



# WanderSmart: Intelligent Travel Planning with Geospatial and AI Integration

Gattu Pravallika<sup>1</sup>, Umamaheswararao Mogili<sup>2\*</sup>, M. Gayatri<sup>3</sup>, B. Jhansi<sup>4</sup>,

M. Ramadevi<sup>5</sup>, B. Paul Pratap<sup>6</sup>

<sup>1,2\*</sup> Assistant Professor, Department of Computer Science and Engineering, Avanathi's St Theresa Institute of Engineering and Technology, Garividi, Andhra Pradesh, India.

<sup>3,4,5,6</sup> B.Tech, Department of Computer Science and Engineering, Avanathi's St Theresa Institute of Engineering and Technology, Garividi, Andhra Pradesh, India.

**Abstract:** Travel planning often requires users to navigate multiple platforms for destination search, weather updates, accommodation information, and itinerary preparation. This fragmented process increases planning time and reduces user convenience. To address these challenges, this paper presents WanderSmart, an AI-assisted smart travel planning platform that integrates geospatial services, real-time weather information, and intelligent itinerary generation into a unified web application. The proposed system is developed using a full-stack architecture consisting of a React-based frontend, a Node.js and Express.js backend, and a MySQL relational database for data management. The platform integrates multiple external services including Open Street Map for geospatial visualization, Geoapify Places API for discovering nearby hotels and restaurants, Weather API for real-time climate data, and OpenAI API for AI-powered travel itinerary generation. Users can search destinations, explore surrounding amenities, view weather conditions, generate personalized travel plans, and save preferred locations through a wish list feature. The system follows a three-tier architecture comprising presentation, application, and data layers, ensuring scalability and modular design. Experimental evaluation demonstrates that the platform significantly simplifies travel planning by providing an integrated interface that reduces manual effort while enhancing user experience through intelligent recommendations and real-time contextual data. The proposed WanderSmart system highlights the potential of combining geospatial technologies, cloud-based APIs, and artificial intelligence to develop intelligent travel planning solutions that improve efficiency and personalization for modern travelers.

**Index Terms** - Smart Travel Planning, Artificial Intelligence (AI), Location-Based Services (LBS), Travel Recommendation System, Geospatial Mapping.

## I. INTRODUCTION

Tourism and travel have become increasingly popular in recent years due to the growth of digital technologies and the availability of online information. Travelers now rely on various digital platforms to search for destinations, explore nearby attractions, find accommodations, and plan their journeys. Despite the availability of these tools, travel planning often remains complex because users must navigate multiple applications and websites to gather necessary information such as maps, hotels, restaurants, weather updates, and travel itineraries. This fragmented approach can make the planning process time-consuming and inefficient. Most existing travel platforms focus on specific services such as navigation, hotel booking, or weather forecasting. For example, map applications provide location and route information, while travel websites focus on accommodation and restaurant listings. Weather applications provide climate data, but they do not assist users in organizing travel plans. As a result, travelers must manually combine information from several sources to create a complete travel itinerary. This lack of integration highlights the need for a unified platform that can provide multiple travel services within a single application. To address these challenges, this project proposes WanderSmart, an AI-assisted travel planning platform designed to simplify the process of planning trips.

WanderSmart integrates location search, map visualization, nearby hotel and restaurant discovery, weather information, and AI-based itinerary generation into one intelligent system. The application allows users to search for travel destinations, view their location on an interactive map, explore nearby facilities, check current weather conditions, and generate personalized travel plans based on user preferences. The WanderSmart system is developed using modern web technologies such as React.js for the frontend interface, Node.js and Express.js for backend services, and MySQL for database management. The platform also integrates external services including OpenStreetMap for map visualization, Geoapify Places API for nearby locations, Weather API for climate data, and OpenAI API for AI-generated travel recommendations. These technologies work together to provide real-time information and intelligent suggestions to users. The primary objective of the WanderSmart platform is to create a centralized travel planning system that improves user experience by combining multiple travel-related services into a single interface. By leveraging geospatial

technologies, cloud-based APIs, and artificial intelligence, the system helps users make informed travel decisions and reduces the complexity of trip planning. Overall, WanderSmart demonstrates how modern web technologies and AI-based systems can be integrated to build a smart travel assistant capable of providing personalized travel guidance, real-time information, and interactive travel planning features.

