

BIKE BUDDY: TRUSTED COMPANION ON TWO WHEELS

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FINAL YEAR DESIGN PROJECT REPORT

This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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DHAKA, BANGLADESH

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APPROVAL

This Project titled “Bike Buddy: Trusted Companion on Two Wheels”, submitted by **201-15-14228 Md Mahabub Alam and 201-15-14229 Md Tanbeer Hossain** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 14-07-2024.

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We hereby declare that this project has been done by us under the supervision of **Mr. Narayan Ranjan Chakraborty, Associate Professor and Associate Head, Department of Computer Science and Engineering, Daffodil International University.** We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree.

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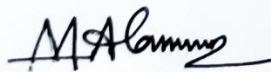
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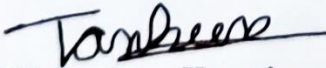


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ABSTRACT

To address the shortcomings of the current platforms and websites pertaining to bikes, this project presents " Bike Buddy: Trusted Companion on Two Wheels," a cutting-edge Android application that has been painstakingly designed to completely transform the biking experience. This project provides "Bike Buddy: Trusted Companion on Two Wheels," a state-of-the-art Android application that has been meticulously built to radically revolutionize the bicycling experience in order to overcome the deficiencies of the current platforms and websites relevant to bikes. "Bike Buddy: Trusted Companion on Two Wheels " is a cutting-edge product that uses carefully chosen features to cater to the various demands of both riders and bike enthusiasts. Acting as a one-stop shop for information, the app provides a vast database of information on bikes, complete with technical specs, user-friendly reviews, and professional analysis, enabling users to make well-informed choices. Beyond only providing information, "Bike Buddy" stands out for its ground-breaking location-based services, which seamlessly integrate features to locate and navigate around repair facilities and gas stations, giving riders unmatched convenience and peace of mind. The application's user-centric design approach shows in its user-friendly interface, which has been meticulously developed to provide seamless accessibility and navigation, increasing user happiness and engagement. Adopting an attitude of constant development, "Bike Buddy" is dedicated to changing along with its user community, taking use of real-time input and new developments in technology to enhance its features and capabilities. "Bike Buddy" is dedicated to providing top-notch products and services. Its objective is to simplify and enhance the biking experience, making it the ideal travel companion for bike enthusiasts and riders seeking new experiences.

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CHAPTER 1

Introduction

1.1 Overview

“Bike Buddy: Trusted Companion on Two Wheels” is an innovative Android application designed to overcome the limitations of existing bike-related websites and platforms. Unlike fragmented solutions, Bike Buddy offers a centralized hub for comprehensive bike information, including specifications, reviews, and thought sharing. The app provides location-based services, allowing users to easily find nearby bike service centers and fuel stations, thus simplifying maintenance and refueling needs. With a focus on user-friendly interface design, Bike Buddy ensures seamless navigation and an enjoyable user experience. The app is committed to continuous improvement, incorporating user feedback and technological advancements to stay relevant and effective. By doing so, Bike Buddy enhances the biking experience for both casual riders and dedicated enthusiasts, offering convenience, reliability, and a wealth of information at their fingertips. This centralized approach not only saves time but also fosters a more connected and informed biking community.

1.2 Background and Present State

The motivation behind "Bike Buddy" is inspired by the observation that while existing websites offer bike information and some even provide details about bike service centers, they lack location-based information. Additionally, while platforms like Google Maps offer precise locations for fuel stations and service centers, there needs to be more centralized solutions that combine all these features. Currently, bike enthusiasts face the inconvenience of having to switch between multiple platforms to gather comprehensive information about bike specifications, reviews, fuel stations, and service centers. This fragmentation results in a disjointed and inefficient user experience. Recognizing this gap, we aim to develop Bike Buddy as a centralized solution that seamlessly integrates all these features, providing a one-stop platform for all biking-related needs. By doing this, Bike Buddy aims to solve the difficulties facing bike lovers and provide a more effective, simple-to-use, and informative experience.

1.3 Problem Statement

The main goals of this Project are:

1. Create a centralized information hub for comprehensive bike details.

2. Provide location-based information on nearby service centers and fuel stations.
3. Develop a user-friendly interface for seamless navigation.
4. Commit to continuous improvement based on user feedback and technological.

1.4 Objectives

The main purpose of this Project is:

1. Create a centralized information hub for comprehensive bike details.
2. Provide location-based information on nearby service centers and fuel stations.
3. Develop a user-friendly interface for seamless navigation.
4. Commit to continuous improvement based on user feedback and technological advancements.

1.5 Scope and Limitations

The expected outcomes for " Bike Buddy: Trusted Companion on Two Wheels" include:
The project outcome of Bike Buddy shows how well it solved the issues that riders and bike lovers faced. This comprehensive Android application offers a user-friendly interface where users can access detailed bike information, including specifications and reviews, in one centralized location. Additionally, Bike Buddy provides location-based services, enabling users to easily find nearby bike service centers for maintenance and repairs, as well as fuel stations for refueling during rides. The project outcome highlights our commitment to continuous improvement, with plans for future enhancements based on user feedback and technological advancements. In summary, Bike Buddy offers a valuable solution for bike enthusiasts, simplifying the bike buying process and increasing the biking experience.

1.6 Report Organization

This well-organized project report is divided into multiple Chapters, each of which highlights important project details. A summary of the study and an analysis of earlier research in the area come first. The project's code, design specifications, and other relevant information are covered in the next sections. A presentation of the finished product is made, and then the project is put to the test. In addition to recommendations for more research in this area, the paper ends with an appraisal of the project's results, social benefits, and overall effect. Here is the Architecture of Report Organization.

