A Major Project Final Report on TravelPulse: A Smart Travel Planning and Assistance System

Submitted in Partial Fulfillment of the Requirements for

The Degree of Bachelor of Engineering in Information Technology

Under Pokhara University

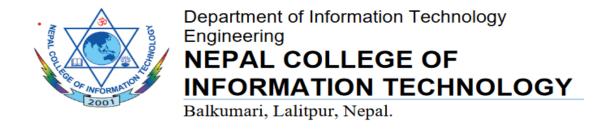
Submitted by:

Sabina Acharya, 201546 Dikshya Khadka, 201513 Radha Pant, 201529 Ayushma Chapain, 201553

Under the supervision of **Resha Deo**

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ABSTRACT

This proposal outlines a smart tourism decision-support platform that integrates sentiment analysis with destination exploration to enhance travel planning. Designed with a user-friendly interface and scalable architecture, the application aims to enhance the travel experience, promote tourism in Nepal, and bridge the technological gap in the local travel industry. The application integrates several key features to improve user experience and convenience.

This project aims to develop an intelligent platform for analyzing and visualizing tourist sentiment. Implemented using LLM for travel assistance, React.js for the frontend interface and Node.js for server-side handling, the platform allows users to explore destinations based on aggregated data to improve traveler experiences. By bridging the technological gap in Nepal's travel industry, TravelPulse not only facilitates convenient travel management but also contributes to the promotion of tourism in the country. This project demonstrates the potential of integrating modern technologies into web applications to create innovative and practical solutions tailored to local needs.

Project will consist of two module (admin side and user side) to drive dynamic content and decision support.

Keywords

Tourism Intelligence, React .js, Travel and Tourism, Large Language Model, Travel Assistant, Reviews and Ratings

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1. INTRODUCTION

In an era where traveler sentiment shapes tourism trends, understanding the emotional responses of people toward travel destinations is crucial for improving tourism experiences and promoting informed travel. This proposal advocated for a sentiment analysis system focused on tourism-TravelPulse. By harnessing the power of Natural Language Processing (NLP), the system aims to extract valuable insights form user- generated content such as reviews and social media posts, thereby enabling travelers, businesses and tourism boards to make data- driven decisions.

By implementing such features, TravelPulse aims to digitalize the travel experience in Nepal and bridge the gap between travelers and transportation services. The app focuses on enhancing accessibility, minimizing manual efforts, and reducing travel-related stress for users. Moreover, it aligns with the growing trend of mobile-first solutions, making it highly relevant in today's tech-driven world. In addition to these core features, TravelPulse integrates a chatbot assistant to offer instant support to users. This chatbot can answer frequently asked questions, assist with travel queries, and guide users through the app's functionalities.

The development of TravelPulse demonstrates how technology can be leveraged to create meaningful changes in daily life, particularly in the travel and transportation sector. It has the potential to set a new standard for how travelers interact with transportation services in Nepal, ultimately contributing to the modernization of the country's travel infrastructure.

1.1 PROBLEM STATEMENT

Despite the widespread availability of travel reviews and ratings online, there remains a significant gap in interpreting the emotional tone behind those texts. The traditional process of obtaining travel information, booking bus tickets, and making payments is largely manual, time-consuming, and inconvenient. Travelers are required to physically visit bus stations, inquire about routes and schedules, and stand in long queues to purchase tickets. This not only causes delays but also limits accessibility, especially for people living in remote areas or those unfamiliar with local transportation systems.

Furthermore, there is no reliable system to provide real-time updates regarding bus availability, fare calculations, or route changes. Students, who form a significant portion of daily travelers, often miss out on discounts due to the lack of a system that verifies and applies student concessions automatically. Additionally, language barriers and limited access to customer support make it difficult for international travelers and even locals to navigate the transportation process effectively.

The lack of a secure and convenient digital payment system further aggravates the problem, as users are forced to rely on cash transactions, which can be inconvenient and unsafe. In the current scenario, there is a clear need for a comprehensive solution that not only simplifies the travel planning and booking process but also incorporates modern features like real-time notifications, chatbot assistance, and secure digital payments.

1.2 OBJECTIVE

Our primary objectives for this project include:

- a. To simplify and personalize travel planning with real time search and destination information.
- b. To ensure secure booking, account management and user data control.
- c. To provide safe online payment integration and seamless travel assistance for hassle free tour.

1.3 PROJECT SCOPE AND LIMITATION

1.3.1 PROJECT SCOPE:

- Provides a platform for users to search, explore and book travel destinations in Nepal.
- Allow user registration, login and account deletion for secure access and control.
- Supports real time booking
- Integrates online payment gateway
- Offers admin control to manage destinations and user data
- Prepares for future integration of a recommended system for personalized travel suggestions.

1.3.2 LIMITATIONS:

- Currently limited to destinations within Nepal.
- Relies on stable internet connection for real time data and payment process.
- No offline access to booking or travel info.
- Limited support for multi language features.
- System may not handle very high user traffic in it's initial version.

