UNIFIED PLATFORM FOR SMART TRAVEL PLANNING

[1]Roopa H K , MCA student, JNN College of Engineering,

Shivamogga, Karnataka, India.

[2]Dr. Raghavendra S P, Assistant Professor, MCA, JNN College of Engineering,

Shivamogga, Karnataka, India.

Abstract:

Smart Travel Planning is an online platform which makes the preparations of touring simpler and more interactive. The vast majority of tourism applications are unconnected, requiring the user to have to switch between tools when they want to book a hotel, arrange transportation, or compile an itinerary. This is often confusing and time-wasting. It does away with this by integrating all these into a single point. It allows real-time updating, secure log-in, and user profile. The site also develops entire itineraries with suggested hotels, travel, and destinations nearby so that groups can plan as a group with avoiding any complications. The MySQL database support also allows information to be stored safely, be able to manage user profiles, trip details and other booking information securely and access information whenever required. The software uses html js and css on user side and nodejs with expressjs server side if it is touch friendly it will confirm the customers can obtain facts on any device By solving the issues of travel tools that are distributed across many other departments, Smart Travel Planning provides easy, reliable and user-friendly system which capable of manage preparations faster and more engaging compared with usual techniques of doing it.

Keywords:

Collaborative Travel Planning, Smart Tourism Portal, Automated Itinerary Generation, Transportation and Accommodation Management, Interactive Travel Mapping, Node.js and MySQL Integration.

1. INTRODUCTION:

travel has always been a method through which individuals could explore other destinations experience other cultures and create memorable moments although the desire to travel is shared by all people the authentic manipulation of organizing a vacation may seem easily demanding and time-agitating previously people were subject to travel agents printed brochures and paper maps in their attempts to get around planning has become disorganized with the internet as most of such activities have now moved online in the real world today travelers tend to book hotels at one location and seek the transport in another location and use different applications to create an itinerary using a variety of platforms is notOnly lengthy but also with more platforms involved more prone to miss important information or communicate incorrectly especially when trying to manage a group trip during the past few years websites and portable applications related to travel have mushroomed nonetheless the majority of them only pay attention to one aspect of traveling as in booking hotels transportation although such facilities perhaps helpful they can not be integrated causing the ability of users to utilize them to assemble and merge facts this increases duplication of efforts excess wastage of time and difficulty in coordinating among others lack of ready-made solution which allows an explorer to organize a comfortable experience is a significant issue to explorers interested in a smooth process

The travel websites and portable applications have become very fast in the recent years. Nevertheless, the majority of them are limited to a single aspect of traveling, e.g. accommodation reservation, transport. Although such services are valuable, they do not be interconnected, which empowers users to gather and merge the facts independently. It brings about redundant work, waste of time and difficulty in lining up with others. When inspected as a streamlined adventure that involves a bit of organizing, explorers who desire to reach the process harmoniously will consider the nonexistence of an all-inclusive experience a critical issue.

Smart Travel Planning was designed to address these issues by pulling all the critical aspect of tour organizing into a single and simple platform. Thanks to this scheme, users do not have to go to different sites to plan their trips, select destinations, make detailed plans, find attractions, book hotel rooms, and explore transportation opportunities. The main attribute is that it enables consumers to share their plans and coordinate with friends or their relatives in real time. This keeps everyone in the loop and eliminates the issues that normally occurs when plans alter suddenly.The platform is built on a database-driven model that stores trip information safely and access can be made in an instant. Security options such as customer login and profiles make it more dependable and trustworthy. By combining these functions, Smart Travel Planning will cut down planning time, enhance collaboration among travelers and enable users focus more on the pleasure in traveling as opposed to the burden of having to make the arrangements.

In sum, Smart Travel Planning is not only the alternative travel planner but the whole travel managing system. It bridges the gap that the current tools did not fill and also introduces a collaborative planning experience that shifts the paradigm in terms of how individuals do plan the trips. This combination is able to offer a stable, convenient and easy to use facility to solve all the tourism needs of those tourists.

2. LITERATURE SURVEY:

Zarate-Carbajal et al. (2022) [1] developed A framework based on machine learning designed for effective optimization. corporate travel policies by setting advance booking thresholds. Using a modified regression decision tree, it analyzes historical travel patterns to customize cost-effective policies for both scheduled and unscheduled travelers.

Sylejmani and Dika (2011) [2] reviewed various tourist trip planning tools, assessing their efficiency in route optimization, preference alignment, and scalability. Their findings underline the prominence of judgement upkeep organizations and note limitations in adaptability to diverse travel contexts.

