International Journal of Combined Research & Development (IJCRD)
eISSN:2321-225X;pISSN:2321-2241 Volume: 13; Issue: 5; May- 2024

AN EFFECTIVE MECHANISM OF BIKE RENTAL SYSTEM

Dr. Susil Kumar Sahoo
Professor & Head,
Department of Computer Science & Applications,
The Oxford College of Science, Bangalore
sushil.sahoo1@gmail.com

Adapala Yogitha Priyanka
PG Student,
Department of Computer Science & Applications,
The Oxford College Of Science, Bangalore
yogipriya2022@gmail.com

Subbara Prathyusha
PG Student,
Department of Computer Science & Applications,
The Oxford College Of Science, Bangalore
prathyushasubbara@gmail.com

ABSTRACT:

The Bike Rental Management System (BRMS) is a software application designed to streamline and automate the operations of a bike rental business. With the increasing popularity of biking as a mode of transportation and leisure activity, managing bike rentals efficiently has become crucial for rental businesses to thrive. Bike Rental Management System offers a comprehensive solution to manage various aspects of bike rental operations, including bike inventory, customer bookings, rental duration, billing, and reporting.

Bike Rental Management System will facilitate the functioning of web-based rental bike store [1]. The system allows customers to browse available bikes, check their specifications, and make reservations online. Once a bike is selected, customers can specify the rental duration and complete the booking process online. Each type of bike should have a different rental fee per day. Rental fee depends on number of days, brand and how fast the bike runs.

For the rental business owners and managers, Bike Rental Management System offers a centralized dashboard where they can monitor bike inventory, track reservations, and manage rental schedules. The system automatically updates the inventory status based on bookings and returns, ensuring real-time availability information.

ental rates can be easily configured based on factors like bike type, rental duration, and peak/off-peak hours.

The system equipped to answer customer's inquiries about the availability and rental fee of various types of bikes for certain dates in the future. When the customer makes a decision about the type of bike and the dates, the system should be able to reserve or earmark the requested type of bike for requested dates. The customer should be given a confirmation number.

Keywords: Docking Station, Sustainable Urban Mobility, Geofencing, Fleet, Rental Bikes, Booking System, User Registration, Rental Duration, User Feedback /reviews.

1. INTRODUCTION

Urban transportation systems are facing increasing challenges due to growing populations, congestion, and environmental concerns [2]. In response to these challenges, bike rental systems have emerged as a promising solution to promote sustainable and efficient urban mobility. This research paper explores the role of bike rental systems in enhancing urban transportation and the impact they have on cities and their inhabitants.

Traditional modes of urban transportation, such as cars and public transit, often contribute to congestion, air pollution, and carbon emissions. Additionally, they may not always provide

a convenient or cost-effective means of travel, especially for short distances. Bike rental systems offer an alternative mode of transportation that is not only environmentally friendly but also promotes health and well-being.

In today's fast-paced world, the demand for convenient, eco-friendly, and efficient transportation solutions is higher than ever [3]. With the rise of urbanization and environmental awareness, biking has emerged as a popular mode of transport for short to medium distances. However, managing a bike rental service efficiently requires more than just providing bikes – it demands a robust system that streamlines operations, ensures customer satisfaction and contributes to a sustainable urban environment. This paper introduces and explores the significance of a Bike Rental Management System (BRMS) in addressing these challenges and optimizing bike rental operations.

2. LITERATURE REVIEW

"Two-wheeler Rental System Based on the Block Chain Technology" by D. P. Xu, published in the journal Applied Sciences in 2018 [4]. The paper presents a motorcycle rental system based on the block chain technology, which provides users with a secure and transparent way to rent motorcycles. The system uses a decentralized network to store rental information and process transactions, which ensures that the data is tamper-proof and cannot be altered. The system also includes a reputation system that allows users to rate each other based on their rental experience, which helps to improve the overall quality of the service. "Developing a Context-Aware Motorcycle Rental System" by A. L. Shima and A. E. Ahmed, published in the journal Wireless Personal Communications in 2018. The paper proposes a context-aware motorcycle rental system that takes into account the user's location, preferences, and the availability of motorcycles to provide a personalized rental experience. The system uses a combination of sensors, mobile devices, and machine learning algorithms to predict user behaviour and make recommendations based on their preferences.

Ma et al. (2019) investigates the environmental impacts of bike-sharing systems, highlighting their role in reducing greenhouse gas emissions and promoting sustainable urban transportation.

Lathia et al. (2020) provide a comprehensive review of bike-sharing systems, examining their evolution, operational models, and technological advancements. Martinez et al. (2021) analyze the growth and trends of bike-sharing systems worldwide, emphasizing innovations such as dock less bikes and electric-assist bicycles. Milakis et al. (2021) assess the challenges of integrating bike-sharing systems with public transit, highlighting issues such as first/last-mile connectivity and interoperability.

