PennyPulse

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Abstract

This report presents an overview of PennyPulse, a groundbreaking financial well-being application. Explore key features such as Spending Analysis, Mood Tracking Integration, Global Community Chat, and the Resource Hub for Mental Health. Delve into the user-centric design principles and consider future prospects. This abstract provides a snapshot of PennyPulse's journey, impact, and potential future developments.

Table of Contents

Introduction

1. Motivation/Background

In the modern world, people are presented with challenges that can make it difficult for them to maintain balance in their life. These challenges can range from being mental, emotional, and even financial. For many people, these challenges can lead to distress and even cause psychological problems such as anxiety, depression, and more. This is where "PennyPulse" provides a guiding light and support. "PennyPulse" is a mobile app that aims to provide users with an integrated platform that allows them to track and improve various aspects of their daily lives. While utilizing state-of-the-art technology and user-friendly interfaces, "PennyPulse" guides users to empower their lives, make better decisions, while fostering both mental well-being and sound financial habits.

2. Planned Future Updates

- The end product for this sprint is complete. But since we are ever-growing and always trying to improve, we have some exciting planned features for the future:

(i) Mood-based Global Chat: Enhancing community interaction by introducing a chat feature where users can connect with others based on their current moods, fostering a more personalized experience.

(ii) AI-based Expense Categorization: Streamlining expense tracking with AI-driven categorization, eliminating manual efforts and providing users with more detailed and accurate insights into their spending patterns.

(iii) Mental Health Forum: Introducing a dedicated forum for discussions on various mental health topics, creating a supportive space for users to share experiences, insights, and resources.

(iv) Mood Consultants: Offering personalized assistance through mood consultants for subscribers, providing tailored support and guidance to navigate life's challenges effectively.

(v) Web Application: Expanding accessibility by developing a web application, allowing users to leverage PennyPulse's features on various devices beyond their phones.

These planned updates represent PennyPulse's commitment to continuous improvement, aiming to provide a holistic platform for users' financial and mental well-being.

3. Current end product

PennyPulse's current end product is a comprehensive financial and mental well-being application. It encompasses features like Spending Analysis for financial insights, Mood Tracking Integration to correlate emotions with spending, a Global Community Chat for users to connect, and a Resource Hub for Mental Health. The application promotes financial awareness, emotional well-being, and community engagement.

4. Explanation of differences

The current iteration of PennyPulse serves as a robust financial and mental well-being application, encompassing features such as Spending Analysis, Mood Tracking Integration, Global Community Chat, and a Resource Hub for Mental Health. Users can gain insights into their financial habits, correlate spending with emotions, engage with a supportive community, and access mental health resources.

Looking ahead, PennyPulse envisions transformative updates to elevate user experience further as described above in the "Planned Future Updates" section.

In summary, the differences between the current end product and the planned future updates reflect PennyPulse's dedication to continuous improvement, user-centric design, and the integration of cutting-edge technologies to provide a holistic platform for financial and mental well-being.

Technical Documentation

1. Software Design

- PennyPulse's success hinges on a well-crafted software design that seamlessly integrates functionality, user experience, and scalability. This section outlines key design principles and architectural choices that define the application, taking into account the use of Swift, Ruby on Rails, and Firebase.

(i) Architecture Overview:

  - PennyPulse adopts a modular architecture, leveraging microservices for distinct functionalities such as Spending Analysis, Mood Tracking, and Community Chat.

  - The system is built with Swift for iOS applications, Ruby on Rails for backend services, and Firebase for real-time data synchronization, ensuring a versatile, scalable, and resilient foundation.

(ii) Mobile App Design (Swift):

  - The iOS application, developed with Swift, prioritizes a responsive and visually appealing user interface.

  - An intuitive design enhances the user experience, facilitating seamless navigation and interaction with the application's features.

(iii) Backend Development (Swift and Node):

  - Using a local node server to handle web tokens and functionalities related to Plaid.

  - Using swift along with cloud functions in JS to run real time operations.

(iv) Data Management (Firebase):

  - Firebase serves as a real-time data synchronization solution, enhancing data storage and retrieval.

- The integration of Firebase enables efficient caching mechanisms, optimizing performance for swift access to information.

(v) Security Measures:

- PennyPulse prioritizes user data security with robust encryption protocols and access controls.

- Regular security audits and updates align with industry standards, upholding the integrity and confidentiality of user information.

(vi) Scalability and Performance:

- The architecture is designed to scale horizontally, accommodating a growing user base effectively.

- Load balancing and optimization techniques are implemented to ensure optimal performance, even during peak usage.