Hussain and Ahmad (2023) [3] proposed a smart travel companion mobile app integrating GPS location tracking with social features. It enhances travel safety and coordination by providing optimized routes, nearby place suggestions, and offline mode for uninterrupted service.

Sharma and Sharma (2024) [4] examined mobile expense tracking applications, highlighting features like ease of use, visual budget displays, and AI-based expense categorization. Their study positions expense trackers as essential tools for promoting financial literacy and management.

Adepegba et al. (2019) [5] created an Android portable app for tracing day-to-day expenditures. It emphasizes portability, security, and user-friendliness to improve financial discipline. Built using MySQL and Android Studio, it automates data entry, sends budget alerts, and generates spending reports, replacing traditional manual tracking methods.

Bheemarasetty et al. (2024) [6] developed an AI-driven trip companion platform that merges expense tracking with collaborative travel planning. The system supports itinerary building, budget control, and group coordination, offering a personalized interface and enabling real-time interaction to improve the overall travel experience.

3. PROPOSED METHODOLOGY:

Smart Travel Planning is a complete travel arrangement application developed to make all travel arrangement look cool by transferring all the information on a single platform the user no longer has to use other applications to make hotel reservations transportation information and itineraries as well as tourist sites as they can be found in one web boundary which can work seamlessly across devices using this structure the users can plan a trip choose destinations make schedules and arrange booking without switching between different tools the services offer details regarding hotels transport and ticketing in entirety hence providing a one-stop source of details to travelers in group travel the elevated platform promotes real time planning where all people involved can see and update plans collectively and this eliminates misunderstanding and enhances coordination.

Security is controlled through a safe login process, and all user details along with trip information are stored in a central database for rapid access. By linking hotel reservations, transport planning, itinerary creation, and attraction recommendations in one application, Smart Travel Planning saves time, improves collaboration, and confirms a smooth and trustworthy travel experience for both individual and group travelers.

