

Design Proposal: Inventory App — Shelfie

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Introduction

Shelfie is designed to serve as a comprehensive and intelligent home inventory management app that revolutionizes how users track, organize, and optimize their household and grocery items. Shelfie simplifies a traditionally time-consuming and error-prone process by leveraging modern technology to reduce waste, enhance convenience, and promote sustainability.

Shelfie's core function allows users to digitally log and manage all their household items, ranging from groceries and cleaning supplies to personal care products. Unlike traditional manual methods like handwritten lists or typing one's list onto a note app, Shelfie offers advanced features that automate and personalize inventory management. Users can scan barcodes or upload receipts to instantly record items, saving significant time and effort. Additionally, Shelfie allows users to integrate with grocery store accounts to auto-import purchase data, creating a seamless flow of information from store to storage. For users who prefer manual entry, the app supports photo uploads analyzed by AI to record all information about the product, ensuring maximum flexibility.

The app allows users to enable notifications to alert when items are approaching expiration date or running low, permitting for proactive management of inventory. For example, Shelfie can alert users that the milk in their fridge will expire soon, reminding them to use it before it goes to waste. Moreover, the app generates personalized grocery lists based on users' in-stock, shopping habits, and frequency of use. The personalization algorithm will ensure that shopping trips are efficient and purposeful. This not only helps users save money by avoiding unnecessary purchases but also reduces the environmental impact of food waste.

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One of Shelfie's standout features is its recipe suggestion capability, which uses the user's current inventory to propose meals they can prepare immediately. For instance, if a user has chicken, vegetables, and spices in stock, Shelfie might suggest a stir-fry recipe that utilizes these ingredients.

Shelfie also offers a family plan that enables up to 10 members to share and update household inventory collaboratively. This ensures everyone is on the same page, preventing issues like duplicate purchases or forgetting to buy important items. Essentially, the app also respects individual privacy by offering personal inventory sections where users can log private items, such as personal care products they prefer to keep to themselves.

Additionally, Shelfie incorporates spending insights and trend analysis to help users understand their shopping habits for the period of time they select. This financial management feature is essential for budget-conscious users, providing insights into overall spending, frequently purchased items, and areas where they can cut costs or shop more strategically.

To further enhance accuracy, Shelfie integrates with smart home technologies like weight-tracking shelves, which automatically monitor stock levels. This eliminates the need to manually check one's food stock, making virtually tracking inventory possible with just one click away from one's cellphone. With these combined features, Shelfie is not just an inventory tracker. It is a comprehensive household management tool designed to optimize everyday life.

In summary, Shelfie's fundamental goal is to provide a smart, user-friendly solution for managing household items and groceries. By automating labor tasks, offering personalized recommendations, and promoting efficient consumption, the app empowers users to save time, money, and resources. Shelfie transforms inventory management from a chore into a streamlined experience, ultimately redefining how households deal with their possessions.

Problem or issue Shelfie tries to address

Shelfie aims to address household food waste and inventory management inefficiencies, which lead to economic losses and potential health complications. These problems are prevalent worldwide, as poor organization and a lack of effective tracking systems contribute to food waste and unintentional consumption.

Household Food Waste

Food waste is a critical problem. Large portions of perishable items go to waste because they are forgotten in refrigerators. Research from Ohio State University reveals that many refrigerated foods are often neglected, leading to spoilage and unnecessary discard (Davenport et al., 2019). The neglect not only wastes food but also contributes to environmental issues, as discarded food often ends up in landfills, generating methane, a greenhouse gas that contributes to global warming.

Economic Impact

The economic impact of household food waste is significant. The Waste & Resources Action Programme (WRAP) estimates that food waste costs industrialized countries around \$680 billion each year (Davenport et al., 2019). For individual households, this amounts to hundreds of dollars spent annually on uneaten food, adding pressure to household budgets and increasing financial burden.

Health Risks

Beyond financial and environmental concerns, eating expired foods can pose serious health risks. Foods that spoil quickly and are not stored properly or are past their expiration dates can develop toxic bacteria like Salmonella and E. coli. Eating these contaminated foods can

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cause illnesses, with symptoms ranging from mild stomach upset to severe health problems, especially for vulnerable groups like children, the elderly, and people with weak immune systems (Wellwisp, n.d.).