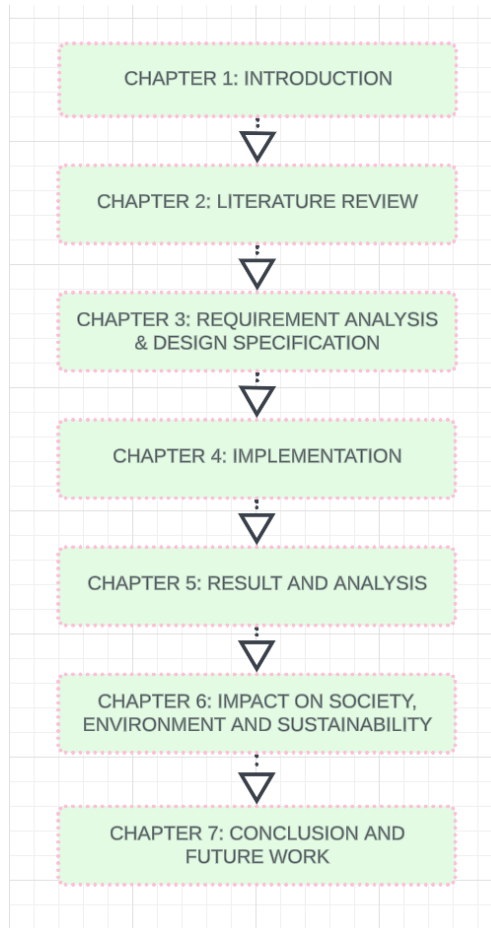


Figure 1.1: Report Organization

1.7 Summary

In summary, the Bike Buddy project aims to solve the gap in existing bike-related websites and platforms by offering a comprehensive Android application to bike enthusiasts and riders. The application addresses various limitations, including the lack of mobile applications, incomplete information, poor UI/UX design, and limited features, by providing a centralized information hub with detailed bike specifications and reviews, location-based services for nearby bike service centers and fuel stations, forum section for thought sharing and a user-friendly interface for seamless navigation. With a commitment to continuous improvement, Bike Buddy offers a valuable solution that simplifies the bike buying process and enhances the overall biking experience.

CHAPTER 2

Literature Review

2.1 Overview

This section evaluates existing bike-related websites, highlighting strengths and weaknesses. It identifies common limitations such as the need for mobile apps, incomplete information, and poor UI/UX plans. Suggestions include implementing extra features and improving user experience. Overall, there's a requirement for improvements to create a more user-friendly platform for bike enthusiasts.

2.2 Related Work

In the related study for "Bike Buddy - Android Application," we examine similar platforms, technologies, and research focusing on bike management, user interfaces, security, and personalized services. Here's a summary of almost similar works:

Bike Management Startups: Analyze and evaluate the features, benefits, and limitations of existing bike-related mobile applications. Review popular apps such as BanglaMotor[1], BikeBD[2], DeshiBiker[3], MotorcycleValley[4] to gain insights into functionalities, user experiences, and advancements in the field.

Graphical User Interface: Find best practices and principles for designing user-friendly interfaces for mobile applications. Study successful bike-related apps to understand effective UI/UX design elements, intuitive navigation, and ways to enhance user engagement.

Security Measures in Mobile Applications: Looking for industry-level security system, encryption technology to ensure user data protection and platform security. Review reading articles and case studies on building a secure mobile application.

Customization and Suggestion Frameworks: Verify methods and Technique used in recommended systems within bike-related applications. Explore how machine learning and AI techniques can be employed to provide personalized bike recommendations and service suggestions based on user data.

Agile Development Methodologies: Read the publications and case studies discussing the implementation of Agile methodologies in mobile app development. Evaluate how iterative and collaborative approaches can facilitate the development of complex applications like Bike Buddy.

Industry Trends and Innovations: Explore the latest trends, emerging technologies (such as IoT and connected vehicles), and innovations impacting the bike industry. Assess the potential effects of these advancements on the architecture and features of the Bike Buddy.

Study in Bike Management: Review scholarly articles, journals, and conference proceedings focused on bike-related articles such as user behavior analysis, user satisfaction with bike platforms, and technological advancements in the bike industry.

Gathering knowledge from related fields can provide valuable insights, standards, and ideas for designing, developing, and enhancing the "Bike Buddy - Android Application."

2.3 Comparison between existing works

A comparative analysis for " Bike Buddy: Trusted Companion on Two Wheels" include evaluating comparable systems or platforms that are currently in use. For a comparison examination, consider the following breakdown:

Lack of Mobile Applications: Several analyzed sources do not offer a mobile application, which limits accessibility and convenience for users who prefer mobile devices.

Incomplete Information: Some sources lack essential details such as showroom information, service center lists, or necessary specifications, which hinders a comprehensive user experience.

Poor UI/UX Design: Multiple sources have been criticized for their poor user interface and user experience design, which can negatively impact user engagement and satisfaction.

Limited Features: While most sources offer basic features such as bike specifications, reviews, and blogs, there is a common suggestion to implement additional features like an e-commerce system or an Android application to enhance functionality and user experience.