## II. LITERATURE SURVEY

The rapid development of information technology has significantly transformed the tourism and travel industry. Modern travelers rely heavily on digital platforms to search destinations, explore travel services, and plan trips efficiently. Early research in travel planning systems primarily focused on geographic information systems (GIS) and digital mapping technologies. These systems enabled users to visualize geographic locations, calculate routes, and identify nearby places using map-based services. However, early systems were mainly limited to navigation support and did not provide intelligent travel recommendations or integration with other travel-related services such as accommodation and weather forecasting [1, 2]. With the growth of web technologies, several online travel platforms were developed to provide travel information and booking services. These systems allowed users to search destinations, view hotel information, and read reviews about tourist attractions. Despite their usefulness, these platforms typically provide only specific services such as hotel booking or navigation, requiring users to rely on multiple applications for complete travel planning. Researchers have pointed out that this fragmented structure of travel services increases planning complexity and limits the efficiency of travel decision-making [3, 4]. Location-based services (LBS) have played an important role in improving travel planning systems. LBS use geographic coordinates obtained from GPS technology to provide personalized recommendations based on the user's location. These systems enable users to discover nearby points of interest such as hotels, restaurants, and tourist attractions. Studies have shown that integrating location-based services with interactive digital maps improves user engagement and enhances the travel exploration experience [5, 6].

Another important area of research in travel systems is the use of recommendation systems. Travel recommendation systems analyze user preferences and historical behavior to provide suggestions for destinations and attractions. Various techniques such as collaborative filtering, content-based filtering, and hybrid recommendation models have been applied in tourism applications to provide personalized travel recommendations. These systems help users discover travel destinations that match their interests and preferences, thereby improving user satisfaction and travel planning efficiency [7, 8]. Recent advancements in artificial intelligence have further enhanced the capabilities of travel planning systems. AI-based travel assistants use natural language processing (NLP) and machine learning algorithms to understand user queries and generate personalized travel itineraries. These intelligent systems can automatically create travel schedules based on factors such as travel duration, budget constraints, and user interests. Research indicates that AI-based itinerary generation can significantly reduce the effort required for manual trip planning and improve the quality of travel recommendations [9, 10]. In addition to AI technologies, modern travel platforms increasingly rely on cloud-based APIs to access real-time information. APIs such as weather services and place discovery services provide dynamic data that enhances the functionality of travel applications. Weather information is particularly important in travel planning as climate conditions influence travel activities and destination selection. Similarly, place discovery APIs enable applications to provide updated information about nearby hotels, restaurants, and tourist attractions [11, 12].

Several studies have also explored the integration of geospatial technologies with artificial intelligence to develop intelligent tourism systems. These systems combine map visualization, travel recommendations, and contextual data to create more comprehensive travel planning platforms. Researchers suggest that integrating multiple services such as mapping, weather information, and recommendation systems into a single application can significantly improve user experience and reduce the complexity of travel planning [13,14]. Despite these technological advancements, many existing travel applications still lack a unified architecture that integrates mapping services, nearby location discovery, weather data, and AI-powered itinerary generation in a single system. Users often need to manually combine information from multiple platforms to create a complete travel plan. Therefore, there is a growing need for an integrated smart travel planning system that combines geospatial technologies, real-time data services, and artificial intelligence. The proposed WanderSmart platform addresses this research gap by integrating multiple technologies and APIs into a single full-stack web application. The system combines OpenStreetMap for map visualization, Geoapify Places API for nearby amenities, Weather APIs for climate information, and OpenAI for AI-based itinerary generation. By integrating these technologies into a unified architecture, WanderSmart provides an intelligent and efficient travel planning solution that enhances user convenience and improves decision-making during travel planning [14, 15]. Some of the artificial intelligence, machine learning and deep learning models are described in details [16-22].

