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Personal Calendar Agent

Prapthi N[1], Rakshitha H M[2], Prajwal S[3]

Department of Computer Science & Engineering (AI & ML), Maharaja Institute of Technology Mysore, Karnataka, India[1]

Department of Computer Science & Engineering (AI & ML), Maharaja Institute of Technology Mysore, Karnataka, India[2]

Department of Computer Science & Engineering (AI & ML), Maharaja Institute of Technology Mysore, Karnataka, India[3]

Abstract: Effective management of daily schedules has become increasingly challenging due to the growing number of personal, academic, and professional responsibilities. Traditional calendar applications depend heavily on manual input and provide limited intelligent assistance. This paper presents a Personal Calendar Agent, an AI assisted conversational scheduling system that enables users to manage calendar events using natural language interaction. The proposed system allows users to create, update, delete, and retrieve events through simple conversational commands. A Gemini 2.0 AI model is used for intent recognition and information extraction, while a Fast API-based backend performs scheduling logic and event processing. Event data is persistently stored using an SQLite database. Additional features such as automated reminders, conflict detection, and category-based filtering improve scheduling efficiency. Experimental evaluation shows that the system reduces manual effort, improves usability, and enhances accuracy compared to traditional calendar tools.

Keywords: Personal Calendar Agent, Conversational AI, Intelligent Scheduling, Natural Language Processing, FastAPI, SQLite.

I. INTRODUCTION

Effective time management is essential for maintaining productivity in modern academic and professional environments. Students and working individuals are often required to manage multiple tasks, meetings, assignments, and personal activities simultaneously. As schedules become more complex, the likelihood of forgetting important events or missing deadlines increases. Traditional scheduling methods such as paper planners and handwritten notes depend heavily on user memory and constant manual updates, making them unreliable in dynamic environments.

Digital calendar applications offer an improvement over manual methods by providing reminder notifications and structured event storage. However, these systems still require users to manually input event details, configure alerts, and manage updates through graphical interfaces. Such interactions can be time consuming and inconvenient, particularly for users who prefer quick and flexible ways to manage schedules. Moreover, traditional calendar applications are passive tools that do not actively assist users in understanding or organizing their commitments.

Recent advancements in artificial intelligence and natural language processing have enabled the development of conversational systems capable of understanding user commands and performing automated actions. Conversational interfaces reduce user effort by allowing interaction through simple natural language instead of complex menus. Motivated by this advancement, the Personal Calendar Agent is designed to function as a smart scheduling assistant that simplifies calendar management. The system focuses on reducing manual effort, improving accessibility, and supporting efficient planning through automation intelligent.

II. LITERATURE SURVEY

Research on intelligent scheduling systems has evolved significantly over time. Early calendar assistants were primarily rule-based systems that scheduled events according to predefined constraints and fixed rules. While these systems reduced manual planning to some extent, they lacked adaptability and were unable to handle changing user preferences effectively.

Subsequent research introduced personalized scheduling assistants that learned user habits and routines to improve scheduling decisions. These systems demonstrated better accuracy by adapting to historical user behaviour, but they often

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required large datasets and complex learning mechanisms. Multi-agent scheduling systems were also explored to manage shared calendars and collaborative scheduling scenarios. Although effective in complex environments, such systems introduced additional computational overhead and configuration complexity.

More recent studies have focused on conversational scheduling assistants that allow users to interact using natural language. These systems improve usability and reduce cognitive load by eliminating the need for detailed manual input. However, many existing solutions are proprietary or computationally expensive, making them unsuitable lightweight academic implementations. The Personal Calendar Agent builds upon these concepts by offering a simple, conversational scheduling system that balances intelligent functionality with practical implementation.

III. METHODOLOGY

The development of the Personal Calendar Agent followed a systematic and iterative methodology.

A. Requirement Analysis

Functional requirements such as event creation, viewing schedules, updating events, deleting entries, and receiving reminders were identified. Non-functional requirements including performance, usability, security, and reliability were also considered.

B. System Design

The overall system architecture, database schema, and data flow were designed. UML diagrams such as data flow diagrams, use case diagrams, sequence diagrams, and activity diagrams were prepared to visualize system behaviour.

C. Frontend Development

The frontend was developed using HTML, CSS, and JavaScript to provide a simple and intuitive interface. The UI allows users to interact with the system and view scheduled events clearly.

D. Backend Development

FastAPI was used to implement RESTful APIs for handling event operations. Business logic such as conflict detection and input validation was implemented in this layer.

E. AI Integration

The Gemini 2.0 AI model was integrated using function-calling features to map natural language commands to backend operations.

IV. SYSTEM IMPLEMENTATION

The Personal Calendar Agent is designed using a modular system architecture to ensure maintainability and scalability. The architecture consists of a user interface layer, an AI processing layer, a backend service layer, and a database layer. Each component performs a specific function while interacting seamlessly with other components.

The user interface provides a chat-based interaction environment that allows users to enter scheduling commands in natural language. It also displays system responses, scheduled events, and reminder notifications in a clear and structured manner. This interface reduces user effort by allowing direct conversational interaction.

The AI processing layer uses the Gemini 2.0 model to analyse user input and identify the intended action. The model extracts essential information such as event title, date, time, and category from natural language commands. Once the intent is identified, the request is converted into a structured format suitable for backend processing.

The backend service layer is implemented using FastAPI and handles the core application logic. It validates input data, performs conflict detection, manages reminders, and executes database operations. The backend communicates with the database layer to store and retrieve event information. SQLite is used as the database due to its lightweight nature and ease of integration, making it suitable for small scale applications.

V. RESULTS AND DISCUSSION

The Personal Calendar Agent was evaluated using various natural language commands related to event creation, updating, deletion, and retrieval. The system successfully interpreted user intent and executed backend operations accurately. Conflict detection logic prevented overlapping events, and reminder notifications were delivered at appropriate times.

User interaction testing indicated that the conversational interface significantly reduced the effort required to manage schedules. Compared to traditional calendar applications, the proposed system provided faster interaction and improved

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ease of use. The results demonstrate that conversational scheduling systems can enhance user productivity and reduce scheduling errors.

VI. CONCLUSION AND FUTURE SCOPE

This paper presented the design and implementation of a Personal Calendar Agent that provides intelligent scheduling support through natural language interaction. The system addresses the limitations of traditional calendar applications that rely on manual input and static reminders. By integrating a conversational AI model with a structured backend architecture, the proposed solution enables users to manage daily schedules more efficiently and with reduced effort. The chat-based interface allows intuitive interaction, making calendar management simpler and more accessible.

The use of the Gemini 2.0 AI model enables accurate understanding of user intent and extraction of scheduling details from natural language commands. The FastAPI backend ensures reliable processing of scheduling operations, while the SQLite database supports persistent and structured event storage. Features such as automated reminders and conflict detection help prevent missed events and overlapping schedules, improving overall reliability.

The system demonstrates improved usability and efficiency compared to traditional calendar tools. Although the current implementation focuses on single-user scheduling, future enhancements may include multi-user collaboration, personalized scheduling based on user behavior, integration with external calendar platforms, and multi-channel notifications. Overall, the Personal Calendar Agent highlights the effectiveness of conversational.AI in improving personal time management and provides a scalable foundation for intelligent scheduling systems.

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