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TrackIQ: Smart Activity Planner and Tracker

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Abstract:
In modern academic, professional, and personal life, managing daily responsibilities has become increasingly challenging due to growing workloads and time constraints. Existing productivity applications often combine planning, execution tracking, and analytics into a single, complex workflow, reducing clarity and affecting the accuracy of performance evaluations. This paper presents TrackIQ, a modular, offline-first Android application designed for single-user task management on a single device. The system is divided into three modules: Planner for creating recurring and one-time tasks, Home for displaying daily scheduled tasks and monitoring completion, and Analytics for measuring productivity through deterministic logs stored locally using AsyncStorage. Days without records are treated as zero completion to maintain analytical consistency. To enhance usability, a Large Language Model (LLM) is integrated as a supporting layer to refine tasks, generate summaries, and suggest improvements. Productivity metrics are calculated only through algorithmic methods, ensuring transparency and reliability. Developed with React Native, Expo, and TypeScript, TrackIQ provides a privacy-focused, maintainable, and effective solution for structured productivity management.

Keywords: Productivity Management, Task Planning, Offline-First Application, React Native, AsyncStorage, Modular Architecture, Large Language Models (LLMs), Activity Tracking, Data Privacy, Mobile Application

1. Introduction

In the past few years, there has been a substantial increase in the use of digital tools for everyday activity management [9]. Students, professionals, and individuals managing various tasks require well-organized systems to structure their tasks, oversee their execution, and evaluate their productivity effectively [1]. Although there are numerous task management applications available, many of them combine planning, tracking, and analytical functions into a single continuous workflow [2]. This closely linked structure often results in interface clutter, unclear delineation of responsibilities, and inconsistencies when evaluating performance [3].
Additionally, the extensive reliance on cloud-based storage and account-based authentication diminishes offline accessibility and raises concerns over data privacy and user control [8]. The creation of TrackIQ: Smart Activity Planner and Tracker is inspired by the demand for a modular, privacy-focused, and analytically reliable productivity management solution. This application is designed as an offline-first, Android-based system intended for single-user operation on one device.In contrast to conventional applications, TrackIQ employs a strict modular architecture that divides functionality into three distinct components: Planner, Home,

and Analytics. This separation ensures clarity in system design, controlled data flow, and enhanced maintainability [2]. The Planner module is dedicated solely to task definition, allowing users to create recurring daily activities (habits) as well as one-time tasks tied to specific dates. The Home module functions as the daily execution interface, displaying only tasks scheduled for the current date and allowing users to log their completion status. The Analytics module operates as a read-only evaluation layer, processing stored daily logs to compute productivity metrics.To uphold analytical integrity, the system treats unrecorded days as zero completion, thereby ensuring transparency and preventing inflated performance figures [7].

To improve usability without compromising computational accuracy, TrackIQ incorporates a Large Language Model (LLM) as an assistive feature [10]. The LLM supports task refinement, creates structured summaries, and provides contextual improvement suggestions based on the computed analytics data.However, it does not participate in metric calculations or alter any stored records. All productivity indicators—including daily completion rates, periodic averages, and streak detection—are derived strictly through deterministic algorithmic logic applied to locally stored data. The application is developed using React Native with Expo and TypeScript, facilitating modular development and maintainable code architecture.Data persistence is managed through AsyncStorage, ensuring full offline functionality without reliance on cloud services or authentication systems [8]. Additionally, modern user interface techniques are employed to deliver responsive and intuitive visual representations of productivity data. By integrating structured modular architecture with regulated AI-assisted interaction, TrackIQ offers a balanced approach to intelligent productivity management. The system prioritizes offline capability, data privacy, and analytical reliability, making it a practical and academically valid solution for effective task planning and performance evaluation.

2. Literature Review

A. Evolution of Productivity Management Systems

Advancements in mobile technology and Artificial Intelligence have profoundly influenced the structure and functionality of present-day productivity management systems [8][10]. Task management and habit-tracking applications are extensively utilized to support the establishment of goals, daily scheduling, and performance tracking [1]. Early versions of productivity tools were predominantly checklist-driven or reminder-focused, exhibiting limited analytical capabilities [1]. These initial systems did not differentiate between recurring and one-time tasks and failed to maintain a clear distinction between the planning and execution phases, resulting in inconsistent tracking habits and reduced analytical reliability [2][3].

