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Eventrix: Online Event Management System

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Abstract: ***Eventrix is an advanced event management platform designed to streamline event hosting, registration, and participant engagement. Acting as a centralized hub, it empowers organizations, institutions, and enterprises to efficiently manage events while ensuring a seamless experience for attendees. Traditional event management systems often involve lengthy and inefficient processes, requiring users to manually input details and verify registrations, leading to delays and security concerns. To overcome these challenges, Eventrix leverages AI-powered automation, integrating voice-assisted navigation for improved accessibility and face recognition or QR-based check-in to expedite entry while enhancing security. The platform also incorporates real-time event notifications, ensuring that attendees receive timely updates, while administrators stay informed about key changes and event modifications. By eliminating unnecessary bottlenecks, Eventrix enhances the overall event experience through automated ticket generation, which delivers QR-based tickets via email for quick and seamless access. Additionally, an AI-powered chatbot provides real-time assistance, guiding users through event details, registrations, and inquiries. For event organizers, the system offers a structured event tracking dashboard, simplifying participant management, ticket validation, and logistics. With its intelligent automation and user centric design, Eventrix redefines event management by improving accessibility, reducing administrative overhead, and ensuring a seamless, technology-driven experience for all stakeholders.***

Keywords: Event Management, Artificial Intelligence, Chatbot, QR Code, Facial Recognition, Voice Assistance

I. INTRODUCTION

Most online event management platforms today require users to input extensive personal information, raising concerns about privacy and data security. Additionally, these systems often rely on centralized servers for real-time updates, leading to high server loads and performance bottlenecks, especially during peak registration periods. Many platforms still depend on conventional ticketing methods that require attendees to print or download QR codes, adding extra steps to the check-in process. Moreover, the lack of accessibility features, such as voice-assisted navigation, makes it difficult for differently-abled individuals to interact seamlessly with these platforms, limiting inclusivity and ease of use. Eventrix addresses these challenges by leveraging AI-driven automation to enhance event registration, check-in, and engagement processes. By incorporating voice-assisted navigation and face recognition or QR-based check-ins, the platform significantly reduces the time spent on manual data entry and authentication, ensuring a seamless experience for attendees. An integrated chatbot provides real-time assistance, helping users with event inquiries and registration processes. For organizers, Eventrix offers an intuitive dashboard that streamlines attendee management, automates notifications, and provides valuable insights into user engagement, ultimately improving event coordination and operational efficiency. Looking ahead, Eventrix aims to incorporate predictive analytics for personalized event recommendations, blockchain-based ticketing for enhanced security, and multi-language AI driven assistance to further improve accessibility. By continuously refining its intelligent automation features, Eventrix is set to redefine event management, offering a faster, more secure, and highly user-friendly platform that adapts to the evolving needs of modern event organizers and participants.

Eventrix is developed as a next-generation event management platform aimed at addressing these gaps. It integrates artificial intelligence (AI) and automation to enhance the end-to-end event experience for both attendees and organizers. The platform leverages technologies such as facial recognition and QR-based check-in systems for fast, contactless, and secure event access. A voice-assisted chatbot provides real-time user support, guiding users through event registration and inquiries, while an intuitive dashboard helps organizers manage schedules, monitor attendance, and track logistics seamlessly.

Looking forward, Eventrix intends to adopt blockchain-based ticketing systems for tamper-proof ticket validation, predictive analytics for personalized event recommendations, and multilingual AI support to improve accessibility across diverse user groups. With its scalable, intelligent architecture and user-first design, Eventrix sets a new standard for digital event management by reducing administrative overhead, enhancing engagement, and delivering a seamless experience across all stages of event execution.

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II. LITERATURE SURVEY

Over the past decade, event management systems have evolved significantly, shifting from manual, paper-based processes to digital platforms. Traditional systems often face challenges such as poor scalability, lack of real-time interaction, and limited accessibility. The growing demand for intelligent, user-centric event solutions has prompted researchers and developers to explore technologies like Artificial Intelligence (AI), biometric authentication, and voice-based interaction.

Several commercial platforms like Eventbrite, Cvent, and Explara provide event scheduling, registration, and ticketing features. However, these platforms present notable limitations. For instance, Eventbrite offers QR-based check-ins but lacks intelligent support features like chatbots or facial recognition. Explara integrates government ID verification, which raises privacy concerns due to sensitive data storage. Cvent, while powerful, is resource-intensive and complex, making it less accessible for small or medium-sized event organizers.

