

DEVELOPMENT OF AN iOS APPLICATION FOR TASK PLANNING WITH CONSIDERATION OF THE USER'S EMOTIONAL STATE

The article focuses on the development of a digital tool designed to address the problem of decreased productivity caused by emotional exhaustion. The main objective of the study is to create an iOS application for task planning that takes into account the user's emotional state, offers mindful breaks for emotional awareness and recovery, and provides analytics on emotional trends.

The research includes a comparative analysis of existing software solutions in the areas of time management and mental well-being. During the development process, modern frameworks, tools, and architectural patterns for iOS development were analyzed. An adaptive planning algorithm was implemented, that takes into account both the user's emotional feedback and the attributes of tasks.

As a result of the research, a mobile application named Moodpace was developed using Swift, with SwiftUI for building the user interface, SwiftData for data persistence, and the MVVM architectural pattern to ensure maintainable code structure. During the development process, SwiftLint was used for static code analysis, and SwiftFormat was integrated for automatic code formatting. The app was localized into Ukrainian using String Catalog.

The developed application is designed to help users manage their tasks while maintaining balance with their mental well-being. It is suitable for everyday use and especially beneficial for individuals with flexible schedules.

Keywords: task management, productivity, emotion, adaptive planning, mobile application, iOS, Swift, SwiftUI, SwiftData.

Introduction

Today's reality is shaped by constant military conflicts, economic challenges, and information overload. In times of this global instability, emotional burnout has become a common problem, which can lead to a significant drop in personal productivity. Studies have shown that employees who engage in emotional regulation exercises and manage their mental health have 20-30% higher productivity compared to those who rely only on time management techniques [7].

At the same time, the rise of digital technology has made popular tools that help users manage their time, track their mood, and general well-being. Though there are a lot of apps in the fields of time management and mood-tracking, there is currently no widespread solution that integrates both productivity and mental health into a unified system. This creates a gap for a digital tool that adapts schedules to users' emotional states and promotes mindful time management.

This paper presents the design and development of a mobile app that addresses this gap. The objective is to create a user-friendly tool that offers a personalized task planner that adjusts to a user's current emotions, encourages mindfulness, and supports analytics to reflect on trends over time and improve future planning. Additionally, the application supports the Ukrainian language. The proposed system effectively combines adaptive planning, emotion tracking, and mindfulness exercises.

Overview of Existing Solutions

To gain a better understanding of the subject area, four mobile applications were analyzed: two focused on emotion tracking (DailyBean [4] and Bearable [3]) and two on task management (TickTick [12] and Notion [8]).

As shown in Table 1, existing tools tend to focus on isolated aspects of the problem domain. None of them provide an automated way to integrate time management with emotional state, which highlights the need for a new approach.

Table 1. Comparison of Existing Solutions

App	DailyBean	Bearable	TickTick	Notion
Primary Purpose	Daily journaling of activities and mood	Tracking health metrics, well-being, and mood	Task management using productivity techniques	Information organization and project planning
Time Planning	No	No	Yes	Yes (via templates)
Emotion Tracking	Yes	Yes	No	Yes (via templates)
Customization Level	Low	High	Medium	High
Account Creation	Yes, optional	Yes, required	Yes, optional	Yes, required
Integration with Other Services	No	Yes (Fitbit / Apple Health)	Yes (Calendars, Notion, Apple Health, Reminders etc.)	Yes (Slack, Jira, Google Calendar, Figma etc.)
Reminders	Yes	Yes	Yes	Yes
Ukrainian Language Support	No	Yes	Yes	No
Adaptive Task Planning	No	No	No	No

Additionally, it was discovered that all tools support reminders; only half of them offer Ukrainian language support and require account creation, and most apps enhance usability by having integrations with other services.

Technologies and Tools Used

The mobile application, called Moodpace, was developed for the iOS platform because of increased user engagement on iPhones [13] and higher trust in Apple's privacy policies [2].