B. Limitations of Integrated Workflow Systems

With the advancement of mobile applications, contemporary productivity platforms now feature dashboards, visual representations of progress, and performance summaries to boost user engagement [7]. Nevertheless, numerous existing systems combine planning, execution, and analytics into a unified workflow [2]. This tightly integrated architecture heightens system complexity, diminishes transparency in the flow of data, and may jeopardize the reliability of calculated metrics. Research in software engineering underscores the significance of modular architecture, the separation of concerns, and deterministic state management to guarantee maintainability, logical consistency, and precise computation [3][8]. Systems that lack adherence to these principles frequently encounter scalability challenges and inconsistent performance assessments.

C. Behavioral Insights in Habit Tracking

Behavioral Insights in Habit Tracking Research in behavior indicates that consistently tracking activities, along with providing measurable feedback, is crucial for enhancing user motivation and maintaining long-term commitment to goals [4]. Features such as maintaining streaks, tracking daily progress percentages, and utilizing visual cues are essential for reinforcing positive behaviors [7].

Nonetheless, the effectiveness of these features depends on accurate and consistent data recording. For analytical results to be reliable, all productivity metrics must be based solely on recorded data, avoiding assumptions or artificial modifications [2]. Any discrepancies in deterministic tracking can result in distorted or inaccurate performance assessments.

D. Role of Large Language Models in Productivity Systems

The Integration of Large Language Models (LLMs) has greatly improved the capabilities of contemporary productivity applications [10]. These models support natural language processing, contextual understanding, and the generation of structured content. In task management systems, they enhance task descriptions, create summaries, and offer actionable recommendations.

When utilized as an additional layer alongside deterministic systems, LLMs enrich user experience while preserving the fundamental computational processes. This distinction ensures that AI contributes to usability without compromising data accuracy and analytical integrity.

E. Offline-First Architecture and Data Privacy

Recent research highlights the increasing significance of offline-first architecture in the development of mobile applications [8]. These systems prioritize local data storage and independent management of state, enabling continuous functionality without requiring internet access, thus enhancing user privacy.

By decreasing dependence on cloud services, they mitigate risks associated with data transmission and external storage. Efficient local storage options, such as AsyncStorage, are particularly effective for single-user productivity applications, offering swift data access, improved performance, and greater control over personal information without necessitating authentication or constant connectivity.

3. Methodology

A. System Architecture and Design

The TrackIQ: Smart Activity Planner and Tracker system is designed with a modular and layered architecture that ensures a clear distinction between task planning, execution

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monitoring, analytical computation, and intelligent assistance. This design is optimized for offline-first functionality, individual user operations, and deterministic data processing.

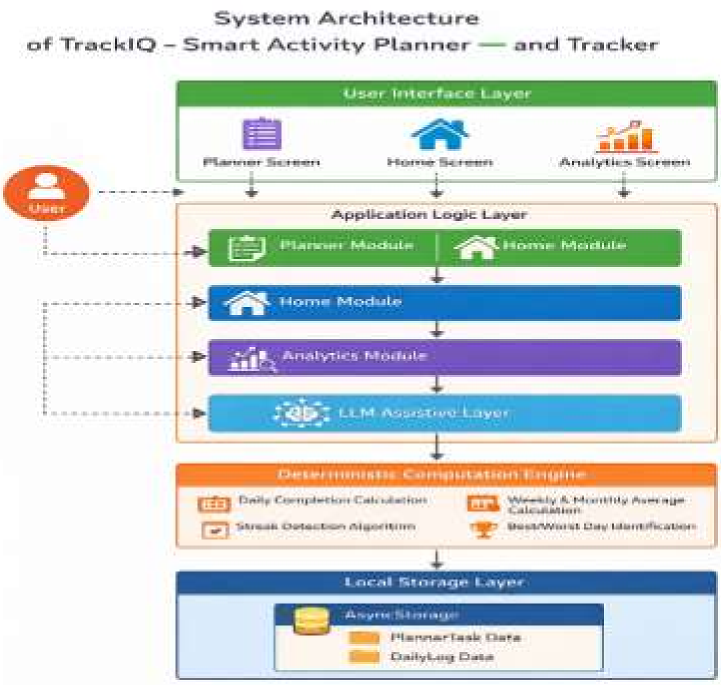

Figure 1: System Architecture

The overall system is divided into four primary layers: User Interface Layer, Application Logic Layer, Computation Layer, and Storage Layer (Figure 1). The workflow begins with user interaction through the mobile interface, where tasks are created, executed, and analyzed.
The User Interface Layer provides three primary screens: Planner, Home, and Analytics. The Application Logic Layer manages task handling, execution flow, and coordination between modules. The Deterministic Computation Engine processes productivity metrics using predefined algorithmic logic. The Local Storage Layer (AsyncStorage) ensures persistent offline data storage.
Additionally, an LLM Assistive Layer is integrated as a non-intrusive component that operates on computed outputs to generate structured summaries and suggestions. Unlike AI-driven systems, TrackIQ ensures that all core computations are performed using deterministic logic, maintaining analytical accuracy and transparency.
This layered architecture ensures efficient data flow, low latency, high maintainability, and privacy-focused operation, making it suitable for real-time productivity tracking without reliance on cloud infrastructure.