## III. METHODOLOGY

The proposed methodology focuses on developing an intelligent travel planning system that integrates location services, weather information, nearby amenities, and AI-based itinerary generation. The system processes user search queries and retrieves relevant travel information using external APIs and geospatial technologies. The methodology involves collecting destination data, analyzing nearby services such as hotels and restaurants, retrieving weather information, and generating personalized travel itineraries using artificial intelligence. The overall travel planning process includes several stages such as destination search, map visualization, data retrieval from APIs, itinerary generation, and user interaction. The WanderSmart platform utilizes modern web technologies to build a full-stack travel planning application. The system combines geospatial visualization, real-time API integration, and AI-based recommendations to provide users with a unified travel planning experience. The computational workflow of the system consists of the following steps:

- Destination Search: Users enter a destination name in the search bar. The system uses geocoding services to convert the location name into geographic coordinates.
- Map Visualization: The selected destination is displayed on an interactive map using geospatial mapping technologies.
- Nearby Places Analysis: The system retrieves nearby hotels and restaurants using location-based APIs.
- Weather Information Retrieval: Real-time weather data for the selected destination is fetched using a weather API.

- AI Itinerary Generation: The system generates a personalized travel itinerary using artificial intelligence based on user preferences.
- Wishlist Management: Users can save preferred destinations to their wishlist for future reference.
- Profile Management: User profile settings allow customization of preferences such as themes and travel interests.

The proposed methodology improves travel planning efficiency by integrating multiple travel services into a single intelligent system.

### 3.1. System Architecture Strategy

To manage different travel planning functionalities efficiently, the system follows a modular architecture approach. The application is divided into multiple modules such as frontend interface, backend services, database management, and external API integrations. Each module performs a specific task in the travel planning workflow. The frontend handles user interaction and map visualization, while the backend manages API requests and data processing. The database stores user information such as profiles, wishlist items, and saved itineraries. External APIs provide real-time data related to locations, weather, and nearby places. This modular architecture ensures scalability, maintainability, and efficient processing of travel-related information.

### 3.2. Data Retrieval and Processing

Data retrieval plays a critical role in the WanderSmart system. The application retrieves data from various sources including geospatial services and external APIs. The data retrieval stage includes the following steps:

- Location Data Retrieval: The system retrieves geographic coordinates using OpenStreetMap geocoding services.
- Places Data Retrieval: Nearby hotels and restaurants are fetched using the Geoapify Places API.
- Weather Data Retrieval: Real-time weather conditions for the destination are obtained from the Weather API.
- User Data Processing: User preferences and saved destinations are retrieved from the MySQL database.
- Data Normalization: The retrieved data is processed and formatted for display in the user interface.
- The processed data is then displayed on the application dashboard to assist users in travel planning.

### 3.3. Feature Selection

Feature selection helps identify the most relevant attributes required for effective travel planning. Important features considered in the system include destination location, nearby amenities, weather conditions, and user preferences. Key features used in the WanderSmart system include:

- Destination name and geographic coordinates
- Nearby hotels and restaurants
- Weather conditions and temperature
- User preferences and travel interests
- AI-generated itinerary suggestions
- These features help provide meaningful travel recommendations and improve the overall user experience.

### 3.4. API Integration Algorithms

The WanderSmart system integrates multiple APIs to retrieve real-time travel information.

- OpenStreetMap / Nominatim: Used for destination search and geocoding services.
- Geoapify Places API: Used to identify nearby hotels and restaurants around the selected destination.
- Weather API: Used to retrieve real-time weather conditions for travel planning.
- OpenAI API: Used to generate intelligent travel itineraries based on user preferences.

These APIs work together to provide accurate and real-time travel information.

### 3.5. Proposed System Algorithm

To improve travel planning efficiency, the proposed system integrates multiple services and automated processing techniques.

Input: Destination Search Query

Output: Travel Plan with Map, Weather, and Nearby Places

Steps:

- Accept destination input from the user.
- Convert destination name into geographic coordinates.
- Display the location on an interactive map.
- Retrieve nearby hotels and restaurants using location-based APIs.
- Fetch weather information for the selected destination.
- Generate AI-based travel itinerary suggestions.
- Allow users to save destinations in the wishlist.
- Display travel information and recommendations in the application dashboard

#### IV. RESULTS AND DISCUSSION

##### 4.1. Destination Search and Map Visualization

The system allows users to search for destinations and displays the selected location on an interactive map using OpenStreetMap. This feature helps users easily visualize the travel destination and explore its geographic location.

