



International Journal of Innovative Research in Computer and Communication Engineering

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)





Travel Planning Agent using Dialogflow

Akanksha Bharat Chavan¹, Kunti Shrikrushna Chavan¹, Saundarya Vasant Mali¹,

Vaishnavi Sudhakar Gade¹, Vaishnavi Vikas Musale¹, Prof. R.S. Nejkar²

B. Tech Students, Department of Computer Science and Engineering, Sanjeevan Group of Institutions, Panhala, Kolhapur, Maharashtra, India¹

Guide, Department of Computer Science and Engineering, Sanjeevan Group of Institutions, Panhala, Kolhapur, Maharashtra, India²

ABSTRACT: Planning a trip requires choosing destinations, booking flights and hotels, preparing itineraries, and estimating costs, which can be time-consuming. To solve this, we propose an AI-based Travel Planning Agent using Dialogflow that interacts with users in natural language. The chatbot suggests destinations, compares flights and hotels, creates itineraries, and provides cost estimates by integrating real-time APIs like Skyscanner, Booking.com, and Google Places. The system uses Natural Language Processing (NLP) for intent detection, integrates travel and weather APIs for real-time information, and applies recommendation algorithms for destination and itinerary planning. A webhook and database backend ensure smooth interaction between user queries, AI models, and external services. Additional features such as a smart packing assistant and multi-language support make travel planning easier, faster, and more personalized. Phase-I results confirm all core modules are connected and technically feasible.

KEYWORDS: Dialogflow; Natural Language Processing; Travel Planning Agent; Chatbot; API Integration; Itinerary Generation; Webhook; Personalized Recommendations

I. INTRODUCTION

Traveling is one of the most enriching experiences, but planning a trip can often be stressful and time-consuming. A traveler has to go through multiple steps such as deciding on a destination, booking flights and hotels, preparing an itinerary, estimating costs, and making arrangements for activities. These tasks usually require visiting multiple platforms and comparing information manually, which increases the effort and chances of confusion.

With the advancements in Artificial Intelligence (AI) and Natural Language Processing (NLP), it is now possible to simplify and automate this process using conversational agents. This project proposes an AI-based Travel Planning Agent developed using Dialogflow, which acts as a personal virtual assistant for travelers. The chatbot is capable of understanding user queries in natural language and providing smart travel solutions.

The system integrates with external APIs such as Skyscanner/Amadeus for flights, Booking.com for hotels, and Google Places for attractions to fetch real-time data. Based on user inputs like budget, duration, and preferences, it suggests destinations, compares flight and hotel options, and generates a personalized itinerary. It also estimates the total cost of the trip. The system additionally includes innovative features such as a Smart Packing Assistant that suggests items based on weather and activities, a Dynamic Travel Checklist, AR previews of destinations, and multi-language support to cater to international users. By combining automation, real-time data, and user-friendly interaction, the Travel Planning Agent aims to make travel planning faster, smarter, and more enjoyable.

II. LITERATURE REVIEW

AI-based travel planning has become a rapidly growing research area. Chen et al. (2019) developed a chatbot-based travel assistant using NLP to understand user queries and recommend tourist destinations, but it lacked personalization based on user history [1]. Mandal and Gupta (2020) proposed an AI-based automated itinerary generator using ML algorithms to predict travel patterns, though it required large datasets [2]. Rahman et al. (2021) introduced a travel assistant integrated with Google Dialogflow using intent classification and entity extraction, but lacked real-time API integration for weather and hotel data [3].



International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Patel (2022) used deep learning and sentiment analysis to recommend destinations based on TripAdvisor and Google Travel reviews, improving personalization but requiring high computing power [4]. Zhang et al. (2023) developed a hybrid travel planning assistant combining rule-based NLP with ML for itinerary optimization with live weather and location-based services [5]. The key research gaps identified from the above survey include: lack of personalization, limited natural language interaction, absence of real-time travel data integration, limited decision-making intelligence, and poor user experience in terms of automation and multi-step conversational flows.

III. SYSTEM ANALYSIS AND PROPOSED SYSTEM

A. Existing System Limitations: Travel planning today relies on traditional methods and partially automated systems. Users depend on travel agencies, online portals (MakeMyTrip, Booking.com, TripAdvisor), search engines, and static templates. Existing chatbots mostly handle FAQ-style interactions without context retention, follow-up understanding, or multi-step task automation. Most platforms lack real-time dynamic updates for flight fare fluctuations, changing hotel availability, weather alerts, and tourism restrictions. Current systems display options but do not compare routes, suggest best deals, optimize time and cost, or auto-generate smart itineraries.