B. System Design

The design of the system outlines the logical workflow, inter-module interactions, and data movement within TrackIQ.The application maintains a strict division of responsibilities, with

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each module functioning independently while contributing to the system's overall effectiveness. The workflow commences with the Planner Module, where users create tasks that are classified into:

- Date-specific one-time tasks
- Recurring daily tasks (habits)

These tasks are kept locally in AsyncStorage.The Home Module fetches tasks scheduled for the current day and enables users to mark their completion status.Each interaction results in a DailyLog entry that systematically organizes execution data. The Analytics Module functions as a static evaluation layer, analyzing the DailyLog data to generate productivity metrics, including:

- Weekly and monthly averages
- Streak detection
- Best and worst performing days
- Daily completion percentage

A key design principle is that missing or unrecorded days are treated as zero completion, ensuring analytical integrity and preventing inflated performance results.

Figure 2: Flowchart – system Design

The LLM Assistive Layer operates after analytics computation. It generates structured summaries, insights, and suggestions based solely on computed data without modifying stored records.

This design ensures clear data flow, logical consistency, and reliable performance evaluation, making the system both scalable and maintainable.

C. Modules Description

- Planner Module

The Planner Module is tasked with the creation and management of assignments.It allows users to set up both recurring and one-time tasks, complete with structured details such as date, type, and description.This module ensures that task information is well-organized before it is stored locally.

- Home Module

The Home Module functions as the interface for daily operations.It fetches tasks that are pertinent to the current date, enabling users to mark them as completed.It serves as the main interaction point for monitoring productivity in real-time.

- Analytics Module

The Analytics Module analyzes the DailyLog data to assess user productivity.It operates solely in a read-only capacity, ensuring that stored records remain unchanged.This module produces both visual and numerical insights through deterministic computations.

- Deterministic Computation Engine

The deterministic computation engine is the fundamental computational element of the system, responsible for executing all calculations related to productivity based on established algorithmic principles.It calculates vital metrics such as the percentage of tasks completed daily, as well as weekly and monthly averages, and tracks consecutive days of 100% task completion.Furthermore, the system identifies the best and worst performing days by examining recorded data.All results are derived purely from documented data, guaranteeing precision, consistency, and clarity in productivity assessment.

- LLM Assistive Layer

The Large Language Model (LLM) layer improves user engagement by creating structured summaries of productivity, enhancing task descriptions, and offering actionable recommendations for improvement.It operates strictly on outputs generated by the system's deterministic analytics and does not alter stored data or influence fundamental calculations.This separation guarantees the integrity, consistency, and transparency of data while allowing the system to leverage AI-driven insights without jeopardizing computational reliability.

- Local Storage (AsyncStorage)

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AsyncStorage is utilized as the local data storage mechanism for the system, where it stores task definitions (PlannerTask) as well as execution logs (DailyLog). This approach enables complete offline functionality while ensuring fast data access and reliable data persistence. By eliminating dependency on cloud services, the system enhances user privacy and maintains full control over stored information.

D. Algorithms And Technologies Used

- Deterministic Computation Algorithms

All productivity metrics within the system are derived from established algorithmic logic coded in JavaScript and TypeScript.These calculations encompass percentage evaluations, average computations, and streak detection mechanisms.This deterministic methodology guarantees that all outcomes are consistent, accurate, and reproducible, thereby ensuring analytical dependability.

- Mobile Development Technologies

The application is built with contemporary mobile technologies such as React Native, Expo Framework, and TypeScript.React Native allows for effective cross-platform mobile development with seamless user interface rendering, while Expo streamlines the processes of development, testing, and deployment.TypeScript improves code reliability by incorporating static typing, thereby enhancing the overall maintainability of the system.

- Data Storage

AsyncStorage serves as the main data storage solution to facilitate local data persistence within the application.It supports an offline-first architecture by storing task definitions and execution logs directly on the device, removing the necessity for authentication systems or cloud services, while ensuring data privacy and reliability.

