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Passenger Alert Application

Mr.Jegan Amarnath J[1], Raizudeen S[2], Kiran Kumar S[3]
[1, 2, 3]*Department of Computer Science & Engineering Sri Sairam Engineering College, Chennai, Tamil Nadu, India*

Abstract: ***This paper describes the creation of an intelligent real-time interactive public transport application. The application focuses on enhancing the user experience and improving communication among passengers. The main features of the application include a chat module that enables users to have conversations, facilitating the exchange of information and providing a platform for passengers to inform others about any issues or disruptions in the public transportation system. Additionally, the application incorporates an alarm module designed to alert or awaken passengers from their sleep or quick naps when the bus enters a buffer zone, indicating that their destination is approaching.By leveraging real-time data and intelligent algorithms, the application enhances the overall quality of public transportation services. The chat module promotes community engagement and empowers passengers to actively contribute to the improvement of the system's reliability and efficiency. Furthermore, the alarm module serves as a valuable tool for passengers, ensuring they are informed and prepared as their destination approaches, thus minimizing the risk of missing their stop.The development of this intelligent application addresses the growing need for efficient and user-centric public transportation solutions. It harnesses the power of real-time data and interactive communication to create a seamless and reliable travel experience for passengers. The findings and insights from this project contribute to the advancement of intelligent transportation systems, offering practical solutions to the challenges faced by public transportation networks worldwide.***

Keywords: Intelligent application, real-time, interactive, public transportation, chat module, information exchange, passenger communication, alarm module, buffer zone, user experience, community engagement, reliability, efficiency, intelligent transportation systems.

I. INTRODUCTION

Public transportation plays a vital role in modern urban mobility, offering a convenient and sustainable mode of travel for millions of people worldwide. However, the efficiency and user experience of public transportation systems can be enhanced through the integration of intelligent technologies. This paper presents the development of an intelligent real-time interactive application designed specifically for public transportation. By leveraging the power of real-time data, communication, and intelligent algorithms, this application aims to revolutionize the way passengers engage with the system and stay informed during their journey.

The application features a chat module that enables passengers to have conversations, facilitating the exchange of information and empowering them to inform others about any issues or disruptions in the public transportation network. This community engagement aspect allows passengers to actively contribute to the system's reliability and efficiency, fostering a sense of collaboration and shared responsibility among commuters.

In addition to the chat module, the application incorporates an alarm module that goes off when the bus enters a buffer zone, signaling to passengers that their destination is approaching. This innovative feature aims to improve the overall experience for passengers, particularly those who may be sleeping or taking a quick nap during their journey. By alerting and awakening them in a timely manner, the application minimizes the risk of missed stops and ensures passengers are informed and prepared as they reach their desired destination.

The alarm on their mobile devices will go on when the bus passes through the buffer zone, alerting or awakening the passenger from their sleep or quick nap and letting them know the destination is not far away. At this point, they will be prepared to exit. This app's primary function is to alert drowsy travelers—and occasionally disabled individuals with hearing loss or deafness—when they are getting close to their destination.By doing this, they might be able to avoid missing their stop and have enough time to check their luggage before getting off the bus. In addition, this technology might make it easier for an unfamiliar traveller to alert the driver to their destination without having to ask another passenger, which could be problematic if they are having trouble communicating in their native tongue.

The development of this intelligent application holds significant potential to address the challenges faced by public transportation networks. By providing real-time information, facilitating passenger communication, and leveraging intelligent algorithms, it offers practical solutions to enhance reliability, efficiency, and user satisfaction.

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The findings and insights from this project contribute to the advancement of intelligent transportation systems, paving the way for more seamless and user-centric public transportation experiences.

II. SOFTWARE USED

The development of the intelligent real-time interactive application for public transportation involves the use of various software components and technologies. The primary software used for this application can be categorized as follows:

A. Mobile App Development

The front-end of the application is typically developed as a mobile app to provide a user-friendly interface for passengers. The app can be built using popular frameworks and tools such as React Native, Flutter, or native development languages like Java or Swift.

B. Chat Module

The chat module within the application requires a real-time messaging system to facilitate communication among passengers. Technologies such as Firebase Real-time Database or WebSocket can be employed to enable instant messaging capabilities, allowing users to exchange information, report issues, and engage in conversations.

C. Geolocation and Mapping

To provide accurate and real-time location information, the application integrates geolocation services. APIs like Google Maps API or Mapbox API can be utilized to track the bus's position, display real-time route information, and assist passengers in identifying their current location and upcoming stops.

D. Real-time Data Processing

The application relies on real-time data processing to provide up-to-date information on bus schedules, routes, and any service disruptions. Backend technologies such as Node.js or Python with frameworks like Express or Django can be used to handle data processing, integrate with external APIs for retrieving live transit data, and perform necessary computations for determining buffer zones.

