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Party Pilot: Event Management Application for Cross-Platform Use with Flutter and Dart

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Abstract: Organizing events can be both exciting and overwhelming, especially when juggling multiple tasks such as venue booking, decorations, equipment purchase, and budget management. Party Pilot is a mobile application designed to simplify event planning by offering real-time data updates, secure user authentication, and an intuitive interface. We leverage AI-driven machine learning algorithms to recommend venues based on user preferences and locations. In addition to traditional event planning features, Party Pilot now includes a comprehensive equipment purchase module that enables users to buy essential items directly within the app

Keywords: Event Management, Mobile Application, Firebase Integration, Real-Time Updates, AIdriven Recommendations, Equipment Purchase, User Authentication, Admin Dashboard, Decoration Booking, Notifications, Flutter Framework, Location-Based Services

I. INTRODUCTION

Event planning is a multifaceted process that plays a crucial role in both personal and professional settings. Common challenges faced by users include selecting appropriate venues, managing decoration logistics, coordinating service providers, and handling the procurement of necessary equipment. Although various mobile applications exist to address individual components of event management, most lack an integrated system that consolidates these features into a single platform. To address this gap, *Party Pilot* is developed as a comprehensive cross-platform mobile application that streamlines the event planning process. Built using the Flutter framework, the application ensures a uniform and responsive user interface across Android and iOS devices. It employs Google Firebase for real-time data synchronization, secure user authentication, and cloud-based storage services [2]. Furthermore, a machine learning-based recommendation engine has been incorporated to provide users with venue suggestions based on personalized criteria such as event type, location, and budget preferences [7].By offering modules for venue booking, decoration selection, and equipment purchase within a unified interface, *Party Pilot* enhances usability and operational efficiency in event planning. The system is designed to support both users and administrators, offering real-time updates, personalized notifications, and secure access control mechanisms to ensure a seamless and reliable user experience.

II. IMPLEMENTATION AND TECHNOLOGIES USED

A. Development Framework [2] [3]

Flutter is used to develop a single codebase application that functions on multiple mobile platforms, providing a cohesive and attractive user interface.

B. Backend Services

• Firebase Authentication: Secures user registration and login processes.

• Firestore: A NoSQL real-time database that handles data for venue bookings, decoration orders, and equipment purchases.

• Firebase Storage: Manages media uploads, including images for venues, decorations, and equipment.

• Firebase Cloud Messaging: Sends timely push notifications for all system activities.

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C. State Management

The Provider package is used to handle state management, ensuring that all changes (e.g., booking, purchasing, notifications) are updated in real time across the application.

D. AI and Location-Based Services

• Machine Learning: The recommendation engine analyzes user preferences (budget, event type) and location data to suggest suitable venues.

• Location Services: With user permission, the app accesses current location data to recommend nearby venues and equipment providers, improving convenience and potential cost savings..

III. COMPARISON OF CHALLENGES AND IMPROVEMENTS

The following table summarizes the key challenges in event management, contrasting existing solutions with the improvements offered by Party Pilot.

Problem /Challenge	Existing IEEE Solutions	Improvements in Party Pilot
Real-Time	e-Notifier for College Events using Firebase (ICECA	Party Pilot integrates Firebase Cloud Messaging
Updates	2021) – real-time alerts for college event changes.	for instant updates on bookings, notifications, and
		equipment changes.
User	Informative Push Notifications & Web App for	Party Pilot enhances engagement through role-
Notification &	Senior Citizens (2023) - combines push alerts and	based dashboards and real-time status tracking for
Engagement	dashboards.	all users.
Cross-Platform	Tourism App using Flutter & Firebase (2021) –	Developed with Flutter, Party Pilot ensures
Compatibility	demonstrates seamless cross-platform mobile app	seamless functionality on both Android and iOS
	development.	platforms.
Security &	Smart Car Security via Firebase & IoT (2024) –	Party Pilot uses Firebase Auth and database rules
Role-Based	enforces access control using Firebase	to securely separate admin and user roles with
Access	Authentication and Firestore rules.	fine-grained access.
Personalized	(INTERCON 2023) – applies ML for user-specific	Party Pilot features a modular structure and
User	suggestions.	supports AI modules for event-specific
Experience		recommendations (e.g., decoration themes).
Unified Data	Student Affairs Management System (ICCSE 2020)	Party Pilot consolidates venue, decoration, and
Management	– centralizes student service modules into a single	financial modules in one system for streamlined
	interface.	event planning.
AI-Powered	AI-Based Event Management Web App (IEEE 2022 -	Party Pilot enhances this by supporting AI
Recommendati	<u>9850551</u>) – suggests events based on user interest	modules for dynamic event, vendor, and theme
on	and views.	suggestions based on real-time behavioral
		patterns.
Event	Event discovery is filtered by categories or names;	Party Pilot adds smart filters, personalized feeds,
Browsing &	interest-based registration is automated.	and integrated registration reminders that evolve
Registration		with user behavior.
User-Friendly	Clean UI using Firebase and Flutter for browsing	Party Pilot leverages Flutter's Material Design
Interface	and managing events.	with adaptive UI/UX, ensuring usability across all
		age groups and tech backgrounds.