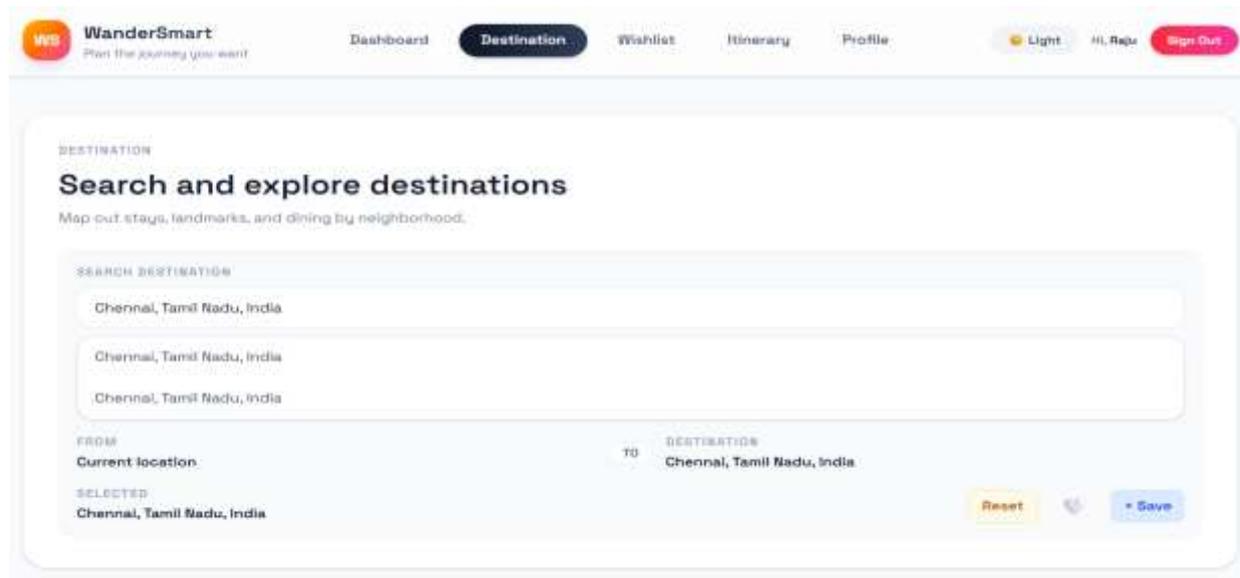


Figure 1. Destination Search and Map Visualization

##### 4.2. Data Processing and API Integration:

The application retrieves nearby hotels, restaurants, and weather information using external APIs. The collected data is processed and displayed on the dashboard to assist users in travel planning.