Swift 6 was used for development, as it is Apple's recommended programming language for modern iOS development [9].

For building the user interface, the declarative SwiftUI framework was used. It reduces boilerplate code and improves rendering efficiency [5].

For data persistence, the SwiftData framework was chosen as a native solution that combines the advantages of CoreData and Realm and provides easy integration with SwiftUI [10, 11].

To ensure code quality, the static code analyzer SwiftLint was integrated as an Xcode Run Script Build Phase, and the automatic code formatter SwiftFormat was added as a Git pre-commit hook.

Application Architecture and Structure

The application follows the MVVM (Model–View–ViewModel) architectural pattern, which provides clear separation of concerns, where the Model handles data, the View presents the UI, and is responsible for user interaction, and the ViewModel acts as an intermediary that handles business logic. This pattern was selected for its balance of simplicity and scalability, which makes it suitable for medium-sized applications [6].

As shown in Figure 1, the project's file structure is organized in a way that makes it easier to find necessary files and expand the project with new features.

Classification of Tasks

In the proposed system, tasks can be either fixed or flexible.

Fixed tasks have predetermined start and end times, for example, a university lecture or a scheduled daily work meeting.

Flexible tasks need to be completed during the day, but the exact time is not critical; examples include watching a recorded lecture or watering houseplants.

In addition to the type, each task has the following attributes:

- title;
- description;

- category: work, study, personal, home, or other;
- difficulty: very easy, easy, medium, difficult, or very difficult;
- start and end time (for fixed tasks);
- estimated duration (for flexible tasks).

All attributes, except for title, have default values.

Regardless of its type, each task is assigned a time block and is displayed on an interactive calendar. This aligns with the time-blocking technique, encouraging the user to focus on one task at a time.

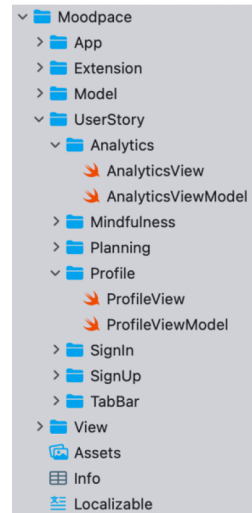


Figure 1. File structure of the app

Emotional Feedback

Once a task is marked as completed, the user is prompted to select the emotion they are experiencing now. This encourages emotional awareness and supports mindful productivity. Emotions are represented by five emojis: very sad, sad, neutral, happy, and very happy. As shown in Figure 2, these emotions are internally converted into numerical values from 0 to 4 – emotionScore.

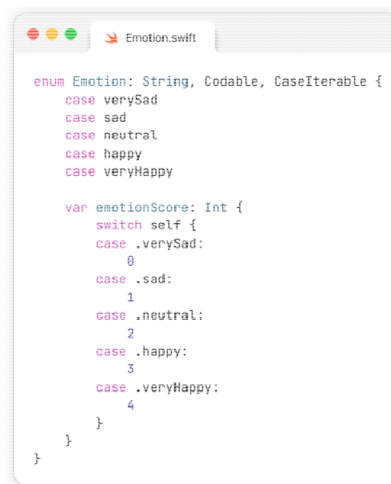


Figure 2. Emotion enumeration and numerical mapping for emotion score values

Adaptive Planning Algorithm

The system uses an adaptive planning algorithm that dynamically adjusts the tasks depending on the user's current emotion. Naturally, the algorithm can only rearrange flexible tasks. In some cases, it also suggests mindfulness exercises.

As illustrated in Figure 3, based on the selected emotion, the algorithm adjusts the user's schedule accordingly:

- if the emotion is neutral or positive (emotion score 2–4), the system assumes that the user is in a good state and can handle more challenging tasks first; so, flexible tasks are sorted by difficulty in descending order;
- if the emotion is negative (emotion score 0–1), the algorithm sorts flexible tasks in ascending order of difficulty so that the user could do something easy and recover mentally. Additionally, the system evaluates the upcoming task. If it is flexible, or fixed, but there is at least a 10-minute gap before it, the short mindfulness practice is suggested. Otherwise, the app just shows a supportive message.

