# SAIN: AI-Powered Food Recommendation System

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*Abstract*— In today's digital age, mobile applications play a pivotal role in enhancing various aspects of daily life, including food exploration and recommendation. This research focuses on the design and evaluation of the Sain application, a mobile platform prototype aimed at providing users with personalized food recommendations based on their preferences and location. The study adopts a user-centered design approach, incorporating principles of minimalist design and lean methodology to create an intuitive and efficient user experience. Key design decisions, including the implementation of a Single Food Recommendation System and streamlined navigation pathways, are informed by user feedback and usability testing. The effectiveness of the Sain application is evaluated through a combination of qualitative and quantitative measures, including user satisfaction ratings and usability metrics. The findings demonstrate high levels of user satisfaction and engagement with the application's core functionalities, highlighting its potential to improve food exploration and decision-making processes. This research contributes to the growing body of literature on mobile application design and provides valuable insights into the development of user-centric food recommendation platforms.

*Index Terms*— prototyping, user-centric, wireframing

## I. INTRODUCTION

In an era characterized by the pervasive influence of technology in various aspects of daily life, the realm of food consumption and recommendation has also experienced a digital transformation. Mobile applications dedicated to food recommendation have emerged as powerful tools for users seeking personalized dining experiences tailored to their preferences and dietary needs. Among these applications, the Sain application stands out as a promising platform designed to connect users with nearby eateries and provide curated food recommendations based on user preferences and social interactions.

### A. Background of the Problem

Despite the proliferation of food recommendation applications, there remains a need to critically evaluate their efficacy in meeting user expectations and enhancing their dining experiences. While features such as real-time trending recommendations and interactive random wheel selections offer enticing possibilities, the extent to which they effectively engage users and fulfill their needs requires empirical investigation. Thus, this study seeks to address this gap by systematically evaluating the usability, functionality, and user satisfaction with the Sain application's features.

### B. Hypotheses

This research aims to test the following assumptions:

- Adding a Trending Near You feature to the Sain application will enhance user satisfaction by providing users with real-time insights into popular food choices in their vicinity, leading to a perceived improvement in the relevance and usefulness of the recommendations.
- Implementing a one-at-a-time food recommendation approach in the Sain application will improve user satisfaction by simplifying the decision-making process and providing users with a more focused and personalized experience, compared to presenting multiple options simultaneously.
- Introducing a random wheel feature in the Sain application to provide additional food options upon user request will enhance user engagement and satisfaction by introducing an element of surprise and excitement, resulting in increased user exploration of food choices and overall enjoyment of the recommendation experience.

### C. Personas

In this section, vivid and relatable user personas are presented to provide a tangible representation of the diverse user base of the Sain application. Through carefully crafted narratives and accompanying visuals, these personas encapsulate key demographic, psychographic, and behavioral attributes of typical users. By humanizing the target audience and highlighting their unique needs, preferences, and pain points, these personas serve as invaluable tools for guiding the design and development process of the application, ensuring that it resonates effectively with its intended users.



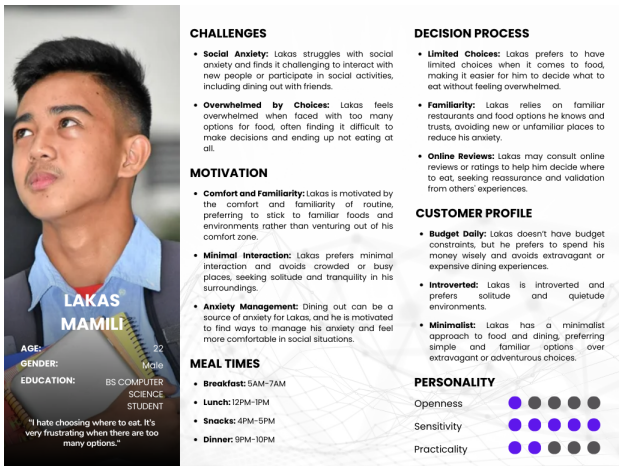Fig. 1. User Persona of Hiraya Tikas

Fig. 2. User Persona of Lakas Mamili



Fig. 3. User Persona of Ligaya Marosa

### D. Design Decisions

The design decisions of the Sain application were driven by a user-centric approach aimed at optimizing usability, accessibility, and engagement. Several key decisions were made to enhance the overall user experience, aligning with minimalist design principles and lean methodology, including:

*1) Color Scheme:* The color green was strategically chosen as the primary color scheme for the Sain application. Green conveys a sense of freshness, healthiness, and vitality, aligning well with the application's focus on food recommendations and healthy dining options.

