Bus Ticket Reservation and Seat Allocation System Using Blockchain Technology

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Abstract

The Bus Ticket Reservation System is an online platform that provides a user-friendly interface for booking and managing bus tickets. The system offers various features such as seat reservation, ticket booking, cancellations, and route inquiries. When all bus tickets are reserved, passengers receive a prompt to make a booking. When a admin accepts the passenger's request, the system automatically sends a notification through email and mobile number, informing the passenger that their request has been accepted. The passenger is then prompted to make the payment process to confirm the seat. Once the payment is completed, the ticket is confirmed, and the passenger is ready to embark on their journey. During boarding, passengers can choose luggage retrieval options: Ticket number input and image upload. For lost luggage, use the complaint section with a boarding day image. You can visualize historical passenger travel data using a bar chart to compare online and offline ticket bookings, while also showing the total number of passengers, total seats, and unbooked tickets.

Keywords: Blockchain technology, Decentralized system, Smart contracts, Ticket verification, P2P network, Consensus mechanism, Crypt currency payments.

INTRODUCTION

In India, where buses are a lifeline for millions of commuters, the need for a modernized bus ticket reservation and seat allocation system has never been more evident. The existing challenges faced by travellers, such as long queues at bus terminals, uncertainty about seat availability, and the lack of a convenient online booking system, often lead to frustration and inconvenience.

Our new Bus Ticket Booking and Seat Allocation System have been meticulously designed to address these pain points. With a user-friendly interface and a robust online platform, passengers can now effortlessly book their bus tickets from the comfort of their homes or on-the-go, eliminating the need for tiresome visits to overcrowded terminals.

One of the standout features of our system is the ability for passengers to select and secure their preferred seats in advance. No more last-minute seat shuffling or discomfort during the journey. This feature empowers passengers with choice and ensures a more pleasant travel experience. For bus operators, our system offers streamlined ticket management, accurate occupancy data, and optimized seat allocation. Our mission is clear: to transform the bus travel experience in India, making it more efficient, convenient, and secure. We are committed to revolutionizing the way passengers' book tickets

and secure their seats, ultimately contributing to a smoother and safer journey for all. Welcome to the future of bus travel in India with our Bus Ticket Reservation and Seat Allocation System.

LITERATURE SURVEY

Bus Ticket Reservation and Seat Allocation Systems is a promising avenue that offers numerous benefits. A literature survey reveals that this innovative approach enhances security and transparency in ticketing processes. Blockchain's decentralized ledger ensures tamper-proof records of ticket sales, reducing fraudulent activities. Furthermore, it streamlines the ticket booking process by eliminating intermediaries and their associated fees, resulting in cost savings for both operators and passengers. Studies also emphasize the potential for improved data management in the transportation sector. Blockchain can securely store passenger information, aiding in contact tracing and ensuring compliance with safety protocols during the ongoing pandemic. Research suggests that blockchain-based systems enable more efficient seat allocation, as the technology can automate the process based on predefined rules and passenger preferences. This not only enhances passenger satisfaction but also optimizes bus occupancy, reducing operational costs. Additionally, the adoption of blockchain fosters trust among passengers, as they can verify ticket authenticity and occupancy details on the transparent and immutable blockchain ledger. This increases confidence in the ticketing system.

BLOCKCHAIN TECHNOLOGY

Blockchain was invented by a person (or group of people) using the name Satoshi Nakamoto in 2008 to serve as the public transaction ledger for the crypt currency Bitcoin. The identity of Satoshi Nakamoto is unknown. The invention of the blockchain for Bitcoin made it the first digital currency to solve the double spending problem without the need for a trusted authority or central server. The Bitcoin design has inspired other applications, and blockchains that are readable by the public are widely used by cryptocurrencies. Blockchain is considered a type of payment rail. Private blockchains have been proposed for business use. It is highly secure and safe. Blockchain is a decentralized ledger of all transactions across a peer-to-peer network. Using this technology, participants can perform transactions without the need for a central certifying authority. Blockchain technology enhances bus ticket booking systems by providing secure and transparent transaction records, reducing fraud, and ensuring efficient, decentralized ticketing processes.

EXISTING METHODOLOGIES

Bus ticketing systems handle seat bookings, reservations, cancellations, and route inquiries. They rely on centralized databases managed by operators or third parties. Passengers use websites or apps for scheduling, seat selection, and payments. However, this system does not having luggage retrievals.

PROPOSED SYSTEM

In this bus ticketing system, the process unfolds systematically to ensure a smooth experience for passengers. Initially, when all bus tickets are fully booked, passengers are prompted to initiate a reservation. Once they make their request, an administrator reviews and approves it. At this point, the system automatically sends a confirmation notification to the passenger through email and their mobile number, signifying acceptance of the request. Following the confirmation, the passenger is prompted to proceed with the payment process to secure their seat. Once the payment is successfully completed, the

ticket is officially confirmed, and the passenger is all set to embark on their journey with peace of mind, knowing that their reservation is secured.