3.1 System Architecture:

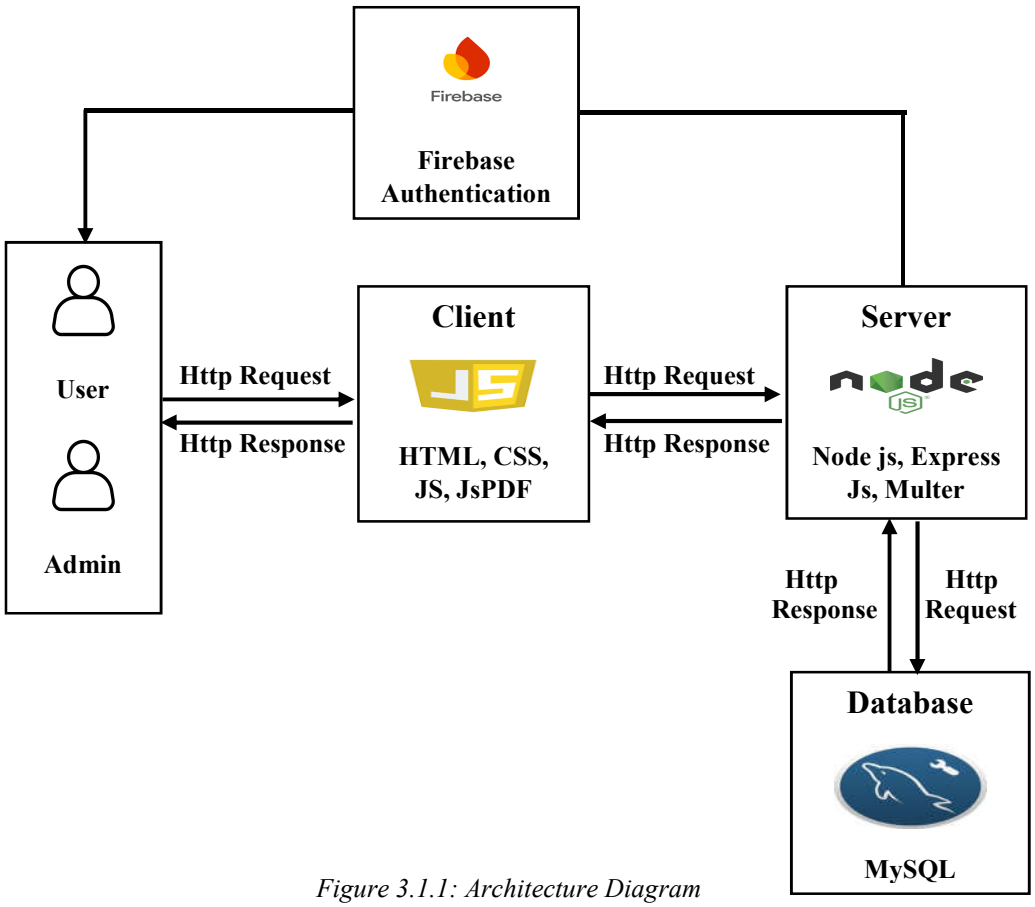

Figure 3.1.1: Architecture Diagram

The system structural design of Smart Travel Planning depicts the main parts, technologies and their interaction in the platform. At the centre is the client crossing point, created by the use of HTML, CSS, JavaScript, and JsPdf that performs the point of interaction between the users and the administrators. This crossing point concludes with the customers registering, logging in, and utilizing various characteristics of this system. The process of authentication is controlled by the Firebase so the sensitive user credentials do not have to be handled directly. The client communicates with the server, which is built on Node.js and Express.js, along with Multer for managing API requests and file uploads.

The processing of business judgement and transmission of requests to the MySQL database where the full range of information about the users profiles, trips, bookings and expenses is stored is responsibility ofThe server. This integration will make flow of facts among the customer and server to be smooth and simultaneously, it will ensure consistency of data and its reliability. This architecture is decomposed in terms of concerns with a presentation layer (front-end), a business logic layer (server) and a layer that stores the data (database). Another line of protection ensured by Firebase is identity verification that must be made prior to gaining access to any component of the structure. The usage of MySQL as the major source of the data will confirm that all travel information are permanently stored. In summary, the Smart Travel Planning architecture adopts a client-server model with secure authentication, structured data management, and modular components. This plan not only confirms security and maintainability but also makes the system scalable for future enhancements such as mobile applications or AI-driven travel recommendations.

3.2 Data Flow Diagram:

The **Data Flow Diagram (DFD)** demonstrates how information circulates within the Smart Travel Planning platform, beginning from the point of input and continuing until it is stored or utilized. the system has two primary actors namely admin and the user the administrator logs in to carry out any activities including the user viewing addition or deletion the admin uses the administration log in to administer the practices such as viewing adding or removing of users all the activities are closely tied to the database so the user records are instantly updated a customer on the other hand is beginning with a registration followed by logging in once they are logged in successfully they can view the features of exploring public trips create their own trips invite their friends add hotel information and expenses tracking all of these activities involve either storing or retrieving data to the database and this makes all the information very accurate and consistent the data flow is also associated with a distinguished direction which has a straightforward guideline to give an example a user needs to log in first before being able to make trips or book hotels and admins follow a different process as it is restricted to managing users only this is a type of separation based on roles and this assists in security and precludes unauthorized access the dfd essentially provides a very neat chart of the flow of data between users admins processes and the database in a systematic manner.

Smart Travel Planning is a complete travel arrangement application developed to make all travel arrangement look cool by transferring all the information on a single platform the user no longer has to use other applications to make hotel reservations transportation information and itineraries along with tourist sites as they might be found in one web boundary which can work seamlessly across devices using this structure the users can plan a trip choose destinations make schedules and arrange booking without switching between different tools the services offer details regarding hotels transport and ticketing in entirety hence providing a one-stop source of details to travelers in group travel the elevated platform promotes real time planning where all people involved can see and update plans collectively and this eliminates misunderstanding and enhances coordination.