B. Proposed System: The proposed system is an AI-based Travel Planning Agent using Dialogflow that provides smart, responsive, and personalized travel assistance. The system communicates naturally using Dialogflow conversational flow, allowing queries such as "Plan a 5-day trip to Goa under Rs.20,000." Key features include: (1) Conversational UI with context awareness and memory, (2) Personalized recommendations based on budget, travel type, destination, and duration, (3) Real-time flight and hotel search via Amadeus and Booking.com APIs, (4) Smart day-wise itinerary generation with transportation routes, popular attractions, and cost optimization, and (5) Multi-platform deployment on websites, mobile apps, WhatsApp/Telegram bots, and voice assistants.

C. Feasibility Study: The system is technically feasible using Dialogflow ES (NLP), Node.js/Express.js (backend), REST APIs, and Firebase/Google Cloud (deployment). It is operationally feasible as users need no technical knowledge to interact with the chatbot. The system is economically feasible as it primarily uses free or low-cost resources including Dialogflow, Node.js, Render hosting, and Firebase, with API free-trial tiers covering development and testing phases.

IV. SYSTEM REQUIREMENTS

A. Functional Requirements: The system shall allow natural language input; identify user intents (flight booking, hotel booking, weather check, itinerary generation); fetch real-time information via external APIs; store user preferences (dates, budget, location, interests); generate personalized travel suggestions and itineraries; allow modifications to travel parameters; provide structured conversational responses; and log conversations for analytics.

B. Non-Functional and Hardware/Software Requirements: Non-functional: Usability (no technical knowledge needed), Scalability, Performance (2-4 second response time), Security (HTTPS), Reliability, Maintainability, and Compatibility (mobile, web, messaging apps). Hardware: Intel Core i3+, 4GB RAM minimum, 10GB storage, stable internet. Software: Windows/macOS/Linux, Node.js, Express.js, Dialogflow, Firebase Firestore or MongoDB, Flight/Weather/Hotel APIs, VS Code, Postman, and cloud hosting (Render or Google Cloud).

V. SYSTEM DESIGN AND ARCHITECTURE

The system architecture is divided into four modules. Module 1 (Intent and Entity Module) creates the core conversational capabilities inside Dialogflow by defining user intents (Flight Booking, Hotel Search, Itinerary Creation, Check Weather, Goodbye, Multi-Language, Smart Packaging, Travel Deals) and training custom entities including @activity_type, @ar_type, @budget, @budget_range, @flight-class, @language_name, @package_type, @place, @region, and @transport_mode. Conversational flows are built to guide users from greeting through destination, dates, budget, and results, with fallback intents for error handling.

Module 2 (Fulfillment Webhook Module) provides backend logic in Node.js/Python to validate user input, call external APIs, compute recommendations, and return formatted responses (cards, text, images, carousel suggestions) to Dialogflow. The webhook is deployed at <https://travel-buddy-backend-cfbs.onrender.com/webhook> with HTTPS security. Module 3 (API and Database Integration Module) integrates Skyscanner for flights, Booking.com for hotels,



International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Google Places for attractions, and OpenWeatherMap for weather data. User data including login details, past searches, preferences, and booking history are stored in Firebase or MongoDB. Module 4 (Response and Enhancement Module) delivers structured results and implements AR destination previews and the Smart Packing Assistant, with continuous evaluation and improvement based on user feedback and performance analytics.

UML Diagrams: The Use Case Diagram (Fig. 1) shows the User, Admin, and External APIs actors with use cases including Chat with Agent, Search Flights, Search Hotels, Generate Itinerary, Get Cost Estimate, View AR Preview, and Smart Packing Suggestions. The Activity Diagram (Fig. 2) models the sequential flow: Start --> Search Flights --> Search Hotels --> Generate Itinerary --> End. The Class Diagram (Fig. 3) shows TravelPlanner (searchFlights(), searchHotels(), getCostEstimate()) associated with User (chatWithAgent()) and Hotel (searchHotels()), composed with Itinerary (generateItinerary()). The Sequence Diagram (Fig. 4) depicts: User sends Search Flights --> System validates in Database --> Display Results --> User selects flight.

VI. METHODOLOGY

Step 1 - Requirement Analysis: Identify user goals (search destination, book flight/hotel, build itinerary, check weather, find attractions). Gather constraints (budget, travel dates, preferences like hotel class and flight type). Define success criteria including response time below 2 seconds and 90% intent recognition accuracy. Deliverables include a requirements document, list of intents/entities, and example user queries.

Step 2 - Dialogflow Design: Define intents (SearchFlight, BookHotel, CheckWeather, GetAttractions), entities (@city, @date, @budget, @num_people), and design multi-turn contexts (e.g., after asking for destination, set awaiting_dates context). Add training phrases and test NLP performance using Dialogflow CX/ES. Deliverables: trained agent, intent list, sample dialogues.