To conclude, the challenges mentioned highlight the critical need for effective household inventory management systems. By providing users with tools to track food items, monitor expiration dates, and manage inventory, Shelfie hopes to minimize waste and prevent the risks associated with spoiled food. The app's features, such as expiration reminders and AI-powered inventory tracking, directly address these pain points, enabling users to make informed decisions about their food consumption and storage.

Why is Shelfie socially significant?

Shelfie is socially significant by the potential to address issues that affect millions of households worldwide, food waste and its associated consequences. This problem has wide-ranging effects, including environmental damage, financial burden, and health risks.

Environmental Impact

From an environmental perspective, reducing food waste is crucial to mitigating climate change. Discarded food that ends up in landfills generates methane, a greenhouse gas that is 25 times more potent than carbon dioxide in trapping heat in the atmosphere (EPA, 2021).

Social Significance and Behavior Change

Shelfie has the potential to foster long-term behavior change and raise awareness about sustainable consumption. By making inventory management easier and more accessible, it encourages users to adopt mindful habits that align with broader social goals of reducing waste and promoting sustainability.

The Sheer Scale of Affected Users

The market for inventory management tools is still underdeveloped. As more people seek convenience and efficiency in managing their daily lives, there is an increasing demand for solutions like Shelfie.

In conclusion, Shelfie is not only important but essential to address the interconnected challenges of food waste, economic strain, health risks, and environmental harm. By offering a solution that is practical and accessible, Shelfie represents an innovative first step toward addressing these issues and gradually making a positive impact on the world, which aligns with societal needs and empowers users to make meaningful changes in their consumption habits.

Logo



Fit in Media Environment / Competitor Analysis

Shelfie distinguishes itself from existing inventory management applications through its innovative features and personalization. While there are similar tools on the market, such as Itemtopia, Out of Milk, Fridge Pal, and Pantry Check, Shelfie surpasses these competitors by offering a more comprehensive and user-focused approach to household inventory management.

Competitors

Itemtopia is an application that records detailed information about household items that allows one to keep things such as receipts and warranties.

Out of Milk is a shopping list and inventory management application that helps users keep track of what's in stock at home and create to-go shopping lists.

Fridge Pal is a refrigerator inventory management application, allows users to scan barcodes to add food inventory and provides expiration reminders and shopping list generation functions.

Pantry Check is an online inventory management tool that records food inventory through barcode scanning and provides expiration reminders and nutritional information.

Scope of Inventory Management

Unlike competitors like Itemtopia, which focuses on logging household assets (e.g., receipts and warranties), or Pantry Check, which specializes in food inventory, Shelfie tracks both groceries and household items. Making Shelfie a more versatile service.

Expiration and Stock Reminders

Shelfie's expiration date reminders and low-stock notifications ensure proactive inventory management. While competitors like Fridge Pal offer expiration alerts, Shelfie stands out with higher user-friendliness and personalized notifications based on shopping and usage behaviors.

Smart Grocery List and Recipe Suggestions

Out of Milk generates basic shopping lists but lacks integration with user-specific behaviors. Shelfie uses algorithms to analyze stock levels, shopping habits, and frequency of use to create personalized grocery lists. It also leverages in-stock items to suggest recipes, a feature absent in most competitors, promoting sustainable consumption and reducing waste.

Shared and Private Inventory Management

Shelfie's family plan supports multi-user functionality, enabling households to share inventory data while maintaining private sections for personal items. This capability is unique compared to other apps, offering a balance between collaboration and privacy.

Spending Insights and Trend Analysis

Shelfie provides detailed financial insights, tracking overall spending, frequently purchased items, and trends. This feature promotes budget-conscious shopping and is not directly available in competitors like Fridge Pal or Pantry Check.

