IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Smart Location-Enabled Travel Monitoring and Data Analysis System

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***Abstract*—**The Travel Details Smart Logging Application is an intelligent mobile-based solution developed to modernize and streamline the process of capturing, managing, and storing travel- related information in a structured digital format. Traditional methods of recording travel details often depend on manual entry or paper-based documentation, which can lead to inaccuracies, data loss, and inefficiencies in managing travel records. This application addresses these challenges by providing an automated, user-friendly platform that allows users to record origin and destination locations using real-time GPS services, automatically capture date and time information, and manage additional travel parameters such as mode of transportation and number of travelers through an intuitive interface. The system enhances accuracy by minimizing manual intervention and ensures reliable data logging through automated location detection and time stamping. Designed with a focus on usability and efficiency, the application supports seamless data entry and retrieval, making it suitable for individuals, organizations, and institutions that require structured travel documentation for purposes such as expense tracking, travel monitoring, logistics management, and reporting. The lightweight architecture and scalable design allow easy deployment across devices while maintaining performance and accessibility. By integrating mobile technology with location-based services, the application demonstrates how digital solutions can significantly improve everyday travel documentation processes. The proposed solution promotes efficiency, reduces administrative overhead, and provides users with a convenient and dependable method to maintain organized travel records, thereby contributing **to** smarter and technology-driven travel management practices**.**

***Index Terms*—Travel Monitoring, GPS Tracking, Mobile Application, Data Analysis, Smart Tourism**

I. Introduction

Tourism and travel activities have significantly increased with the rapid growth of digital technologies and mobile applications. People frequently travel for purposes such as education, work, tourism, and logistics, which creates a continuous need to record and manage travel-related information efficiently. Traditionally, travel details such as location, date, Mode of transport, and trip records are often maintained manually through notebooks, spreadsheets, or basic digital logs. Although these approaches may appear simple, they often result in incomplete records, loss of information, and difficulty in retrieving previously stored travel data.

With the advancement of smartphones and location-based technologies, mobile applications have become an effective platform for managing travel information. Modern devices are capable of capturing real-time geographical coordinates, timestamps, and user interactions, enabling applications to automatically record important travel parameters. By utilizing these capabilities, it is possible to develop systems that reduce manual effort while ensuring that travel information is stored accurately and systematically.

The Travel Details Smart Logging Application is proposed as a mobile-based system designed to improve the process of recording and managing travel data. The application provides a structured interface where users can log their travel information with minimal manual input. Through the integration of location services, the system automatically identifies origin and destination details, while time-related information is captured using built-in system clocks. This automated approach ensures that travel records are reliable, organized, and easily retrievable when required.

In addition to basic travel logging, the proposed system incorporates a chatbot-assisted information module that enables users to quickly obtain travel-related details about different destinations. The chatbot provides information about tourist attractions, hidden locations, and accommodation options through simple text-based interaction. This feature improves user

engagement and allows travelers to access useful information without navigating through multiple application screens.

Another important component of the system is the data analysis module, which enables administrators to analyze user interaction patterns and travel activity. By collecting and evaluating usage data, the system can identify frequently searched destinations and determine the percentage of users interested in specific locations during a given period. Such analytical insights can be useful for understanding travel trends and supporting data-driven decision making in tourism-related services.

The main objective of this research is to design and implement an integrated mobile platform that combines travel data logging, chatbot-based assistance, and travel activity analytics within a single application. By merging these functionalities, the proposed solution aims to provide a convenient and efficient digital environment for recording travel information and exploring travel destinations. The system demonstrates how mobile technology and simple intelligent features can be utilized to enhance travel documentation and support smarter travel management practices.

II. Literature Review

In recent years, the tourism and travel industry has increasingly adopted digital technologies to improve the way travel information is accessed and managed. Mobile applications, intelligent assistants, and data analytics tools are widely used to support travelers in planning trips, exploring destinations, and maintaining travel records. Several studies have explored the use of information systems and mobile platforms to enhance tourism services and improve user convenience. Research on tourism information systems highlights the importance of providing structured and easily accessible travel data to users. Early systems focused mainly on static travel guides and online information portals that allowed travelers to search for details about destinations, hotels, and transportation facilities. Although these systems provided useful information, they lacked personalization and real-time interaction capabilities [1]. As a result, users often had to navigate multiple sources to obtain complete travel details.

