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Enhancing User Experience and Ride Efficiency: A Case Study of Bike-Sharing App Design

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Abstract: The bike sharing app "Bike Buddy" facilitate people living in the big cities particularly where number of two wheelers are increasing. Many prefer two wheelers to save time and money. This can avoid wastage of the time traveling by public transport. Personal cars used individually raises traffic problems. This has attracted attention in using and sharing of bike service. The app developed provides hassle-free, easy way to share bike. The rider once declares the travelling route, he invites friends to join the ride which is claimed to save money and traffic issue in large cities. The invitation is visible to people who want to travel by the said route. After accepting the invitation, the rider will pickup the designated passenger. The service, depending upon rider may be paid or free.
Keywords: Urban transportation, Traffic congestion, Time-saving, Cost-saving, Peer-to-peer sharing, Invitation system, Ride-sharing, Hassle-free transportation, App-based service, Sustainable transportation, Urban mobility

I. INTRODUCTION

In the era of burgeoning urbanization, where the hustle and bustle of city life necessitate innovative solutions for transportation, the "Bike Buddy" Android application emerges as a beacon of change. As the number of two-wheelers skyrockets, individuals are increasingly seeking efficient and economical alternatives to traditional commuting methods. In response to this burgeoning demand, "Bike Buddy" proposes a transformative approach to transportation, leveraging the ubiquity of smartphones and the connectivity they afford to create a robust bike-sharing ecosystem. This visionary application addresses the unique challenges faced by city dwellers, particularly those residing in sprawling metropolises where traffic congestion and time-consuming commutes are everyday tribulations. Understanding that many prefer the nimbleness and cost-effectiveness of two-wheelers, "Bike Buddy" endeavors to harness the power of shared mobility. By connecting bike owners, or riders, with like-minded passengers traversing similar routes, the application pioneers a community-driven paradigm shift in urban transportation. At the heart of "Bike Buddy" lies a symbiotic relationship between the rider and the passenger. The rider assumes the role of a facilitator, meticulously inputting ride details such as pickup and drop-off points, as well as the proposed time of travel. This information, once disseminated through the intuitive Android interface, becomes a beacon for passengers seeking a convenient, economical, and eco-friendly mode of transportation. The application's design prioritizes accessibility, ensuring that the process of ride-sharing is not only efficient but also user-friendly, catering to a diverse demographic. The significance of "Bike Buddy" extends beyond mere convenience; it encapsulates a vision for sustainable urban living. By leveraging the power of community collaboration, the application aspires to mitigate the adverse effects of individual car usage, diminishing traffic congestion, and reducing the carbon footprint associated with daily commutes. As the rider extends invitations to friends or fellow commuters, the concept of shared responsibility takes root, fostering a sense of collective action in the pursuit of a more sustainable and interconnected urban environment.

In this survey paper, we delve into the multifaceted reasons fueling the surge in interest in bike-sharing applications, exploring the economic, environmental, and social implications of this evolving transportation landscape. Through a comprehensive analysis, we aim to shed light on the transformative potential of "Bike Buddy" and similar initiatives, envisioning a future where shared mobility becomes synonymous with smart, sustainable, and community-driven urban living.

II. RELATED WORK

In the paper [1], In this current world, technology innovation is developing day by day which makes people's life easier and more comfortable. Nowadays, nearly every work of a computer and many features are presently empowered in a mobile application. To move in the city, it is quite expensive when people use transport privately but if it is possible to share, then the cost of transportation will decrease at least half or less than half. This paper presents an android application that works collectively using Google APIs and maps. This is a ride-sharing app. Users with the same destination will be able to share rides with others who are of the same place to reach. The application will calculate their fares. A database is used to store the records of registered users.

By using the android based platform, application would be optimized for any usage. For the applications, efficient offline and online algorithms have been presented. An algorithm with theoretical analysis and trace-driven simulations under practical settings has been verified. In the paper [2], This paper addresses challenges in bike-sharing systems, focusing on predicting the availability of bikes and free slots in bike-sharing stations for short-term durations (15, 30, 45, and 60 minutes). The study compares state-of-the-art techniques, emphasizing the importance of predictions to enhance service quality, especially for e-bikes that require recharging. Deep learning, particularly Bidirectional Long Short-Term Memory networks (Bi-LSTM), is identified as a robust approach, providing reliable and fast predictions, even with limited historical data. The research uses data from bike-stations in Siena and Pisa, Italy, within the Sii-Mobility National Research Project and Snap4City Smart City IoT infrastructure. The study contributes by offering a solution for short-term prediction of bike availability, demonstrating the validity and flexibility of the proposed model for different clusters and time series behaviors. The work is part of the Sii-Mobility project, aiming to improve sustainable mobility in the Tuscany region. The paper concludes with a structured overview of related works, data description, clustering, feature identification, machine learning approaches, and overall findings. In the paper [3], This paper addresses challenges in dealing with massive bike-sharing system (BSS) data, focusing on reducing high dimensionality and noise while extracting informative usage patterns. The research proposes a novel approach involving Discrete Wavelet Transform (DWT) for data representation and a two-phase framework for clustering BSS usage patterns. The method is applied to a 3-month bike usage dataset from the Chicago BSS, demonstrating the effectiveness of DWT in reducing dimensionality and filtering random errors.

The integrated time series clustering, employing Dynamic Time Warping (DTW), DTW barycenter averaging (DBA), and k-means, provides a comprehensive solution for analyzing BSS data. The contributions of the work include introducing a dimension reduction method for count series data and proposing a robust framework for processing and clustering BSS usage data.