Related Concepts

Highly personalized

In this fast-paced world, everybody has so much to be done in their daily life and hence it's tough to manage what people have been keeping at home. Further, these may lead to various

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problems brought about by running out of some important particular, wasted food, or even buying the same things again when they still have so many at their homes. Automating personalization technology to help people manage their inventory efficiently is an area of growing interest. "The Daily Me" concept was proposed by Negroponte in 1995, this conception described an information consumption model that was personalized. This model assumed that through digital media, with personal recommendation technology, news or information people encountered on a daily basis was no longer uniformly edited by the traditional media prior to dissemination to the greater population. Instead, by using other technologies like filtering systems and algorithms, it continuously tracks and analyzes the users' behavior, interests, and preferences while using the product and, as such, eventually comes up with daily personalized digital newspaper for the user alone, putting him in a completely personalized information world.(Negroponte, 1995)

Shelfie has tracked the shopping habits, inventory status, and personalization preferences of the users for serving intelligent recommendations such as personalized shopping lists, inventory-based recipe recommendations, and so on. Thus, with it, there is no need for users to make extra efforts in updating the information one by one manually in the app. They just need to scan the purchased items into the software, and whatever information would be required in the background, the system automatically updates them. It holds great features that are the essence of "The Daily Me," where technology dynamically alters to show only what a user needs. Shelfie will save the energy of making the shopping list or finding just the right recipe with all the accompanying stress involved, to reserve users' energy for something far more rewarding.

On the other hand, it is the reason for some limitations simultaneously. Over-dependence on customization by the user results in less exposure of the user to the wide variety. Users only

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receive those recipe recommendations that match their daily preferences, influencing trying new recipes. The application also requires user data in order to provide experiences. The user may feel concerned with what data shall be collected and whether data is ever misused without their consent.

Seamless Integration

Most of the household management tools available, like Out of Milk, depend on user input or manual updates. They need people's undivided attention toward the software all the time to keep updating it constantly when, actually, it should be intended to make human life easier. Mark Weiser conceptualized "Ubiquitous Computing" in 1991, computing is seamlessly embedded in the environment, running in an unobtrusive way to support human activities. Unlike traditional kinds of computing, embedding technology into everyday life and the surrounding environment turns it "smart" and connected. This will let technologies be tuned into the background, naturally integrated into life, and helping without one's constant attention or explicit command. It will ease life, make it more effective and productive. (Weiser, 1991)

Shelfie's functional design embeds it into the natural flow of the user's daily household tasks. Users only need to scan the barcode of the item when the purchased item is packed and sorted to the corresponding storage location, and the software will automatically enter the name, quantity and expiration time of the item, and continuously update the information in the background to send appropriate reminders such as the expiration date of the item or the inventory emergency, so as to ensure that the user takes timely action without remembering every detail of the inventory, which reduces the cognitive burden for the user. It will also integrate Shelfie with a set of smart home devices, such as refrigerators and digital home assistants, which allows Shelfie can automatically collect household item inventory data, creating an environment in

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which technology will work invisibly but efficiently. It would naturally fit into the user's life, turning into an important yet inconspicuous part in the life management of a person, which meets expectations to simplify and facilitate life.

On the other hand, Shelfie also has a few limitations. The high degree of Shelfie consistent integration with life can prevent the understanding and acceptance of less tech-savvy clients on how Shelfie finishes highlights such as personalized suggestions, which can lead to fear, disarray, and doubt of Shelfie's innovation. As a result, they are incapable of requiring full advantage of Shelfie, and may indeed select not to use Shelfie. In expansion, Shelfie's dependence on the user devices' scanning function can make barriers for users who do not have get to consistent equipment, resulting in a few users not being able to involve Shelfie's helpful highlights.

Extension of Self

Technology is now involved in every moment of life, from setting reminders to writing memos. Growing reliance on technology indicates the trend of technology no more just a tool, but already a part of personal cognition and daily life. The concept of "Extended Self" mentioned by Clayton and two other authors in 2015 explains this phenomenon, where the objects and technologies owned by a person are seen as extensions of their physical and mental strength. People become anxious once separated from these objects or technological artifacts and their cognitive powers decrease. (Clayton et al., 2015)

Shelfie embeds into the user's life, acting like a digital assistant, from active tracking of expiration dates and creating personalized shopping lists based on item inventory information to recipe recommendations. It replaces user memory and computing power by managing family inventory and mirroring the user's values, and enhancing the user's identity role.