With the rapid development of smartphones and internet connectivity, mobile travel applications have become a popular platform for delivering travel services. These applications enable users to access travel information anytime and anywhere through mobile devices. Many modern travel applications integrate location-based services to provide context-aware recommendations based on the user's current location [2]. Such systems help travelers discover nearby attractions, restaurants, and accommodation facilities. However, most existing applications primarily focus on providing recommendations and booking services rather than maintaining structured travel logs or records.

Another important advancement in recent years is the integration of chatbot technology in tourism applications. Chatbot are conversational systems designed to interact with users through natural language input. In the tourism domain, chatbot are commonly used to answer user queries related to travel destinations, weather conditions, transportation options, and hotel availability. These systems allow users to obtain information quickly without manually browsing through large amounts of content [3]. Studies have shown that chatbot- based assistants can improve user engagement and provide a more interactive experience in travel applications [4]. Despite these advantages, many existing chatbot systems are designed mainly for customer support or travel recommendations and do not integrate directly with travel data logging systems.

In addition to information delivery, data analytics has become an important component of modern tourism management systems. Researchers have explored the use of analytical techniques to understand travel behavior and tourism trends. By analyzing user interactions and travel records, tourism systems can identify popular destinations, seasonal travel patterns, and user preferences [5]. These insights can assist tourism organizations and administrators in making informed decisions regarding tourism planning and service improvement. However, most analytics-based tourism studies rely on external datasets rather than collecting data directly from a mobile travel application. Several studies have also discussed the concept of smart tourism systems, which combine mobile technology, data analytics, and intelligent interfaces to improve tourism services [6]. These systems aim to create an integrated environment where travelers can access information, plan trips, and interact with digital services through a single platform. While such systems provide advanced capabilities, they often require complex infrastructure or large datasets, making them difficult to implement in smaller applications or academic prototypes. From the analysis of existing research, it can be observed that many tourism applications focus either on destination recommendation, chatbot interaction, or tourism analytics individually. Very few systems attempt to combine these features within a single application framework. In particular, the integration of travel data logging, chatbot- based destination assistance, and user activity analysis within a lightweight mobile application remains relatively unexplored in the existing literature.

To address this research gap, the proposed Travel Details Smart Logging Application integrates three essential functionalities within a unified mobile platform. First, the system provides a structured mechanism for recording travel details using automated location and time capture. Second, a chatbot module enables users to obtain quick information about travel destinations and tourist attractions. Third, an administrative data analysis module evaluates user interactions to identify frequently searched locations and travel trends. By combining these components, the proposed system aims to improve both travel documentation and user interaction while also supporting data-driven insights for travel analysis.

III. PROBLEM STATEMENT

Despite the availability of several digital travel platforms, many existing systems still face limitations in effectively recording and managing travel-related information. Most travel applications primarily focus on providing destination recommendations, booking services, or general travel guidance. While these features are useful for trip planning, they often do not provide a structured mechanism for maintaining a reliable record of travel activities. As a result, travelers frequently depend on manual methods such as notebooks, spreadsheets, or simple note-taking applications to document their travel details. These traditional approaches are prone to data loss, incomplete records, and difficulty in organizing information for future reference. Another limitation observed in current travel applications is the lack of integrated interaction systems that allow users to quickly obtain travel information within the same platform. In many cases, users must navigate through multiple screens or

