining and improving the application based on real-world user experiences. The incorporation of features such as customized alert lists, real-time allergen alerts, and a scanning function for ingredient identification directly targets the users' specific needs.

5.2 How would you improve it further?

We have some ideas about future improvement like:

i.   <u>Educational Component:</u> We will try to incorporate some daily tips or advices related to chosen dietary domain to increase nutritional knowledge and encourage healthier choices.
ii.   <u>User Community:</u> This feature was suggested during iteration 2 review. So, we can implement them as community feature where users can share experiences, recipes, and tips, fostering a sense of community among individuals with similar dietary needs.
iii.   <u>Enhanced Personalization:</u> We may provide more customization options for alerts and preferences, allowing users to tailor the app more closely to their unique requirements.
iv.   <u>Gamification:</u> To increase user engagement, we can introduce gamification elements.

5.3 How is the design different with respect to possible existing solutions?

The design is different from existing solution, for many reasons:

i. <u>Simplicity and Focus:</u> Excessive information have been avoided and it offers a straightforward and user-friendly experience. It concentrates solely on the task of identifying labeled ingredients based on user requirements.

ii. <u>Personalization:</u> The emphasis on personalized profiles, customized alert lists, and tailored dietary preferences sets the application apart. This ensures that users can manage their dietary restrictions in a way that aligns with their individual needs and preferences.

iii. <u>Efficiency in Scanning:</u> The real-tile allergen and food ingredient alerts, are the exclusive features and contributes to address the specific challenges faced by users managing dietary restrictions.

6. What did you learn about the design process?

I can start my learning diary with this one that, effective problem-solving begins with a clear understanding of the problem. And we also need to identify the shortcomings of existing applications before starting the design.

For designing the solution, framing research questions and making informed design decisions are second most important things to do. This pre-design phase sets the course for a targeted and purposeful approach, which ensures every step contributes to solving the identified problem.

While we design either any application or any solution, we should consider a user-centric approach. Users are needed to be at the core of the design process and we must understand their challenges and preferences, using these insights to steer design choices. It's better to have prototyping and iterative design while starting with low-fidelity prototypes and progressing iteratively to high-fidelity designs allows for continuous refinement based on feedback

We may use diverse evaluation methods, including interviews, walkthroughs, and surveys, and all of them are unique and important in their own way. Analyzing both quantitative and qualitative data provides a comprehensive understanding of user satisfaction and areas for improvement. Then we must derive insights, extract meaningful patterns, themes, and specific suggestions from user feedback guides design refinements and improvements. We should keep in mind that; continuous improvement is foundational. The initial design has never been final and it must encourage planning for future work.

Different features should be highlighted, for different design and solution but features those differentiate the design from existing solutions is essential. Focusing on simplicity, personalization, and addressing specific user challenges sets the solution apart.

Above all, maintaining alignment between identified problems and proposed solutions is crucial. Each design decision, evaluation, and future consideration should directly contribute to solving the initially identified problem, ensuring a focused and effective design.

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