1.4 SIGNIFICANCE OF STUDY

The TravelPulse project holds significant value for both travelers and the tourism industry:

- 1. **For Travelers**: It empowers users to make smarter travel decisions by providing insights into how people emotionally react to different destinations, beyond just star ratings or popularity. This helps them choose places that align with their expectations and comfort.
- 2. For Tourism Agencies and Businesses: TravelPulse offers valuable feedback extracted from public sentiment, helping them identify areas for improvement, understand visitor satisfaction, and adapt to changing preferences. This can lead to enhanced services and better customer experiences.
- 3. **For Researchers and Developers**: The project demonstrates the practical application of sentiment analysis and natural language processing (NLP) in a real-world scenario, serving as a foundation for future innovations in emotion-aware systems.

2. LITERATURE REVIEW

Sentiment analysis has become an essential tool for businesses in the travel and tourism industry to gauge customer satisfaction and improve services. Various sentiment analysis tools are designed to track and evaluate customer feedback, ranging from online reviews to social media mentions.

Himalayan Travel Guide is a travel blog that focuses on adventure tourism in Nepal, including trekking, mountaineering, and cultural tours. It offers detailed itineraries for trekking routes like Everest Base Camp, Annapurna Circuit, and Langtang Valley. The site also provides useful travel tips, gear recommendations, and local insights for tourists looking to explore Nepal's mountains and rich cultural heritage.

Trip Nepal is an online platform offering travel services including tour packages, trekking, and other adventure activities in Nepal. The website provides detailed information about popular destinations like Kathmandu, Pokhara, and Chitwan National Park, as well as the best time to visit and other travel tips. It also features travel blogs and customer reviews, making it a trusted resource for both international and domestic travelers.

MakeMyTrip is one of India's largest online travel agencies, providing a variety of services such as hotel bookings, flight reservations, holiday packages, and car rentals. It features detailed travel guides, destination recommendations, and tips for exploring India's diverse regions. MakeMyTrip also offers insights into local experiences, including cultural festivals and adventure activities like trekking and wildlife safaris.

Goibibo is another popular Indian travel portal that offers booking services for flights, hotels, trains, buses, and holiday packages. It features destination-specific travel content, including city guides, itineraries, and travel tips for exploring various parts of India. Goibibo also provides insights into affordable travel options, making it a great resource for budget-conscious travelers.

In summary, TravelPulse is valuable for understanding user reviews and improving travelling. This project aims to build on these advancements to provide detailed insights for travellers.

3. METHODOLGY

The methodology for the TravelPulse project of reviews can be structured around an agile framework, which emphasizes iterative development, flexibility, and traveller collaboration.

3.1 SOFTWARE DEVELOPMENT LIFECYCLE

For our project's software development, we have chosen to use the Incremental Model. This approach involves gradually constructing the system through multiple iterations, with each iteration covering the phases of Analysis, Design, Coding, and Testing.

During initial iteration, we will be focusing on implementing the fundamental features such as user authorization and authentication, frontend and backend part. These essential elements form the core functionality of our platform.

In subsequent iteration, we will introduce our Machine Learning and Modeling part that analyze the review and classify it accordingly. The following subsection provides a concise overview of the different phases of the incremental SDLC model that we will utilize in the system's development.

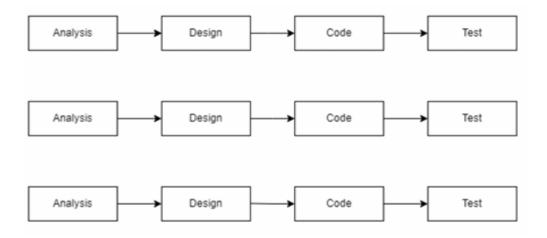


Fig 1: Incremental model

3.1.1 REQUIREMENT ANALYSIS

In this phase, we collected functional and non-functional requirements through brainstorming, research, and studying similar systems like RedBus and eSewa. Also, we identify the target users: local travelers and tourists.

3.1.2 DESIGN PHASE

In this phase, the specifications gathered are designed as per the requirement. We design use case diagrams, activity diagrams, and flowcharts to visualize the system's flow and interactions. Further the database models and the logic are implemented in the project.

3.1.3 SYSTEM DEVELOPMENT PHASE

Developed core modules: Authentication Module, Travel Module ,Payment Module ,Notification Module and Chatbot Module.

3.1.4 CODING PHASE

After the analysis and design, coding is done according to the specifications. Coding in progress, leads to a working system in this phase.

3.1.4 TESTING PHASE

In this phase, the system will be tested with each testing list of changes to the system developed, and the change will be applied to the software and the software would be delivered as a successive increment until a satisfying system is achieved.

3.2 SOFTWARE SPECIFICATION

JS:

JavaScript is a popular programming language used to make websites interactive and dynamic. It works alongside HTML and CSS and allows features like animations, form validation, and real-time updates. JavaScript can run in the browser as well as on the server using Node.js. It is widely used in web development, and frameworks like React and Angular make it easier to build modern web apps.