SL No	Reference	Function/Feature	Advantages	Limitation	Suggestion
1.	[1]	Bike Information, Blogs, Tips, and News	All Bike information is available at once.	No mobile application is Available	Build an Android app for this site.
2.	[2]	Bike specification, Showroom Details, review, Comparison.	All Bike information is available at once.	No Android application and Service center lists are available.	Implement more Features.
3.	[3]	Bike Specifications, review & blog	Pre-owned bikes, accessories for sale.	Lack of Showroom details and mobile application	Adding necessary showroom details shows less advertising.
4.	[4]	Bike details, review & blog.	EMI for bikes.	Pre-owned bikes, accessories for sale, No mobile application	Attach Ecommerce system.
5.	[5]	Bike and sealer point information	User review	Poor UI/UX design,	Improve UI/UX
6.	[6]	Bike Specifications, review & news.	E-commerce system, EMI	Pre-owned bikes, accessories for sale	Improve UI/UX design

7.	[7]	Bike Specifications, review & news.	E-commerce system, EMI	Pre-owned bikes, accessories for sale	Improve UI/UX design
8.	[8]	Showing the location of bike rental sites, real-time available locations of parking spots.	All facilities at once.	Information on rental sites or availability of parking sites.	add parking slots and rent prices.
9.	[9]	Road safety, travel cost.	The smartest and most suitable route, efficient for bikers/cyclists.	Lack of service center, and user review.	make a section for users to express their real opinions against the application.
10.	[10]	Bike sharing, borrowing.	Time Saving, cost-efficient.	Users can't use it if NFC is unavailable.	Make it usable without NFC

Table 2.1. Comparative analysis

2.4 Open Issues

The scope of the project encompasses the development of a robust Android application that effectively resolves the challenges faced by bike enthusiasts and riders. The application offers a centralized platform where users can access detailed bike information, thereby simplifying the bike-buying process. Additionally, Bike Buddy provides location-based

services, allowing users to easily locate nearby bike service centers for maintenance and repairs, as well as fuel stations for refueling during rides.

2.5 Summary

The comparative analysis reveals strengths like comprehensive bike information, reviews, and blogs across sources. However, common limitations such as lack of mobile applications, incomplete data, and poor UI/UX design are evident. Suggestions for improvement include implementing additional features, enhancing UI/UX, and filling information gaps like showroom details.

In summary, there's a clear opportunity to enhance functionality, user experience, and overall value for bike enthusiasts and consumers by addressing identified gaps and implementing suggested improvements. The focus is on delivering a more robust and user-friendly platform for accessing bike-related information, ultimately enriching the experience for all users.

CHAPTER 3

Requirement Analysis & Design Specification

3.1 Overview

The development approach for Bike Buddy begins with a thorough requirement analysis to identify the unique needs and preferences of riders and bike enthusiasts. The goal is to create a comprehensive road map for developing a robust Android application that addresses the limitations of current bike-related platforms. Through extensive research and direct engagement with potential users via questionnaires, interviews, and feedback sessions, we have gained valuable insights into their expectations and pain points. This analysis highlights the necessity of a single, comprehensive solution that provides detailed bike information, including specifications and reviews, along with location-based services for finding nearby service centres and fuel stations. Understanding these requirements is crucial for ensuring that Bike Buddy meets user needs effectively, offering a more streamlined and informative experience compared to existing options.

The design specification for Bike Buddy focuses on creating a feature-rich, user-friendly application that meets the identified needs of our target audience. It prioritizes a seamless user experience with an intuitive and visually appealing interface that facilitates easy navigation and quick access to information through clear layouts and visually distinct icons. Robust security measures will be implemented, including encryption protocols, secure user authentication, and regular security audits. Scalability is ensured through a scalable architecture leveraging cloud-based infrastructure and efficient coding practices to handle growing user loads and data volumes. Customization options will allow users to personalize their experience, such as saving favorite bike models and setting preferences for notifications. The application will integrate comprehensive bike information, including specifications, reviews, and comparisons, as well as location-based services for real-time information on nearby service centers and fuel stations. By addressing user experience, security, scalability, and customization, we aim to develop a robust and enjoyable application that stands out from existing solutions and meets the diverse needs of bike enthusiasts.

3.2 System Design

Front-end Design:

"Bike Buddy: Trusted Companion on Two Wheels" features a modern, user-friendly front-end design tailored for cyclists. The interface uses responsive design principles to ensure seamless usability across smartphones and tablets. It offers an intuitive layout for easy navigation and quick access to bike specifications, fuel and service center information. The design prioritizes accessibility, usability, and aesthetics, ensuring a pleasant and efficient UX for all bike enthusiasts.

Back-end Design:

For internal functionality, "Bike Buddy: Trusted Companion on Two Wheels" leverages the Python framework Django and the Django Rest Framework (DRF) to ensure robust performance and efficient data management. Django handles server-side logic, processes user requests, and facilitates dynamic content generation, while PostgreSQL manages the database. The PostgreSQL database is structured with tables for user accounts, bike models, specifications, fuel stations, and service centers, all optimized for quick queries and data integrity. Django Rest Framework builds RESTful APIs that interface with the PostgreSQL database, handling CRUD operations to ensure smooth data exchange between the front end and back end. Secure user authentication is implemented using Django's built-in authentication mechanisms and token-based authentication, with SQL injection prevention and data encryption methods protecting sensitive information. Data validation and business logic are managed by Django models and views to ensure accuracy and reliability of the data, including bike specifications and service center details. Performance is optimized through indexing in PostgreSQL, efficient query writing, and Django's caching mechanisms to reduce server load and enhance response times. This integration of Django and PostgreSQL provides a scalable, secure, and efficient platform capable of effectively managing user interactions and data tasks.