- User Interface and Visualization

The system employs advanced UI libraries such as react-native-svg and react-native-reanimated to improve user interaction and visualization.These technologies allow for the creation of graphical elements, such as progress indicators, and offer fluid animations and responsive transitions, resulting in an intuitive and engaging user experience.

- LLM Integration

A Large Language Model (LLM) is embedded into the system as an assistive layer to generate structured summaries and offer productivity-related recommendations based on computed analytics.The integration is meticulously managed to ensure that the LLM functions independently of the core computation logic, thus maintaining a clear distinction between AI assistance and deterministic data processing.

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4. Result

A. Introduction

The TrackIQ system was assessed to determine its capability to effectively monitor, calculate, and display user productivity metrics over time.This assessment emphasizes the system's deterministic computation framework, immediate responsiveness, and its capacity to derive valuable insights from user-inputted task data.

B. Daily Performance Computation

TrackIQ measures daily productivity using a specific formula grounded in task completion: Completion Percentage = (Number of Completed Tasks / Total Tasks) × 100 This approach ensures that all productivity indicators are directly based on user activity records, which eliminates any confusion and supports consistent results. A significant design choice is to regard days without recorded tasks as achieving 0% completion.This prevents any misleading conclusions about productivity and guarantees that periods of inactivity are clearly shown in the analysis.As a result, the system presents a truthful and fair representation of user actions.

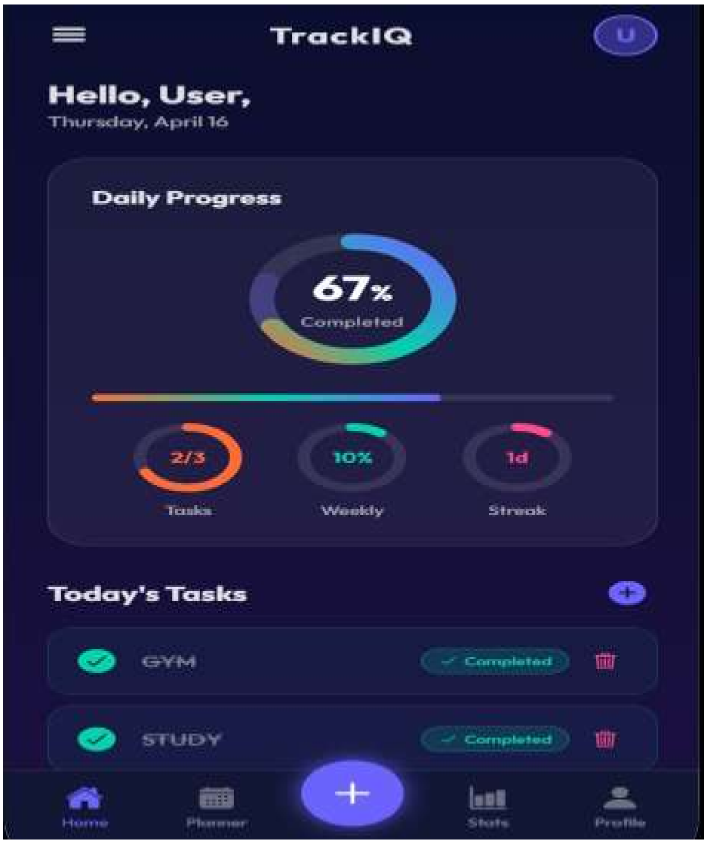

Figure 3: The real input interface of Daily Progress

C. Weekly Performance Analysis

The system carries out a short-term analysis by gathering task data from the previous seven days.It computes completion percentages for each day and organizes them into a coherent weekly profile. Besides the daily statistics, TrackIQ also calculates an average weekly

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completion percentage, enabling users to evaluate their overall performance throughout the week.This aggregation facilitates the identification of: High and low productivity patterns Daily performance variability Behavioral trends throughout the weekdays The weekly display functions as a useful tool for short-term reflection and modification of user habits.