CSS:

Cascading Style Sheets is a styling language used to describe the look and formatting of a webpage written in HTML. It controls how elements appear on the screen, such as their layout, colors, fonts, spacing, and animations. CSS allows developers to separate content (HTML) from design, making websites easier to maintain and style consistently. It supports features like responsive design (adapting layouts for different screen sizes), transitions.

React JS:

React.js is a widely-used open-source JavaScript library developed by Facebook for building user interfaces, particularly single-page applications. It utilizes a component-based architecture, allowing developers to create reusable UI components, and employs JSX, a syntax extension that facilitates embedding HTML within JavaScript.

Node JS:

Node.js is an open-source, cross-platform runtime environment that allows developers to execute JavaScript code outside a web browser, primarily on the server side. It supports the development of a wide range of applications, from web servers and real-time chat applications to APIs and micro services. Node.js uses a single-threaded event loop to handle multiple connections concurrently, which significantly enhances performance for I/O-heavy tasks.

MongodB:

MongodB is a popular NoSQL database that stores data in a flexible, JSON-like format called documents. Unlike traditional relational databases, MongodB doesn't use tables and rows—instead, it uses collections and documents, which makes it easier to store complex data structures. It is highly scalable, fast, and good for handling large amounts of unstructured or semi-structured data.

Stripe:

Stripe is a popular online payment platform that allows websites and apps to accept payments securely. It supports various payment methods like credit/debit cards, digital wallets, and bank transfers. Stripe is easy to integrate with APIs and is often used in e-commerce sites and mobile apps for one-time payments, subscriptions, and refunds. It's known for being developer-friendly and secure.

Cloudinary:

Cloudinary is a cloud-based service used for uploading, storing, and managing images and videos. It allows developers to easily upload files from websites or apps, automatically optimize them, and deliver them quickly using a content delivery network (CDN). Cloudinary also provides tools to resize, crop, and transform media files on the fly, making it ideal for modern web and mobile applications.

SendGrid:

SendGrid is a cloud-based email service used to send transactional and marketing emails from web and mobile applications. It helps developers manage email delivery, track email performance (like opens and clicks), and ensure reliable delivery to users' inboxes. SendGrid is commonly used for sending password resets, sign-up confirmations, newsletters, and other automated emails through easy-to-use APIs and SMTP integration.

Mongoose

Mongoose is an Object Data Modeling (ODM) library for MongoDB and Node.js. It provides a straightforward way to define schemas for your MongoDB collections, enforce data validation, and interact with the database using easy-to-use JavaScript methods. Mongoose is widely used for development because it simplifies database operations and offers an easy workflow, helping developers organize and manage data efficiently in Node.js applications.

Redux Toolkit Query

Redux Toolkit Query (RTK Query) is a feature of Redux Toolkit that simplifies API calls by handling data fetching, caching, and state management automatically. It generates hooks for queries and mutations, manages loading and error states, and keeps API data in sync with the UI. This reduces boilerplate code and makes working with APIs faster and cleaner compared to traditional Redux approaches.

OpenAI GPT-3.5 API

The OpenAI GPT-3.5 API is a powerful language model API that allows developers to integrate advanced natural language processing into their applications. It uses GPT-3.5 Turbo, which is optimized for faster performance and lower costs compared to earlier GPT-3 models. The API supports a large context window of up to 16K tokens, enabling more extended conversations and complex tasks. It automatically handles chat-based and text completion tasks, making it ideal for chatbots, content generation, summarization, and coding assistance.

Visual Studio Code:

Visual Studio Code, also commonly referred to as VS Code, is a source-code editor developed by Microsoft for Windows, Linux, macOS and web browsers. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded version control with Git.

Github:

GitHub is a web-based platform used for version control and collaboration. It allows developers to store, manage, and track changes to their code using Git, a powerful version control system. GitHub makes it easy for teams to work together on projects by enabling code sharing, issue tracking, and project management. It's widely used in software development to keep code organized, review changes, and collaborate efficiently.

4. DESIGN

4.1 USECASE DIAGRAM

Use case diagrams are considered UML diagrams. UML diagrams define and organize the high-level functions and scope of a system.