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Recommendations on the right recipes from Shelfie regarding the family's food and members of different ages keep on showing commitment to the sustainability and optimization of resources taken care of for the family, therefore strengthening one's identity about being a caring and considerate family member.

But when Shelfie extends the ability of the user, it also has some of its possible limitations. The users are more and more dependent on technology to do the task of home inventory management. The result is that they will experience some progressive erosion of independent memory and organizational skills. Once outside the technology, they get overwhelmed and cannot even handle managing their home items.

Target Audience

Demographic Variables

Age: Shelfie is designed for both genders, tech-savvy individuals aged from 18 to 64. This broad age range reflects a diverse group of users, including young professionals, families, and older adults comfortable with smartphone-based applications.

Income level: The app is aimed at middle- to upper-class individuals who can afford a light subscription fee and may already use smart home devices, making them more likely to integrate an inventory management tool like Shelfie.

Household formation: It is ideal for both single-person households and families. Families, in particular, benefit from Shelfie's multi-user functionality, enabling seamless collaboration on shared inventories while maintaining privacy for personal items, making it uniquely appealing to households with diverse needs.

Psychological Variables

Tech-savvy: Users comfortable with technology are the primary audience, as the app involves scanning barcodes, uploading receipts, and potentially integrating with smart home devices.

Organizational mindset: Individuals who value structure, planning, and efficiency are likely to download Shelfie. These types of users will see the app as a way to save time, reduce stress, and simplify household management.

Sustainability conscious: Environmentally conscious users are motivated by reducing waste and adopting sustainable practices, which align with Shelfie's features, such as recipe suggestions and goals of minimizing food waste and promoting mindful consumption.

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Budget-conscious: This type of user actively seeks ways to optimize spending and avoid unnecessary purchases, which would likely be drawn to the app's recipe suggestion and spending insights & trend analysis features.

Non-Target Audiences

Technological Limitations:

Users who are unfamiliar with or unwilling to engage with smartphone apps or AI technologies are less likely to use Shelfie. This may include older individuals who may find barcode scanning or smart home integration challenging without additional support.

Unstructured Lifestyle:

People with highly unpredictable or unstructured lifestyles may find the app less useful, as its value depends on regular updates and inventory tracking.

Minimal Grocery Needs:

Shelfie may be less appealing to individuals who shop infrequently or consume minimal groceries, as its primary functions address recurring inventory and food management challenges.

Privacy Concerns:

Users wary of digital privacy may hesitate to adopt the app, despite its customizable privacy settings.

Adopting different types of users

Shelfie is designed to accommodate a diverse range of users with varying skills, personas, and technology practices. The app's flexibility makes it appealing to different user groups while ensuring that the core functionality remains accessible and useful to all.

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Shelfie's potential users include tech-savvy professionals, families, budget-conscious individuals, older adults, and environmentally conscious users. For tech-savvy professionals, the app offers time-saving features like barcode scanning, receipt uploads, and AI-driven inventory tracking. These users can rely on Shelfie's seamless integration with smart home devices and personalized grocery suggestions to simplify their busy schedules. Families and shared households benefit from the Family Plan, which supports collaborative inventory management for up to 10 members. This feature ensures everyone is on the same page while also offering private sections for individual items, addressing both collaboration and privacy concerns.

For budget-conscious individuals, Shelfie offers valuable insights into spending patterns and generates cost-efficient grocery lists, helping users optimize their budgets while avoiding unnecessary purchases. Older adults or less tech-savvy users can use the Simplified Mode, which focuses on core functions like expiration reminders and manual logging through an easy-to-use interface. In addition, multi-language support ensures accessibility for users from diverse backgrounds. Lastly, environmentally conscious users will find Shelfie's waste reduction policy and recipe suggestions particularly appealing as they align with their sustainability goals and encourage eco-friendly consumption habits.