*2) Navigation Efficiency:* Efficient navigation was prioritized in the design of the Sain application, with a strict limit of three clicks for accessing any feature or information. This streamlined navigation structure ensures that users can easily navigate through the app and find relevant content without unnecessary complexity or confusion.

*3) Single Food Recommendation System:* A Single Food Recommendation System was implemented in the Sain application to simplify the decision-making process for users. By presenting one food recommendation at a time, users are relieved from the cognitive burden of choosing among multiple options, enhancing their overall satisfaction and reducing decision fatigue.

*4) Iconography:* Icons were incorporated into the user interface for certain buttons and actions to enhance usability and familiarity. By leveraging widely recognized icons, users can intuitively understand the functionality of various features without the need for lengthy explanations or textual labels, thereby improving the overall user experience.

*5) Minimalist Design:* The Sain application embraces minimalist design principles, focusing on simplicity, clarity, and functionality. Extraneous elements and visual clutter are minimized to ensure that users can focus on the core functionalities of the app without distractions, enhancing usability and user engagement.

*6) Lean Methodology:* Lean methodology was employed throughout the design and development process of the Sain application to prioritize the delivery of value to users while minimizing waste and unnecessary features. By focusing on the core functionalities essential to user needs, the app remains lightweight and agile, facilitating rapid iteration and continuous improvement based on user feedback.

These design decisions collectively contribute to the intuitive, user-friendly nature of the Sain application, ensuring that users can easily navigate, engage with, and derive value from the platform while adhering to minimalist design principles and lean methodology.

## II. MATERIALS AND METHODS

The materials and methods section of this study delineates the systematic approach employed to evaluate the effectiveness of the Sain application's features in enhancing user experience and satisfaction. This section outlines the methodologies utilized to collect data, assess user feedback, and analyze results comprehensively. By employing a structured and rigorous methodology, this study aims to provide robust insights into the usability, functionality, and overall effectiveness of the Sain application in meeting users' needs and preferences. Through a combination of qualitative and quantitative measures, this section elucidates the systematic process undertaken to gather meaningful data and draw informed conclusions regarding the application's performance and potential areas for improvement.

### A. Participants

The participants in the experiment will primarily consist of university students aged 18-25. This demographic is chosen for several reasons. Firstly, university students in this age range are often active users of mobile applications and are familiar with technology-driven solutions. Secondly, their extensive social networks and propensity for social interaction make them ideal candidates for testing the social sharing features of the Sain application. Lastly, by targeting undergraduate students across various academic disciplines, we aim to capture diverse perspectives and preferences, ensuring comprehensive feedback on the app's usability and appeal.

*1) Selection Criteria:*

- Participants should fall within the age range of 18-25 years old. This demographic is chosen to target young adults who are typically more technologically savvy and socially active, aligning closely with the target user base of the Sain application.
- Emphasis will be placed on recruiting participants from diverse academic disciplines. This criterion ensures that feedback obtained during prototype testing sessions represents a broad spectrum of perspectives and preferences, enriching the testing process with a range of viewpoints.
- Prospective participants should demonstrate a willingness to actively engage in the prototype testing process and provide honest, constructive feedback on the Sain application. This criterion is essential for gathering valuable insights into the app's usability, functionality, and overall user experience.

*2) Number of Participants:* Approximately 20 university students meeting the specified criteria will be recruited for prototype testing sessions. This number is considered adequate for several reasons. Firstly, it allows for a sufficiently large sample size to gather diverse feedback and insights into the Sain application's usability and appeal. Secondly, by focusing on a specific demographic with shared characteristics, we can ensure that the feedback obtained is relevant and representative of the target user base. Lastly, the manageable size of the participant pool enables thorough observation and analysis of user interactions during the testing sessions, facilitating the identification of strengths, weaknesses, and areas for improvement in the app's design and functionality.