Then the system waits for the next task to be completed, continuously adjusting the workflow to balance productivity and emotional well-being.

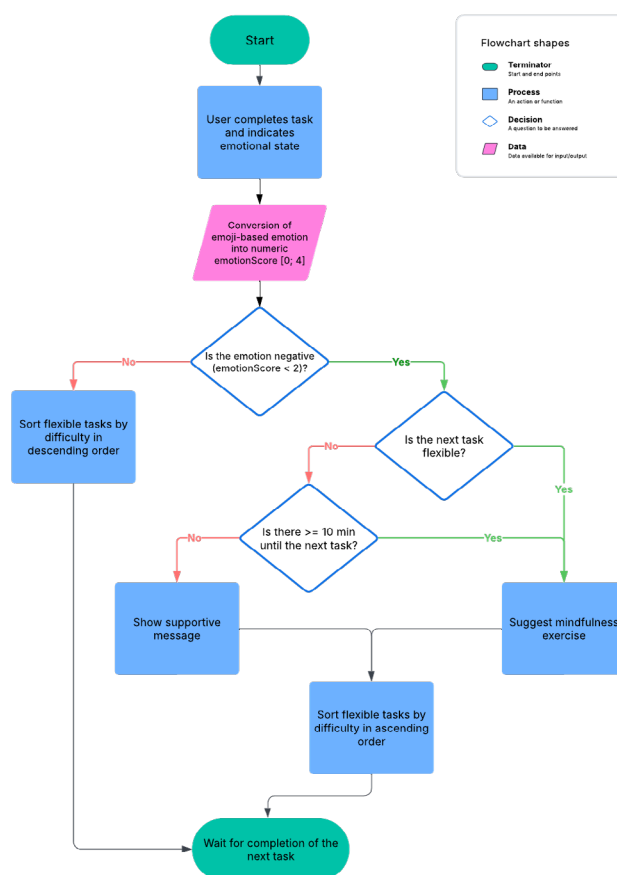


Figure 3. Flowchart of the adaptive planning algorithm

Results

As a result of the research, the iOS app Moodpace was developed. The core functionality of the app is organized into four primary sections, accessible via a tab bar (Figure 4):



Figure 4. The tab bar of the Moodpace app

- 1) planning: Using an interactive calendar, users can create, view, edit, and delete tasks (Figure 5). After marking a task as completed, users are asked to rate their emotional state. Based on this input, an

adapted schedule is created and, if needed, a mindfulness exercise is suggested, or a supportive message is shown;

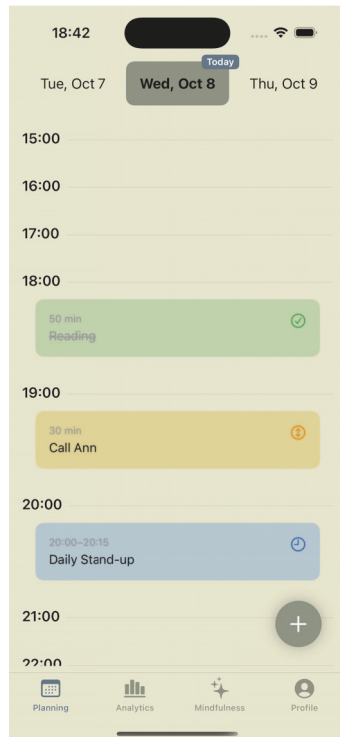


Figure 5. Planning screen



Figure 6. Analytics screen

- 2) analytics: Users can view statistics on completed and not completed tasks, as well as charts displaying average emotions by category and day over a selected period (Figure 6). These charts are implemented using the Swift Charts framework. The presented analytics help to identify patterns in emotional state based on time and categories;
- 3) mindfulness: Users can select one of five short interactive mindfulness exercises: 4–7–8 Breathing, Emotional Journaling, 5–4–3–2–1 Grounding, Gratitude Practice, or Emotional Drawing. These practices are recommended after negative emotional feedback but also are available on demand (Figure 7);