E. Alarm and Notification System

The alarm module in the application requires a robust notification system. Push notification services like Firebase Cloud Messaging can be used to send alerts and awaken passengers when the bus enters the designated buffer zone.

F. Backend and Database Management

The application requires a backend server and a database to handle user authentication, store chat conversations, manage user profiles, and store other relevant data. Backend technologies like Node.js, Django, or Ruby on Rails, combined with databases like MongoDB or PostgreSQL, can be employed for these purposes.

Overall, the development of this intelligent application requires a combination of mobile app development frameworks, geolocation and mapping services, real-time data processing technologies, notification systems, and backend/database management tools. The specific choice of software depends on the development team's preferences, platform compatibility, scalability requirements, and other project-specific considerations.

III. PROCEDURE

The procedure for developing the intelligent real-time interactive application for public transportation involves several key steps. Here is a generalized outline of the development process:

A. Requirements Gathering

Begin by understanding the goals, objectives, and requirements of the application. Conduct market research, user surveys, and stakeholder interviews to identify the needs of passengers and the desired features of the application.

B. Conceptualization and Design

Based on the gathered requirements, create a conceptual design for the application.

This includes defining the user interface (UI), user experience (UX) design, and overall architecture of the application. Create wire-frames or prototypes to visualize the flow and layout of screens.

C. Technology Selection

Determine the appropriate technologies and tools for the development of the application. This includes choosing the mobile app development framework (e.g., React Native, Flutter), backend technologies (e.g., Node.js, Django), geolocation services (e.g., Google Maps API, Mapbox API), and any additional software components required.

D. Front-end Development

Develop the user interface and front-end of the mobile application. Implement the designed UI/UX, including screens, navigation, and user interactions. Utilize the chosen mobile app development framework and programming languages to create the desired functionalities and visual elements.

E. Back-end Development

Set up the backend server and database infrastructure. Develop the necessary APIs and services to handle user authentication, chat functionalities, real-time data processing, and other server-side operations. Use appropriate technologies and frameworks for the backend development, ensuring scalability, security, and performance.

F. Integration of Geolocation Services

Integrate geolocation services into the application to track the bus's real-time position and display relevant route information. Implement APIs or SDKs provided by mapping services like Google Maps or Mapbox to retrieve location data, calculate distances, and determine buffer zones.

G. Chat Module Implementation

Develop the chat module to enable real-time communication among passengers. Implement the necessary functionality for sending and receiving messages, displaying conversations, and handling notifications. Integrate real-time messaging services or build custom solutions for instant messaging capabilities.

H. Dijkstra's algorithm

Technique to sort users based on the route in public transport is by using a graph-based algorithm. Here's a step-by-step process using Dijkstra's algorithm, which can be applied to solve this problem:

1) Initialize:
a) Create an empty set of visited nodes.
b) Create a priority queue to store nodes and their distances.
c) Set the initial node as the source node.
d) Assign a distance of 0 to the source node and infinity to all other nodes.
e) Add the source node to the priority queue.

2) While the priority queue is not empty:
a) Remove the node from the priority queue with the shortest distance (we'll call it the current node).
b) If the current node has already been visited, continue to the next iteration.

3) Mark the current node as visited.
4) For each current node's neighbour:
a) Calculate the distance from the source node to the neighbor through the current node.
b) If the calculated distance is less than the previously recorded distance for the neighbor, update the neighbor's distance and previous node.
c) Add the neighbor and its new distance to the priority queue.

5) Repeat steps 2-4 until all reachable nodes have been visited or until the target node (desired destination) is reached.
6) Sort and retrieve the sorted users:
a) Once the algorithm finishes, sort the users based on their distances from the source node to the desired destination node.

7) Display the sorted users in the app:
a) Use the sorted list of users to display relevant information in your Android app's UI, such as user profiles, desired destinations, and optimal routes.

I. Alarm Module Development:

Create the alarm module that alerts or awakens passengers when the bus enters the buffer zone. Implement the logic to detect the bus's proximity to the destination and trigger notifications or alarms to notify the passenger. Integrate with push notification services for delivering timely alerts.