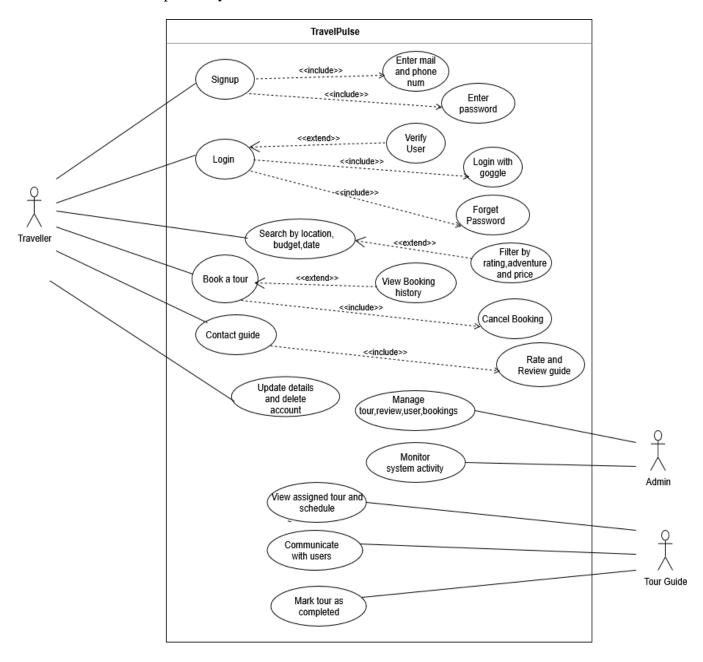


Fig 2: Use case Diagram

4.2 FLOWCHART

A flowchart is a visual diagram that shows the steps of a process in a clear and logical order.

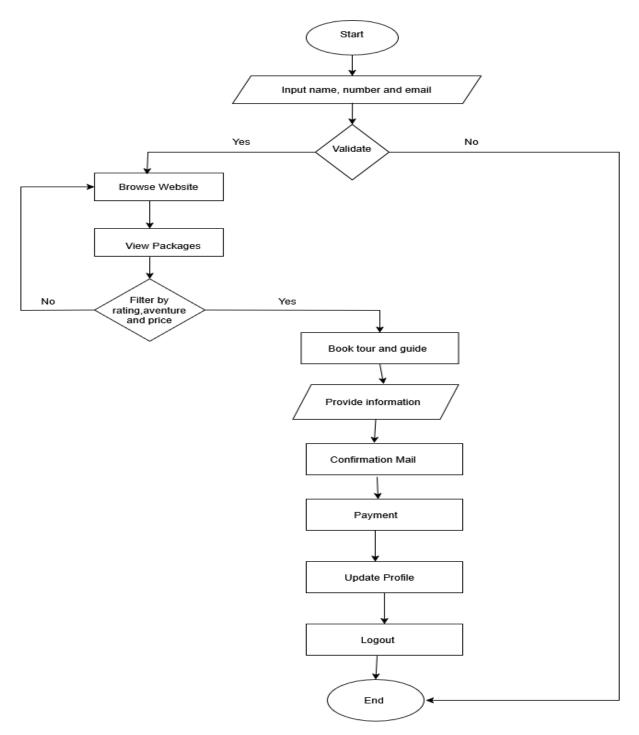


Fig 3: Flowchart

4.3 SEQUENCE DIAGRAM

A sequence diagram is a UML diagram that shows how objects interact with each other in a specific order over time using messages.

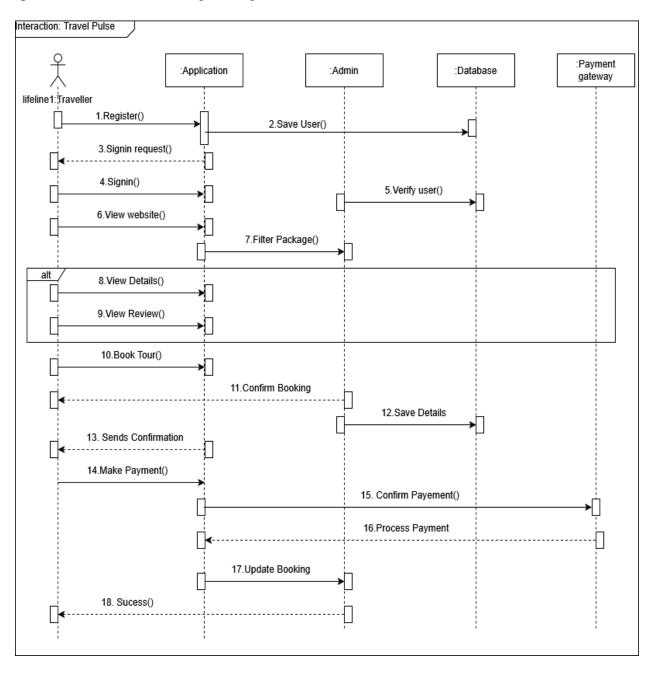


Fig 4: Sequence diagram

4.4 Process Flow Diagram

A process flow diagram is a visual representation that shows the sequence of steps in a process using symbols like arrows, rectangles, and circles to illustrate how inputs are transformed into outputs.