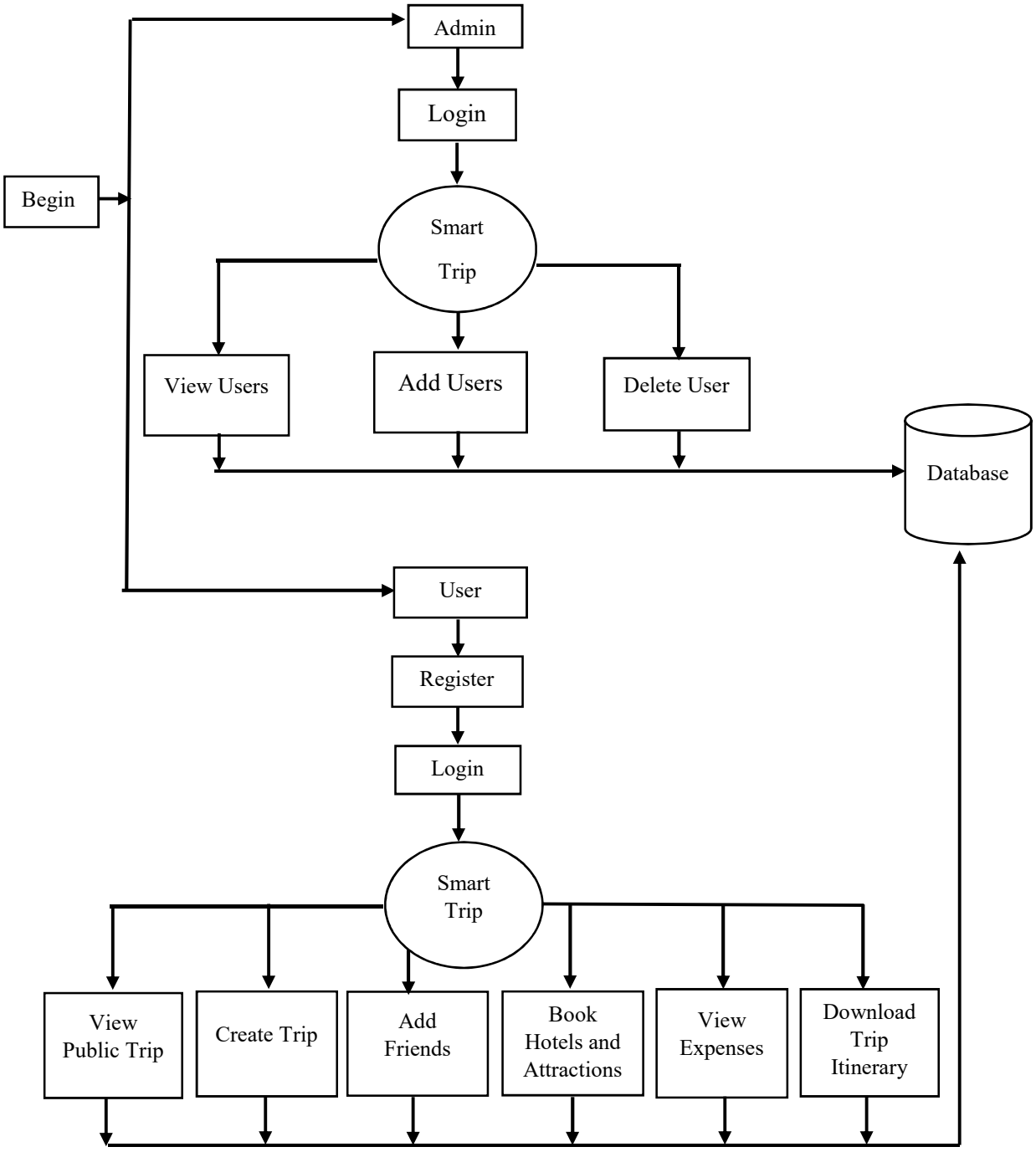

Figure 3.2.1: Data Flow Diagram

3.3 Technology Stack

The Smart Travel Planning structure is intended with up-to-date web skills to make it fast, consistent, and easy to use. it has a triple tier or layer architecture of database user-interface and server-side in which there exists a role of each part the front-end is made with html5 and css3 to calculate layout and design of the pages javascript and the end customer can easily communicate with such features as creating trip booking the hotel and managing the profiles the back end is developed in nodejs and using expressjs framework this segment accomplishes the server side work and receives the user requests and

binds the front end to the database it also contributes to the ability of serving several users on a single session without lagging mysql is deployed as the database that stores all the valuable data including user accounts facts about trips details about the hotels and bookings its relational format enables one to update search and organize the records easily other tools are incorporated to include additional capabilities take for example multer simplifies the process of uploading such files as profile pictures jspdf enables downloading of trip plans in pdf format font awesome inserts the iconography to add proper visuals and google fonts helps to improve the appearance of text.

Altogether, this mix of technologies makes Smart Travel Planning secure, smooth to operate, and user-friendly. It also provides opportunities for future improvements, making the platform flexible and long-lasting.