TABLE I
LITERATURE REVIEW COMPARISON OF TRAVEL DATA COLLECTION SYSTEMS

S.No	Research Paper Name and Year	Existing Work and Drawbacks	How Our Project Overcomes the Issue
1	Smart Mobility Data Collection Using Mobile Applications, IEEE Access, 2024	Continuous monitoring causes battery drain and raises privacy concerns.	Collects travel data only when users manually submit trip details.
2	Real-Time Travel Data Management Using Cloud Platforms, IEEE Transactions on Big Data, 2024	Stores raw travel data and lacks structured reusable database design.	Stores travel data in a structured and well-defined centralized database.
3	Analysis of Human Mobility Patterns Using Mobile Network Data, IEEE Internet of Things Journal, 2025	Uses cell tower data which provides low accuracy for local infrastructure analysis.	Provides accurate location-based travel data for better analysis.
4	Using App Usage Data From Mobile Devices to Improve Activity-Based Travel Demand Models, IEEE Transactions on Big Data, 2024	Focuses mainly on activity modeling and ignores service provider integration.	Integrates travel demand data with resource provider management.
5	Mobile GPS Data Analytics for Urban Travel Patterns, IEEE Access, 2020	Continuous GPS tracking increases Battery consumption.	Avoids continuous tracking and records manual trip entries.
6	Big Data Approach for Travel Demand Modeling Using Mobile Apps, IEEE Transactions on Intelligent Transportation Systems, 2020	Focuses on prediction models but lacks administrative monitoring features.	Includes an admin module for monitoring and decision making.
7	GPS-Based Tourist Movement Analysis Using Mobile Devices, IEEE Sensors Journal, 2022	Focuses only on tourist tracking without integrating travel services.	Includes hotel and restaurant resource provider module.
8	Travel Data Collection Using Smart Mobile Apps and GPS, IEEE Access, 2021	Privacy risks due to automatic background GPS tracking.	Collects only essential trip data with user permission.
9	Analysis of Tourist Travel Patterns Using Mobile Crowd sensing, IEEE Internet of Things Journal, 2020	Crowd-sensed data may be inconsistent and unreliable.	Uses authenticated user data stored in a centralized database.

External websites to find details about tourist attractions, accommodation options, and destination highlights. This process can be time-consuming and reduces the overall efficiency of travel planning and information retrieval. Furthermore, most existing applications do not utilize the travel data generated by users for analytical purposes. Travel-related information such as frequently searched destinations, user interest in specific locations, and travel activity patterns can provide valuable insights when analyzed properly. However, many applications do not include built-in mechanisms to analyze such data. Without a dedicated analysis module, it becomes difficult to identify trends in user travel behavior or understand which destinations attract greater attention during specific time periods. In addition to these challenges, manual entry of travel details increases the chances of inaccuracies.

Absence of automated logging mechanisms further reduces the reliability of travel documentation systems. Considering these limitations, there is a clear need for a system that can simplify the process of recording travel information while also providing intelligent assistance and analytical capabilities.

A unified application that integrates automatic travel data logging, chatbot-based travel information access, and user activity analysis can significantly improve the way travel Information is managed and utilized. The Travel Details Smart Lgging Application is designed to address these issues by offering a mobile-based platform that captures travel details automatically, provides interactive chatbot support for destination information, and enables administrators to analyze user travel patterns. By integrating these functionalities within a single application, the system aims to provide a more efficient and organized approach to managing travel-related information.

IV. PROPOSED SYSTEM

The Travel Details Smart Logging Application is designed as a mobile-based platform that simplifies the process of recording travel information while also providing intelligent assistance and analytical insights. The proposed system integrates multiple functionalities within a single application to support both general users and administrative analysis. The system focuses on improving travel documentation, providing quick access to destination information, and analyzing user interaction data to understand travel trends. The architecture of the proposed system is structured around three primary functional modules: Travel Data Logging Module, Chatbot Assistance Module, and Data Analysis Module. These modules operate together to create an efficient and user- friendly travel management environment.

A. Travel Data Logging Module

The Travel Data Logging Module serves as the core component of the application. This module allows users to record their travel activities in a structured digital format. The system automatically captures important travel parameters such as location, date, and time using built-in mobile device services. By integrating location-based technology, the application can identify the user's origin and destination information with minimal manual input. Users can also record additional travel- related details such as mode of transportation, number of travelers, and purpose of travel. The automated logging process improves accuracy and ensures that travel records are stored in an organized and retrievable format.

