IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 12, December 2025

DOI: 10.17148/IJARCCE.2025.1412100

LLM POWERED AI TRIP PLANNER

Mrunali Chore[1], Mayank Misal[2], Mohit Kapgate[3], Om Patle[4], Kunal Lanje[5]

Assistant Professor, Computer Science & Engineering, Priyadarshini College of Engineering, Nagpur, India[1]

Student, Computer Science & Engineering, Priyadarshini College of Engineering, Nagpur, India[2]

Student, Computer Science & Engineering, Priyadarshini College of Engineering, Nagpur, India[3]

Student, Computer Science & Engineering, Priyadarshini College of Engineering, Nagpur, India[4]

Student, Computer Science & Engineering, Priyadarshini College of Engineering, Nagpur, India[5]

Abstract: Exploring the domain of Artificial Intelligence and its utilization towards designing better solution for our tasks highlight the key technological advancement. With these systems using the large language models, machine learning algorithms and natural language processing along with real time data integration an leveraging these for our AI-powered trip planner to address the issue of improper planning and management of the tour, this travel planner considers several factors and constraints such as budget, location, real time considerations to plan out user centric itineraries. Personalization is the key element which helps to optimize the plan and adapt the user behavior for interest and tailor the plan according to the preferences. Multi agent architecture helps to provide a diverse planning considering real time forecasting updates and keeping the localized touch to the travel plan to maintain the dynamic adaptability and feasibility of the plans. With certain data and recurrent planning these AI driven planners evolve as a successful handy solutions than traditional time-consuming plans. Although these AI driven plans also come with certain challenges to overcome such as data privacy, accuracy of the information, real time data driven forecast and user emergencies, integrating highly developed and emerging technologies such as augmented reality, blockchain can be wonderful to enrich the user experience and for long term adaptive learning would be helpful to build a trustworthy AI driven travel solutions.

Keywords: Personalized Travel Planning, Dynamic Itinerary Adaptation, Behavioral Prediction and User Modeling, User Engagement and Feedback Loops, Scalability and Robustness in Travel Planning, Graph-structured Context Management.

I. INTRODUCTION

Planning a successful trip also attracts lots of confusions and different constraints such as choosing destinations, considering different point of interest, sequencing destinations, arranging travel and accommodation and itinerary along with other constraints like timeline of journey, health needs, budget, environmental concerns. Travelling with a group especially with a limited time has lots of work and robust planning is required which is time consuming process varying maps, reviewing the bookings and availability of the planned accommodation within the time and sometimes a small addition of day or a new member or removal of member can led to a big impact on the before hand planned travel. Traditional tools involves lot of static data and do not match the latest information and destination significance with respect to current scenario. AI driven trip planners leverage the idea of technical solution to complex tasks and automate the process of travel planning considering the last minute changes to rescheduling for emergencies along with considering all the constraints to significantly reduce the errors for traditional planning. Understanding the usage of Natural Language processing in transforming the user simple conversation to generate a travel itinerary plan considering the case if a user ask to “plan a five day trip to kerala” the software does the rest with user preference the model generates the different keywords from the text to determine the parameters and also questions the basics such as budget, destination suggestions, group size and multiple fronts are judge real time information and usage of external APIs for estimating budget, distance and transport availability , these systems offers grounded information , local events and provide a user centric itineraries but can omit some places depending upon the user preferences. Mechanisms for including personalization effect and learning from previous experience of user data improves the performance. In this review paper we analysed the feasibility, adaptability, and accuracy for the advancement of Ai driven travel planner. We had put an effort to determine the usage of these planners to provide and effective alternative for manual planning and identify the underlying challenges which can be overcome with the rigorous work and data driven optimization. It highlights the discussions with respect to studies and scope for the development of a prominent software for travel planning and itinerary generation.

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 12, December 2025

DOI: 10.17148/IJARCCE.2025.1412100

II. LITERATURE REVIEW

a) Generative language models: strengths and practical limits: Large language models are mostly explored and utilized as reliable way to generate itineraries and for travel planning as these have readable outputs and makes the evaluations based upon the inputs and drafts the plan within the time considering the user preferences and offering a great expertise for a normal user as well. But at certain time it is dependent upon the external information and reports to consider the real time considerations and sometimes these systems omit the important destination due to the lack of detailed consideration or certain factors of inevitable circumstances so in order to make them optimistic it requires a backing of grounded understanding of the destination and learning of realistic scenario.