4. MATHEMATICAL MODEL:

A. Total Trip Cost:

$$c_{total} = \sum_{i=1}^{K} h_i + \sum_{j=1}^{M} t_j + \sum_{l=1}^{P} a_l \qquad (1)$$

Where,

- h_i= Cost of hotel stay *i* per night in ₹.
- t_j= Transport fare j per trip in ₹.
- a_l= Attraction visit entry fee cost l per trip in ₹ .
- K = Total number of hotels selected in the trip
- M = Total number of transport tickets used in the trip
- P = Total number of attractions visited in the trip

This formula calculates the overall trip cost by adding the expenses of hotel stays, transportation, and attractions. Each summation represents the total amount spent on multiple options within that category. Hotels may involve several nights, transportation can include different modes, and attractions may cover various entry fees. By combining them, the formula gives a clear estimate of the total cost. It ensures travelers have a complete budget view before starting the trip.

B. Per-Person Trip Cost:

$$c_{per\_person} = \frac{c_{total}}{N} \qquad (2)$$

- c_{total}= Total trip cost (sum of hotel + transport + attraction costs)
- N = Number of travelers in the group
- c_{per_person}= **Per-person cost** (total cost divided by group size)

This given formula helps in calculate how much each participants of the cluster has to pay for the trip. The total trip cost is divided equally among all participants, ensuring that expenses are shared fairly. By applying this formula, group travelers can clearly grasp their personal financial contribution without confusion.

5. RESULTS AND DISCUSSION:

5.1 Trip Creation

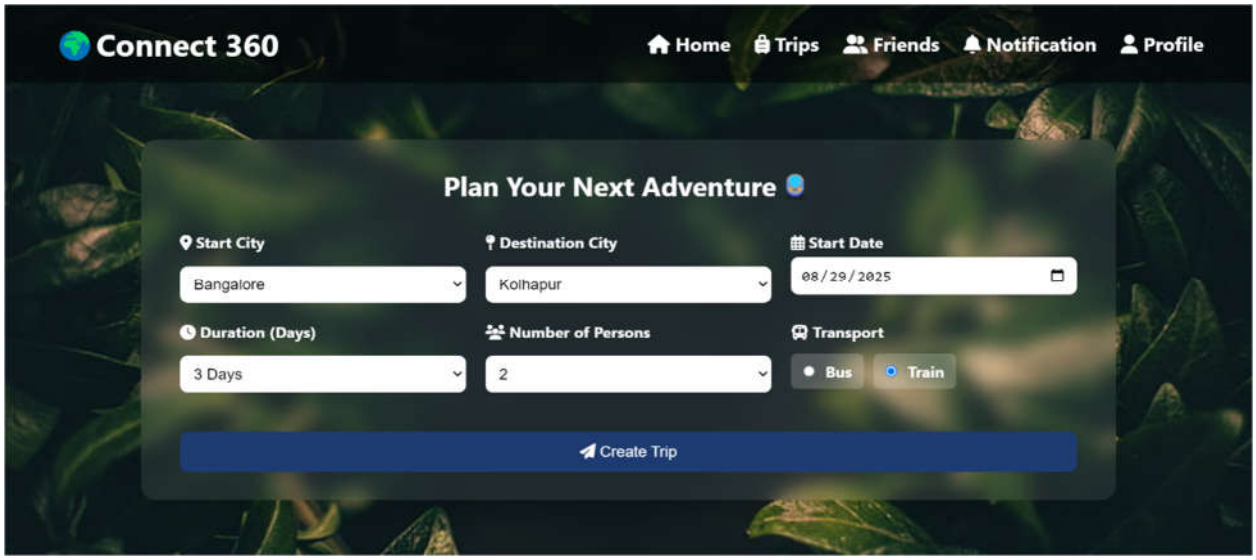

Figure 5.1.1: Trip Creation

The "Create Trip" feature allowed users to set up a journey by choosing the starting location, destination, travel date and time, travel mode (train or bus), and number of person. Once submitted, the trip details wee stored in the database, and users were redirected to the relevant page.