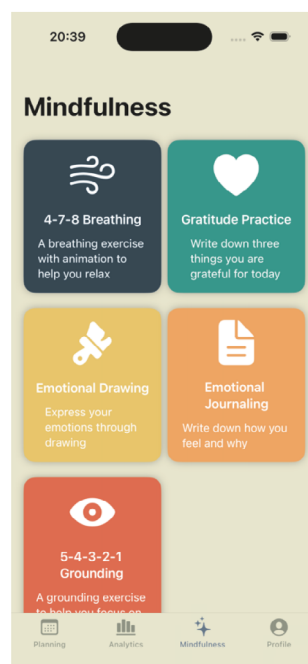


Figure 7. Mindfulness practices screen

- 4) profile: Users can manage their account and configure preferences, such as receiving notifications for fixed tasks and setting day start/end times. Authorized users can also request a CSV export of their tasks data.

All use cases of the app are shown in the use case diagram in Figure 8.

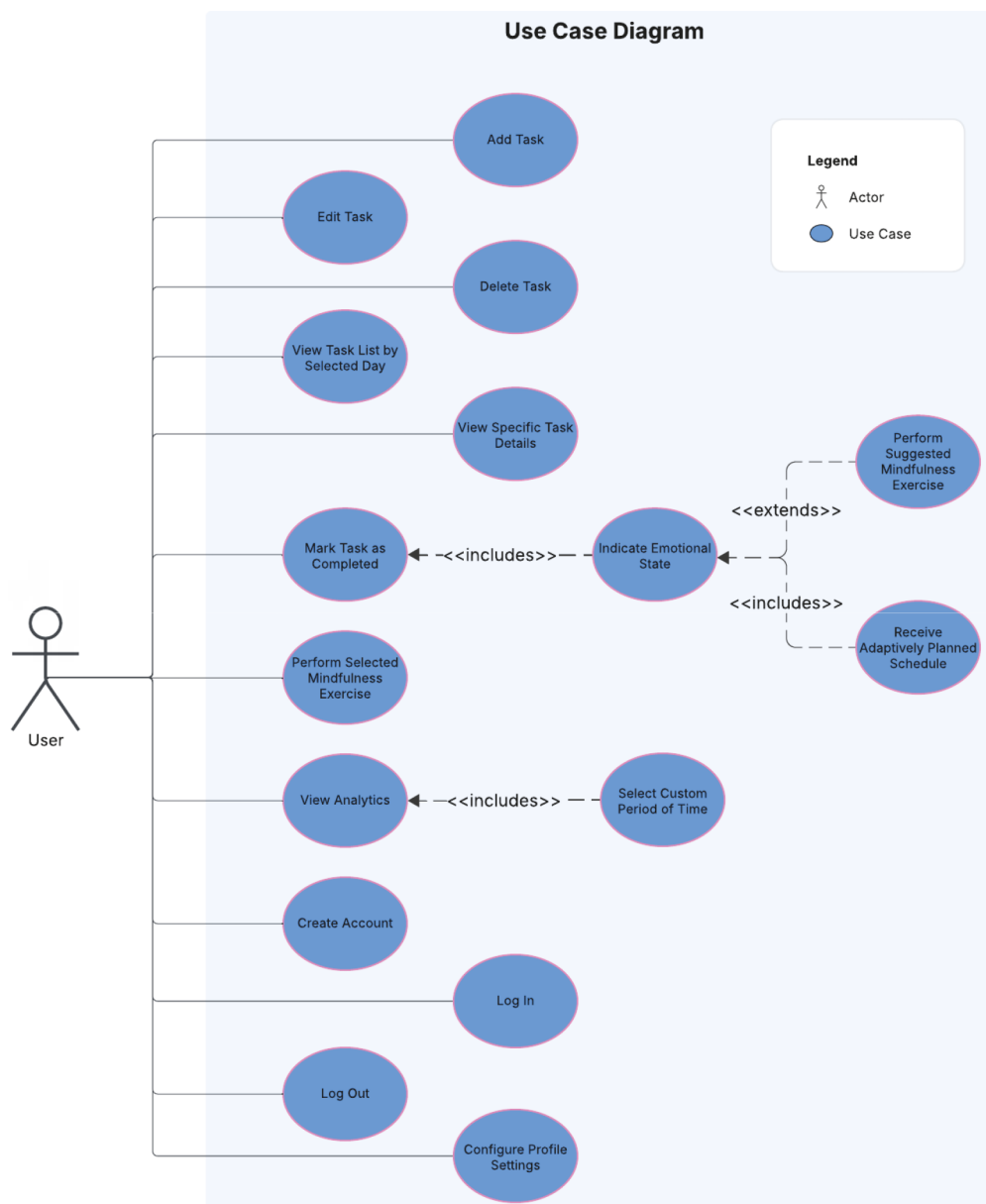


Figure 8. Use case diagram of a system

To help users avoid missing fixed tasks, the notification mechanism was implemented using the UserNotifications framework. The system sends local reminders 15 minutes before and at the start time of fixed tasks.

The app is localized into Ukrainian using the String Catalog, which is the preferred localization approach starting with Xcode 15 [1]. The app's language is automatically selected based on the iPhone's system language.

Conclusions

This study addressed the lack of integrated solutions that combine productivity with consideration of emotional state. A comparative analysis of existing applications showed that none of them offered adaptive planning based on a user's current emotions. This identified a gap and defined the direction for a new solution.

To bridge this gap, tasks were categorized as either flexible or fixed, emotions were quantified, and, finally, the adaptive planning algorithm was developed. This algorithm dynamically adjusts the order of flexible tasks based on the user's mood and tasks' attributes.

As a result, an iOS application was implemented using modern technologies for iOS development such as Swift, SwiftUI, and SwiftData. Code quality and format were ensured by SwiftLint and SwiftFormat. The project followed the MVVM architecture.