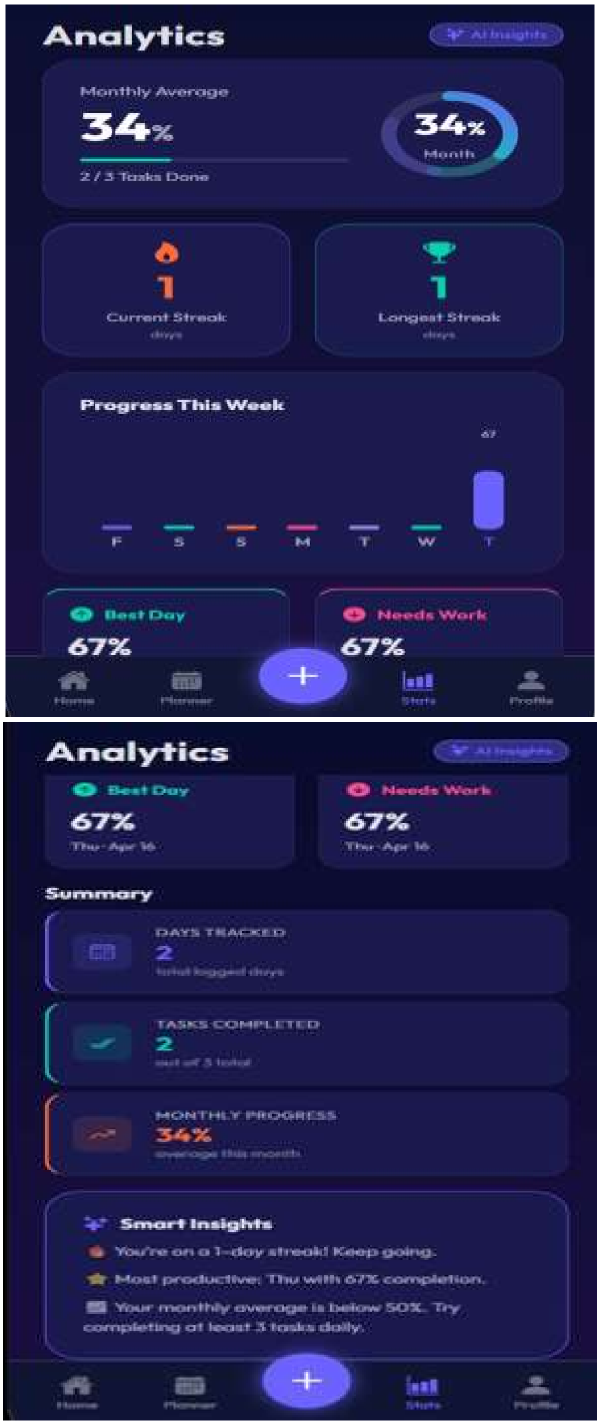

Figure 4: The real input interface of Weekly Progress

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D. Monthly Performance Evaluation

For assessing performance over an extended period, the system analyzes all documented activities from the current month.It calculates the average completion percentage for the month, reflecting the user's consistency and ongoing involvement. Differing from weekly reviews that focus on short-term fluctuations, the monthly analysis mitigates variability and serves as a more stable gauge of productivity behavior. This empowers users to: Assess their long-term discipline, Gauge their progress over time, and Identify enduring trends in engagement or inactivity.

E. Best and Worst Day

Identification To improve clarity, TrackIQ identifies extreme performance indicators within the weekly data set: The day with the highest completion percentage is regarded as the best-performing day. The day with the lowest completion percentage is considered the worst-performing day. This comparative evaluation enables users to swiftly identify their most productive days and their least engaged days.Such information is useful for understanding behavioral influences and enhancing task scheduling.

F. Streak Detection Mechanism

TrackIQ features a streak detection algorithm that tracks consecutive days of full task completion (achieving a 100% completion rate).The system monitors: Current streak length, Longest streak recorded. This functionality offers a measurable assessment of user consistency and the development of habits.Evidence shows that tracking streaks fosters ongoing engagement by motivating users to keep uninterrupted task completion sequences.

G. Real-Time Progress Tracking

A significant advantage of the system is its capacity to provide real-time feedback.As users complete tasks, the system promptly updates: Daily completion percentage Visual progress indicators Analytical summaries This immediate feedback cycle increases user awareness and motivation, facilitating continuous tracking without the need for manual calculations or delays.

H. Overall System Performance

The findings indicate that TrackIQ effectively provides precise, transparent, and interpretable productivity analytics through a fully deterministic approach.The system successfully: Produces accurate, date-specific performance data Ensures consistency in daily, weekly, and monthly assessments Removes dependence on estimates or predictive assumptions Delivers actionable insights into user behavior and productivity trends Additionally, the combination of structured analytics with real-time updates keeps users consistently informed about their performance.