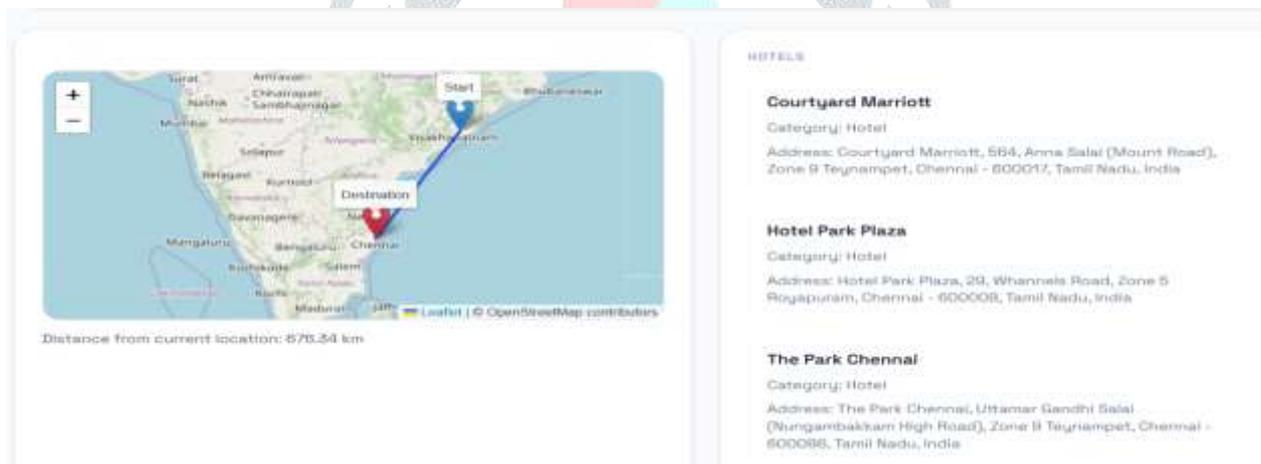


Figure 2. Data Processing and API Integration part 1

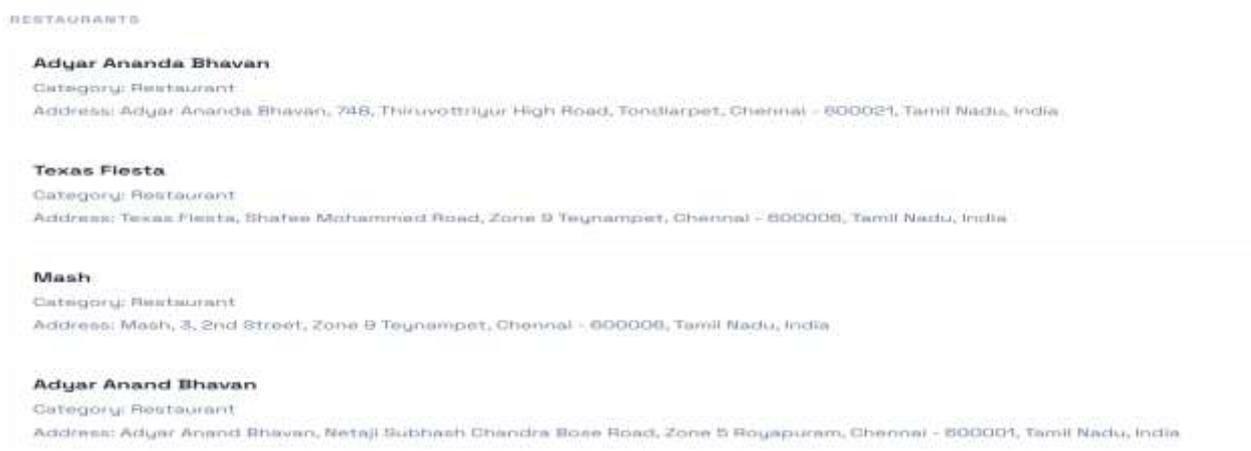


Figure 3. Data Processing and API Integration Part2

### 4.3. Places to visit & itinerary

The system successfully displays travel information including destination location, nearby facilities, and weather details. These results help users plan trips efficiently and generate AI-based travel itineraries within the application.

Figure 4. Places to visit & itinerary

## IV. Conclusion

The WanderSmart system was developed to simplify travel planning by integrating multiple travel-related services into a single intelligent web platform. The system allows users to search destinations, view locations on an interactive map, explore nearby hotels and restaurants, check real-time weather information, and generate AI-based travel itineraries. By combining these features, the application reduces the need to use multiple platforms and provides a convenient environment for efficient trip planning. The implementation of WanderSmart using modern web technologies such as React.js, Node.js, and MySQL demonstrates the effectiveness of full-stack development for building scalable travel applications. The integration of external APIs including OpenStreetMap, Geoapify Places API, Weather API, and OpenAI enables the system to deliver real-time data and personalized travel recommendations. In the future, the system can be enhanced by adding features such as hotel booking integration, advanced recommendation systems, and multilingual support to further improve the travel planning experience.