Academic research has also explored AI's role in event management. Ergen [1] examined the use of digital concierges and AI assistants in enhancing event interactivity, while Halim et al. [3] emphasized AI's potential to reduce operational costs and improve attendee satisfaction. Studies by Mukherjee and Mishra [4] demonstrated how AI tools can personalize user experiences through recommendation systems, and Wang et al. [12] implemented AI chatbots to automate customer support in event settings.

Moreover, blockchain technologies have been proposed for secure and transparent ticketing systems, as seen in the work of Zhou and Lee [13]. Sentiment analysis and natural language processing (NLP) techniques, as explored by Patel et al. [14], offer tools for evaluating event feedback in real time.

Despite these advancements, the integration of AI for real-time interaction, biometric authentication, voice navigation, and personalized event recommendations remains limited in commercial applications.

III. SYSTEM ARCHITECTURE

The system architecture of *Eventrix* is designed to facilitate secure, intelligent, and efficient event management through a modular flow of operations, beginning from user authentication and ending with session termination. It integrates AI-powered automation, real-time verification mechanisms, and scalable data storage to streamline the experience for both event attendees and organizers. The architecture is depicted in Figure 1.

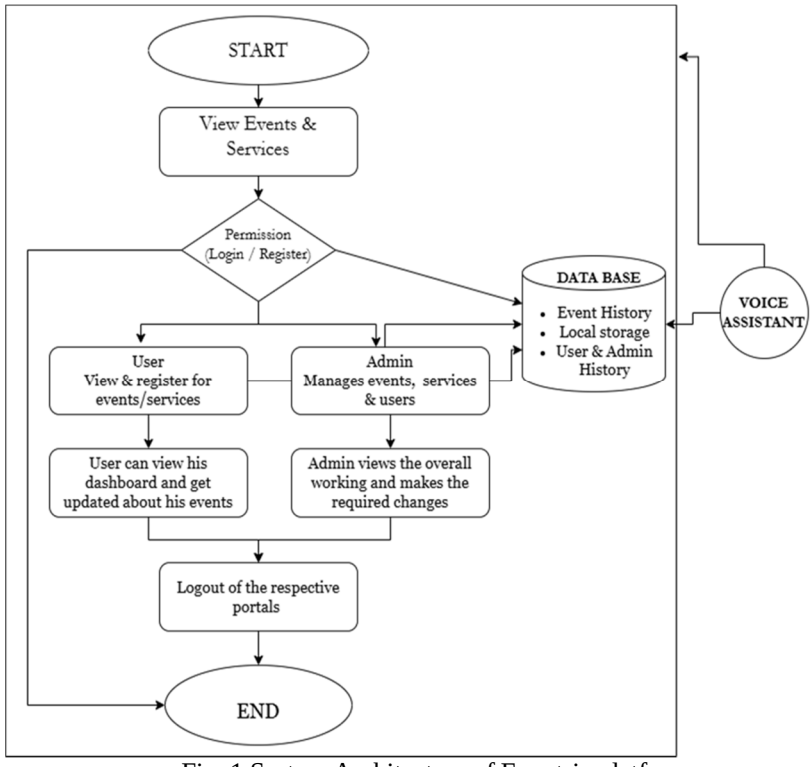


Fig. 1 System Architecture of Eventrix platform

A. User Authentication

The entry point into the system involves user authentication, where attendees or administrators submit login credentials. These credentials are validated against securely stored records in the database, ensuring authorized access to the platform.

B. Portal Access – User vs. Admin

After successful login, users are routed to either the user or admin portal depending on their role. The User Portal allows attendees to register for events, view their personal dashboard, and download QR-based tickets. The dashboard displays all registered events and their relevant details for easy access and tracking. The Admin Portal provides event organizers with tools to manage events, monitor check-ins, and view analytics. Administrators can track user participation and gain insights into overall event performance.

C. Database and AI Integration

Eventrix uses MongoDB to manage data such as user credentials, event details, and check-in logs. This structure supports fast and secure access to event-related information. An AI assistant is integrated with the database to enhance platform functionality. It supports participant recommendations, event management, and automates responses through a built-in chatbot. The chatbot utilizes natural language processing to assist users with registrations, FAQs, and event navigation. This AI integration improves both automation and user experience.

D. Participant Verification and Event Entry

Before attending the event, participants must verify their identity using one of two methods: QR code or facial recognition. QR codes are generated at registration and scanned at event entry for quick validation. This process enables contactless and efficient access. Alternatively, users can verify themselves through AI-powered facial recognition. The system matches a user's face with stored biometric data for secure entry. Both methods prevent unauthorized access and eliminate ticket fraud, improving overall security.