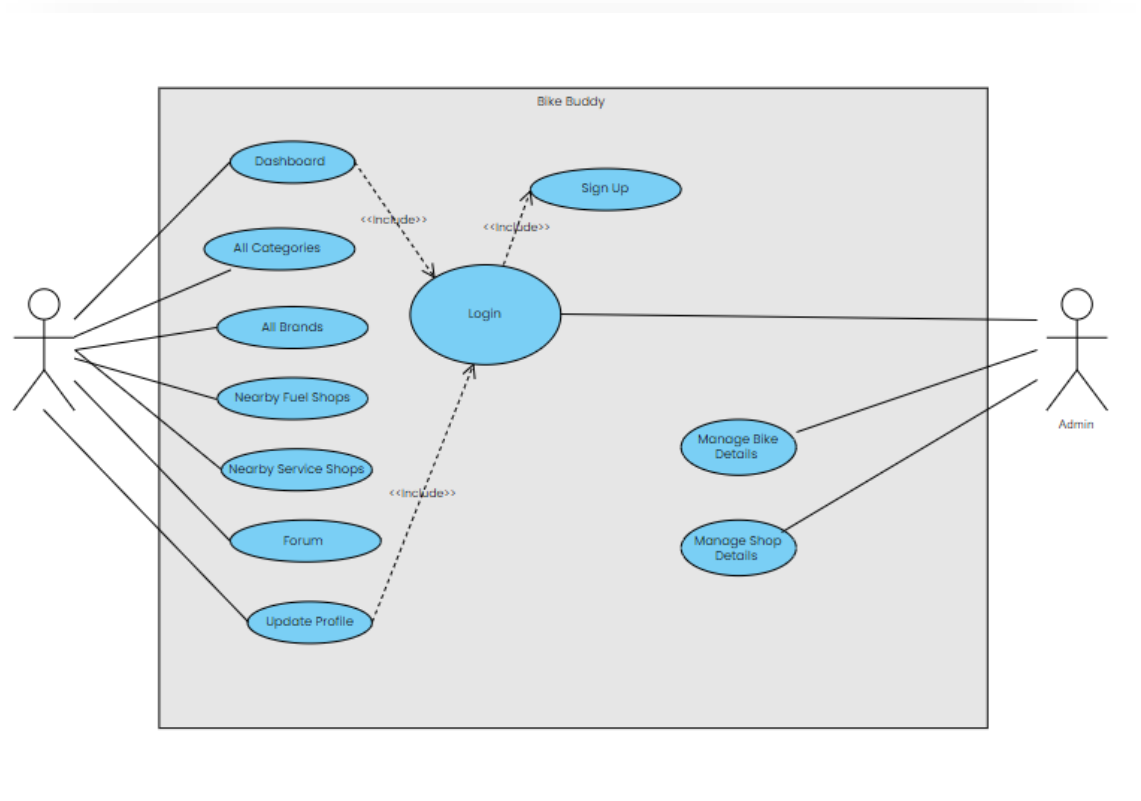


Figure 3.1 Use Case Diagram

The use case diagram shows interactions between two actors, User and Admin, with the system. Users can perform actions such as opening the app, logging in, signing up, viewing bike details, accessing nearby fuel and service shops, participating in forums, updating profile information, and logging out. Admins can log in and manage bike details, shop details, and user accounts, ensuring the smooth operation and maintenance of the application.

