

An AI-Powered Intelligent Travel and Tourism Support System in India

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Abstract - Travel planning often faces challenges such as lack of personalization, inefficient routing, limited real-time information, and communication barriers, resulting in suboptimal travel experiences. The purpose of this study is to develop an intelligent travel assistant as a Flask based web application integrated with an SQLite3 database to manage users, itineraries, and local guide listings. The system provides optimized route calculation for bus and car travel and integrates real-time weather updates through external APIs to ensure safe and timely travel decisions. It offers recommendations for hotels, food, and sightseeing locations based on user preferences and contextual information. To overcome the challenge of identifying reliable local guides, the platform includes a secure on-demand marketplace where verified guides can list their services. A trip planning module generates optimized multi-day itineraries, virtual assistant using GPT 4o mini model and NLP powered chatbot with multilingual text-to-speech support enhances user interaction. Geolocation services and email notifications further improve usability and communication.

Keywords: Flask Web Application, NLP, Multilingual Chatbot, Email Notifications, LLM

1. INTRODUCTION

Travel planning today involves checking routes, comparing hotels, understanding local culture, and finding reliable guides, which can become time-consuming and complex when performed across multiple applications [1]. Travelers often rely on separate platforms for navigation, accommodation booking, cultural information, and local assistance, leading to fragmented planning and inefficient decision-making. To address these challenges, this project develops an AI-based travel assistant that integrates all essential travel services into a unified platform, reducing fragmentation and improving overall user convenience and accessibility [2]. Built using the Flask framework, the system assists users by providing optimized routes for bus and car travel while incorporating real-time weather updates to support safer and more informed travel decisions [3]. By utilizing geolocation services and external APIs, the platform dynamically adapts route suggestions based on changing conditions such as traffic congestion or adverse weather. This approach helps travelers avoid delays and ensures smoother navigation throughout their journey. The platform offers intelligent recommendations for hotels, restaurants, and sightseeing locations by

analyzing user preferences, travel history, and contextual information. In addition, the system automatically generates complete multi-day travel itineraries by considering factors such as user interests, travel duration, and budget constraints. This automated planning capability reduces the effort required for manual trip organization and helps users create well-structured travel schedules that balance time, cost, and comfort.

To promote authentic cultural experiences, a secure marketplace for verified local guides is incorporated into the system. This feature allows travelers to browse guide profiles, review ratings, and connect with trusted professionals, enhancing on-ground support and cultural exploration [5]. Security measures ensure safe interactions and reliable transactions between users and service providers.

Furthermore, an NLP-powered chatbot with multilingual voice support enables natural interaction by allowing users to ask questions and receive instant text or audio responses. Additionally, the platform integrates a virtual assistant powered by a Large Language Model (LLM), specifically the GPT-4o mini model, which enhances conversational intelligence and contextual understanding. This virtual assistant provides personalized travel guidance, answers complex queries, assists in itinerary modification, and supports real-time decision-making through adaptive and human-like interactions. Geolocation services highlight nearby attractions and services, while email integration ensures timely delivery of booking confirmations, itinerary updates, and important notifications. Collectively, these features provide a reliable, user-friendly, and efficient travel planning experience, significantly improving the way travelers plan and manage their trips [6].

2. SYSTEM DESIGN OVERVIEW

An intelligent travel assistant framework provides a unified digital platform that supports travelers throughout all stages of trip planning, including route selection, accommodation discovery, itinerary creation, and on-ground assistance. Unlike conventional travel applications that offer isolated services, intelligent travel assistants integrate multiple travel-related functions into a single system, thereby reducing information fragmentation and improving planning efficiency [1]. The proposed framework operates as a centralized travel support system that combines real-time data, user preferences, and contextual information to deliver relevant travel guidance. Core functionalities include route planning for bus and car travel, real-time weather monitoring, and recommendations for hotels,

restaurants, and sightseeing locations. The framework also supports automated multi-day itinerary generation by considering factors such as travel duration, user interests, and budget constraints, enabling efficient and structured travel planning [2].

The framework further enhances user interaction through an intelligent communication layer that supports natural and intuitive system access. An NLP-based chatbot allows users to ask travel-related queries in a conversational manner and receive instant text or multilingual voice responses, improving accessibility and usability [3]. In addition, the system integrates a virtual assistant powered by a Large Language Model (LLM), specifically the GPT-4o mini model, which enables advanced conversational intelligence, contextual understanding, and personalized travel guidance. The virtual assistant assists users in accessing application features, modifying itineraries, retrieving recommendations, and performing task-based interactions through natural language commands. Geolocation services are incorporated to identify nearby attractions, accommodations, and services based on the user's current location [4].