E. Session Termination

Once the event concludes, users are securely logged out of the system. The session termination process updates activity logs and check-in records in the database. This ensures data integrity and provides accurate information for future event analytics. The system remains secure and ready for the next user session.

IV. FEATURES AND IMPLEMENTATION

A. Data Management and Storage

Eventrix relies on structured datasets stored in MongoDB, ensuring scalability and flexibility for handling dynamic event data. The User Dataset contains attendee and organizer details, including authentication credentials, preferences, and past event participation. The Event Dataset maintains schedules, speaker details, session locations, and QR-based check-in records. AI Interaction Logs store chat-bot conversations to enhance intelligent assistance over time. Facial Recognition Data holds encrypted biometric vectors for AI-driven authentication. Additionally, QR Code Data is used for event ticket validation and attendee authentication.

B. Intelligent Assistance and User Interaction

The AI-driven chat-bot in Eventrix is powered by Natural Language Processing (NLP) and offers real-time event assistance. Users can interact through voice commands, enabled by speech-to-text algorithms for hands-free navigation. The text-to-speech feature provides verbal responses, improving accessibility. The chat-bot assists in retrieving event details, session schedules, speaker information, and guiding users through the event venue. Users can activate the voice assistant to query event details, check schedules, or navigate through interactive voice responses, making the experience more intuitive and inclusive.

C. Event Check-in and Authentication

Eventrix implements multi-modal authentication for seamless and secure check-ins. The facial recognition system, built using Amazon Recognition or Microsoft Azure Face API, captures and verifies attendee identities in real time. Users can also opt for QR code-based check-ins, where event passes are scanned for entry validation. The facial recognition process starts by capturing an image using a webcam or mobile camera, processing the image for unique biometric features, and matching it against stored data for authentication. The QR-based check-in system generates unique QR codes for attendees, which are scanned upon entry to verify registration status instantly. These methods eliminate manual verification, ensuring an efficient and secure entry process.

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D. Core Technologies Used

Eventrix integrates modern web and mobile technologies to enhance performance and scalability. The front-end is developed using React.js for the web and React Native for mobile applications, while the back-end is powered by Node.js with Express.js. MongoDB serves as the primary database for storing event-related information. Firebase Authentication & OAuth provide secure user authentication. The AI-powered chat-bot utilizes Google Cloud NLP and Open-AI GPT for interactive event assistance. Real-time updates and notifications are powered by Web Sockets, ensuring smooth communication between organizers and attendees.

- Visual Studio Code: The development environment for writing and debugging code, offering features like Git integration, intelligent code completion, and an extensive marketplace for extensions.
- React.js: A JavaScript library for building interactive and dynamic user interfaces, leveraging a component-based architecture for scalability and efficiency.
- Node.js: A runtime environment enabling the execution of JavaScript on the server, facilitating real-time data processing and API handling.
- Express.js: A lightweight web framework for Node.js that simplifies back-end development, providing middleware support and robust routing capabilities.
- MongoDB: A NoSQL database offering flexibility in data storage, supporting JSON-like documents, and enabling efficient handling of dynamic event-related data.
- Speech Recognition API: A powerful tool for converting voice input into text, allowing hands-free interaction and enhancing accessibility within the Eventrix chat-bot and navigation features.

Algorithm-1: Text-to-Speech & Speech-to-Text Algorithm Eventrix incorporates advanced speech-processing algorithms to enable hands-free event navigation. The Speech-to-Text algorithm, powered by Google Speech-to-Text API, converts user speech into text, allowing for voice-based interaction. The Text-to-Speech algorithm, integrated using Amazon Polly or Google TTS API, generates natural voice responses for chat-bot interactions. These features improve accessibility, enhance user engagement, and allow attendees to receive real-time event updates using voice commands.

Implementation Example

```
const startSpeechRecognition = () => {
    if (speechRecognition && !isListening) {
        speechRecognition.start();
        setIsListening(true);
    }
};
```

Figure 4.1: Code snippet for initializing speech recognition API.

As illustrated in Figure 4.1, this function initializes the speech recognition system, enabling users to interact with the chatbot using voice commands. 4.6 Algorithm-2: Facial Recognition Algorithm The facial recognition system in Eventrix ensures AI- driven check-in verification. It operates in three steps: face detection, feature extraction, and identity matching. Attendee facial features are captured and converted into biometric vectors, which are then compared with stored encrypted data. Using Amazon Rekognition or Microsoft Face API, the system determines authentication status, granting or denying access accordingly. This method ensures a secure and efficient check-in experience, eliminating the need for manual ticket scanning.