Broach et al. (2022) conduct a case study of a bike-sharing program at a university campus, evaluating its impact on student travel behaviour, satisfaction, and environmental outcomes.

3. METHODOLOGY

Developing a Bike Rental Management System (BRMS) involves several stages, including planning, design, implementation, and testing. The methodology for building a BRMS typically follows a structured approach to

ensure the system meets the requirements of both rental operators and users. Here's an overview of the methodology used in developing a BRMS:

A. Needs Assessment and Planning

- Identify Objectives: Determine the goals of the bike rental system, such as promoting sustainable transportation, improving mobility, and reducing carbon emissions.

As part of our research, we conducted a survey through online using Google forms. The analysis of our study is as follows:

What type of transportation is used more?

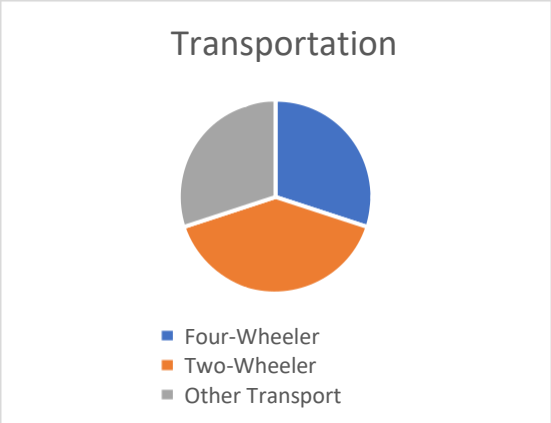

Fig. 1. Mode of transportation used by society(maximum)

As per the above data, the usage of two-wheeler is more compared to other transport.

Have you ever used Rental System?

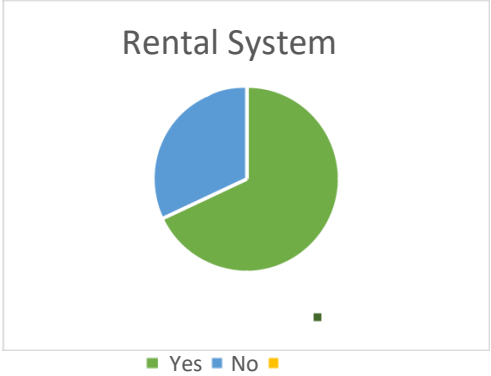

Fig. 2. This pie chart depicts whether public uses rental system or not

- Gather Data: Conduct surveys, interviews, or focus groups to understand the transportation needs and preferences of common people. Identify potential users, their travel patterns, and key destinations.

As part of our project, the survey is conducted based on usage of transport by gender

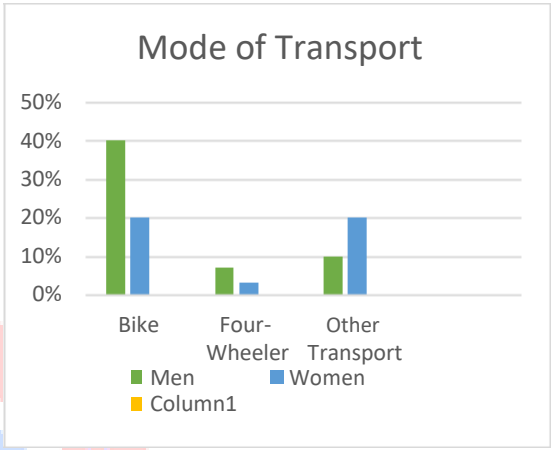

Fig. 3. This bar chart depicts the usage of different modes of transport by gender

B. System Design and Technology Selection

- Choose System Type: Decide on the type of bike rental system based on campus characteristics and user needs. Options include docking stations, dock less bikes, or hybrid systems.
- Select Technology: Choose appropriate technology for bike rental operations, such as bike locks, payment systems, and rental management software. Consider factors like user convenience, security, and scalability.
- Design User Interface: Develop a user-friendly interface for renting bikes, managing accounts, and accessing rental information.

Consider mobile apps, self-service kiosks, or web-based platforms for ease of use.

Fig. 4. User-Interface of Bike Rental System

C. Infrastructure Development

- Identify Station Locations: Determine optimal locations for bike rental stations based on, student traffic, and accessibility. Consider placing stations i.e., dock stations near residence halls, academic buildings, and recreational areas.
- Install Stations: Set up bike rental stations equipped with racks, bikes, signage, and information boards. Ensure stations are well-lit, visible, and easily accessible to users.