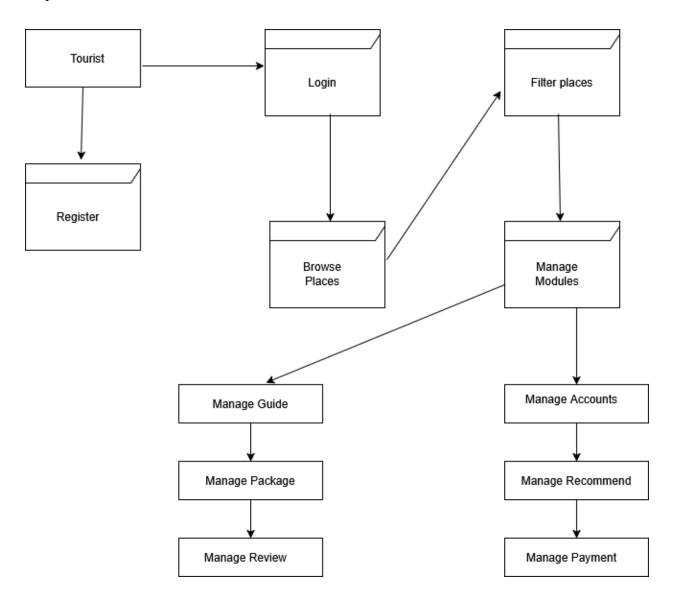


Fig 5: Process Flow diagram

4.5 LEVEL 0 DFD

A context diagram is a high-level diagram that shows a system as a single process and gives an overview of the system's boundaries and data flow.

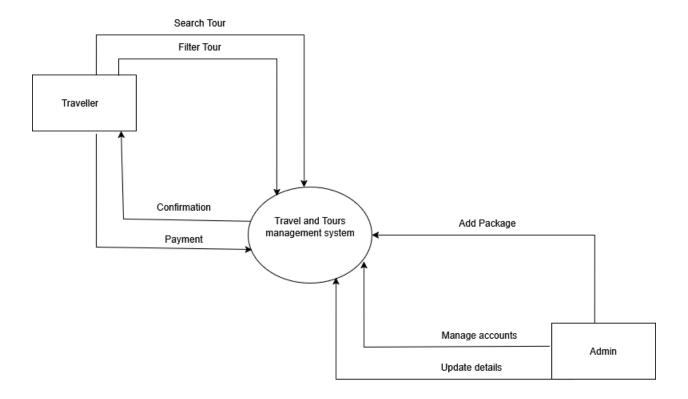


Fig 5: Level 0 diagram

4.6 LEVEL 1 DFD

A level 1 DFD (Data Flow Diagram) breaks down the main process from the context diagram into sub-process showing more detailed data flow between processes, data stores, and external entities. It helps to understand how the system functions internally.

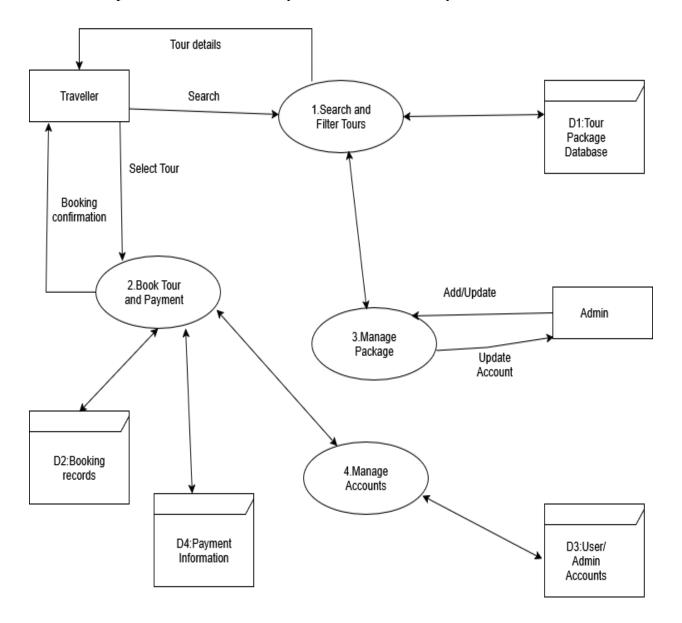


Fig 6: Level 1 DFD diagram

4.7 FLOWCHART: AI ASSISTANT LOGIC

A flowchart for an AI assistant logic shows the step-by-step decision-making and actions the assistant takes to respond to a user's input. It helps you visualize how the assistant processes input, manages tasks, and provides output.

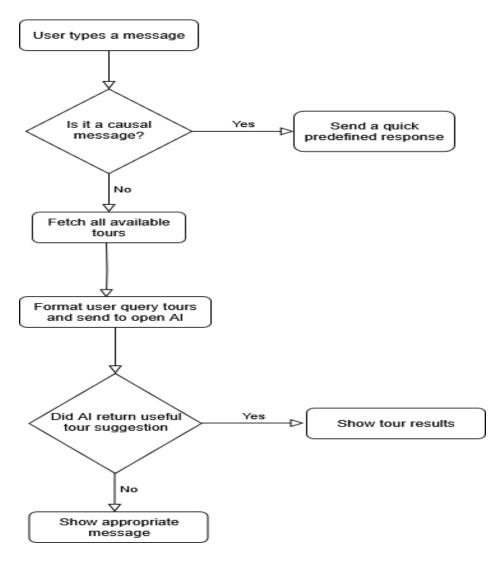


Fig 7: Flowchart (AI assistant Logic)

4.8 SEQUENCE: AI ASSISTANT LOGIC

A sequence diagram for an AI assistant logic shows how different components interact step by step over time.