*B. Technique*

Each participant will undergo a testing session estimated to last approximately 20-30 minutes. This duration allows sufficient time to conduct usability testing, in-depth interviews, and post-test surveys comprehensively while ensuring that participants remain engaged and focused throughout the process. The testing session's duration is designed to balance thoroughness in assessing the Sain application's interface and features with the need to respect participants' time commitments and attention spans.

*1) Experiment Types:* Usability testing plays a pivotal role in assessing the Sain application's interface and features within a real-world context. By observing participants as they interact with the prototype, researchers can pinpoint usability issues, navigation challenges, and areas for improvement. This hands-on approach offers invaluable insights into users' engagement with the app, shedding light on opportunities to enhance user experience and functionality.

In-depth interviews provide a qualitative exploration of user experiences, perceptions, and preferences regarding the Sain application. Through open-ended questioning and probing, researchers can delve deeper into participants' thoughts, emotions, and behaviors, gaining a nuanced understanding of their interactions with the app. Interviews allow participants to articulate their feedback, suggestions, and pain points, providing rich qualitative data that complements insights gleaned from usability testing.

Post-test surveys serve as a structured mechanism for gathering quantitative feedback on user satisfaction and perceived usefulness. Administering standardized questionnaires following the testing session enables researchers to quantify participants' overall impressions of the Sain application, assess satisfaction levels, and measure perceived utility. Surveys yield statistical data that complement qualitative findings, offering a comprehensive overview of user perceptions and attitudes toward the app.

The mixed-methods approach, combining usability testing, in-depth interviews, and post-test surveys, ensures a holistic evaluation of user interactions and preferences, allowing for nuanced insights into the Sain application's strengths, weaknesses, and areas for improvement. By triangulating data from multiple sources, researchers can derive actionable recommendations to guide iterative design decisions and enhance the app's usability, functionality, and overall user experience.

*C. Representative Tasks*

During the usability testing session, participants were tasked with a series of actions to evaluate their interactions with the Sain application, including opening the app, exploring the 'Trend Near You' feature by clicking on 'View Directions' for selected food recommendations, using the random wheel feature to add food items to favorites, like or dislike food items, exploring the 'Single Food Recommendation' feature by viewing directions for each recommended food item, and navigating to the 'Favorites' section to remove selected items from their favorites list. Following the completion of these tasks, participants were asked to provide feedback through a post-survey. This survey aimed to gather quantitative data on user satisfaction and perceived usability of the Sain application. Participants were presented with a series of standardized questions covering aspects such as overall satisfaction with the application, ease of use, usefulness of features, and likelihood of recommending the app to others. Additionally, participants were given the opportunity to provide open-ended comments or suggestions for improvement. The post-survey allowed researchers to quantitatively assess participants' impressions of the application, complementing the qualitative insights gathered during the usability testing session.

*D. Measurements*

Both qualitative and quantitative measures will be employed to evaluate user feedback and satisfaction with the Sain application. Qualitative data will be gathered through user feedback obtained during usability testing sessions and in-depth interviews, where participants will provide insights into their satisfaction levels, perceived relevance of features, and ease of use of the app. This qualitative feedback will offer valuable insights into users' subjective experiences and perceptions, helping to identify strengths and weaknesses in the app's design and functionality. Additionally, quantitative data on user satisfaction will be collected through post-test surveys, utilizing Likert scale questions to assess participants'

satisfaction levels with the Sain application. These quantitative ratings will provide numerical indicators of users' overall satisfaction with the app's interface design, interaction patterns, and features. The combination of qualitative feedback and quantitative satisfaction ratings serves as robust indicators of the success or failure of the hypotheses, offering a comprehensive understanding of user perceptions and experiences with the Sain application.

*1) Statistical Analysis:* The data collected will undergo analysis using descriptive statistical methods, focusing on summarizing and describing the dataset. Descriptive statistics will provide insights into the central tendencies, variability, and distributional characteristics of the measured variables, enabling a comprehensive understanding of the data without employing inferential techniques. This approach allows for a thorough exploration of the dataset, providing valuable insights into the effectiveness of design features and interaction patterns within the Sain application. Throughout the analysis, bar charts, pie graphs, and descriptive statistics were utilized to elucidate the findings and draw meaningful conclusions from the collected data.