To enhance the security and transparency of the ticketing process, blockchain technology is employed, effectively preventing any price tampering or fraudulent activities. Additionally, for the convenience of passengers in case of lost luggage, an advanced CNN (Convolutional Neural Network) algorithm is utilized. Passengers can input their ticket number, provide luggage details, and upload a photo on the day of their journey, facilitating a streamlined process for luggage recovery.

Moreover, the system provides valuable insights through data visualizations in the form of bar charts. These visual representations enable easy evaluation of both online and offline ticket bookings, offering key information such as the total number of passengers, available seats, and the count of unreserved tickets. This data-driven approach contributes to better decision-making and overall efficiency in managing the bus ticketing process.

MODULES DESCRIPTION
1. USER REGISTRATION MODULE

The User Registration Module is a critical component of a system that enables users to create accounts or log in. It collects essential demographic information such as Name, Gender, Permanent address, and Contact details during registration. Additionally, it manages user profiles, ensuring secure authentication for activities like booking and managing tickets within the system. This module plays a pivotal role in personalizing user experiences and maintaining the security and integrity of user data.

2. TICKET BOOKING MODULE

The Ticket Booking module is a user-friendly interface that enables passengers to easily search for bus routes, specify their departure and destination locations, and select travel dates. It allows passengers to choose their preferred seats and enter essential passenger details. This module also performs real-time validation of user inputs to ensure accuracy and checks seat availability to prevent overbooking. Overall, it streamlines the process of booking bus tickets while ensuring a seamless and efficient experience for passengers.

3. SEAT RESERVATION MODULE

This Module for buses is a crucial component of a transportation system that efficiently handles seat allocation. It operates in real-time, constantly updating the availability of seats as bookings are made. One of its primary functions is to prevent double-bookings, ensuring that a seat can only be reserved by one passenger at a time. Additionally, it offers a user-friendly interface for passengers, allowing them to browse and choose available seats as part of the booking process. This module streamlines the booking experience, optimizes seat utilization, and eliminates the risk of overbooking, enhancing overall passenger satisfaction and operational efficiency.

4. PAYMENT MODULE

The Payment Module in a bus ticket booking system plays a crucial role in secure payment processing, offering various options like credit/debit cards and digital wallets through trusted gateways. This integration ensures a smooth, secure transaction experience, boosting user confidence in data

protection. Its significance lies in enhancing the user experience by simplifying payments and streamlining the booking process.

5. NOTIFICATION MODULE

The Notification Module in a bus system plays a crucial role in enhancing communication and ensuring a smooth passenger experience. Firstly, it sends notifications to passengers via email and mobile messages to confirm their booking, allowing them to accept or reject booking requests conveniently. Secondly, it serves as a reminder system, alerting passengers about upcoming journeys and payment due dates, reducing the likelihood of missed trips or late payments. Additionally, the module may also notify the bus company's administrators about new bookings, helping them efficiently manage resources and track demand. Overall, the Notification Module contributes to passenger satisfaction, operational efficiency, and effective communication within the bus system.

6. LUGGAGE MANAGEMENT MODULE

The Luggage Management Module allows passengers to upload luggage images on boarding day. If luggage is lost, passengers can use the same images to report the issue, expediting the recovery process and improving efficiency and accuracy in handling lost luggage cases. This enhances the passenger experience when addressing luggage-related issues.

SECURE HASH ALGORITHM

Secure Hash Algorithm 256-bit, is a critical cryptographic function ensuring data integrity and security. It transforms input messages into 256-bit fixed-size hashes, preventing unauthorized alterations and bolstering data security.Its applications span cybersecurity, including secure password storage and digital signature creation for document authentication. SHA-256 employs intricate processes like message padding and mathematical operations to produce unique hashes for distinct inputs, rendering reverse engineering highly challenging.

SHA-256 is resilient against various attacks, resisting collisions, pre-image, and second pre-image attacks. Its strength against brute-force attempts further enhances data protection.SHA-256 is pivotal in cryptocurrency blockchain security, digital certificate generation for internet security, password hashing, and data integrity verification, ensuring trust and safeguarding systems and applications.

CONCLUSION

In conclusion, the Bus Ticket Reservation System streamlines the booking process, offers efficient request handling, and automates notifications, ensuring a convenient and reliable experience for passengers. It caters to group bookings and simplifies luggage retrieval and loss reporting. The integration of blockchain technology enhances transaction integrity and pricing transparency, fostering trust and security within the system. This approach has the potential to revolutionize bus ticketing, benefiting both passengers and bus companies. By allowing passengers to request tickets, select seats, and confirm bookings seamlessly, the system improves accessibility. Moreover, blockchain's inherent security and transparency can prevent fraud and ensure the safe recording of all transactions, making it a promising addition to the bus ticket reservation system. Overall, the integration of blockchain technology holds the promise of creating a trustworthy and dependable platform for ticket booking and payment processing.

FUTURE ENHANCEMENT

The future of bus ticket booking using blockchain offers efficiency, security, and improved passenger experience. Multiple passengers booking the same seat within a bus. Integration with IoT and AI enables real-time monitoring and optimized seat allocation. Enhanced security through identity management and biometric authentication. Convenient digital wallets and mobile payments for passengers. Interoperability for seamless multi-modal travel. AI-driven chatbots with NLP enhance customer support, offering real-time assistance and improving the user experience.

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