B. Chatbot Assistance Module

The Chatbot Assistance Module enhances user interaction within the application by providing a simple conversational interface for accessing travel information. Instead of navigating through multiple menus, users can interact with the chatbot by entering the name of a destination or tourist location. The chatbot responds with relevant information such as popular attractions, nearby places, accommodation options, and travel tips. This interactive approach improves the overall usability of the system and allows travelers to quickly obtain useful information without leaving the application environment.

C. Data Analysis Module

The third component of the system is the Data Analysis Module, which is primarily designed for administrative purposes. This module collects and evaluates user interaction data generated within the application. By analyzing the frequency of user searches and travel logs, the system can identify the destinations that attract the highest level of interest among users. The analytical component can present statistical insights such as the percentage of users interested in particular destinations during specific time periods, including daily, weekly, or monthly trends. These insights can help administrators understand travel patterns and support better planning for tourism-related activities.

The integration of these three modules within a single Application creates a comprehensive travel management system. The proposed solution not only simplifies travel documentation but also improves accessibility to travel information while generating valuable insights from user data. By combining automated logging, chatbot-based interaction, and analytical capabilities, the system demonstrates how mobile technology can be effectively utilized to enhance modern travel management practices.

V. System Architecture

The system architecture of the Travel Details Smart Logging Application is designed to ensure efficient interaction between users, application services, and data processing components. The architecture follows a modular approach in which different components of the system operate independently while remaining interconnected through the application framework. This design improves maintainability, scalability, and overall system performance.

The architecture primarily consists of four main layers: User Interface Layer, Application Processing Layer, Data Storage Layer, and Data Analysis Layer. Each layer performs specific functions that contribute to the overall operation of the system. Fig. 1 illustrates the overall architecture of the proposed system.

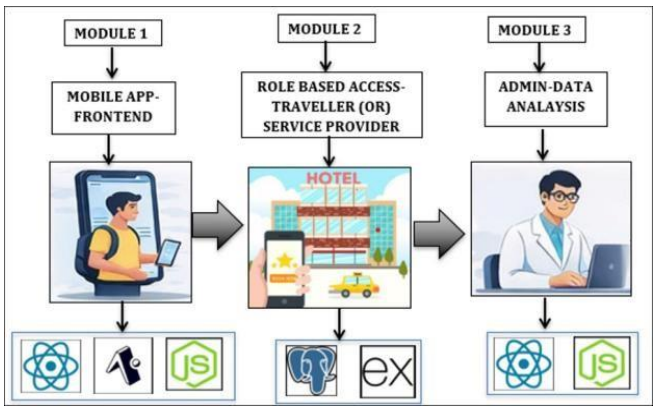

Fig. 1. System Architecture of the Travel Details Smart Logging Application

A. User Interface Layer

The User Interface Layer acts as the primary interaction point between the user and the application. This layer is responsible for presenting the graphical interface through which users can enter travel details, interact with the chatbot, and view stored travel information. The interface is designed with simplicity and usability in mind so that users can easily navigate through the application without requiring technical knowledge. Through this interface, users can record travel logs, access chatbot responses for destination information, and retrieve previously stored travel records.

B. Application Processing Layer

The Application Processing Layer manages the core logic of the system. This layer processes user inputs, coordinates chatbot responses, and handles the automatic logging of travel details. When a user enters travel information or interacts with the chatbot, the processing layer interprets the request and per- forms the necessary operations. The chatbot component within this layer analyzes user queries and retrieves relevant travel information from the internal data repository. Additionally, this layer integrates location-based services that automatically capture location and timestamp details to ensure accurate travel data recording.

C. Data Storage Layer

The Data Storage Layer is responsible for maintaining all travel-related information generated by the application. This includes user travel logs, chatbot knowledge data related to tourist destinations, and records of user interactions with the system. The structured storage of this data allows users to easily retrieve previous travel details and supports further analysis by the administrative module. Proper organization of stored data also ensures reliability and prevents information loss.

D. Data Analysis Layer

The Data Analysis Layer focuses on evaluating user interaction data and travel activity patterns. This component collects data generated by the application, such as frequently searched destinations and user interest in specific locations. By analyzing these records, the system can determine the percentage of users interested in particular travel destinations within a specified time frame. The results generated by this module provide valuable insights into travel trends and user behavior. Overall, the system architecture ensures that the application operates efficiently by separating user interaction, application logic, data management, and analytical processing into distinct layers. This structured design enables the Travel Details Smart Logging Application to provide reliable travel data management, interactive chatbot assistance, and meaningful analytical insights within a single integrated platform.