5.2 Map view:

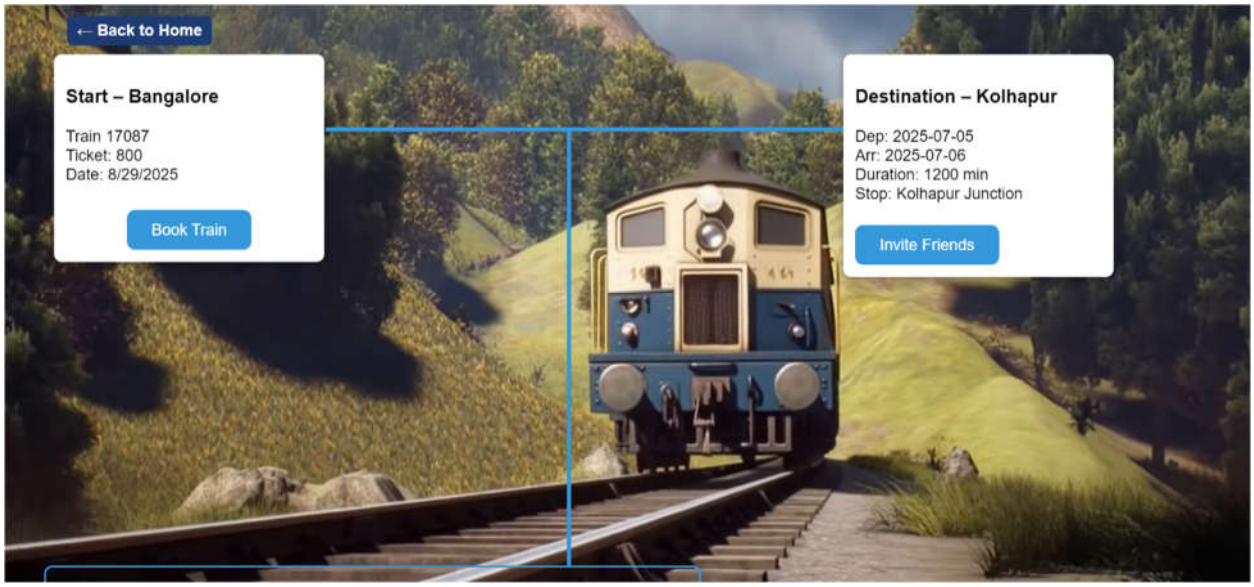

Figure 5.2.1:map view

The map page dynamically retrieved and displayed nearby hotels and attractions from databank according to the selected destination city. This helped users easily view their options and make better travel choices.

5.3 Train Search Details:

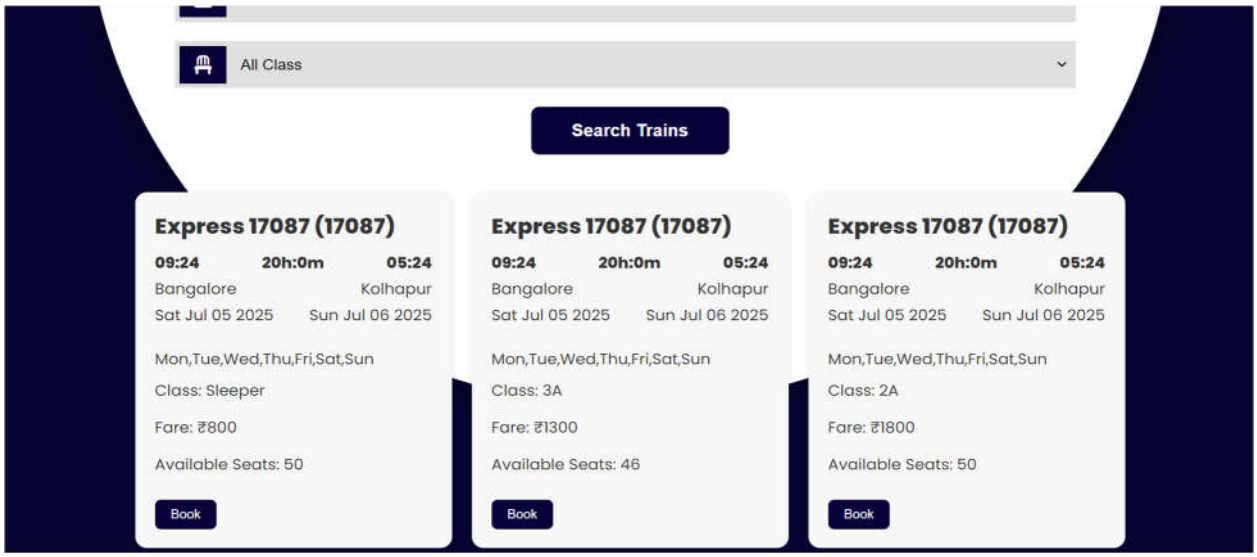

Figure 5.3.1: Train Search Details

The train booking module displayed available train services between the chosen source and destination cities. Users were able to select a preferred train, reserve their seats, and receive booking confirmation.

