PaperTrail

AI-Enhanced Journaling Platform

Design Document

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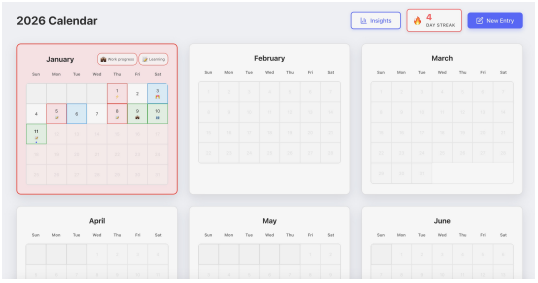

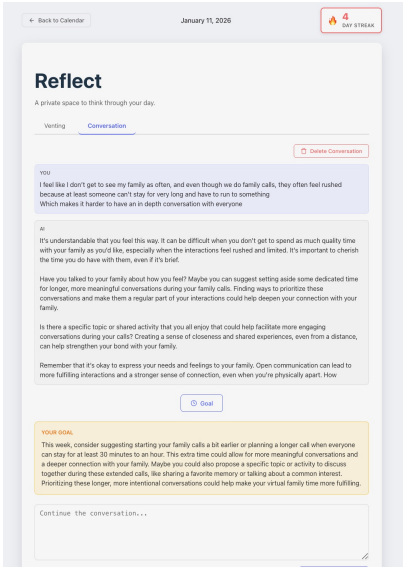

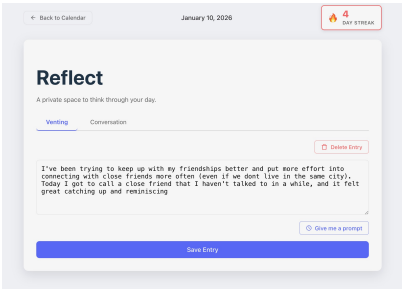

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1 Design Overview

1.1 Problem Statement

Many people struggle with maintaining a consistent journaling habit due to:

- Lack of structure or guidance when facing a blank page.
- Difficulty identifying patterns in their thoughts and emotions over time.
- Limited feedback or insights from their entries.

1.2 Solution

PaperTrail addresses these challenges through a thoughtful combination of traditional journaling and AI-powered analysis, designed to make self-reflection both accessible and meaningful.

1.3 Core Design Principles

1. **Intrinsic Motivation**: Visual progress, insights, and gamification elements that make journaling rewarding and encourage daily engagement.
2. **Unfiltered Expression**: Dual modes for venting or conversation, paired with adaptive writing prompts reduce blank page anxiety by making it easier to start and express thoughts and feelings authentically.
3. **Privacy First**: All data stored locally with no cloud synchronization.
4. **Empathetic AI**: Supportive, non-judgmental interactions that encourage reflection, with adaptive prompts that personalize based on journaling history and patterns.
5. **Flexibility**: Dual modes accommodate different journaling needs and preferences.
6. **Simplicity**: Clean, distraction-free interface that does not overwhelm users.

2 Design Choices & User Benefits

2.1 Dual Journaling Modes

On different days, users have different needs or goals with their journaling. Some days, they might just need to let their thoughts out freely without interruption or external opinions. Other times, they want guidance and conversation that provides them a direction for further reflection.

2.1.1 Venting Mode

User Benefit and Impact

- Provides a safe space for unfiltered, unpolished expression.
- Removes barriers to entry—faster, more natural writing that doesn't have to be neat.
- Reduces blank page anxiety by eliminating the pressure and allowing the user to write anything.

2.1.2 Conversation Mode

User Benefit and Impact

- Offers support in helping users process their thoughts.
- AI acts as a thoughtful listener, asking meaningful follow-up questions.
- Transforms journaling from passive recording to active reflection, potentially prompting perspectives the user would otherwise not have considered.

2.2 Visual Calendar Interface

While traditional journaling apps show lists of entries, PaperTrail uses a calendar because it provides immediate visual context about journaling patterns and emotional trends.

2.2.1 Color and Visual-Coded Sentiment

Colors and images/icons reflect sentiment and themes of the user's thoughts across time.

User Benefit and Impact

- Instantly see broad patterns without reading entries.
- Users can identify positive weeks or stressful periods at a glance.

2.2.2 Hidden Entries

Previous entries don't appear in the calendar view but are accessible if the user clicks on the specific date.

User Benefit and Impact

- Journal entries, no matter how users choose to write them, do not lead to their journal being any more disorganized or less visually aesthetic. Encourages more raw feelings and continued journaling.
- Users do not have to be reminded of previous entries, which may contain negative experiences.
- Past entries are still easily accessible, allowing for users to reflect, reminisce, and grow.

2.3 AI-Powered Analysis

Manual pattern recognition is difficult, especially for oneself. Users often do not notice their own emotional patterns or recurring themes. AI analysis makes these insights automatic and accessible.

2.3.1 Personalized Prompts

User Benefit and Impact

- Tailored writing prompts based on journaling history and previous entries.
- Reduces "blank page anxiety" with relevant suggestions that lead to helpful introspection.
- Makes journaling easier to start, more welcoming and meaningful.

2.3.2 Context-Aware Goals

If the user chooses to engage in conversation, the user can ask the journal to generate a small, actionable goal.

User Benefit and Impact

- Provides the user a goal that's not daunting to strive for but is still meaningful (Ex: This week, set aside 20 minutes to have a focused, non-judgmental, open conversation with your friend).
- Gives the user a meaningful target to look forward to and strive for.
- Can make journaling more fulfilling.