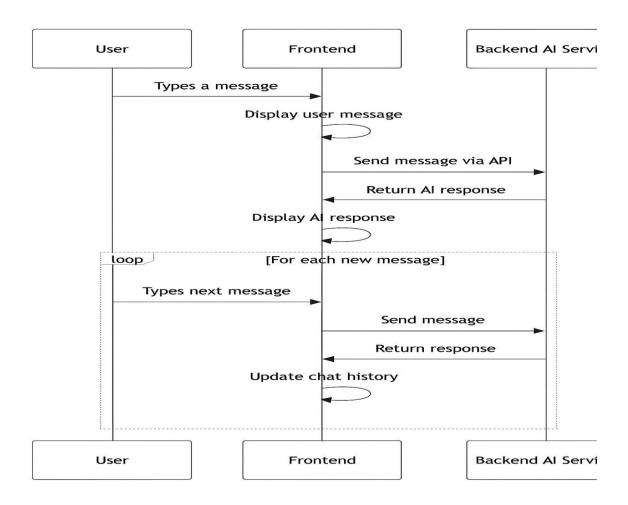


Fig 8: Sequence (AI assistant Logic)

5. MODULE DESCRIPTION (AI TRAVEL ASSISTANT)

5.1 PURPOSE

The AI Travel Assistant is an interactive chatbot designed to help users find suitable travel tours based on their interests. It uses OpenAI's GPT-3.5 model to understand user queries and suggest the most relevant tours from the database.

5.2 FEATURES

- Predefined responses for greetings and small talk without using the AI model.
- AI-powered recommendations based on available tour data.
- Graceful error handling with fallback responses.
- Dynamic and clean UI with automatic scrolling to latest messages.

5.3 WORKING OF MODULE

1. User Input

The user types a message into the chat box describing the kind of tour they are looking for (e.g., "I want to visit places to enjoy this winter").

2. Casual Message Check

The system checks if the input is a casual or general message (e.g., "hello", "thanks", "who are you"). If it is, a predefined response is sent instantly without involving the AI model.

3. Fetching Tour Data

If the user query is valid and not casual, the module fetches all available tours from the backend API using useFetchAllToursQuery (Redux Toolkit Query).

4. Preparing AI Prompt

The system then creates a prompt by combining:

- -A system instruction to the AI (defining its role)
- -The user's query
- -A list of all available tours (with name, description, duration, price, and link)

5. Calling OpenAI API

This prompt is sent to the OpenAI GPT-3.5 API, which processes the information and responds with a list of 2–3 recommended tours.

6. **Displaying Results**

The response from the AI is parsed and displayed to the user as a set of visually formatted tour cards containing:

- -Tour name
- -Short description
- -Price
- -Clickable link to view more
- -And AI generated summary of all

7. Fallback Handling

If the AI response is not useful or if there is an error in fetching data:

-The appropriate message is displayed for further flow for the user.

5.4 HOW IS IT DIFFERENT FROM NORMAL SEARCH?

Feature	AI Travel Assistant	Normal Search Function
		No – requires keywords or
Understands natural language	Yes – users can type freely	filters
	Yes – recommends based on user	
Personalized suggestions	input	No – just lists matching tours
	Yes – selects 2–3 most relevant	
Intelligent filtering	tours	No – shows all results
	Yes – understands the query	No – depends on exact words
Context awareness	context	used
	Yes – feels like chatting with a	
Conversational interface	guide	No – standard search UI
	Yes – feels like chatting with a	
Conversational interface	guide	No – standard search UI

Table 1: Travel Assistant Vs Normal Search Function

5.5 SUMMARY

The AI Assistant acts like a smart travel agent who understands user needs, preferences, and context. In contrast, a normal search only matches keywords and shows all related results without prioritizing or explaining why a tour is a good fit.

6. SECURE PAYMENT INTEGRATION

6.1 Overview

To handle secure online payments, our project integrates Stripe, a widely adopted and trusted

payment gateway. Stripe simplifies payment processing by providing robust APIs and

compliance with international security standards. It enables users to make transactions through a

secure and user-friendly interface while reducing the burden of handling sensitive payment

information directly.

6.2 Security Considerations

Stripe offers multiple layers of security to protect both users and developers:

PCI DSS Level 1 Compliance: Stripe is certified as a PCI Level 1 Service Provider, the highest

level of certification in the payment industry.

Tokenization: Card information is never stored or transmitted through our server. Stripe handles

this through secure tokenization methods.

End-to-End Encryption: All card data is encrypted using AES-256 and securely transmitted from

the frontend to Stripe's server.

Fraud Prevention (Radar): Stripe uses machine learning to detect and block fraudulent activities.