5.4 Hotel Booking

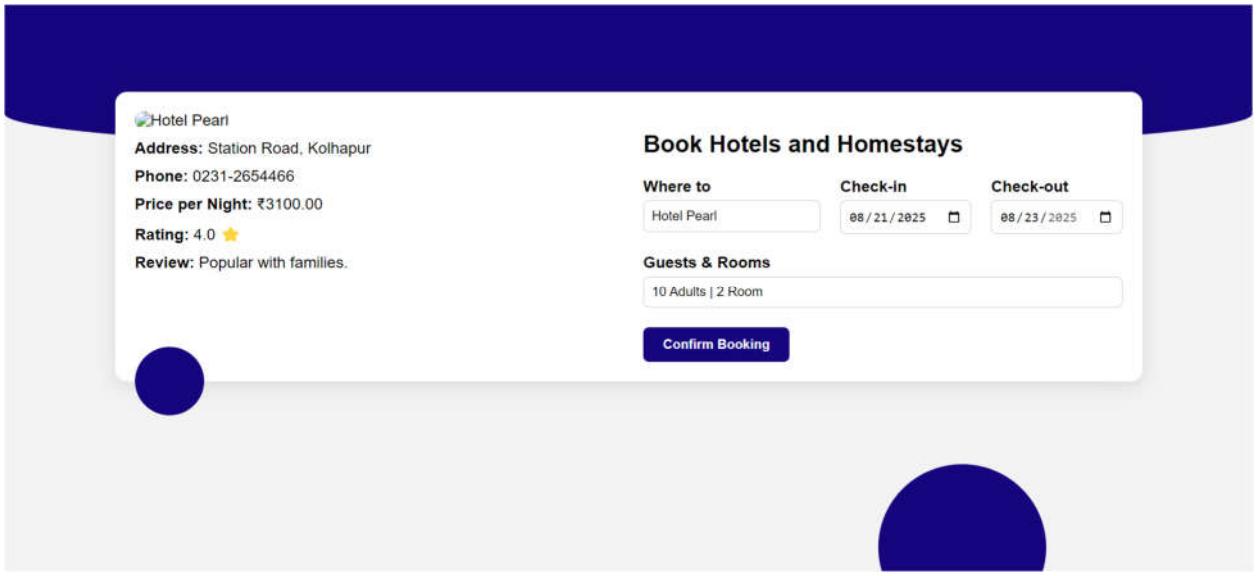

Figure 5.4.1: Hotel Booking

In hotel booking system, Users could pick from the listed hotels, confirm a booking, and can see the confirmation message. All booking records were also saved in the Hotel Bookings table.

6. CONCLUSION:

In the end, Smart Travel Planning turned out to be more than just a travel planning site – it feels like a personal assistant for trips. While building it, the main aim was to remove the hassle of jumping between different apps for bookings, itineraries, or finding nearby places. Now, everything sits in one space, making the whole process less stressful and more fun. It doesn't matter if someone is travelling alone or with a group – the tools inside Smart Travel Planning help in keeping things organized and clear. The design provides space for forthcoming additions features to be attached afterward without breaking what already works. Looking back, the project shows how a simple idea, when built carefully, can solve a real problem and actually make travelling a smoother experience.

7. FUTURE ENHANCEMENT:

The ease of travel planning offered by smart travel planning can also be enhanced in upcoming years by integrating ai-powered travel advice that would generate trip itineraries the infrared connections to airlines trains and hotels could enable real-time update of bookings the system will be paramount to international travelers when it is multilingual enabled and currency converting a sophisticated expense tracker can lead a person through budgeting enhanced security like the use of biometrics to log-in will intensify security the upgrades will increase the intelligence and stability of the platform as well as its usability

REFERENCES:

[1] J.-M. Zarate-Carbajal, R. Ruiz-Cruz, and J. D. Sanchez-Torres, "Managing Corporate Business Travel Policy: A Quantitative Approach Using Machine Learning," Res. Square, Oct. 2022, doi: 10.21203/rs.3.rs-2203422/v1

[2] K. Sylejmani and A. Dika, "A Survey on Tourist Trip Planning Systems," *International Journal of Arts & Sciences*, vol. 4, no. 9, pp. 13–26, 2011.

[3] M. A. Hussain and M. T. Ahmad, "A Smart Travel Companion Application with Location and Connectivity Features," *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, vol. 9, no. 4, pp. 42–47, 2023.

[4] N. Sharma and A. Sharma, "Smart Personal Expense Tracker Technology," *International Journal of Research and Analytical Reviews (IJRAR)*, vol. 11, no. 1, pp. 37–40, Feb. 2024.