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Implementation Example:

```
const capturePhoto = () => {
    if (!videoRef.current || !canvasRef.current || !isCameraRea

    const video = videoRef.current;
    const canvas = canvasRef.current;
    const context = canvas.getContext("2d");

    if (!context) return;

    canvas.width = video.videoWidth;
    canvas.height = video.videoHeight;

    context.drawImage(video, 0, 0, canvas.width, canvas.height);

    const photoDataUrl = canvas.toDataURL("image/jpeg");
    setUserPhoto(photoDataUrl);
    simulateFaceRecognition(photoDataUrl);
    stopCamera();
};
```

Figure 4.2: Code snippet for capturing and processing an image for facial recognition.

As shown in Figure 4.2, the function captures a user's facial image from a webcam, processes the data, and simulates a recognition check. The Eventrix platform integrates AI-powered assistance, speech recognition, and facial authentication to provide a seamless event management experience. By leveraging real-time chatbot interactions, QR-based check-ins, and voice-enabled navigation, Eventrix enhances accessibility, security, and user engagement. These innovations collectively make Eventrix an intelligent and efficient solution for modern event management.

V. RESULTS AND DISCUSSIONS

A. *Results*

Performance Measurement Performance evaluation is a fundamental aspect of the Eventrix platform, as it ensures the system operates efficiently under various conditions and scales according to user demand. The following key performance metrics are closely monitored to maintain optimal system performance and provide a seamless user experience:

1) Response Time: Response time measures the latency between a user's action and the system's corresponding reaction. This metric is critical in ensuring that interactions with the chatbot, event data retrieval, and check-in processes are completed swiftly. To enhance response time, the system utilizes optimized API calls, efficient data caching, and asynchronous processing to handle multiple requests concurrently. By minimizing delays, users experience real-time responses, making the system more interactive and engaging.

2) Authentication Accuracy: The accuracy of the authentication systems—especially facial recognition and QR-based check-ins—is paramount in preventing unauthorized access and ensuring smooth event entry. Performance is measured by evaluating false acceptance rates (FAR) and false rejection rates (FRR), with the goal of achieving high precision. Machine learning-based models are employed to continually improve the accuracy of facial recognition, reducing instances of incorrect verification. Additionally, QR code scanning ensures quick validation without manual intervention. Continuous refinement of these systems ensures that the user experience remains seamless and secure.

3) System Load Handling: Eventrix is designed to handle large volumes of concurrent users, particularly during peak event times. System load handling is assessed through stress testing and load testing, simulating a high number of simultaneous check-ins and event queries. This ensures that the platform can scale appropriately and maintain performance when thousands of users access the system concurrently. By monitoring system response under stress, any potential bottlenecks in server capacity,

database processing, or network throughput can be identified and mitigated, maintaining system stability even during highdemand periods.

4) Database Query Performance: Efficient data retrieval is essential for smooth event management. The MongoDB database performance is evaluated by monitoring query execution times, ensuring fast access to event data such as schedules, attendee information, and session details. Indexing strategies and query optimization techniques are applied to minimize read times, while caching helps reduce database load by storing frequently accessed data in memory. By fine-tuning query performance, Eventrix ensures that users can quickly access the information they need without delays. • User Satisfaction Metrics: The ultimate measure of the platform's success lies in user satisfaction. This is gauged through a combination of post-event surveys, user feedback, and chatbot interaction logs. Users' experiences with the chatbot, check-in processes, and event navigation features are analyzed to identify areas of improvement. AI-driven analysis of feedback allows for the continuous optimization of chatbot responses and authentication methods. Additionally, user satisfaction data is leveraged to prioritize feature updates and refine the overall event management process, ensuring that the platform remains aligned with user expectations and enhances the attendee experience. Through comprehensive monitoring and analysis of these performance metrics, Eventrix can continuously refine its operations, ensuring that it remains reliable, efficient, and scalable, while providing an excellent experience for all users involved.