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7. TOOLS AND TECHNOLOGIES USED

Various tools and technologies that we have been using to develop our web application are mentioned in table below:

Tools Used	Development Areas
Windows 11	Operating System
Web based application	System Type
Visual Studio Code	Code Editor
Ms Word	Documentation
Draw.io	Diagrams
React.js, JS	Frontend Development
Node.js	Backend Development
Mongo DB	Database
Stripe	Payment
Cloudinary	Manage images
SendGrid	Email Service
Open AI GPT-3.5 API	AI model
CSS	Style the chatbot interface
Github	Code Sharing

Table 2: Tools and Technologies used

8. TASK DIVISION

Member	Role
Sabina Acharya	Frontend Development, Documentation, Slide Presentation
Radha Pant	Login Credentials (Authentication), Mailing Credentials
Dikshya Khadka	Backened plus Payment Integration
Ayushma Chapain	Backend plus Travel Assistant

Table 3: Task Division

9. PROJECT TASK AND TIME SCHEDULE

The project schedule has been designed for duration of two months. The main preference is given to Research and Planning followed by Documentation. The next preference is given to actual core system development process.

TASK	APPROXIMATE DURATION
Project Initiation	3 Days
Research and Planning	8 Days
Design and Wireframing	10 Days
Frontend Development	17 Days
Backend Development	20 Days
Travel Assistant	5 days
Testing and QA	2 Days
Documentation, Submission and Presentation	Throughout

Table 4: Project Task and time schedule

9.1 GANTT CHART

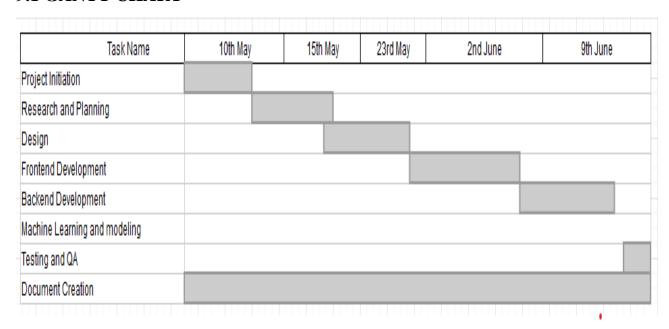


Fig 8: Iteration I

Task Name	10th June	19th June	26th June	2nd July	8th July	16th July
Project Initiation						
Research and Planning						
Design						
Frontend Development						
Backend Development						
Machine Learning and modeling						
Document Creation						

Fig 9: Iteration II

10. CONCLUSION

The TravelPulse project marks a significant step toward modernizing and simplifying the way travelers explore and plan their journeys within Nepal. The application has been designed with the primary goal of addressing the common pain points faced by local and international travelers, such as lack of centralized travel information, difficulties in managing bookings, language barriers, and the need for personalized recommendations. By bringing together innovative features like secure payment integration, chatbot assistance, real-time notifications, TravelPulse provides a seamless and user-centric travel planning experience.

Through the course of its development, the project has emphasized user-friendly design, accessibility, and scalability to ensure it can cater to diverse user groups. Additionally, the chatbot feature provides quick support, making the application a reliable virtual travel assistant.

In conclusion, the TravelPulse project highlights the immense possibilities of integrating technology into the tourism sector. It stands as a testament to how innovative thinking and technical expertise can work hand-in-hand to transform traditional travel planning into a modern, convenient, and enjoyable experience. With future refinements and expansions, TravelPulse holds the potential to become a leading travel companion app in Nepal and beyond.

11. FURTHER WORKS

Since future enhancements are crucial for improving user satisfaction, staying ahead of competitors and fostering business growth. We are planning for continuously adding new features.

- AI-Powered Personalized Recommendations: Integrate machine learning algorithms to analyze user preferences, travel history, and current trends to suggest tailored travel destinations, hotels, and activities.
- Offline Mode for Remote Areas: Enable offline access to essential travel information, maps, and booked tickets, which is especially helpful in regions with poor internet connectivity.
- Social Media Integration: Allow users to share their travel experiences, reviews, and itineraries directly on social platforms.
- Enhanced Security Features: Implement biometric authentication (fingerprint, face recognition) for secure login and transactions.

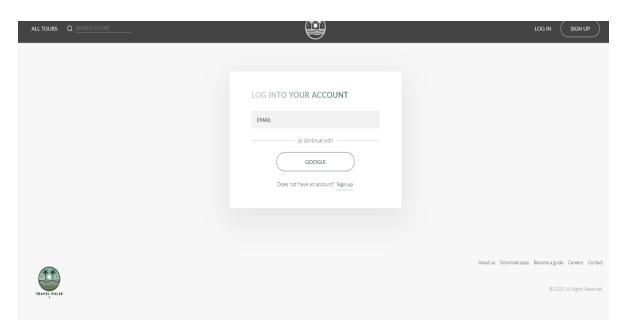
12. REFERENCES

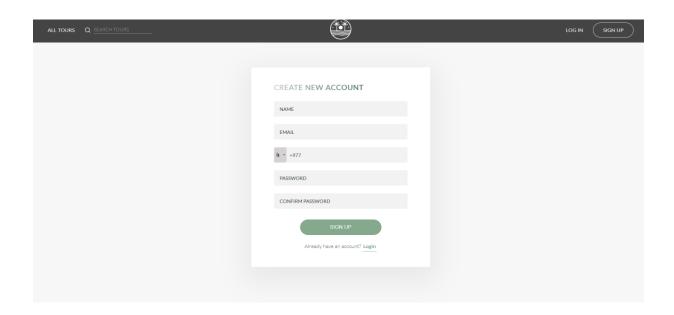
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APPENDIX