To support seamless application access and intelligent assistance, NLP models are utilized for intent recognition, entity extraction, and conversational response generation. These NLP components enable the system to interpret user queries, navigate application modules, and provide context-aware responses, thereby improving interaction efficiency and reducing manual navigation complexity. Additionally, a secure marketplace for verified local guides enables travelers to browse profiles, evaluate reviews, and connect with trusted professionals, promoting authentic cultural exploration [5]. Notification services such as email alerts ensure timely delivery of booking confirmations, itinerary updates, and important travel information, thereby improving system reliability and overall user experience [6].

3. RELATED WORK

Existing studies in the travel and tourism domain have increasingly emphasized the need for intelligent systems that can assist users in making effective travel decisions under dynamic conditions. Research efforts highlight that travel behavior is often influenced by factors such as time constraints, congestion, and incomplete information, leading to the development of adaptive decision-support mechanisms for improved travel planning [4]. Adaptive route planning approaches that consider environmental and contextual factors have shown notable improvements in travel efficiency and user satisfaction; however, these solutions are largely restricted to navigation-related tasks and do not address broader trip planning requirements [7]. Location-aware and semantic-based tourist attraction recommendation techniques further improve prediction accuracy by integrating spatial and textual information related to points of interest [2]. Despite their effectiveness, these

systems typically function as standalone recommenders and lack support for integrated itinerary planning and real-time user interaction.

In addition to individual travel planning, group-based travel recommendation has been explored using constraint-driven models that balance multiple user preferences to generate collective travel plans. Although effective in handling group decision-making, such approaches often assume static user preferences and offer limited adaptability during actual travel scenarios [9]. Studies that integrate external mapping APIs and travel survey data underline the importance of real-time information such as travel cost, duration, and route availability for accurate travel guidance and mode selection [5]. These findings reinforce the value of incorporating live data sources into travel assistance systems.

Parallel research has also focused on enhancing user interaction in tourism applications through conversational systems and chatbot-driven platforms. These systems improve accessibility and user engagement by enabling natural language-based interaction and on-demand information retrieval [8]. However, recent reviews indicate that most existing solutions address isolated functionalities and fail to provide a unified framework that seamlessly integrates routing, itinerary planning, local guide services, and conversational interaction [10]. This limitation highlights the need for an integrated travel assistant capable of delivering comprehensive, end-to-end travel planning and support within a single platform.

4. PROPOSED SYSTEM

We propose a comprehensive and intelligent travel assistant system designed to simplify and enhance the travel planning experience by integrating multiple travel-related services into a unified platform. The proposed system addresses key challenges faced by travelers, including fragmented information sources, inefficient route planning, lack of real-time updates, and difficulty in accessing reliable local guidance. The core of the system is built around a centralized web-based architecture that enables users to plan, manage, and customize their travel activities efficiently through a single interface.

The system operates by processing user inputs such as travel preferences, destination details, budget constraints, and travel duration to provide optimized route suggestions for bus and car travel, along with real-time weather updates. These features support informed decision-making and help travelers avoid delays or unsafe travel conditions. The proposed framework also includes an automated itinerary planning mechanism that organizes hotels, restaurants, and sightseeing locations into structured multi-day travel plans, ensuring efficient time management and improved travel comfort.

To enhance user interaction and accessibility, the system incorporates an NLP-powered chatbot with multilingual voice support, allowing users to communicate naturally and receive instant responses to travel-related queries. In addition, the system integrates a virtual assistant powered by a Large Language Model (LLM), specifically the GPT-4o mini model, which provides advanced conversational intelligence, contextual understanding, and personalized travel support. This virtual assistant enables users to access application features, modify itineraries, retrieve recommendations, and perform travel-related tasks through natural language interactions, thereby reducing manual navigation and improving overall usability. Geolocation services are utilized to identify nearby attractions, accommodations, and services, providing context-aware recommendations during travel. Additionally, a secure marketplace for verified local guides is integrated into the system, enabling travelers to browse profiles, review ratings, and connect with trusted professionals for authentic local experiences.

By combining route planning, itinerary management, conversational assistance, and guide services within a single platform, the proposed system offers high scalability, usability, and adaptability. This integrated design makes the system suitable for diverse travel scenarios and highlights its potential for deployment as a reliable digital companion for end-to-end travel planning and management.

5.1 AUTHENTICATION & USER MANAGEMENT

The Tourister and Guide Management module handles the registration, authentication, and profile management of both tourists and guides within the platform. It collects essential user information, including personal details, contact information, and individual preferences, and securely stores this data in the system database. The module enables guides to submit their service details for verification while allowing tourists to manage and update their profiles and travel preferences. By maintaining accurate and well-structured user data, this module facilitates seamless interaction between tourists, guides, and other system components, ensuring efficient coordination and personalized travel assistance.