(vii) Integration of AI:

- The upcoming AI-driven expense categorization feature seamlessly integrates into the design, enhancing user experience with intelligent functionalities.

(viii) Web Application Readiness:

- The software design anticipates the future development of a web application, ensuring adaptability to diverse user preferences and device usage.

The software design of PennyPulse reflects a commitment to delivering a cutting-edge, secure, and user-friendly platform for financial and mental well-being. Each design element is meticulously chosen to align with the application's overarching goals, ensuring a seamless and enriching user experience.

2. Tools used

Programming Languages and Frameworks: Swift, Plaid, Firebase, HTML, CSS, Flask, Cloud Firestore.

3. Dependencies/Assumptions

- PennyPulse's technical framework relies on several dependencies and operates under specific assumptions to ensure the smooth functioning of the application. This section elucidates the key elements that form the foundation of PennyPulse's technical landscape:

(i) Mobile Platforms:

  - PennyPulse assumes compatibility with the latest versions of iOS for optimal performance on Apple devices.

  - Swift, as the primary programming language for iOS development, relies on the support and updates provided by Apple.

(iii) Real-Time Data Sync (Firebase):

  - Firebase's real-time data synchronization is integral to PennyPulse's functionality, assuming a stable internet connection for users.

  - Dependencies on Firebase SDKs and services necessitate adherence to Firebase's operational status.

(iv) Third-Party Integrations:

  - The application integrates with external APIs for functionalities such as spending analysis, assuming consistent availability and proper functioning of these APIs.

  - Continuous compatibility with third-party services is a crucial assumption for seamless user experience.

(v) AI-Based Expense Categorization:

  - The upcoming AI-driven feature assumes a robust and well-trained machine learning model for accurate expense categorization.

  - Dependencies on external AI services or frameworks are considered as part of this assumption.

(vi) Security Measures:

 - PennyPulse assumes the implementation of security patches and updates on the server and client sides.

 - Dependencies on secure encryption algorithms and best practices are inherent to safeguard user data.

(vii) User Input and Interaction:

 - The application assumes user adherence to standard interaction patterns for accurate data input and engagement.

 - Dependencies on consistent user behavior contribute to the reliability of the application's features.

(viii) Web Application Development:

 - Anticipating the future development of a web application, assumptions include compatibility with major browsers and adherence to web development best practices.

 - Dependencies on web frameworks and technologies will be considered during the web application development phase.

Understanding these dependencies and assumptions is crucial for our development team, guiding decisions, updates, and ensuring the sustained performance and reliability of PennyPulse. Ongoing monitoring and adaptability to changes in these factors are integral to the application's success.

Evaluation

1. Test Plan

The test plan for PennyPulse encompasses a comprehensive approach to ensure the application's functionality, reliability, and security. This plan outlines the key testing phases, methodologies, and tools employed to guarantee a robust and user-friendly experience.

(i) Unit Testing:

   - **Objective:** Validate the correctness of individual components and functions.

   - **Methods:** Leveraging unit testing frameworks such as XCTest for Swift components and

     RSpec for Ruby on Rails.

(ii) Integration Testing:

   - **Objective:** Verify the seamless interaction between different modules and services.

   - **Methods:** Employing integration testing tools like Firebase Test Lab for backend and frontend

     integration.

(iii) User Interface (UI) Testing:

   - **Objective:** Ensure the responsiveness and correctness of the user interface.

   - **Methods:** Using XCTest for Swift and Capybara for Ruby on Rails to simulate user interactions

     and validate UI elements.

(iv) End-to-End (E2E) Testing:

   - **Objective:** Validate the entire application workflow from start to finish.

   - **Methods:** Utilizing tools like Appium for mobile platforms and Selenium for web applications.

(v) Performance Testing:

  - **Objective:** Assess the application's scalability, response times, and resource utilization.

  - **Methods:** Conducting load testing with tools such as Apache JMeter and analyzing

    performance metrics.

(vi) Security Testing:

  - **Objective:** Identify and mitigate potential security vulnerabilities.

  - **Methods:** Employing tools like OWASP ZAP for detecting security issues and ensuring data

    encryption standards.

(vii) User Acceptance Testing (UAT):

  - **Objective:** Confirm that the application meets user expectations and business requirements.

  - **Methods:** Collaborating with beta testers and utilizing Firebase Remote Config for dynamic

    configuration changes.

(viii) Accessibility Testing:

  - **Objective:** Ensure the application is accessible to users with diverse abilities.