b) Modularization and multi-agent designs: Designing of multiple architectural modules to organise the planning and considering the components and scheduling them in an lined up manner requires proper integration of different modules, division of tasks and modules working together for a shared context improves the handling of data and provide more optimized decisions and recommendation, these modularization also helps to fetch a particular information which can be more specific to the task. Requirement of proper coordination highlights the importance to overcome failure to determine the required to solutions.

c) Grounding with real-time tools, APIs and knowledge sources : Being realistic is a major component when comes to an AI powered trip planner as it is essential to be up to date with the availability of the data let it be the proper routing distance between places, weather services, availability of the transportation and accommodation as many itinerary have strict timing for foods and various places do run on availability of booking, determining the transport and even getting ready for the backup is most required task as part of itinerary generation and grounding the passive prompts by user with the active data by APIs to increase the robustness of the system.

d) Personalization and memory architectures: Personal touch to the planning helps user to connect to the reliability of the plan and consideration of user preferences and approaches for recommendation of destination, dietary places, budget and accessibility of the tour. Learning from the user communication and previous tour history helps to gradually optimizing the model for personal choices makes the lower chances of error and make the predictability of the further tours. Usage of recommendation modules and including the memory enabled learning with rating systems and feedback for the suggestions can be a addon to the itinerary generation.

e) Evaluation practices: metrics, study designs, and their limits: Reviewing the itinerary systems highlights various parameters such as constraints satisfaction, feasibility, details and coverage along with personalization. Methods such as human scoring, comparison against manual planning and accuracy metrics. Various reports and papers reflect that handcrafted planning involves large amount of datasets and make a simulation to determine the reliability of the planned tour, and hence AI powered trip planners require standardized benchmarks to capture real word dynamics and carter the itinerary along the set standards.

f) Recurring limitations and ethical considerations: There are several limitations which exist and requires attention such as usage of external APIs and their timely updation and concerns for security and privacy of data for personalization, monetary effect when it comes to invalid or unrealistic estimate which actually need a optimization of algorithm to prevent bias and to recommend the undesired stuff. It also attracts maintaining the documentation of the planned itinerary for certain issues so that we mark the blueprint on certain shutdowns and requires transparent logs to overcome the issues.

g) Synthesis and takeaway for this review: Deriving the solutions to linguistic strength of Large Language Models with different modules grounding with optimization of memory makes a reliable tool for producing feasible, personalized itineraries although building a prototype and implementing it requires evaluation, data readability and improve the explainability so that these generated plans can be useful for broad range of travellers.

III. DISCUSSION

Rapid advancement in AI powered travel planning solution moving beyond the traditional lists to personalized planning. Many tools such as Google, Travel Package offers the planning mainly limited to travel bookings and accommodation although they are providing real time updates regarding transit and availability and AI chatbots handle the user queries and are beginning to tackle end planning but lacks context, for consideration Vai age uses graph structured multi agent framework with LLM agents to fetch weather forecast and maps , similarly Travel Agent integrates LLM with memory modules to integrate under budget, timing and personal constraints.

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 12, December 2025
DOI: 10.17148/IJARCCE.2025.1412100

Despite using advances, LLM approaches sometimes still fall short. A recent study comparing the gpt generated itineraries plan found that it can brainstorm basic schedules but omit many practical details. But eventually outputs were up to date but lack context and point of interests and included the located landmarks and gave minimal description making it less useful for the travellers and hence brings that LLMs without proper grounding tends to avoid practicality and sometimes failed to adapt real world demographics.

i. WORK GAPS AND CHALLENGES

a) Factual Grounding and Data Freshness: LLMs if trained on static data may produce outdated information as Volchek and Ivanon observed, that ChatGPT's knowledge cut-off (2021) means it can differ in weather data is generated to be seen as current, even though it may miss recent changes. Thus we come to know that even the advanced AI agents need to rely on external tools for real time data like maps, weather, events . And this brings its own new problem our TravelAgent notes that dependency on dynamic data source make the system vulnerable to inaccuracy for example Already due flights or stale transport information can lead to poor plans. A robust TravelAgent requires data quality and uptime rather than just connecting APIs.

b) Temporary and Context-Dependent POIs: AI based itineraries can have difficulty in handling temporary or uncertain points of interest this can lead to ignorance in transient events eg local festivals, new pop-up attractions or even lunch and dinner spots. In fact travellers often seek such timely suggestions like today's farmers market, a street fair, or a newly opened café. The currently existing planners rely on static lists of major attractions. A flexible TravelAgent must integrate data from event APIs ,social-media trends, local transportation delays, and suggestion to pick up what is relevant now. This gap is largely not explored till date. Most of the reseaches focus on point of interest which are fixed and with known hours rather than incorporating like a local food tour that only runs in weekends.