In the paper [4], This research focuses on addressing the imbalance in the usage of sharing bikes caused by the uneven distribution of bike-sharing stations. The proposed hierarchical prediction model, consisting of network representation learning and a hierarchical prediction step, aims to forecast the future rentals and returns at each sharing bike station for efficient resource redistribution. Unlike previous models that primarily consider geographical factors, this approach integrates user preferences and global network information. Experimental results demonstrate the effectiveness of the proposed method, outperforming baseline models with significant improvements in prediction accuracy. The research contributes valuable insights into optimizing resource allocation in smart city transportation systems, particularly in the context of sharing bike services.

III. PROPOSED DESIGN

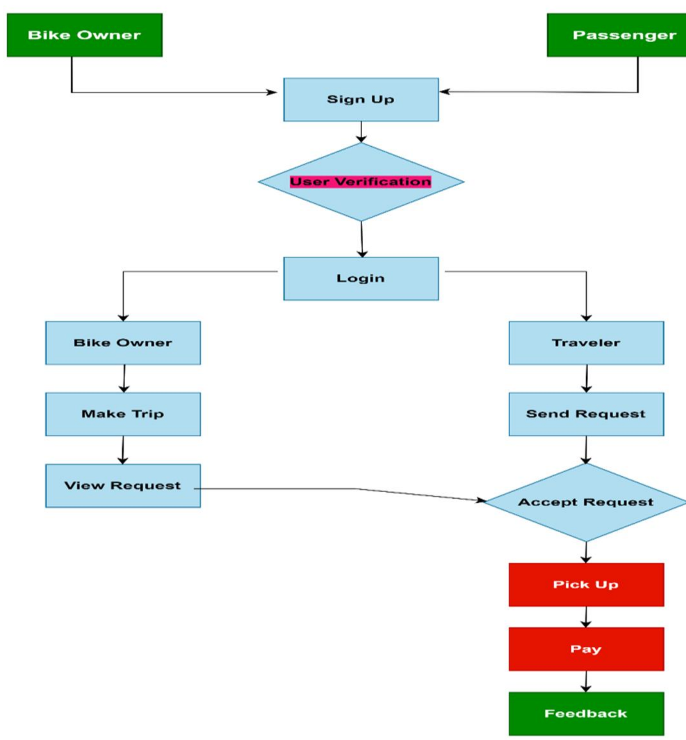

Figure 1: Proposed System Architecture

The Bike sharing android application plays vital role in between the bike owner and passenger to make the jouney and also the charge of that journey is distributed according to their distance of jouney.

Above fig(1) proposed system architecture for a bike-sharing mobile application. It outlines the interactions between two main user groups:

- *Bike Owner:* The person who registers their bikes on the platform for to making the requests.
- *Passenger:*The person who finds bikes through the application for their journey.

//System functionalities:-

1) *Sign Up:* Both Bike Owners and Passengers need to sign up to create an account and access the application's features.
2) *User Verification:* The system likely incorporates a user verification process to ensure user legitimacy, possibly through email or phone verification.
3) *Login:* Once signed up and verified, users can log in to the application using their credentials.
4) *Make Trip:* Bike Owner is make their trip and route to go. Passengers can search for available bikes based on their location. They can search by specifying their preferred pick-up location, drop-off location.. The application would then display a list of available bikes that meet the Passenger's search criteria.
5) *Send Request:* After finding or searching a suitable bike, passengers can send a request to the Bike Owner.
6) *Accept Request:* Bike Owners receive notifications about requests through the application and can choose to accept or reject them. If the Bike Owner accepts the request, the trip is confirmed, and the Passenger can share the bike at the designated location with bike owner.
7) *View Request:* Both parties can view the details of their requests, pick-up location, and drop-off location.
8) *Pick Up:* If the request is accepted, the passenger can pick up from the designated location.
9) *Pay:* Passengers can pay for their trip through the application using various payment methods, such as through cash or other UPI payment options.
10) *Feedback:* Passengers can provide feedback on their experience, potentially improving the system for future users. For example, Passengers might be able to rate the condition of the bike

//Additional considerations:-

The proposed architecture is a high-level overview, and a real-world implementation would require considering additional details:

1) *Security:* The system would need to be secure to protect user data, such as payment information and personal information.
2) *Scalability:* The system would need to be scalable to accommodate a large number of users and bicycles.
3) *Availability:* The system would need to be highly available to ensure users can always access its features.
4) *Location Services:* The application would likely use location services to allow Passengers to search for available bikes near them and track the location of bicycles.
5) *Integration with Payment Systems:* The system would need to integrate with payment systems to allow Passengers to pay for rentals.

Overall, the proposed architecture showcases a system where Bike Owners can list their bikes , Passengers can search for available bikes for their journey, and both parties can interact through the mobile application to manage the further bike sharing process.

IV. CONCLUSION

The implementation of "Bike Buddy" Application encapsulates the essence of modern urban mobility by seamlessly connecting bike owners with passengers, fostering a community-driven approach to transportation. As we navigate the challenges of city living, this innovative Android application not only offers practical solutions to time and cost efficiency but also promotes shared responsibility, contributing to a more sustainable and interconnected urban landscape. "Bike Buddy" stands as a promising example of how technology can revolutionize the way we approach mobility, offering a glimpse into a future where shared resources and community collaboration redefine the way we move through our cities.

V. ACKNOWLEDGEMENT

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