## III. RESULTS

### A. Demographics

The bar chart shown below represents the distribution of participants across various academic courses, revealing diverse representation from multiple disciplines. Notably, BS Biology have the highest frequency, appearing three times, followed closely by BS Computer Science, BS Statistics, BS Development Communication, BS Forestry, BS Economics, BS Agribusiness Management and Entrepreneurship, and Doctor of Veterinary Medicine, each mentioned twice. Other courses such as, BS Agricultural and Applied Economics, BS Mathematics and Science Teaching, and BS Human Ecology are represented once. This distribution underscores the multidisciplinary nature of the participant pool, encompassing a broad range of academic backgrounds. The pie graph below illus-
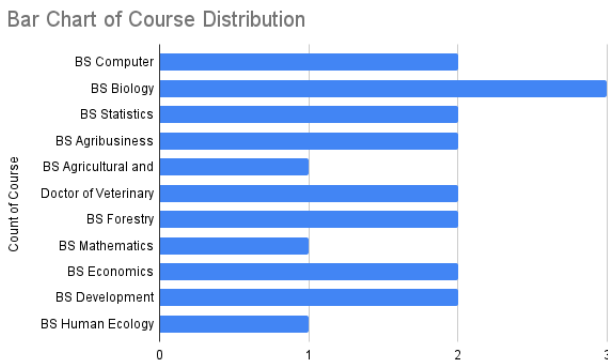


Fig. 4. Bar Chart of the Course Distribution of the Study

trates the distribution of participants across different batches (years) in the study, highlighting that 45% of the participants are from the 2021 batch, suggesting a significant influence of this cohort on the study's outcomes. The 2022 batch

comprises 25% of the participants, indicating a substantial contribution as well. Both the 2020 and 2023 batches represent 15% each, providing a balanced perspective from these years. This distribution aids in understanding the varying levels of engagement and feedback from different years, offering a comprehensive view of the user experience across multiple cohorts.
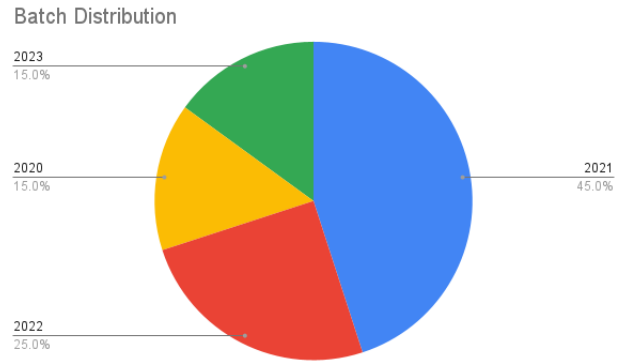


Fig. 5. Pie Graph of the Distribution of Batch of the Study

### B. User Feedback and Satisfaction

The results of the user feedback and satisfaction survey reveal high levels of satisfaction across various features of the Sain application. For the ease of opening and starting the application, the mean rating was 4.7, with a median rating of 5, indicating that most users found it very easy to begin using the app. The 'Trending Near You' feature received a perfect mean rating of 5, with all participants giving the highest possible rating, demonstrating that this feature was exceptionally well-received. The 'View Directions' function for food recommendations also scored highly, with a mean rating of 4.85 and a median of 5, reflecting strong user appreciation for its usefulness. The random wheel feature, which users found engaging and fun, had a mean rating of 4.6 and a median of 5, indicating that most participants enjoyed this interactive aspect of the app. Adding food to favorites using the random wheel was rated with a mean of 4.65 and a median of 5, showing that users found this feature easy to use. Similarly, liking and disliking food items through the random wheel had a mean rating of 4.7 and a median of 5, highlighting its intuitive nature. Exploring individual food recommendations received a mean rating of 4.55 and a median of 5, suggesting that while this feature was helpful, there may be room for slight improvements. The ease of navigation in the 'Favorites' section was rated at 4.5 on average, with a median of 5, indicating that most users found it straightforward to navigate. The simplicity of removing items from 'Favorites' was highly rated, with a mean of 4.9 and a median of 5, showing that users found this action easy and straightforward. The visual appeal of the user interface received a mean rating of 4.6 and a median of 5, demonstrating high user appreciation for the app's design. Overall user experience was rated with a mean of 4.6 and a median of 5, indicating general satisfaction