Interface Structure

a) Monthly average
b) Current Streak
c) Longest Streak
d) Progress of this week

e) Best Day
f) Needs Works
g) Summary
h) Smart Insights

5. DISCUSSION

The findings indicate that TrackIQ offers a well-organized and dependable method for managing productivity, thanks to its modular design and deterministic computational framework.In contrast to traditional productivity applications that merge various functions into a single workflow, this system guarantees a distinct separation between planning, execution, and analysis.Such a structure enhances both user experience and analytical precision, adhering to the principles of modularity and separation of concerns found in software engineering [2][3].

A. Effectiveness of Modular Architecture

The modular division of the system into Planner, Home, and Analytics components significantly clarifies task management.Users can engage with each module separately, which minimizes interface complexity and cognitive demands.This modular framework guarantees that task creation, tracking of execution, and performance assessment are logically distinct, thus improving the system's maintainability and consistency [3].

B. Reliability of Deterministic Analytics

A primary advantage of TrackIQ is its deterministic computation engine, which derives all productivity metrics solely from stored data.Unlike systems that depend on estimates or adaptive assumptions, TrackIQ guarantees that:

- All calculations can be replicated
- No artificial inflation of data occurs
- Days not completed are regarded as zero completion

This method enhances the transparency and reliability of analytics, which is essential for accurate assessments of productivity [2].

C. Impact on User Productivity and Behaviour

Consistent monitoring and measurable feedback are recognized for their positive effects on user motivation and the formation of habits [4][7].Features of the system—such as daily completion rates, tracking of streaks, and visual analytics—promote disciplined behavior and long-term adherence to goals. By displaying only date-specific tasks in the Home module, the system minimizes distractions and encourages focused execution, thereby increasing overall productivity.

D. Role of LLM-Assisted Interaction

The incorporation of a Large Language Model (LLM) improves the user experience by offering structured summaries and contextual recommendations.Unlike fully AI-driven platforms, TrackIQ employs the LLM solely as a supportive element, ensuring that:

- AI does not disrupt essential computations
- Data integrity is maintained

• Output remains aligned with deterministic analytics

This managed integration is consistent with contemporary research advocating for AI to serve as an assistive tool rather than a decision-making entity in productivity systems [10].

E. Offline-First Design and Privacy Considerations

TrackIQ's offline-first design guarantees seamless usability and enhanced data privacy.By storing all information locally using AsyncStorage, the system removes reliance on cloud infrastructure and authentication processes.This method not only boosts performance but also addresses rising concerns regarding data security and user autonomy [8].

F. Limitations and Future Considerations

While effective, the system has certain limitations.It is tailored for single-user, single-device use and lacks support for cloud synchronization or collaborative functionalities.Moreover, it requires manual entry of tasks and does not feature predictive or adaptive scheduling capabilities. Future enhancements may encompass multi-device synchronization, integration with external calendar applications, and the addition of advanced analytics or recommendation models, all while upholding the system's fundamental values of transparency and privacy.

6. CONCLUSION

The current research presents TrackIQ – Smart Activity Planner and Tracker, a modular and offline-oriented productivity management system aimed at overcoming the drawbacks of traditional task management tools.This system offers a well-organized platform for planning daily tasks, tracking their execution, and assessing performance through a distinct division of planning, execution, and analytical functions.By employing a deterministic computation model, TrackIQ guarantees that all productivity metrics are based solely on recorded data, thus enhancing analytical precision, transparency, and dependability.

The integration of a controlled Large Language Model (LLM) enhances user interaction by generating structured summaries and actionable insights without interfering with core computational logic. This balance between deterministic analytics and AI-assisted interaction enables the system to remain both technically robust and user-friendly. The offline-first architecture further strengthens the system by ensuring uninterrupted usability, faster performance, and improved data privacy through local storage mechanisms.

The results of the experimental evaluation show that the system effectively aids in managing tasks, tracking productivity accurately, and conducting consistent performance analyses.Its modular design simplifies system complexity and enhances maintainability, while components like streak tracking, completion percentage metrics, and visual analytics boost user engagement and productivity awareness.However, the system is currently limited to operations on a single user and single device, lacking cloud synchronization and collaborative functionalities.Moreover, it relies on users to manually enter tasks and does not include predictive or adaptive scheduling features.

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Future developments may introduce multi-device support, integration with external calendar systems, and intelligent recommendation models, all while maintaining the system's core values of privacy and transparency.In conclusion, TrackIQ exemplifies that a well-organized combination of modular architecture, deterministic computation, and regulated AI assistance can effectively provide a reliable solution for managing productivity.The system offers a practical, privacy-centric, and academically grounded approach to enhancing task organization and performance evaluation in today's digital landscape.

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