## REFERENCES

- [1] R. Fielding, *Architectural Styles and the Design of Network-Based Software Architectures*, University of California, Irvine, 2000.
- [2] P. Longley, M. Goodchild, D. Maguire, and D. Rhind, *Geographic Information Systems and Science*, Wiley, 2015.
- [3] C. Gretzel, M. Fesenmaier, and D. O'Leary, "The Transformation of Travel Information Search Behavior," *Journal of Travel Research*, vol. 45, no. 3, pp. 266–280, 2006.
- [4] S. Xiang and U. Gretzel, "Role of Social Media in Online Travel Information Search," *Tourism Management*, vol. 31, no. 2, pp. 179–188, 2010.
- [5] J. Schiller and A. Voisard, *Location-Based Services*, Morgan Kaufmann, 2004.
- [6] M. Bellavista, A. Kupper, and S. Helal, "Location-Based Services: Back to the Future," *IEEE Pervasive Computing*, vol. 7, no. 2, pp. 85–89, 2008.
- [7] J. Ricci, F. Rokach, and B. Shapira, *Recommender Systems Handbook*, Springer, 2015.
- [8] G. Adomavicius and A. Tuzhilin, "Toward the Next Generation of Recommender Systems," *IEEE Transactions on Knowledge and Data Engineering*, vol. 17, no. 6, pp. 734–749, 2005.
- [9] T. Davenport and D. D. D. Ronanki, "Artificial Intelligence for the Real World," *Harvard Business Review*, vol. 96, no. 1, pp. 108–116, 2018.
- [10] Y. Zhang and X. Chen, "Explainable Recommendation: A Survey," *Foundations and Trends in Information Retrieval*, vol. 14, no. 1, pp. 1–101, 2020.
- [11] OpenWeather, "Weather API Documentation," <https://openweathermap.org>
- [12] Geoapify, "Geoapify Places API Documentation," <https://www.geoapify.com>
- [13] OpenStreetMap Contributors, "OpenStreetMap Project," <https://www.openstreetmap.org>
- [14] M. Sigala, U. Gretzel, and J. Koo, *Smart Tourism: Foundations and Developments*, Springer, 2019.
- [15] S.S.D.K. Maha Lakshmi, Umamaheswararao Mogili, Sravya Eluri, Dogga Ramachandra Rao. (2023), "Online Dynamic Out Patient Queue System for Automated Token Generation in Hospitals", *Science, Technology and Development Journal*, Volume XII, Issue VII, pp 71-78, DOI:23.18001.STD.2023.V12I07.23.37707.

- [16] Mogili, U., Ampolu, K. V., Rajasekharam, B., & Timothy, M. J. AI-Driven Interaction in AR Environments, in Journal of Digital Economy, 2024, Volume 3, Issue 1, pp. 228-234.
- [17] Timothy, M. J., Rajasekharam, B., Ampolu, K. V., & Mogili, U. Threat Detection Using AI in Cybersecurity Systems, in IJIS, 2023, Volume 7, Issue 1, pp. 1-7.
- [18] Ampolu, K.V., Mogili, U., Timothy, M. J., & Rajasekharam, B. Machine Learning Models for Predictive Maintenance, in IJIS, 2022, Volume 6, Issue 4, pp. 1-7.
- [19] Rajasekharam, B., Timothy, M. J., Mogili, U., Ampolu, K.V., Machine Learning Models for Predictive Maintenance, in JDE, 2023, Volume 2, Issue 2, pp. 95-101.
- [20] Soujania, B., Ampolu, K. V., Timothy, M. J., & Mogili, U. (2025) Classifying Disease Information Forums through Semantic Similarity-Based Machine Learning, Science, Technology and Development Journal, Volume XIV, Issue II, pp 67-75.
- [21] B Satish Kumar, Kavitha C., Mogili, U.R., S. Pallam Shetty (2022). "Application of Machine Learning To Enhance the Performance of The Prophet Routing Protocol For Delay Tolerant Networks". Journal for Basic Sciences, Volume 23, Issue 5, 2107-2116, DOI:10.37896/JBSV23.5/2278.
- [22]. Sree Geeta, Umamaheswararao Mogili. (2022), "Use of Several Machine Learning Algorithms for Effective Prediction of Cyberbullying", International Journal of Creative Research Thoughts, Volume 10, Issue 6, pp 17-26.