5.2. ROUTE MANAGEMENT

The Route Management module focuses on providing efficient navigation and travel support through live mapping and real-time environmental insights. It includes a Live Map with Distance Calculation feature that helps users identify optimal routes for bus and car travel by computing travel distance and supporting better route selection. Additionally, the module integrates Real-Time Weather API services to deliver up-to-date weather information, enabling travelers to make safer and more informed travel decisions. By combining accurate distance analysis with dynamic weather updates, the module enhances route planning

accuracy, reduces travel uncertainty, and improves the overall travel experience within the platform.

5.3. TRIP PLANNING & CATEGORIZATION

The Trip Planning & Categorization module allows tourists to explore destinations and organize their trips in a structured and user-friendly way. It provides categorized details of tourist places, hotels, and budget options, enabling users to browse destinations based on their interests, preferences, and travel constraints. The module presents essential information such as location highlights, cultural significance, nearby facilities, and available services, helping users make informed travel decisions.

Additionally, the module supports multi-day itinerary generation by arranging selected destinations, accommodations, and activities into well-organized travel schedules that consider duration, user preferences, and budget limitations. It also showcases available travel facilities and transportation options by evaluating distance, estimated travel time, and accessibility, thereby simplifying trip planning and improving overall travel efficiency.

5.4. GUIDE MARKETPLACE SYSTEM

The Guide Marketplace System facilitates seamless interaction between tourists and local guides through structured guide listing and profile management features. It enables guides to create and manage detailed profiles showcasing their expertise, service areas, availability, and pricing, while tourists can explore and select guides based on their travel needs. The system supports a tourist request mechanism where tourists can send service requests and guides can accept or decline them, ensuring flexible communication and transparent coordination. It also includes booking confirmation and tourist detail display functionalities that streamline the service process. By analyzing user preferences such as location, budget, interests, and trip duration, the module provides personalized recommendations and intelligently matches tourists with suitable guides and related travel services, thereby reducing search effort and enhancing the overall travel planning experience.

5.5. VIRTUAL GUIDE & COMMUNICATION SYSTEM

The Virtual Guide & Communication System enhances user interaction by providing intelligent conversational support and seamless communication features within the platform. It incorporates NLP-based query processing and GPT-4o mini virtual guide integration to enable natural, context-aware responses to user queries, assisting tourists in accessing application features, travel information, and recommendations efficiently. Multilingual text-to-speech support further improves accessibility by allowing users to receive responses in voice format, while geolocation services provide real-time location-based assistance and nearby travel suggestions.

Additionally, the system includes an email notification mechanism that ensures timely delivery of booking confirmations, itinerary updates, and important travel alerts. By combining virtual guidance, communication tools, and automated notification services, this module improves user engagement, supports real-time decision-making, and delivers a reliable digital assistance experience throughout the travel journey.

6. SYSTEM ARCHITECTURE

The system architecture of the proposed platform is designed to provide an integrated, scalable, and interactive travel planning environment by coordinating multiple functional components. At the core of the architecture is the intelligent processing engine, which acts as the central controller, managing communication between users, services, and intelligent modules. The system supports three primary user roles: Tourister, Guide, and Admin, each interacting with the platform through role-specific dashboards after secure registration and login.

The Tourister module allows users to explore tourist places, view live maps with distance calculations, select preferred guides, generate roadmaps, and initiate bookings. Real-time weather information is fetched using a Weather API, enabling informed travel decisions. Once a trip is initiated, the system applies a clustering algorithm to recommend nearby hotels, restaurants, and essential services. Booking details and confirmations are automatically sent to users via email. The Guide module enables guides to register, receive admin approval, log in, and manage tourist requests by accepting or declining them and viewing tourist details. The Admin module oversees guide verification, dataset management, and system monitoring through an administrative dashboard.

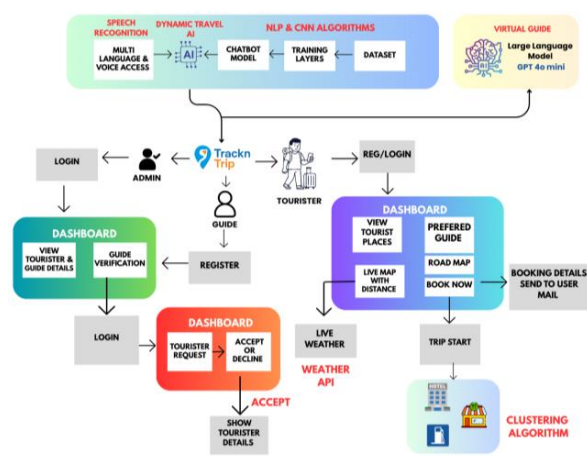


Fig.6.1. Architecture Diagram

Additionally, the architecture integrates an NLP-based chatbot model with multilingual speech recognition and voice access, supported by a training layer and dataset.