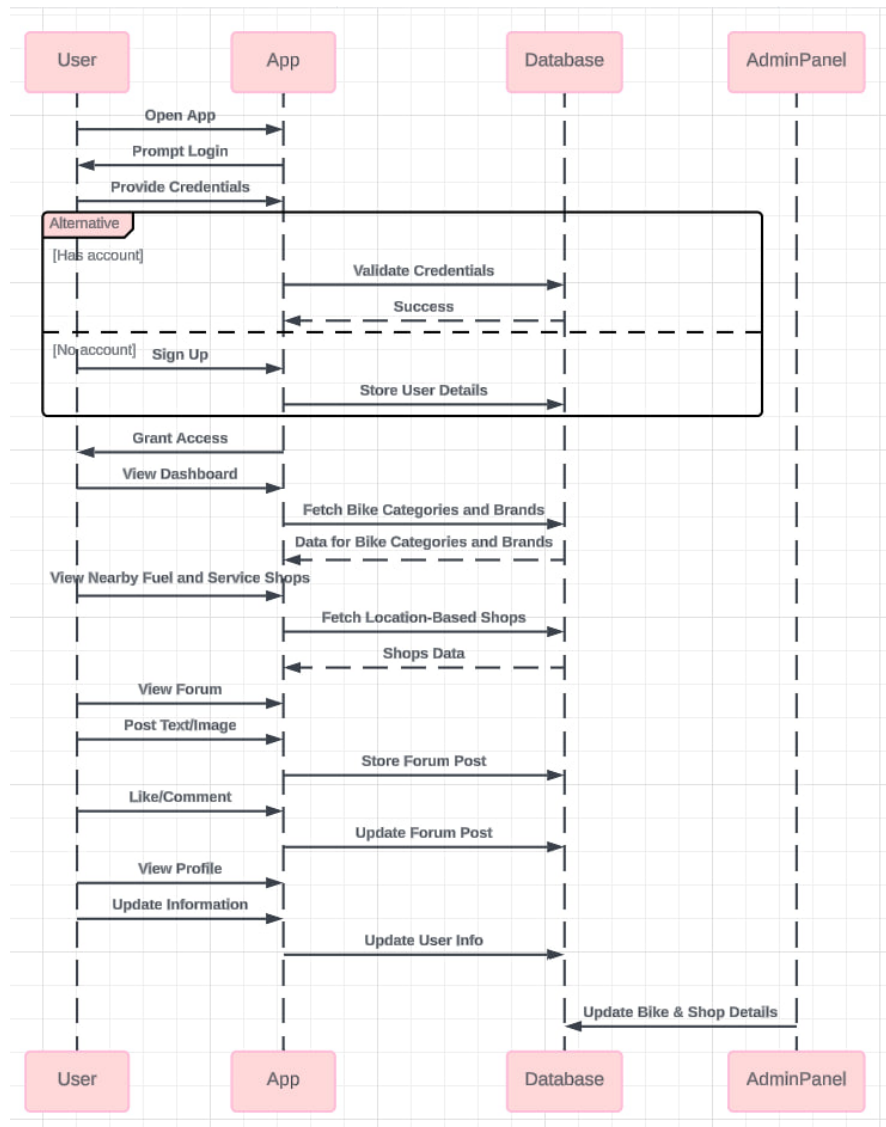


Figure 3.2 Sequence Diagram

The interactions between the User, System, and Admin are depicted in the sequence diagram. It displays the steps a user takes to visit the forum, examine bike and shop details, log in or sign up, use the app, and edit their profile. It also emphasizes the administrator's responsibility to maintain the database current by managing bike and shop details via the admin interface.

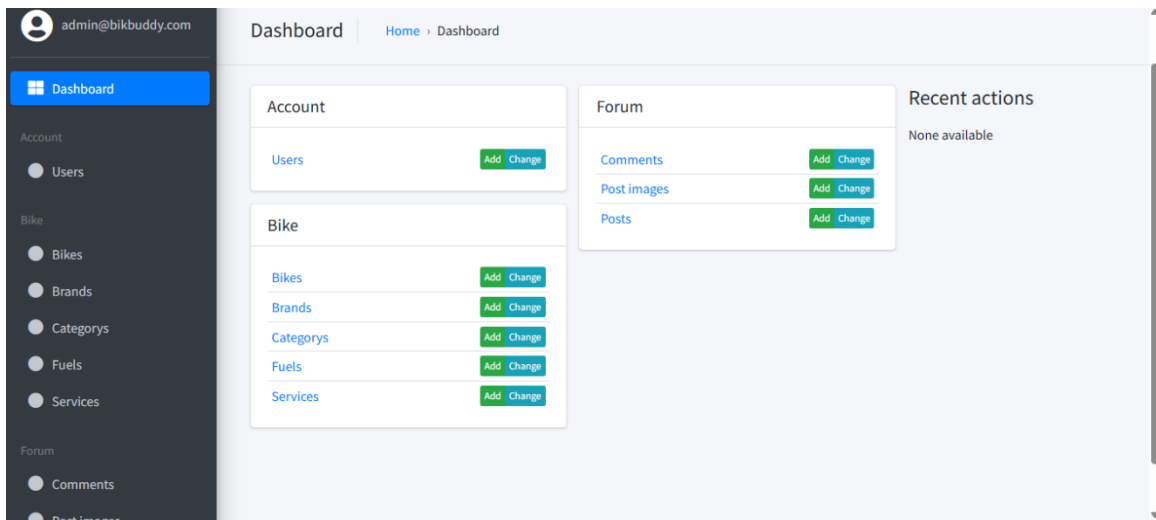


Figure 3.3 Admin Panel

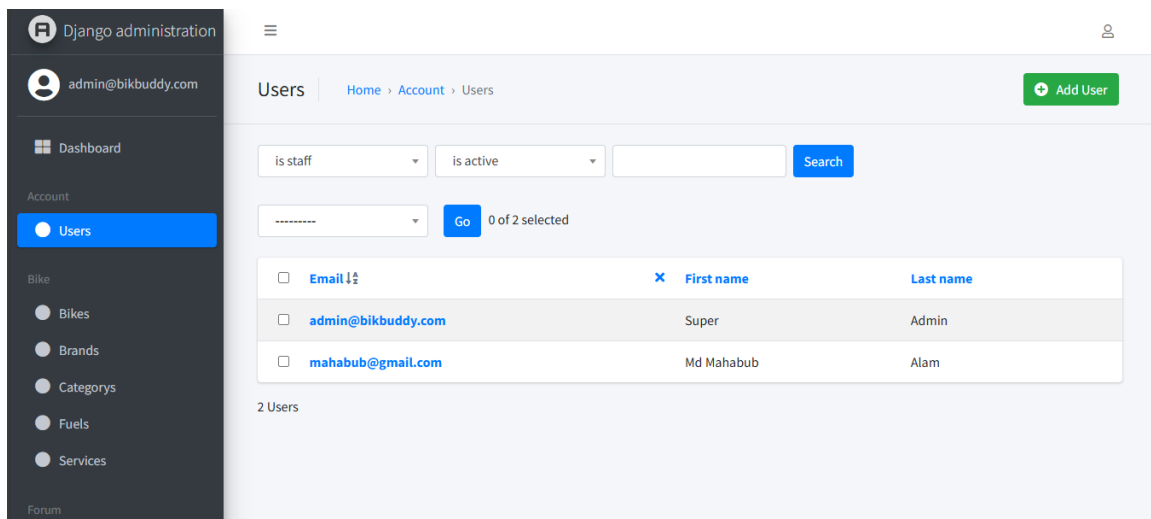


Figure 3.4 Admin List

3.3 Software Requirement

The following technical, operational, and developmental elements are included in the implementation requirements for "Bike Buddy: Trusted Companion on Two Wheels":

Front End:

XML

Java

Back End:

Python

PostgreSQL

Django

Tools:

VS Code

Web Browser

Android Studio (IDE)

3.4 Project Management and Financial Analysis

Project Management:

Project Planning: Write a thorough project plan that includes the assignments, due dates, completion dates, and resource allocation. To guarantee that all objectives are satisfied effectively and on time, this entails developing a timeline for every stage of the project.