c) Advanced Personalization: While systems like Travel Agent and Vaiage allow the user to specify their preferences considering "I like architecture" even then often personalization remains untouched. Actually the travellers are vast : like pace preference (leasuire vs packed) , group characters, needs and accessibility and some want difference in styles like (thrill-seeker vs art-lover). Travel Agents memory module is a step forward, it stores the long term user characteristics, needs and styles preference which helps to refine the suggestions. Even then It acknowledges a need to deeper exploration in personalized activities in travel itineraries based on more detailed user personalisation information is needed. The current status of project typically uses static labels of parameters lile age, budget, basic interest. Yet there is a space to model the other factors for example using an demo profile to tailor how the spontaneous vs planned trip is or knowing about a user dislikes crowd and avoid busy tourist hotspots. This can also reveal the emotional state that is the mood of the traveller based on past rating and visited attractions.

d) Privacy Risks: AI trip planners must keep the sensitive personal info safe like the financial info, travel history and preferences this can pose privacy issues. AI systems that suggest itineraries may leak or misuse data or even good learning models can abruptly expose locations and behaviours. Another concern is that the result can be algorithmically biased. If the training data is aligned to a particular pattern, it could systematically give favour to certain destinations like urban destinations over rural or Western sites over primitive sites without the user being aware about it. In terms of industry reviews flagged data security is the main challenge in smart travel tools and the warning of unfair suggestions due to biased data records also it can translate into recommending only high paying tours or overlook the budget options. Inappropriately crossing the user's privacy boundaries.

e) Evaluation and Scale: Most of the research evaluations are small scale. We conducted a ChatGPT vs expert study covering 3 travel destinations on a few itineraries. The TravelAgent evaluation used 20 scenarios and that was even in a scripted setting. To our knowledge there is no large standard benchmark for real world itinerary quality. Data shows that even GPT-4 achieves the success rate of 0.6% on diverse planning tasks. Which highlights we lack robust evaluation . without broad testing across a number of destinations, traveller profiles, durations and constraints we can conclude that it is unclear how accurately this systems generalize.

f) Explainability and Trust: At the end the logic behind AI- generated itineraries is often not clear. A user might see a list of suggested places and routes but with a little explanation of as to why that particular plan fits their needs. Already existing systems like Vaiage aim for explainable planning by using structured reasoning, but in real life the final output is still a plain itinerary. For the travellers to trust AI suggestions and to develop a sense of control they need visibility into decision process. Thus, the main point is explainability

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 12, December 2025
DOI: 10.17148/IJARCCE.2025.1412100

is critical but underdeveloped. Also it is related to privacy justifying a suggestion may require a reference from sensitive profile data so there is a draw between transparency and confidentiality.

ii. RESEARCH METHODOLOGIES

a) **Contextual Awareness**: currently existing planners mainly process text and structured data. To differentiate we can include inputs such as image, audio, and real world sensors. Example an assistant can use AR to spot nearby points of interest on the users phone in form of camera view, or VR (virtual reality) to give the preview of a place when its about deciding it its worth visiting. The users excitement and fatigue can be identifies by using wearable sensors like GPS and heart rate monitors which can suggest the TravelAgent in real time to slow down the pace or increase it This idea aligns with the vision that AI travel assistant will merge AR/VR in travel.

b) **Decentralize and localization:** Addressing the data privacy concerns can be done by decentralizing the computation and keeping check that most of the data remains on the users device, local optimization and learning would work out very well , required data could be encrypted and uploaded on central server as and when needed. This would help to safeguard confidential information such as monetary details and travel details. Federated learning concept when applied to AI powered trip planner and itinerary generator would be a novel in this domain using AI wisely along with maintaining the data security as well.

c) **Long-Term Adaptive User Models:** Mostly the travel planner are optimized with the series of events and learn from the previous past travel and this can be adaptive with time and learning from the memory for a short term and long term would incorporate accuracy. Moving from individual itinerary planning to group planning and keeping the variable point of interest in consideration. Example a person skipping museums multiple times , the model would be adaptive and suggesting other locations or asks for preference or considering the past experience on why they deviated from itinerary on previous trip, making this questions capable to answer, model would be more calibrated and involve continuous learning with growing data and rising issues.

d) **Collaborative Group Planning:** Researches are made only considering an individual preference but in many case people travel with family, friend that is in group having different points of interest one might like museums while other prefer nightlife , one may be a senior citizen so system has to be integrated in tackling these kind of scenario , many cases if how can one visit museums in noon if another want early concerts so it is interesting to see how can the compromises can be presented and everyone is considered with a collaborative discussions.