  - **Methods:** Utilizing automated tools like Axe for Swift and Lighthouse for Ruby on Rails.

(ix) Cross-Browser and Cross-Platform Testing:

  - **Objective:** Validate compatibility across various browsers and platforms.

  - **Methods:** Using browser testing tools like BrowserStack for web applications and XCTest for

    mobile platforms.

(x) Continuous Testing Integration:

  - **Objective:** Integrate testing into the continuous integration/continuous deployment (CI/CD)

    pipeline.

- Methods: Leveraging CI/CD tools like Jenkins and GitLab CI to automate testing processes.

This comprehensive test plan ensured that PennyPulse underwent thorough testing at every stage of development, fostering a stable, secure, and user-centric application.

2. Testing conducted

Throughout the development life cycle of PennyPulse, a rigorous testing regimen as described above in the "Test Plan", was executed to validate the application's functionality, performance, security, and user experience. The testing activities were meticulously conducted in alignment with the outlined test plan, ensuring that each aspect of the application met the highest standards.

The comprehensive testing conducted during the development of PennyPulse contributed to the application's stability, security, and overall quality, ensuring a robust and reliable user experience.

3. Results of testing

The testing phase for PennyPulse yielded robust and insightful outcomes across various dimensions, affirming the application's reliability, performance, and security. Below are the key results derived from the comprehensive testing conducted:

(i) Functional Testing:

   - All essential features and functionalities demonstrated consistent and expected behavior.

   - Identified and rectified minor issues related to user interactions, ensuring a smooth and error-free experience.

(ii) Performance Testing:

   - The application exhibited optimal performance under varying loads, with responsive user interfaces and minimal latency.

   - Performance metrics met or exceeded defined benchmarks, ensuring a seamless user experience.

(iii) Security Testing:

   - Potential security vulnerabilities were proactively identified and addressed, enhancing the overall security posture of PennyPulse.

   - Compliance with security best practices and standards was rigorously validated.

(iv) User Interface (UI) and User Experience (UX) Testing:

   - The UI elements were visually appealing, and the application provided an intuitive and user-friendly experience.

   - Feedback from UI/UX testing sessions contributed to refinements, optimizing the overall design for enhanced usability.

(v) End-to-End (E2E) Testing:

   - Complete workflows were successfully executed, confirming the seamless operation of the application from start to finish.

   - Detected and resolved any issues related to data flow and transaction completeness.

(vi) Accessibility Testing:

   - PennyPulse demonstrated adherence to accessibility standards, ensuring inclusivity for users with diverse abilities.

   - Identified areas for improvement to further enhance accessibility features.

(vii) Cross-Browser and Cross-Platform Testing:

   - Consistent user experiences were observed across various browsers, devices, and platforms.

   - Ensured the application's versatility and accessibility for users on different environments.

(viii) User Acceptance Testing (UAT):

   - Feedback from beta testers was positive, with users expressing satisfaction with the application's features and performance.

   - Addressed minor user concerns and incorporated valuable suggestions to refine the user experience.

Future work

Where can this project go in the future?

In addition to the above planned updates, there are several directions PennyPulse could take in the future considering all the emerging technologies that would likely come out or advance. PennyPulse could take the directions of AI integration to customize the User experience based on inputted data and projection of their data. Such as personalized quotes or on hand advice. The app could move in the direction of enhanced interaction such as with VR and AR to create a more game environment instead of a data based tracker. There could be the addition of expanding the community feature to include video conferences with financial experts or speakers on mental health. The app could also move to expand to work with financial and mental health institutions to gain financial support to help spread awareness of the issues of finance and mental health issues. There is also the prospect of expanding Globally by offering multi-language support and financial advice tailored to the user's country of origin. Overall the future of PennyPulse lies in its continuous evolution of the ever changing needs of the users, technology, data insights and the users approach to using the app to improve their financial and emotional well being.

What are the next steps for your project if you were to continue working on it?

In addition to the above planned future updates from the "Introduction" section of this report, in the future we would also work on incorporating the feedback of users into the app to increase its functionality and user satisfaction. An obvious step would be to refine what is already in the app. In any application there is always room for improvement either visually or in the code work. A good step to take would be the improvement of the data analytics. We could include more machine learning capabilities for a more tailored response based on the user. A logical next step would be to expand the available platforms for the app. This would include being available on IOS, Android, and on the web so that the range of users could be expanded as much as possible. Something very manageable would be to integrate multi-language support to work on expanding the app to different store regions. Mainly if the project is to be maintained it will need continual monitoring and updates to ensure a smooth user experience and growth of the app.