The system further incorporates an LLM-based virtual assistant powered by the GPT-4o mini model, which enhances conversational intelligence, contextual understanding, and personalized travel assistance. This virtual assistant enables users to interact naturally with the platform, access application features, modify itineraries, retrieve recommendations, and receive real-time guidance through adaptive, human-like responses. Overall, the architecture ensures secure access, intelligent recommendations, real-time assistance, and seamless coordination among all system components.

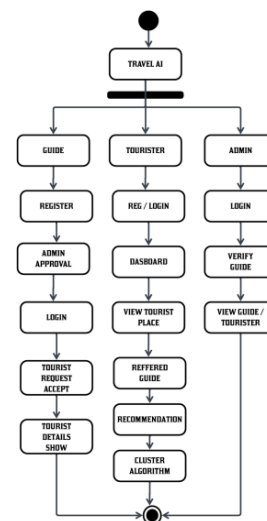


Fig.6.2. Activity Diagram

This activity diagram illustrates the overall workflow of the proposed travel assistant system, showing the interactions among the Tourister, Guide, and Admin roles. It presents the sequence of processes starting from user registration and login, followed by guide verification, tourist place exploration, recommendation generation, and booking acceptance. The diagram emphasizes role-based access control and demonstrates the coordinated flow of activities that support efficient trip planning, guide collaboration, and successful service completion within the platform.

7. EXPERIMENTAL RESULTS

This result discusses the implementation of the proposed travel assistant system by illustrating the overall workflow and interactions among the Tourister, Guide, and Admin roles. It highlights the role-based sequence of operations, including registration, verification, tourist place exploration, recommendation generation, and booking processes, which collectively contribute to efficient trip planning and successful

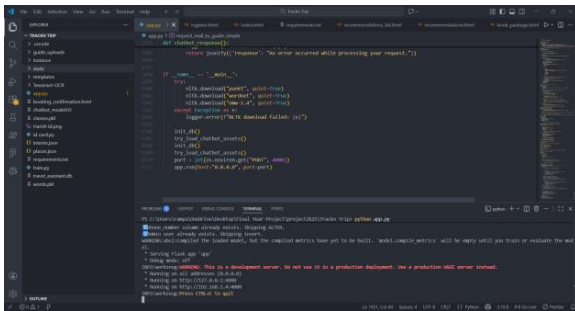


Fig. 7.1. Shows the Execution

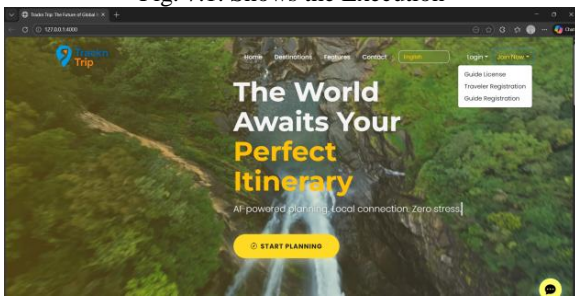


Fig. 7.2. User Interface and Home page

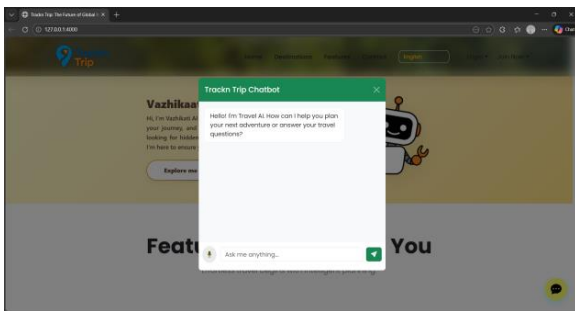


Fig. 7.3. NLP based Chatbot



Fig. 7.4. Admin dashboard

8. CONCLUSION & FUTURE WORK

This project successfully presents an AI-powered travel assistant designed to simplify and enhance the travel planning process through an integrated and user-friendly platform. By combining tourist place exploration, route planning, personalized recommendations, guide booking, and interactive assistance within a single system, the proposed solution reduces dependency on multiple applications. Role-based access control ensures

secure interaction among tourists, guides, and administrators, while administrative verification improves trust and reliability. The inclusion of recommendation logic, real-time route information, an NLP-based chatbot, and an LLM-based virtual assistant powered by the GPT-4o mini model enhances user engagement, enables natural interaction, and supports informed decision-making. Overall, the system demonstrates how intelligent technologies can effectively streamline travel management and improve the overall travel experience.

In future work, the system can be extended to support mobile applications for improved accessibility and real-time notifications. Integration of advanced analytics can help refine recommendations based on travel trends and seasonal demand. Support for additional regional languages and enhanced voice interaction can further improve usability. Moreover, incorporating offline navigation, augmented reality-based location guidance, and deeper integration with transport and accommodation providers can make the platform more comprehensive. These enhancements will enable the platform to evolve into a fully adaptive and intelligent travel companion capable of meeting diverse user needs.

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