e) **Emotional and Behavioral Profiling:** Travellers tracing in the sense of their traits and personalities, mood tendencies and behaviour patterns , we can utilize effective computing which suggest user emotions and adjust recommendations accordingly. Software might use a user's social media platforms although with consent from user to carter itinerary according to interest and this is very useful to learn the social style, dietary choices, adventurous nature. This make the recommendation more personal, and ethical consideration should be transparent in case and these integration are not utilized yet but can offer great input.

f) **Sustainability and Ethical Constraints:** Sustainable development goals offers a chalk out plan towards the environment, every tour also attracts more usage of plastics and use and throw materials and need to be a rising impact for eco-friendly tourism. Our AI powered trip planner can help in case of carbon emission even make aware about the places where crowd is more alternatively suggestion for other timings for the places to visit this is for the purpose as initiative which we can utilize as far as rising environmental impacts are concerns.

IV. CONCLUSION

AI powered travel planning is the intersection of creativity and practicality it can be concluded with the help of reviewed papers that LLMs bring powerful personalization and idea generation, but how useful this can be in real world depends on feeding these models with live data, modular system design and human observation. This can result in systems that people trust and actually use, for this we should focus on integrating real APIs or cached POI and price data so that recommendations will remain accurate and timebound, we will split the responsibilities into retrieval, ranking, routing, and explanation modules for clearer testing and improvement and measure the success with human feedback metrics like: satisfaction, perceived fairness and ease of use along with technical accuracy. Privacy, transparency and simpler user controls must be treated as core features and also human checkpoints to help to catch cultural or high-stake errors. Practically we will start with small: make a prototype then pair an LLM with one live data source, and then run the quick user tests to uncover failure modes, and add short plain language explanations for the recommendations so users will understand and can correct the system. In this project we balance the technical skills of modular engineering with ethical,

DOI: 10.17148/IJARCCE.2025.1412100

user-focused evaluation this way we would make clear planners but also make tools which will genuinely make travel easier, fairer, and more enjoyable for real people.

REFERENCES

[1]. Phulkari, S. V., Shaikh, M., Khedkar, A., Dudhale, J., & Pandarkar, A. (2025). Smart Travel Planner with Real Time Integration. *International Scientific Journal of Engineering and Management*, *04*(03), 1–7. https://doi.org/10.55041/isjem0257

[2]. Volchek, K., & Ivanov, S. (2024). *ChatGPT as a Travel Itinerary Planner* (pp. 365–370). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-58839-6_38

[3]. Sonawane, K. (2025). AI-Powered Tour Planner using Multi-Agent System. *International Journal for Research in Applied Science and Engineering Technology*, *13*(11), 686–691. https://doi.org/10.22214/ijraset.2025.75207

[4]. Liu, B., Ge, J., & Wang, J. (2025). *Vaiage: A Multi-Agent Solution to Personalized Travel Planning*. https://doi.org/10.48550/arxiv.2505.10922

[5]. Jahan, J. (2025). Frizbie: An AI-Powered Web-Based Trip Planner. *INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT*, *09*(05), 1–9. https://doi.org/10.55041/ijsrem47485

[6]. Wang, Z., Pel, A. J., Verma, T., Krishnakumari, P., Van Brakel, P., & Van Oort, N. (2022). Effectiveness of trip planner data in predicting short-term bus ridership. *Transportation Research Part C: Emerging Technologies*, *142*, 103790. https://doi.org/10.1016/j.trc.2022.103790

[7]. Honmane, N. (2025). AI Trip Planner. *INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT*, *09*(05), 1–9. https://doi.org/10.55041/ijsrem48099

[8]. Bankhele, M., G, P., Khollam, M., Jadhav, M., Gite, M., & K, P. (2025). AI-Based Intelligent Trip Planning and Recommendation System. *International Journal of Advanced Research in Science, Communication and Technology*, 352–355. https://doi.org/10.48175/ijarsct-29648

[9]. Deshmukh, A., Gawade, K., & Monga, A. (2025). Smart Travel Companion: AI-Driven Trip Planning Mobile Application. *International Journal of Advanced Research in Science, Communication and Technology*, 393–397. https://doi.org/10.48175/ijarsct-23763

[10]. Hrankai, R., & Mak, B. (2025). Bridging the Affordance-Actualization Gap in User Preferences for AI-Assisted Trip Planning. *Journal of Travel Research*. https://doi.org/10.1177/00472875251322518