VI. Methodology

The methodology of the proposed Travel Details Smart Logging Application focuses on designing a structured framework that enables efficient collection, management, and analysis of travel-related data through a mobile application environment. The system is organized into multiple functional modules that work together to provide seamless travel data logging and intelligent information retrieval.

A. Travel Data Collection

The first stage of the methodology involves travel data col- lection through the mobile application interface. Users interact with the system through a mobile frontend developed using modern cross-platform technologies. The application allows users to enter travel-related details such as the starting location, destination, travel date, and mode of transportation. In addition to manual input, the application utilizes GPS-based location services available in mobile devices to automatically capture the user's current location and timestamp. This approach improves the accuracy of recorded travel data and reduces dependency on manual data entry.

B. Role-Based System Interaction

The second stage focuses on role-based system access and service interaction. In this stage, the application manages user interactions through backend processing mechanisms that validate and organize the travel data. The system architecture

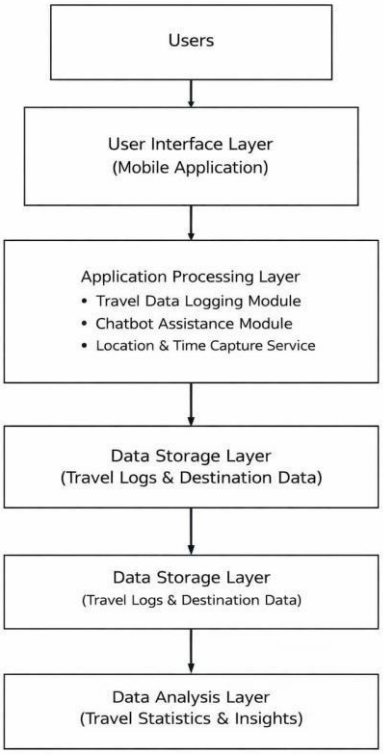

Fig. 2. System Architecture of Travel Details Smart Logging Application

Supports different types of users such as travelers and service providers. The backend server processes the user requests, ensures proper data validation, and manages communication between the application interface and the database system. This structured interaction ensures that the travel information is securely processed and stored.

C. Chatbot Integration

Another important component of the methodology is the integration of a chatbot module within the application. The chatbot provides a simple conversational interface through which users can obtain information about specific travel lo- cations. The chatbot operates using predefined responses and keyword-based query handling techniques, enabling the sys- tem to respond to user questions related to travel destinations and general location information. This feature enhances the usability of the application and provides an interactive method for users to access travel-related knowledge without leaving the application.

D. Data Storage and Management

The third stage of the methodology involves data storage and administrative analysis. All travel records generated through the mobile application are stored in a structured