Group Establishment: Put together a multidisciplinary team of developers, designers, QA specialists, and project managers with experience in database systems, development, UX/UI design, and security.

Obtaining Needs: To make sure the platform satisfies the demands of stakeholders, including riders, system administrators, and service providers, do in-depth research and collect specific requirements.

The Methodology of Agile Development For iterative development, employ an agile methodology that permits modifications and enhancements in response to input received throughout the development phase.

Design and Prototyping: Start with wireframes and prototypes to visualize the application's features and interface, ensuring ease of use and simplicity. Prototypes will be reviewed and refined to align with user expectations and improve overall usability.

Building and Quality Testing: Develop and integrate features and functionalities, followed

by rigorous testing (unit, integration, and user acceptance tests) to ensure functionality and quality.

Deployment and Launch: Execute the application launch in stages or iterations to ensure a smooth transition and minimal disruption, supported by a formal launch and marketing plan.

Monitoring and Maintenance: Establish a program for continuous monitoring, bug fixes, updates, and post-launch user support. This ensures the application maintains optimal performance and user satisfaction over time, adapting to new requirements and resolving issues promptly.

Finance:

Budgeting: Create a detailed budget plan covering infrastructure, marketing, staffing, software, hardware, and development costs.

Resource Allocation: Allocate funds effectively across project phases, prioritizing critical development stages and tasks.

Cost Management: Regularly monitor and control project expenses to ensure adherence to the budget, identifying areas for cost optimization without compromising quality.

Risk Management: Identify financial risks and develop contingency plans to address unexpected expenses or delays during development.

Return on Investment (ROI): Evaluate potential ROI based on market research, projected user base, revenue streams (transactions, subscriptions, and advertising), and long-term sustainability.

Funding Strategies: Explore funding options such as grants, investors, or partnerships to secure the necessary funds for development, marketing, and ongoing operations.

Financial Reporting: Maintain transparent and accessible financial records, regularly produce financial reports, and compare actual expenditures to budgeted amounts to monitor and evaluate financial performance.

Balancing effective project management practices with sound financial management ensures the successful development, launch, and sustainability of "Bike Buddy - Android Application" within the allocated resources and strategic objectives.

3.5 Summary

Our primary focus for Bike Buddy is on accurate data collection from a variety of sources, including bike-related websites, manufacturers' databases, and user-generated platforms. This comprehensive approach ensures that the information provided within the app regarding bike specifications, fuel stations, service centers, and pricing is both accurate and up-to-date. By integrating data from multiple reliable sources, we enhance the user experience, offering a centralized hub for all biking needs. The app aims to provide detailed bike information, such as specifications and reviews, alongside location-based services to help users easily find nearby service centers and fuel stations. This not only simplifies the bike buying process but also supports riders in maintaining their bikes and planning their trips. Emphasis is placed on a user-friendly interface, robust security measures, and scalability to accommodate a growing user base. Through continuous improvement and user feedback, Bike Buddy aspires to become the go-to platform for bike enthusiasts, offering a comprehensive and reliable solution for all their biking needs.

CHAPTER 4

Implementation

4.1 Overview

To implement our project, we started by designing a prototype model using Figma. Once the design was finalized, we moved on to the coding phase. We used XML for the interface creation to make an easily accessible interface. For the back-end development, we used Java and PHP to handle server-side processes. We also used SQL for database management to store and retrieve data efficiently. This mix of technologies helped us create a well-functioning system that met all our project requirements.

4.2 Prototype Design

The first user interface is a prototype design that may be easily updated or changed before complete deployment. The main goal is to improve the design in response to criticism. We proceed to the coding stage when the design is complete, at which point changes can still be made. This method guarantees that the finished product will be both practical and easy to use. It enables us to effectively handle any problems that come up while developing.

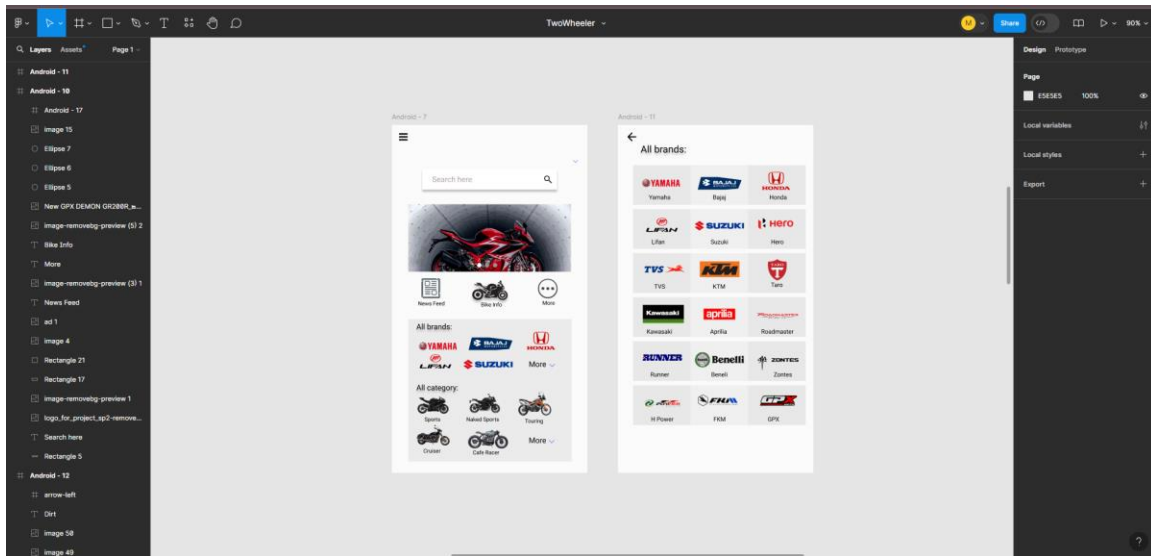


Figure 4.1: Prototype Design (Figma)