J. Testing and Quality Assurance:

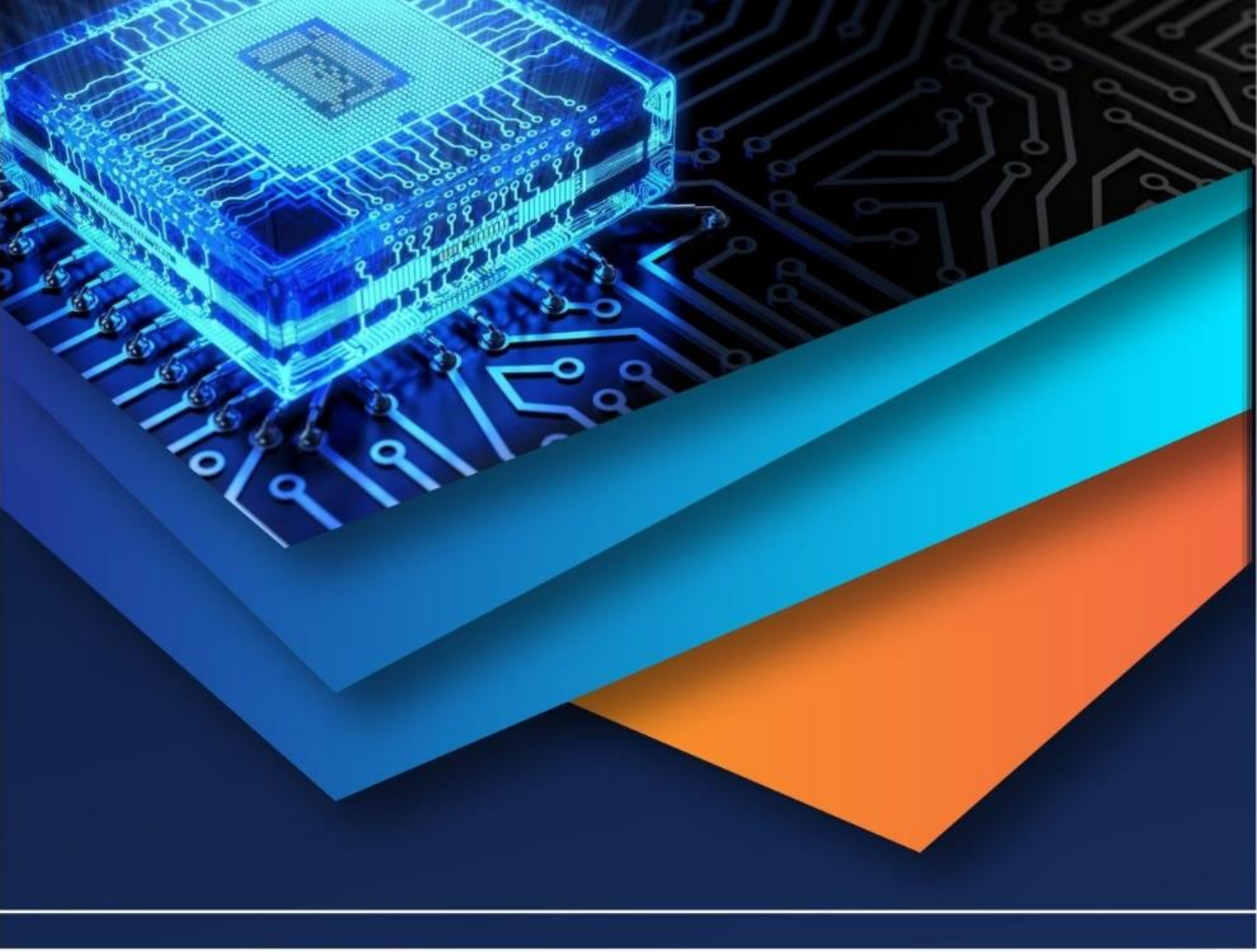
Conduct thorough testing of the application to ensure functionality, performance, and reliability. Perform unit tests, integration tests, and user acceptance tests to identify and fix any issues or bugs. Optimize the application for different devices and platforms.
Throughout the development process, it is essential to follow agile methodologies, collaborate with stakeholders, and conduct regular reviews and iterations to ensure the successful development and deployment of the intelligent real-time interactive application for public transportation.

IV. CONCLUSION

The development of an intelligent real-time interactive application for public transportation presents a significant opportunity to enhance the user experience and improve communication within the system. By integrating features such as a chat module and an alarm module, this application empowers passengers to actively contribute to the system's reliability, efficiency, and overall journey satisfaction. The chat module fosters community engagement, allowing passengers to exchange information, report issues, and inform others about any disruptions or concerns in real-time. This collaborative approach promotes a sense of shared responsibility among commuters and facilitates a more reliable and responsive public transportation network.
Additionally, the alarm module addresses the common issue of passengers missing their stops. By intelligently detecting the bus's proximity to the destination and triggering alarms or notifications, passengers are timely alerted and awakened from their sleep or quick naps. This feature ensures that they are aware of their impending arrival, minimizing the likelihood of missed stops and improving overall convenience and passenger satisfaction. The development process for this application involves a thorough understanding of user requirements, careful design and implementation, integration of relevant technologies, and rigorous testing to ensure functionality and performance. By leveraging mobile app development frameworks, geolocation services, real-time data processing, and notification systems, the application can provide seamless and valuable services to public transportation users.
Overall, the intelligent real-time interactive application for public transportation contributes to the advancement of intelligent transportation systems. It addresses the evolving needs and expectations of passengers by leveraging real-time data and interactive communication. The findings and insights gained from this project have the potential to transform public transportation networks, creating a more efficient, reliable, and user-centric travel experience for commuters around the world.

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