User Motivations

Shelfie is driven by a range of user motivations, including efficiency, cost savings, sustainability, and convenience. While all users share a desire for better household management, their specific goals vary by type. Tech-savvy professionals prioritize efficiency and time management, while families focus on seamless collaboration and privacy for individual inventories. Budget-conscious individuals are motivated by financial savings and waste

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reduction, whereas older users require simplicity and usability. Eco-conscious users are driven by sustainability and reducing environmental impact. By addressing these varying motivations, Shelfie ensures that its diverse features are suitable for its entire user base.

Dimensions That Set Shelfie Apart from Existing Technologies

Shelfie's adaptability and advanced features differentiate it from existing technologies. Unlike competitors that focus on specific aspects like food inventory or warranties, Shelfie offers comprehensive functionality that tracks both groceries and household items. Its emphasis on personalization, leveraging concepts like Negroponte's "The Daily Me," ensures tailored experiences for users through recommendations for recipes, grocery lists, and financial insights. Additionally, Shelfie's Family Plan combines collaboration and privacy in ways unmatched by other apps, while its Simplified Mode accommodates older and less tech-savvy users.

Shelfie's integration with smart home devices, such as weight-tracking shelves, embodies Weiser's concept of ubiquitous computing, creating a seamless, automated experience. Moreover, its sustainability metrics and waste reduction features cater specifically to eco-conscious users, setting it apart from competitors that lack such functionality. These dimensions collectively enhance user experience and make Shelfie a superior alternative in the household inventory management space.

User Experience

Emma is a 35-year-old full-time housewife, and her family members include her husband, her daughter, and herself. Every morning, Emma prepares breakfast for her family. At this morning, when Emma was about to cook the breakfast, she remembered that Shelfie told her last night the milk is due to expire soon, and thus she decided to use the remaining milk to prepare breakfast for her family. Emma opens Shelfie's recipe interface, which, according to all the ingredients at home and Emma's daily cooking ability and preferences, is recommended. Apply filtering functionality in order to remove the recipes concerning milk and choose in a while a recipe that looks appealing. This shows how Shelfie integrated "The Daily Me" concept in order to always propose tailored content with respect to the needs of her specific family. Following the recipe, Emma prepared breakfast efficiently without food waste. No ingredient search or browsing through the Internet to get inspired about which recipes to make was required from Emma-Shelfie has already done it for her. All seamless help for Emma, not interrupting other workflows, made it natural to extend the morning's work of the showcase for the concept of Ubiquitous Computing.

That afternoon, Emma received a reminder from Shelfie that the store she often went to was having a promotion that day, so she decided to go and replenish the items at home. After she arrived at the store, opened Shelfie, swiped into the shopping list page, which had already ranked the recommended priorities according to Emma's daily shopping preference and the inventory quantity of items at home. Emma scans the QR code with Shelfie every time she gets an item that needs to be purchased, and then Shelfie automatically crosses out the item from her shopping list and updates the information about the item on the platform. In this way, Emma can easily shop just by looking into the shopping list and avoids manually editing the shopping list.

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Hence, she avoids frustration with Shelfie to re-scan everything once she gets back from shopping, so that she may concentrate much more with other things with efficiency and rule out unnecessary repetition of purchasing an item that may have been in stock at her residence. These features do not require Emma's continuous attention or interaction which is a manifestation of the concept of "Ubiquitous Computing".

Emma's husband, Michael, was alerted by Shelfie that his stock of laundry detergent was running low, and as a not very tech-savvy person, Michael did not like navigating complex technical interfaces, and his interaction with Shelfie was simple. He clicked on the notification so that he could jump to Shelfie's inventory interface for inventory checking. He confirmed the amount of inventory and told Emma that she could buy some laundry detergent next time. Even though Michael did not know that Shelfie had put laundry detergent on the next shopping list automatically. Michael likes the app's ability to notify him at any time without doing any complex things, which shows how technology works silently in the background to support less active users, embodying the concept of "Ubiquitous Computing".

Emma's 11-year-old daughter Lily uses Shelfie's personal inventory management function to track her snacks and school supplies as well as some personal skin care products. The information of this function will not be shared with other family members. Lily wants to have a clearer understanding and management of her own items, but does not want to share them with her family. Shelfie's function just satisfies her needs, allowing Lily to use it more freely while at the same time keeping in sync with the item information shared with other families. For Lily, Shelfie allows her to take control of her needs and, by doing so, develop organizing skills and a sense of responsibility as an expression of the concept of "Extended Self".