TABLE I
SUMMARY OF POST-SURVEY ANSWERS

| Feature | Mean | Median |
|---|---|---|
| Ease of Opening and Starting the Application | 4.7 | 5 |
| Trending Near You | 5 | 5 |
| View Directions for Food Recommendations | 4.85 | 5 |
| Random Wheel Feature | 4.6 | 5 |
| Adding Food to Favorites Using the Random Wheel | 4.65 | 5 |
| Liking and Disliking Food Items Using the Random Wheel | 4.7 | 5 |
| Exploring Individual Food Recommendations | 4.55 | 5 |
| Ease of Navigation in the 'Favorites' Section | 4.5 | 5 |
| Removing Items from 'Favorites' | 4.9 | 5 |
| Visual Appeal of the User Interface | 4.6 | 5 |
| Overall User Experience | 4.6 | 5 |
| Likelihood of Recommending the Application to Others | 4.7 | 5 |

with the application. Finally, the likelihood of recommending the Sain application to others had a mean rating of 4.7 and a median of 5, suggesting a strong willingness among users to endorse the app to others. Overall, these results indicate very high user satisfaction across most aspects of the Sain application, with median ratings consistently at the highest possible score of 5, reinforcing the positive feedback and success of the application.

## IV. DISCUSSION

### A. User Reception and Core Functionalities

This user research study aimed to evaluate the effectiveness of various features within the Sain social network food recommendation application. The study targeted university students across diverse academic disciplines to gather a broad range of user perspectives. The findings reveal positive user reception towards the Sain application, with high satisfaction ratings across most functionalities.

The "Trending Near You" feature garnered a perfect user satisfaction score, suggesting its exceptional value in providing users with real-time insights into popular food choices in their vicinity. This aligns with the initial hypothesis that this feature would enhance user satisfaction by promoting discovery and potentially improving decision-making.

The "View Directions" function and the random wheel feature also received high ratings, exceeding a mean score of 4.6. These results support the hypotheses that these features would improve user engagement and satisfaction. The random wheel, specifically, appears to offer an element of surprise and enjoyment while facilitating personalized recommendations.

Positive user feedback was also evident for aspects like ease of use, visual appeal, and overall user experience. Notably, removing items from the "Favorites" section received a near-perfect rating, indicating a well-designed and intuitive function.

### B. Areas for Potential Improvement

However, the feedback on exploring individual food recommendations suggests there might be room for improvement.

While user satisfaction remained positive (mean rating exceeding 4.5), it was slightly lower compared to other features. This could be an area for further investigation to identify potential enhancements that could personalize or streamline the exploration process. Similarly, the "Favorites" section navigation received a rating of 4.5, suggesting minor improvements might be implemented to optimize user experience within this section.

### C. Exploring Individual Food Recommendations

Further research could involve usability testing focused specifically on exploring individual food recommendations. By observing user interactions and gathering detailed feedback, researchers could identify pain points and areas for improvement. Potential areas of exploration might include information architecture, content presentation, or the recommendation algorithm itself.

### D. Optimizing the "Favorites" Section

Similar to exploring individual food recommendations, dedicated usability testing could be conducted to assess user experience within the "Favorites" section. This would help identify any navigation challenges or areas for improvement in managing favorited food options.

## V. CONCLUSION

In conclusion, the findings of this study demonstrate high levels of user satisfaction with various features of the Sain application, as evidenced by the positive feedback received across different functionalities. The hypotheses formulated at the outset of the study were largely supported by the data, with features such as the "Trending Near You" function, "View Directions" for food recommendations, and the random wheel feature receiving particularly high satisfaction ratings. These results underscore the effectiveness of these features in enhancing user engagement and overall satisfaction with the application.

However, the study also identified areas for potential improvement, particularly in exploring individual food recommendations and navigating the "Favorites" section. Further investigation and usability testing could be conducted to address these areas and refine the user experience of the application.

Overall, the positive feedback and success of the Sain application suggest that it holds significant promise as a social network food recommendation platform. By continuing to iterate on its features based on user feedback and conducting further research to address areas for improvement, the Sain application has the potential to become a highly valuable tool for users seeking personalized food recommendations.

## VI. FUTURE WORK

Building upon the findings of this study, future research could explore several avenues to further enhance the Sain application and its user experience. One potential direction is to conduct more in-depth usability testing focused specifically on addressing the identified areas for improvement, such as

exploring individual food recommendations and optimizing navigation within the "Favorites" section.