2.3.3 Sentiment Trends Graph

User Benefit and Impact

- Helps users understand their patterns without manual tracking, for ex: categories/areas in their life that are bringing them happiness.
- Allows users to visualize positive or negative cycles, trends, factors.
- Transforms abstract feelings into a trajectory of their thoughts.

2.3.4 Theme Extraction

User Benefit and Impact

- Offers insights on which topics users are prioritizing.
- Enables targeted reflection.

2.3.5 AI Generated Insights

User Benefit and Impact

- Weekly or monthly summaries with pattern recognition of themes in entries.
- Provides insights on trends that users might not have noticed, prompting deeper reflection.
- Displays progress of entries across time.

2.4 Streak Tracking

Habits are hard to maintain consistently. Visual progress tracking provides motivation and accountability (inspired by platforms like Duolingo).

2.4.1 Current Streak Display

User Benefit and Impact

- Encourages daily engagement and provides a push for the user to journal again tomorrow.
- Reflects how journaling doesn't have to be a long process every day and emphasizes consistency.

2.4.2 Milestone Goals

User Benefit and Impact

- User sets their own goals for their journaling streak.
- Tailors the journaling process to different users' needs and schedules.

2.4.3 Total Days Counter

User Benefit and Impact

- Displays the total number of journaled days, reflecting long-term commitment.
- Helps the user feel positively about maintaining their dedication to journaling.

3 Technology Stack

3.1 Backend: Python & Flask

The backend utilizes Flask and Python for supporting most of the web app, including handling HTTP requests and routing API endpoints. It stores the user's journal entries in a local JSON file for better privacy and security, as well as information about streak data and previously generated prompts in

JSON files. In addition, the backend integrates with OpenAI's GPT-3.5-turbo API (via the openai Python package) in order to utilize its natural language processing capabilities, including prompt generation, sentiment analysis, conversation responses, AI-generated insights, and more. The Flask server exposes endpoints like /journal, /entries, /insights/sentiment-trends, and /prompts, which process requests, interact with OpenAI, update JSON files, and return JSON responses to the frontend.

3.2 Frontend: React

For the frontend, the application is built with React, which handles client-side routing. The frontend consists of components like Calendar, Journal, and Insights, which create the UI for different features. These components use React hooks, such as useEffect, for state management, and the frontend connects with the backend through REST API and JavaScript fetch() for HTTP requests.

3.3 AI: OpenAI GPT-3.5-turbo

PaperTrail uses OpenAI's GPT-3.5-turbo model for its AI-powered functionalities, due to a combination of its cost effectiveness, speed, and overall quality compared to other models that were initially experimented with (Grok, Llama, Claude).

3.4 Storage: JSON Files

The user's data and entries are stored locally in JSON files to ensure their personal writing remains private and that the user maintains ownership and control of their information. In addition, it's simple, with no database setup needed, and easy to backup or transfer.

4 Future Enhancements

4.1 Search and Filter Functionality

User Benefit

- Find specific entries or themes quickly, especially if the user isn't sure on the date of an entry they want to look back at.
- As journaling history grows, search becomes essential.

Enhanced Insights

- More in depth pattern analysis, potentially providing the user with nuances in their journaling history.
- Additional data visualizations or metrics offering the user a clearer broad view of their thoughts, priorities, etc.

Broad Reflection Page

- Provide a space for the user to write about their reflections week-to-week or month-to-month (Ex: how they felt about certain topics this month compared to last month).
- Enhances the value of the Insights page, propelling the user to understand themselves from a bigger picture perspective, which can make journaling more meaningful.

4.2 AI Safety

While AI and LLMs are incredibly powerful tools that can identify patterns and support reflection in ways that were more difficult before, AI is certainly not without its risks. These models can often hallucinate and make a wide variety of mistakes. Thus, especially in an application that is highly personal and can be sensitive for many users, AI needs to be used cautiously and ethically. Large volumes of carefully designed testing needs to be conducted, and these models cannot be blindly trusted to provide therapeutically sound advice, nor is it a replacement for open conversations and connections. For this reason, short-term enhancements intentionally focus on low-risk, assistive features—such as prompts, summaries, and pattern detection—rather than positioning the AI as a counselor or emotional decision-maker.

5 Design Impact

5.1 User-Centered Design

Each design decision in PaperTrail was made with the user's journaling experience in mind, with hopes of promoting consistent journaling through features that are encouraging and accessible:

- **Reduced Friction**: The dual modes (venting and conversation), the casual layout of the journal entry page, the option to generate context-based prompts, and the journal's calendar view are all meant to make journaling feel less daunting.
- **Friendly Encouragement**: The streak statistics, the visual feedback, and the generated goals provide sources of positive reinforcement in the journaling experience.
- **Privacy Assurance**: Local storage gives the user ownership of their writing.
- **AI Assistance**: Allows journaling to be more engaging and insightful.

5.2 Measurable Outcomes

The design choices aim to achieve:

- **Increased Consistency**: Streak tracking and visual progress.
- **Better Self-Awareness**: AI insights reveal patterns that users might not have realized.
- **Reduced Barriers**: Multiple entry modes and prompts reduce friction.
- **Long-Term Engagement**: Visual progress and insights maintain motivation.

6 Conclusion

PaperTrail represents a thoughtful approach to digital journaling, integrating a combination of simplicity and meaning into self-reflection, with the assistance of AI analysis. The design choices prioritize user safety, emotional insight,

and habit formation, creating a tool that helps users understand themselves better while feeling positive about expressing their thoughts more freely.