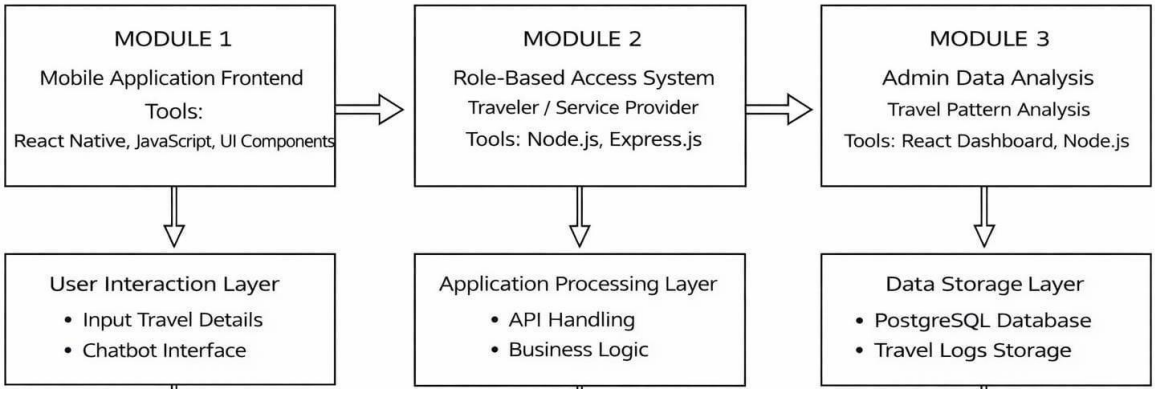

Fig. 3. System Modules of the Travel Details Smart Logging Application

Relational database system. The stored data includes travel routes, timestamps, user interaction records, and other travel parameters. This stored dataset forms the basis for performing further analysis within the administrative module.

E. Travel Data Analysis

Finally, the data analysis module allows administrators to analyze collected travel records to identify patterns and trends. The system processes the stored travel data to determine metrics such as frequently visited locations, travel frequency within specific time intervals, and user travel behavior. The analysis results can be presented through graphical representations such as charts and statistical summaries, enabling administrators to easily interpret the data.

Through this structured methodology, the proposed system demonstrates how mobile applications, backend processing systems, and database-driven analysis can be combined to create an efficient platform for managing travel-related information. The modular design also allows the system to be extended in the future with additional intelligent features and enhanced data analytics capabilities.

VII. Implementation

The implementation of the Travel Details Smart Logging Application focuses on developing a mobile-based platform capable of collecting, managing, and analyzing travel-related information efficiently. The system was implemented using a combination of modern web and mobile development technologies to ensure flexibility, scalability, and user accessibility.

A. Frontend Development

The front-end interface of the application was developed using React Native, which enables cross-platform mobile application development with a consistent user experience. The user interface was designed to be simple and intuitive, allowing users to easily record travel details such as origin location, destination location, travel time, and mode of transportation. By integrating mobile device capabilities such as GPS location services, the application automatically detects and records location data, reducing the need for manual input and minimizing the chances of data entry errors.

B. Backend Development

The backend processing of the system is handled using Node.js, which manages application logic, user requests, and communication between the mobile application and the database system. The backend server processes user inputs, validates the data, and stores the information in a structured format for further analysis. This server-side architecture ensures smooth interaction between different modules of the application.

C. Database Management

A PostgreSQL database is used for storing travel records and user interaction data. The database structure was designed to efficiently manage travel logs, including user details, travel routes, timestamps, and related metadata. This structured data storage allows the system to retrieve travel information quickly and supports efficient data analysis operations.

D. Chatbot Integration

In addition to the travel logging functionality, a chatbot module was integrated into the application to assist users in retrieving information about travel destinations. The chatbot operates using predefined responses and simple query processing techniques, enabling users to obtain quick information about certain locations within the application environment. This feature improves the usability of the system and enhances user engagement.

E. Administrative Analysis Module

The final component of the implementation involves an administrative data analysis module, which enables administrators to analyze travel patterns based on the collected data. This module processes stored travel records to identify trends such as frequently visited locations, peak travel periods, and user travel behavior over specific time intervals. The analysis results can be displayed in graphical formats such as charts and reports, which help administrators gain insights from the collected data.

Overall, the implementation of the proposed system demonstrates how mobile technologies, database systems, and simple intelligent interfaces can be integrated to create a practical and efficient travel data management solution.

VIII. Results and Discussion

The Travel Details Smart Logging Application was tested to evaluate the functionality of its major modules, including the travel data logging system, chatbot interaction module, and the data analysis component. The system was implemented as a mobile-based application and evaluated using sample user data collected through the application during testing.

The travel data logging module successfully captured important travel information such as origin location, destination location, travel date, and transportation details. By integrating GPS-based location services available in mobile devices, the system was able to automatically detect location information and record timestamps accurately. This automatic logging mechanism reduced manual data entry and improved the reliability of travel records stored within the system.

The chatbot assistance module was also evaluated during the testing phase. The chatbot allows users to enter the name of a location and receive information about that destination. When users interact with the chatbot, the system retrieves predefined travel information related to that particular location, including popular tourist attractions and general travel details. This feature improves user engagement and allows users to obtain useful travel information quickly within the application environment.