Additionally, ongoing user feedback and iterative design updates could be implemented to continually refine and enhance the application's features. This could involve implementing new features based on user suggestions, refining existing functionalities based on usage patterns, and ensuring compatibility with emerging technologies and platforms.

Furthermore, longitudinal studies could be conducted to assess the long-term impact of the Sain application on user behavior and dietary habits. By tracking user engagement and satisfaction over time, researchers could gain insights into how the application influences users' food choices and consumption patterns.

Overall, the future work outlined here presents exciting opportunities to further develop and improve the Sain application, ultimately advancing its mission of providing users with personalized and enjoyable food recommendations in a social networking context.

APPENDIX I
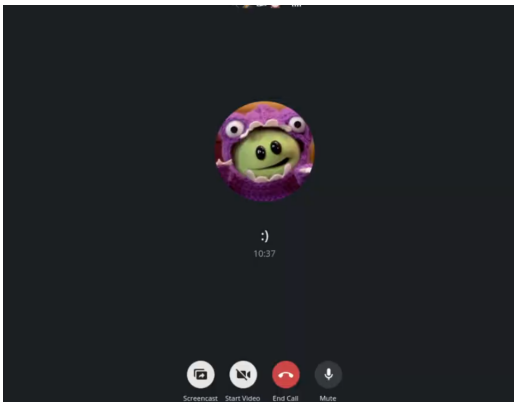SAMPLE INTERVIEWS



Fig. 6.   Interview with Graziella using Telegram
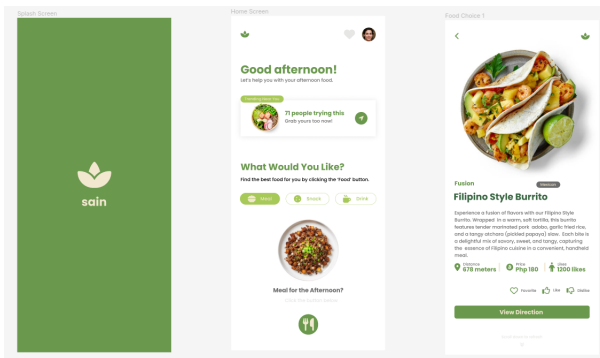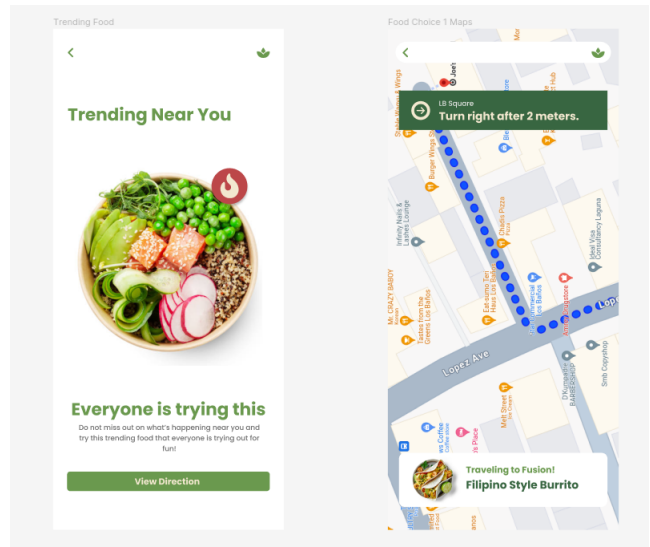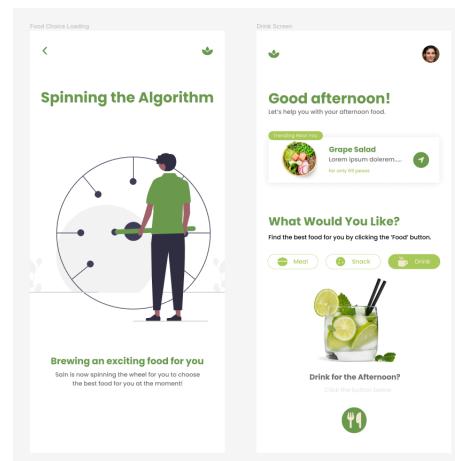
APPENDIX II
WIREFRAME



Fig. 7.   Home Screen UI



Fig. 8.   Trending Near You UI



Fig. 9.   Spinning the Algorithm UI