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In the evening, Emma opens Shelfie again, this time wanting to see the spending trend of her family. The app has a summary of her shopping habits that usually shows her how much she has saved up when trying not to buy things in doubles or even waste food. This would help her strategize where to spend according to the family budget. At the same time, Shelfie reminds her that spinach will expire and is better used as soon as possible. These kinds of reminders and records will help Emma fulfill her goals concerning sustainability and optimize the management of the housing inventory, reflecting the concept of "The daily me".

Closing & Future directions

Shelfie's goal is to be a comprehensive and intelligent household inventory management app that streamlines the traditionally time-consuming and error-prone item tracking process through advanced modern technology, allowing users to manage household inventory with minimal time effort and maximum accuracy, thereby reducing waste, improving convenience, and promoting sustainability.

Scanning barcodes, its further integration with more smart devices, and picture recognition using AI form the core of auto-record inventory in the application. It therefore greatly reduces the energy and time a user needs to invest in updating records accurately. Notifications about nearing expiration dates and low stock will help users take earlier initiatives in the management of inventory and hence avoid wastage to always keep essential items handy. Smart recipe and shopping list suggestions will let users conveniently avoid waste from duplicate purchases and maximize the use of existing inventory. Smart integration with other smart devices lets Shelfie run in the background, not bothering users, and support them at any time of their lives.

By family planning functions and spending insight, Shelfie can be assured that a family better communicates and manages resources. In such a way, Shelfie streamlines home inventory management into an efficient, sustainable, and user-friendly process, leaving its complexity to the app, and allowing users to save time, money, and resources to focus on other more important things. However, as an emerging application software, "Shelfie" remains with several restrictions and a problem that cannot be ignored. The first is that some customers in their old age may not possess a deep knowledge of technology and can not use such options as barcode scanning and AI recommendation, so these users require some time to fit with these complicated functions for

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Shelfie. In view of this problem, Shelfie should develop a simplified mode in the future to provide a non-technical familiar user with a basic functional interface. Meanwhile, different language options are provided for users to choose to ensure that this software becomes an effective assistant that can be used by all user groups.

Second, while personalized recommendations become more and more advanced day by day, some users may be afraid that their personal information might leak or be used for commercial purposes. In the future, Shelfie will provide visualization of privacy settings to help users understand and manage their data permissions, as a implies to pick up trust and cultivate long-term engagement.

Third, while automation and intelligence are great at helping users track and manage household items with Shelfie, it also runs the risk of some users becoming overdependent on the application. Future versions of Shelfie will aim at increasing user engagement and skills building along with the features of automation. For instance, users can set their preferences to get fewer proactive notifications or rely less on automatically generated shopping lists. This will help users build confidence in managing their own inventory over time while still being able to refer to the application when needed. This fits with the "Extended Self" concept, since Shelfie augments the user's capabilities without completely replacing them.

Fourthly, by improving the integration with intelligent devices including fridges and digital assistants, develop the IoT functions, Shelfie may make automatic background updates of inventories and seamless interaction possible. Community Functions can also be incorporated to add the ability to share recipes, shopping lists, or store discounts based on location. Further embedding Shelfie naturally into the user's daily life environment will enhance user engagement and stickiness. This deeper integration is an expression of the concept of "Ubiquitous

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Computing", Shelfie will be able to support the user in managing inventories and optimally using resources in a very unobtrusive way.

Lastly, Shelfie needs to keep innovating to stay competitive. As that, Shelfie in the future will incorporate user feedback and usage data in order to further refine its algorithms and develop further advanced AI-based functionalities like dietary and nutritional analysis to be able to give more accurate and meaningful recommendations to users. This continuous innovation in optimization is the ground for making the app not only serve its basic purpose but a dynamic, forward-looking platform that keeps changing with the growing needs of users and emerging technologies.

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Appendix

Grammarly is used for grammatical and synonym-finding purposes.