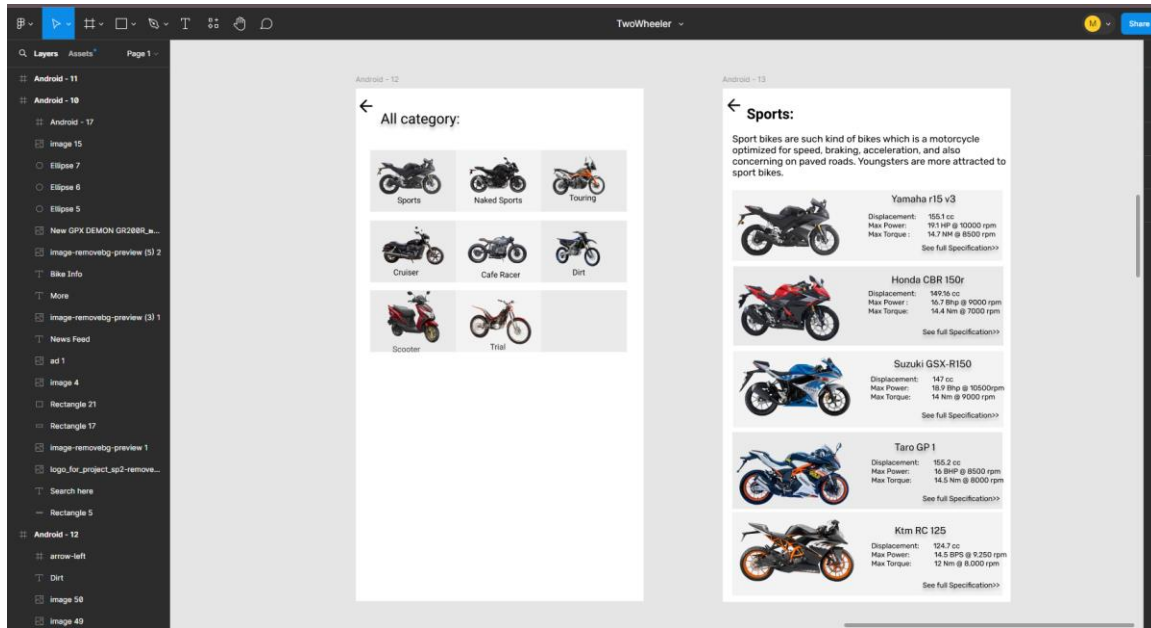


Figure 4.2: Prototype Design (Figma)

4.3 System Testing

Our testing program followed a thoroughly organized test strategy, guaranteeing thorough coverage and functional validation. Strict test cases were run in a variety of circumstances to find and fix any flaws. The user experience, performance, and dependability of the application were validated during the testing phase.

Testing Procedures:

Test Case Creation: Test the system's performance under various loads to determine its stability and responsiveness.

Test Execution and Closure: Run the test cases and report the results of failed cases.

Defects handling: Identify the defects and resolve them systematically.

Regression Testing: Execute this test after fixing any mistake or adding new functions. It ensures that new functionality or fixing bugs are not affected by previous codes/functions.

Acknowledge: Taking feedback from users, whether they are satisfied or not.

4.4 Summary

To improve our user interface, we first created a prototype model in Figma. Then, we coded in XML, Java, PHP, and SQL for data management. For a final product that is user-friendly, adjustments were made throughout the prototype phase in response to input. Comprehensive testing was conducted, including structured test cases, regression testing, and defect resolution to validate performance and reliability. This made sure our system complied with all specifications and offered a dependable user experience.

CHAPTER 5

Result and Analysis

5.1 Overview

Following the deployment of Bike Buddy: Trusted Companion on Two Wheels, we conducted a comprehensive examination of the finished user interface to ensure all features were functioning as intended. This involved meticulous testing of each functionality to verify seamless operation and user interaction. Concurrently, we validated the database operations, ensuring data integrity and consistency across all modules. Back-end processes were rigorously tested to confirm their robustness and efficiency. Our API integration was carefully examined to ensure it was properly incorporated into the system, delivering the expected performance. We also measured response times to assess system reliability and efficiency under various conditions. User feedback was gathered to identify any issues or areas for improvement. Overall, the system performed effectively, meeting both user expectations and project objectives. Continuous monitoring and iterative updates are planned to maintain optimal performance and adapt to evolving user needs.

5.2 Experimental Result

All the different types of motorcycles that are accessible are covered in detail by our program. The system effectively distributes data to consumers by retrieving it from the database. It also provides information on fuel and service shops in the area. This guarantees that customers may quickly locate necessary services for their bikes. Every feature of the system is implemented efficiently, and it is all very well-organized. The interface is fluid and easy to use for users. All things considered, the application satisfies all of our functional and design goals, offering bike aficionados a trustworthy resource.

Can get thorough information about each of its features on this website. This contains comprehensive facts on different brands and their unique characteristics. Will also discover a wealth of knowledge on various categories and the characteristics that correspond with them.