D. Operational Procedures

- User Registration: Develop a registration process for users to create accounts and access the bike rental system. Collect necessary information such as Aadhaar card number, contact details, and payment preferences.
- Rental Process: Implement procedures for renting bikes, including user authentication, bike selection, and payment. Provide options for both online and on-site rentals.
- Safety Guidelines: Communicate safety rules and guidelines for bike usage, including helmet requirements, traffic laws, and bike care instructions. Provide educational materials and training sessions for users.

E. Marketing and Promotion

- Launch Campaigns: Develop marketing campaigns to promote the bike rental system to public. Use various channels such as social media, social events, posters, and email newsletters.
- Incentives: Offer incentives and promotions to encourage bike usage, such as discounts, free rides, or referral bonuses. Partner with campus organizations, clubs, or businesses for co-branded promotions.

4. WORKING

- The user interface is developed using HTML, CSS including JavaScript [4]. The UI allows users to browse available bikes, view their details and rental rates, and make bookings.
- The server-side of the application is developed using PHP. It is responsible for processing user requests, retrieving data from the database, and sending responses back to client.
- The application uses MySQL database to store all the data related to the Bike Rental System for college students. This includes bike details, rental rates, user data and bike information.
- The application includes an authentication mechanism to ensure that only authorized users can access the system.
- The application includes a payment gateway to process payments made payment gateway service such as Razorpay.

5. RESULT

Bike Rental Management System for is user friendly web application. Bike Rental System is fully functional and flexible. User has all rights of adding a new bike, booking bike, and managing bookings. And reporting after booking bike user will make payment successfully.

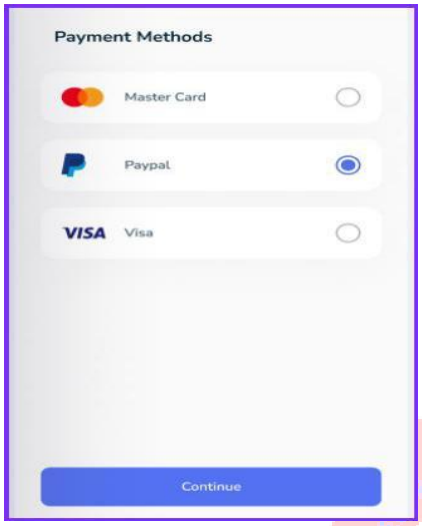

Fig. 5. Payment Methods

6. CONCLUSION

Bike Rental Management System is a web application and it is restricted to only limited type of users. In this application, Admin have all rights like managing bookings, transactions, managing user profiles, etc.

As this web application is designed for limited users, it offers numerous benefits in terms of convenience, affordability, and sustainability [5]. By providing easy access to bikes on campus, universities can significantly enhance the mobility options available to poor people, thereby improving their overall experience.

The integration of such a system provides a solution to common transportation challenges faced by college students, including limited parking, high transportation costs, and the need for flexible, on-demand mobility. With the convenience of renting bikes on campus, students can easily navigate between classes, dorms, libraries, and recreational facilities without relying on cars or public transportation.

7. FUTURE SCOPE

The future scope of a bike rental management system is vast, with opportunities for expansion, innovation, and integration with emerging technologies [6,7]. Here are some potential future directions:

- Sustainable Initiatives: Expand the use of electric bikes (e-bikes) in the rental fleet to promote sustainable transportation options. It introduces bike-sharing programs for public to further reduce the carbon footprint of commuting to campus.
- Integration with Campus Services: It integrates the bike rental system with campus services such as student ID cards, meal plans, and campus events. And offer discounts or rewards for students who use bikes to access campus amenities or attend university-sponsored events.

Overall, the future scope of a bike rental management system for common people is not only about providing convenient transportation but also about fostering a culture of sustainability, innovation, and community on campus and beyond. By embracing these opportunities, universities can create a more vibrant and eco-friendly campus environment while empowering students to lead healthier and more connected lives.

8. REFERENCES

[1] An exploratory study of the bike rental system, Hana Ayadi, Alaeddine Zouari, Nadia Hamani, June 2019.

[2] SDP-2 User Research on Bike Rental System, Kedaresh T, March 2021.

[3] Smart Recommendations for Renting Bikes in Bike-Sharing Systems, Holger Bilhardt, Alberto Fernandez, Sascha Ossowski, Oct 2021.

[4] Dock Based Bicycle Rental System, Harsh Tawade, Meghavi Hada, Deep Shah, Dr. Pankaj Chandre, June 2022.

[5] Online Car/Bike Rental Management System, Shivaraj Kumar T H, Jaweriya Mohammadi, Swapna B, July 2022.

[6] Two-Wheeler Rental System, Vishal Bhong, Mayur Nale, Mahesh Nale, Kunal Girigosavi, May 2023.

[7] Automated Bicycle Rental System and Parking Plan Study, Kimley-Horn and Associates, Inc., Metropolitan Planning Organization, 2011.