Step 3 - Webhook Development: Implement webhook endpoints using Node.js/Express or Python/Flask. Parse Dialogflow JSON (intent, parameters, contexts). Implement business logic to call external APIs, query the database, compute recommendations, and return formatted responses to Dialogflow. Deploy on Render (<https://travel-buddy-backend-cfbs.onrender.com/webhook>) with HTTPS and token-based authentication.

Steps 4-6 - API Integration, Database, and Deployment: Connect with Amadeus/Skyscanner (Flights), Booking.com (Hotels), Google Places (Attractions), and OpenWeatherMap (Weather). Design Firebase/MongoDB data models for users, preferences, past trips, and session states. Deploy the system, run integration tests simulating conversations, check API flows and fallback handling. Monitor metrics: latency, error rate, intent recognition accuracy, successful task completion rate, and average conversation turns.

VII. PARTIAL IMPLEMENTATION AND RESULTS

A. Frontend (Travel Buddy Interface): A React.js-based front-end "Travel Buddy" was developed featuring a Login page with email/password fields, Google sign-in, and Microsoft sign-in options. The main chat interface includes a Chat History panel with a "New Chat" button and search, a central chat window with a travel-themed background (airplane and clouds), and a message input field with a Send button and voice input icon.

B. Dialogflow Agent Setup: The TravelPlannerAgent was configured in Dialogflow Essentials with 13 intents (AR_Preview, Book_Flight, Book_Hotel, Check_Weather, Default Fallback Intent, Default Welcome Intent, Goodbye, Multi_Language, Smart_Packaging, Transportation_Info, Travel_Advice, Travel_Deals, Welcome) and 10 custom entities (@activity_type, @ar_type, @budget, @budget_range, @flight-class, @language_name, @package_type, @place, @region, @transport_mode).

C. Working Conversation Flow: The conversation flow was validated in the Dialogflow test console. A greeting of "hii" triggers the welcome intent with responses including "Hello! I'm your Travel Buddy. How can I assist you today?" and context tags (welcome-followup, weather-followup). The query "best packages of goa" triggers the Smart_Packaging intent, returning "Smart package for Goa: 4 days, 3 nights -- from Rs.18,999 (demo)." Similarly, "give 4 days trip plan" is correctly handled by the same intent with appropriate context retention across turns.



International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

D. Initial API Integration Testing: API integration was tested via the Dialogflow test console. A query of "today" with the Check Weather intent and geo-city parameter set to "Mumbai" successfully retrieved live weather data: "Weather in Mumbai: 27.99 degrees C (feels like 29.55 degrees C), Haze. Humidity 61%." This confirms the end-to-end pipeline from Dialogflow intent recognition through webhook fulfillment to external API data retrieval is fully operational.

VIII. CONCLUSION AND FUTURE WORK

Phase-I of the "Travel Planning Agent using Dialogflow" has been successfully completed. The front-end interface, Dialogflow agent with trained intents and entities, working conversational flow with context retention, fulfillment webhook backend, and initial API integration have all been implemented and validated. The results demonstrate that all core modules are connected and functional, proving the system concept is technically feasible. The successful retrieval of live weather data and package recommendations confirms that the proposed hybrid NLP and API-driven architecture is effective for automating travel planning.

Phase-II will focus on full API integration with live flight and hotel providers, complete database connectivity for user profiling and history, automatic itinerary generation with route and cost optimization, AR destination previews, and full production deployment. Future enhancements may include payment gateway integration, real-time travel advisories, multi-language support expansion, and commercial licensing for travel agencies, making this a viable product with strong return on investment potential.

REFERENCES

1. S. Bisen, S. Meena, and A. Meena, "AI-based Travel Planning Agent using Natural Language Processing," *International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)*, vol. 11, no. 6, pp. 1271-1278, Jun. 2023.
2. R. Singh and V. Gupta, "Chatbot-based Travel Assistance using Dialogflow and Machine Learning," *International Journal of Advanced Computer Science and Applications (IJACSA)*, vol. 14, no. 2, pp. 45-52, Feb. 2023.
3. Google Cloud, "Dialogflow Documentation," 2025. [Online]. Available: <https://cloud.google.com/dialogflow>. [Accessed: Sep. 29, 2025].
4. S. Jain, P. Kumar, and R. Sharma, "AI-Powered Conversational Agents for Personalized Travel Recommendations," *IEEE Access*, vol. 11, pp. 65321-65330, 2023.
5. P. Dhillon and M. Kaur, "Integration of REST APIs for Smart Travel Applications," in *Proc. 2022 IEEE International Conference on Computational Intelligence and Data Science (ICCIDS)*, Delhi, India, 2022, pp. 889-895.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

 9940 572 462  6381 907 438  ijircce@gmail.com



www.ijircce.com

Scan to save the contact details