The application includes such core features as task management and planning, marking emotional state after completing a task, analyzing emotional trends across time and categories, and suggesting mindfulness exercises when needed. The key innovation of the system lies in the adaptive planning mechanism, which helps users stay productive while being mindful of their mental well-being. Additional features include account management, reminders for fixed tasks, and Ukrainian localization.

The results of this research can be applied in the domains of time management and mental health. Future development may be conducted by applying machine learning to personalize the algorithm based on individual patterns. Another promising direction is integration with health tracking solutions such as Apple HealthKit. This would enable the system to consider both mental and physical health data in the task planning process.

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РОЗРОБКА iOS-ЗАСТОСУНКУ ДЛЯ ПЛАНУВАННЯ ЗАВДАНЬ З УРАХУВАННЯМ ЕМОЦІЙНОГО СТАНУ КОРИСТУВАЧА

У статті розглянуто створення цифрового інструмента для вирішення проблеми зниження продуктивності через емоційне виснаження. Метою дослідження є розробка iOS-застосунку для планування справ, який враховує емоційний стан користувача й відповідно до нього коригує графік справ і надає можливість виконувати вправи для емоційного усвідомлення й відновлення. У ході роботи проаналізовано наявні програмні рішення в нішах управління часом і ментального здоров'я, а також розроблено алгоритм адаптивного планування залежно від емоцій користувача та властивостей завдань.

Ключові слова: управління справами, продуктивність, емоції, адаптивне планування мобільний застосунок, iOS, Swift, SwiftUI, SwiftData.

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