A. Data Analysis Module

The data analysis module plays a significant role in the pro- posed system by utilizing the travel data collected from users of the application. Each time a user logs travel information or searches for a travel destination through the chatbot, the system stores the relevant data in the database. This collected dataset includes travel routes, location searches, timestamps, and other travel-related parameters.

The stored user data is then processed by the administrative analysis module to identify travel patterns and user interests. By analyzing the frequency of user searches and travel logs, the system can determine which locations are accessed or visited most frequently within a given period of time. Fig. 4 shows the distribution of transportation modes used by travelers. The analysis indicates that road-based transportation such as buses and cars are more frequently used compared to other modes. This reflects common travel preferences for short and medium-distance journeys. The results of the analysis are presented through graphical representations such as charts and statistical summaries allowing administrators to easily understand travel trends and

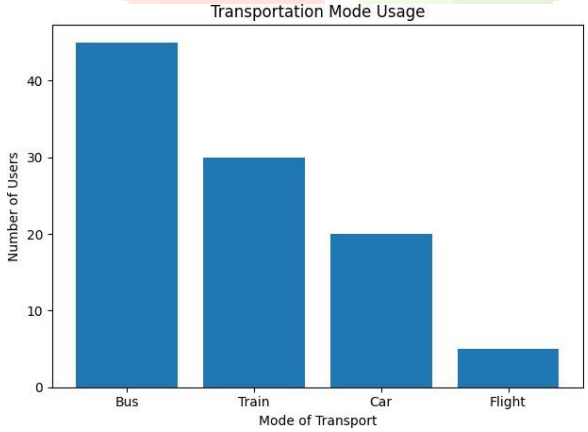

Fig. 4. Distribution of Transportation Modes Used by Travelers

User behavior. These visual representations make it easier to interpret the collected data and provide meaningful insights regarding travel preferences. Overall, the testing results confirm that the proposed sys- tem effectively supports travel data recording, chatbot-based information retrieval, and user travel pattern analysis within a unified platform.

IX. Conclusion

The Travel Details Smart Logging Application was developed as a mobile-based solution to simplify and improve the process of recording and managing travel-related information. The system integrates travel data logging, chatbot-based in- formation assistance, and user travel data analysis within a single application platform. By utilizing mobile technologies and location-based services, the application enables users to automatically record travel details such as origin location, destination location, travel time, and transportation information with minimal manual input. The integration of a chatbot module within the application enhances the overall user experience by allowing users to obtain information about travel destinations through simple text-based interaction. This feature reduces the need for users to search through multiple external sources to find relevant travel details. Another important contribution of the system is the data analysis module, which utilizes the travel data collected from users to identify travel trends and user interests. By analyzing stored travel records, the system can determine frequently visited locations and provide statistical insights regarding travel patterns. These analytical capabilities demonstrate how user-generated travel data can be transformed into useful information for understanding travel behavior. Overall, the proposed system demonstrates the effectiveness of combining mobile application technology, automated travel data logging, and data analysis to create an efficient travel management solution. The developed application provides a structured and convenient method for maintaining travel records while also offering useful insights into travel preferences and trends.

X. Future Work

Although the proposed system provides an effective solution for recording and analyzing travel data, several improvements can be implemented in the future to further enhance the capabilities of the application. One possible enhancement is the integration of real-time travel services, such as hotel booking, transportation booking, and weather information related to travel destinations. These additional services would allow users to plan their trips more efficiently within the same application. Another potential improvement is the incorporation of advanced artificial intelligence techniques to enhance the chatbot module. Instead of relying on predefined responses, the chatbot could be trained using machine learning or natural language processing techniques to provide more intelligent and dynamic responses to user queries.

The system can also be expanded to include real-time travel recommendation features, where the application suggests travel destinations based on user preferences and past travel history. This would make the system more personalized and improve the overall travel planning experience. Additionally, the data analysis module can be extended to support more advanced analytics, such as predictive travel trend analysis and seasonal tourism forecasting. Such features could provide valuable insights for tourism planners and organizations. By incorporating these enhancements, the application can evolve into a more comprehensive smart tourism management system in the future.

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