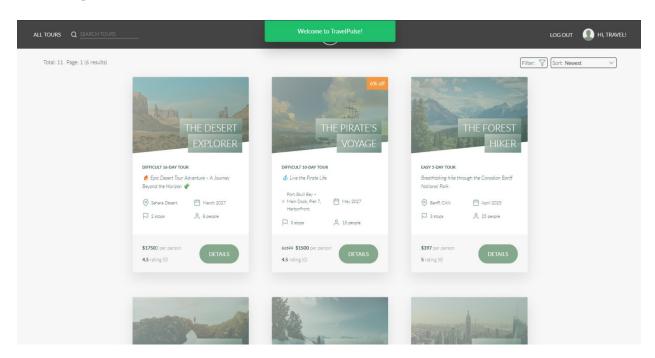
The screenshot of various functionalities of our web application are given:

Authentication and Authorization:

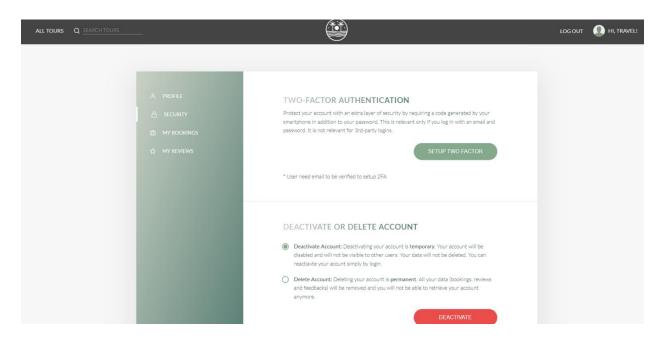




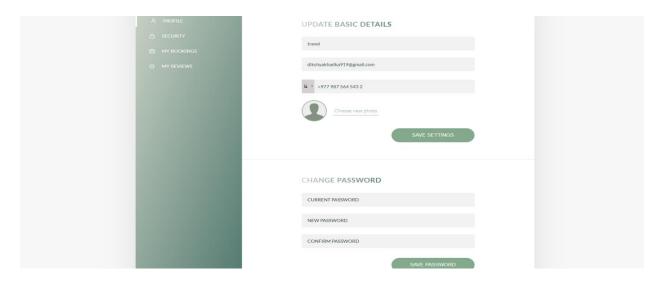
Home Page:



Two factor authentication:



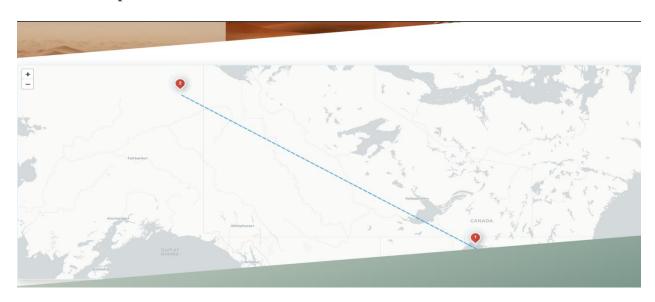
Update Details:



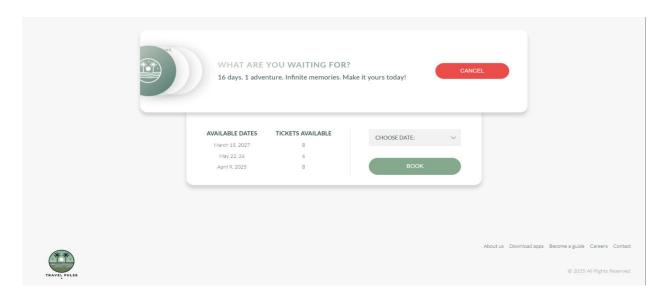
Explore Page:



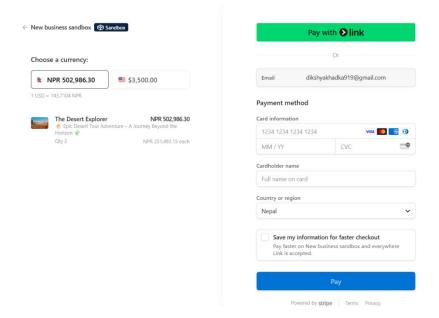
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