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VI. CONCLUSION

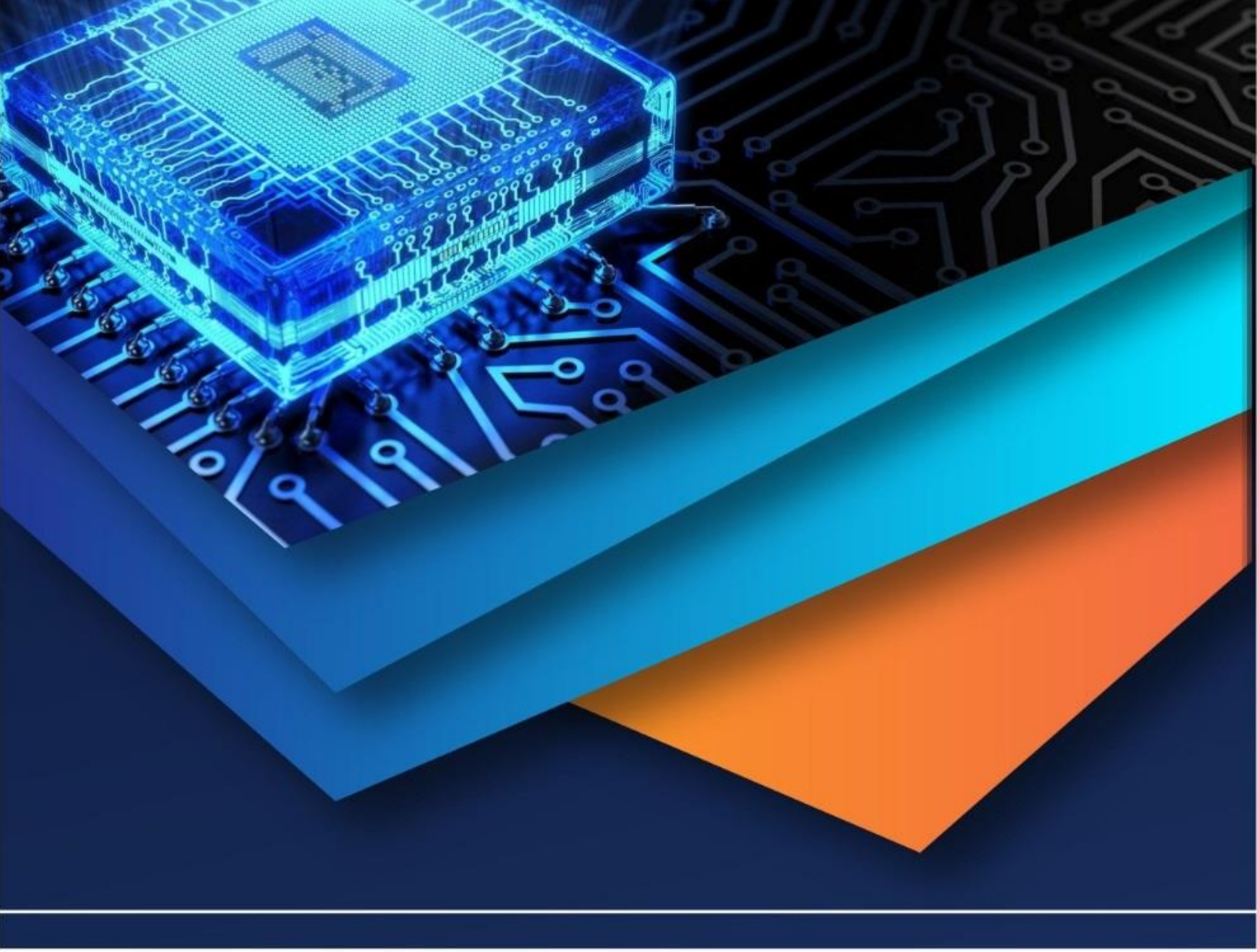
Eventrix is an innovative event management platform designed to streamline the complexities of organizing, registering, and attending events. By incorporating AI-powered automation, real-time event tracking, and secure digital check-ins, it offers a seamless, user-centric solution to modern event management. With features like facial recognition, voice authentication, AI-driven recommendations, and real-time notifications, Eventrix not only simplifies operations but also elevates user experiences through personalization and accessibility. In today's fast-paced world, Eventrix addresses several inefficiencies present in traditional event management systems. The integration of AI enhances security, reduces human error, and accelerates the event registration process through automated ticket generation and smart checkins. Moreover, its AI-driven chatbot provides real-time assistance, ensuring that attendees and organizers stay informed throughout the event lifecycle. Eventrix's ability to cater to different user needs, including accessibility for differently-abled individuals, sets it apart from other platforms, making it a valuable tool for a wide range of event types. Despite its robust features, there is always room for improvement. Future enhancements could include the integration of more advanced machine learning models for better event predictions and personalized recommendations. Incorporating blockchain technology for secure, transparent ticketing and payments could further enhance the platform's reliability and trustworthiness. Additionally, expanding the AI capabilities to offer predictive analytics and more sophisticated voice and gesture-based controls could improve both the organizer and attendee experience. As event technology continues to evolve, Eventrix has the potential to further redefine how events are planned, managed, and experienced.

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