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IV. EASE OF USE

A. Functional Evaluation [4] [5]

Testing of Party Pilot involved multiple scenarios, including large-scale events and intimate gatherings. The new equipment purchase module was rigorously tested alongside venue booking and decoration ordering to ensure seamless integration and real-time updates. Role-based restrictions prevented unauthorized access, while AI-driven recommendations consistently offered relevant suggestions.

B. Performance

Party Pilot demonstrates low latency in data updates and notification delivery. Firebase's real-time database, coupled with optimized Flutter components, ensures that even simultaneous equipment purchases and venue bookings do not compromise performance.

C. User Feedback

Early adopters praised the ease of navigating through the app, particularly the new one-stop shopping experience for all event needs. Users found the equipment purchase module intuitive and appreciated the added convenience of managing all aspects of their event planning within a single platform.

D. Challenges

• Media Upload Optimization: Ensuring efficient management of large media files for equipment and decoration images required careful bandwidth management.

• Cross-Platform Consistency: Extensive testing was necessary to maintain a consistent look and functionality across Android and iOS devices.

• Machine Learning Customization: Fine-tuning the AI model to deliver personalized recommendations based on diverse user data involved iterative testing and adjustments.



Fig .1

Party Pilot employs a layered architecture: the frontend is built using Flutter to ensure a responsive user interface, while Firebase services power the backend. Key components include an authentication module, venue management, decoration booking, and an equipment purchase module that streamlines the user experience. Real-time data updates are maintained using the Provider package for state management, and rigorous security measures are enforced through role-based access controls and strict Firestore rules.

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VI. FEATURES

For regular users, Party Pilot provides features such as venue browsing with advanced filtering, AI-driven recommendations, and an integrated shopping cart for both decorations and essential equipment purchases. Administrators benefit from real-time booking approvals, revenue tracking, and the ability to manage inventories efficiently. The application's design, optimized for both Android and iOS devices, ensures a consistent cross-platform experience. [1] [2] [4] [7]

A. User Features :

• Venue Browsing: Users can filter and search for venues based on type, size, or location.

• AI-Driven Recommendations: Personalized suggestions for venues based on user preferences and current location data.

• Decoration Selection: A wide range of decoration items is available in categorized listings.

• Equipment Purchase: – New Capability: Users can browse and buy celebration essentials such as cameras, flowers, cakes, lights, sound systems, sweets, balloons, and catering services directly within the app.

• Cart Management: Consolidates decorations, equipment, and services into a single cart for an overall cost overview.

• Real-Time Notifications: Instant updates on booking confirmations, equipment orders, and promotional offers.

• Profile Management: Personal profiles displaying booking history, past purchases, and saved preferences.

B. Admin Features :

• Booking Approvals: Real-time approval or rejection of venue bookings.

• Revenue Tracking: A consolidated view of earnings from venue bookings, decoration sales, and equipment purchases.

• Venue and Inventory Management: Administrators can add, update, or remove venues and manage inventories for decorations and equipment.

• Notifications Creation: Administrators can create and send targeted notifications about promotions, system updates, or important announcements.

• Machine Learning Insights: Access to analytics on user behavior and the performance of AI-driven recommendations.

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VII. EVALUATION AND RESULTS

Testing of Party Pilot was performed under multiple scenarios ranging from small-scale events to large gatherings. The integrated equipment purchase module was examined alongside venue booking and decoration ordering to ensure seamless interoperability and real-time system updates. Users provided positive feedback particularly about the app's intuitive navigation and comprehensive functionality, while performance evaluations confirmed low latency and robust security. [2] [3]

VIII. CONCLUSION AND FUTURE WORK

Party Pilot successfully addresses the multifaceted challenges of event planning by combining secure user authentication, real-time data synchronization, and AI-enhanced functionality. Future work includes the integration of an advanced analytics dashboard, refinement of the recommendation algorithms, addition of multilingual support, expanded payment gateway options, and offline functionality to further enhance user experience. [5] [6]

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