[5] O. A. Adepegba, M. A. Fayemiwo, O. A. Oduwole, and A. A. Onamade, "An Android Based Mobile Application for Tracking Daily Expenses," in Proc. 21st iSTEAMS Multidisciplinary GoingGlobal Conf., CSIR-INSTI Ghana, Accra, Nov. 2019, pp. 97–112, doi: 10.22624/AIMS/iSTEAMS-2019/V21N1P9

[6] P. Bheemarasetty and S. R. Raja, "Trip Companion Tour Together and Expense Tracker Application," *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, vol. 10, no. 6, pp. 1538–1545, Nov.–Dec. 2024.

[7] P. Lugtig, D. McCool, O. Mussmann, and B. Schouten, "An App-Assisted Travel Survey in Official Statistics: Possibilities and Challenges," *Journal of Official Statistics*, vol. 37, no. 1, pp. 149–170, 2021.

[8] P. Prabhashitha, W. A. P. Navoda, D. B. Senanayake, U. Rangika, D. I. De Silva, and D. Cooray, "Travel Planner Web Implementation," *International Journal of Engineering and Management Research*, vol. 12, no. 5, pp. 338–342, Oct. 2022.

[9] R. K. Sharma, H. V. Rao, and R. D. P., "A Survey on Expense Tracker Mobile Application," *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, vol. 9, no. 2, pp. 245–249, 2023.

[10] R. Kushwha, R. Bagri, U. Ahirwar, S. S. Chandel, and U. S. Kushwaha, “Hotel Booking Website,” *International Research Journal of Modernization in Engineering, Technology and Science*, vol. 6, no. 4, Apr. 2024. DOI: 10.56726/IRJMETS54944.

[11] R. Patil and S. S. Kadam, "Survey Paper on Automated Tour Planner using Web Application," *International Journal of Scientific Research and Engineering Development (IJSRED)*, vol. 6, no. 5, pp. 512–518, Sept.–Oct. 2023.

[12] R. Regin and S. S. Rajest, “SwiftTrip: Your Smart Travel Companion for Effortless Planning and Memorable Journeys,” *International Journal of Human Computing Studies*, vol. 6, no. 3, pp. 57–70, Sept. 2024.

[13] R. Sheeja, P. Umaeswari, C. Bibin, R. Nishanth, and S. H. Chandana, "Local Train Ticketing System Using Web Services," AIP Conf. Proc., vol. 2393, no. 1, p. 020022, May 2022, doi: 10.1063/5.0074301

[14] S. Fatangale, A. Gaikwad, P. Ghegadmal, M. Kale, and P. R. Kulkarni, “Travel Companion Finder,” *International Journal of Innovative Research in Multidisciplinary and Parallel Studies (IJIRMPS)*, vol. 12, no. 6, Nov.–Dec. 2024.

[15] S. Sirasawada, F. Unnisa, M. Sahel, S. Ismail, and S. Sohail, "Streamlining Personal Finances: An ExpenseTracker Website Study," in 2024 Int. Conf. on Signal Processing and Advance Research in Computing (SPARC), Hyderabad, India, Sep. 2024, doi: 10.1109/SPARC61891.2024.10828675

[16] S. Zhang, K. Alanezi, M. Gartrell, R. Han, Q. Lv, and S. Mishra, "Understanding Group Event Scheduling via the OutWithFriendz Mobile Application," *ACM Transactions on Interactive Intelligent Systems*, vol. 1, no. 1, Article 1, pp. 1–20, Jan. 2016.

[17] T. S. Goud, "Trip Planner Using Generative AI," *International Journal of Innovative Science and Research Technology*, vol. 8, no. 6, pp. 1937–1940, Jun. 2023.

[18] V. Mishra, Y. Singh, U. Bhatt, and A. Mishra, "Travel Buddy: Revolutionizing the Way We Travel with AI-Powered Personalized Planning," *International Journal of Novel Research and Development (IJNRD)*, vol. 8, no. 12, Dec. 2023.

[19] Z. Bozkuş, C. Bisson, and T. Arsan, “Analytical Expense Management System,” *2009 IEEE Conference*, pp. 1–6, doi: 978-1-4244-4615-5/09.

[20] Z. Wang, "Railway Online Booking System Design and Implementation," Physics Procedia, vol. 33, pp. 1217–1223, 2012, doi: 10.1016/j.phpro.2012.05.202