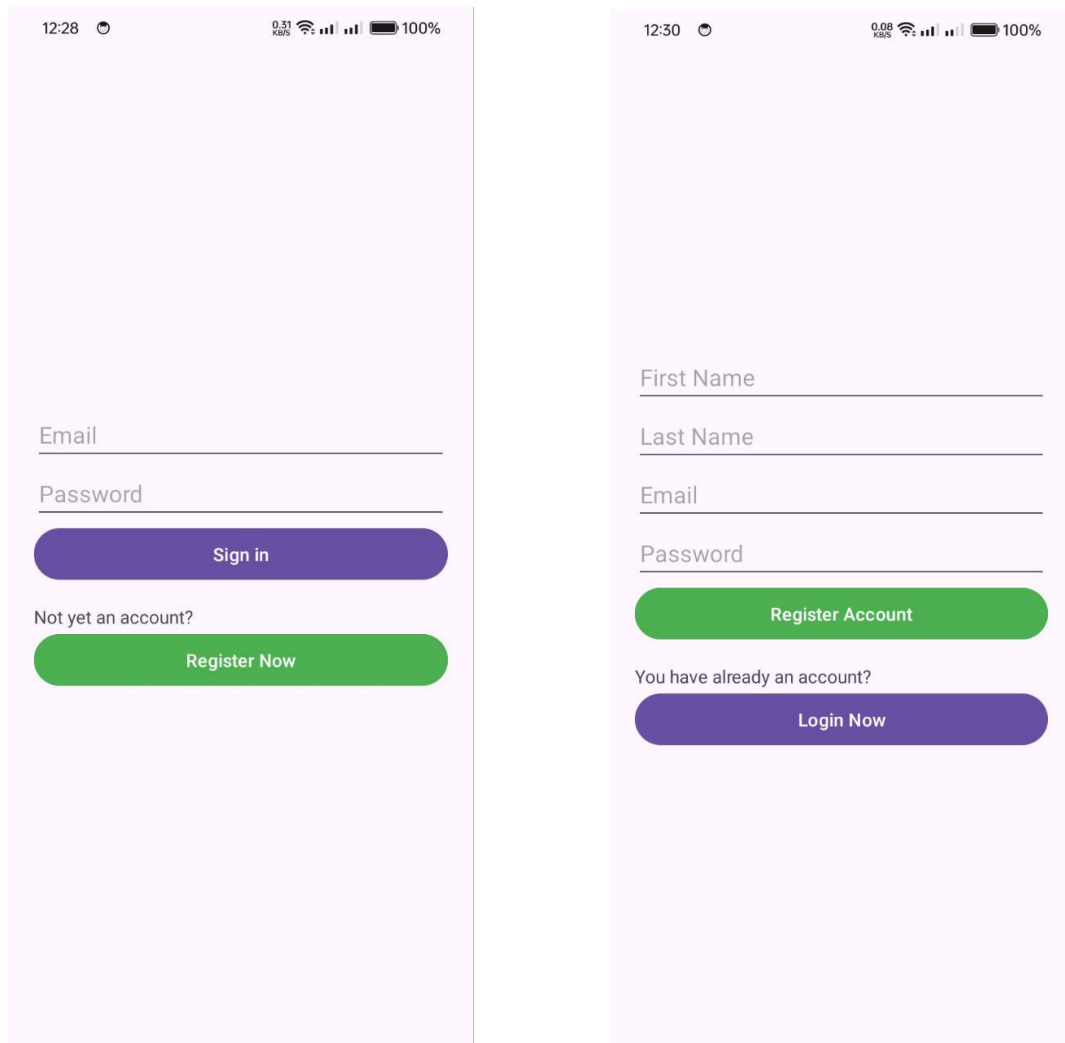


Figure 5.1 Sign in & Register Activity

This is the login page. For each user, need to login first, otherwise can't access the dashboard, If the use isn't registered yet, need to registered first. After successfully authorize, user can access the dashboard.

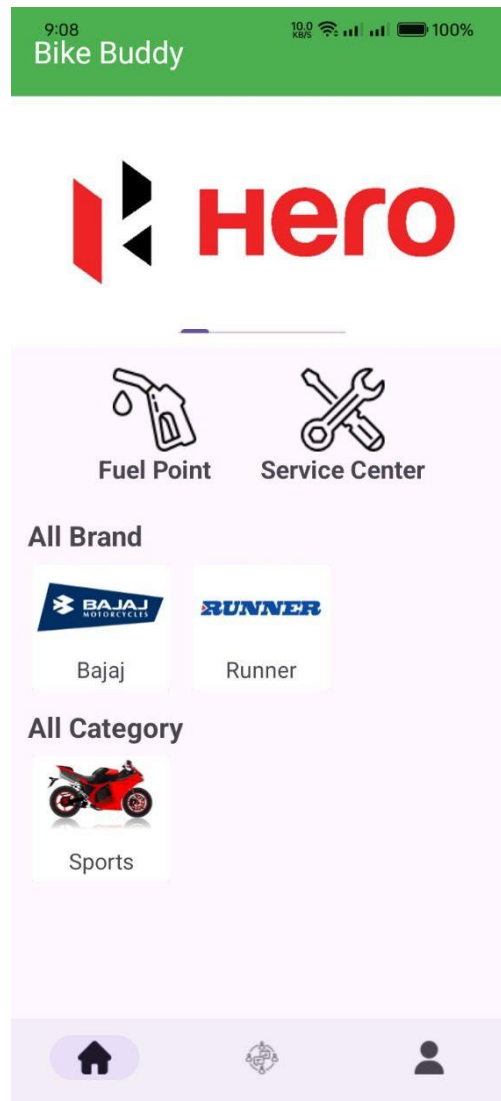


Figure 5.2: Home Screen.

This page will show all of the features and functionality, from this page user can see the details according to bike category, brand name and as well as can see the location of nearby fuel and service shops according to their given location area. User can also post his/her thoughts in the forum section aligned at the middle bottom of the page.

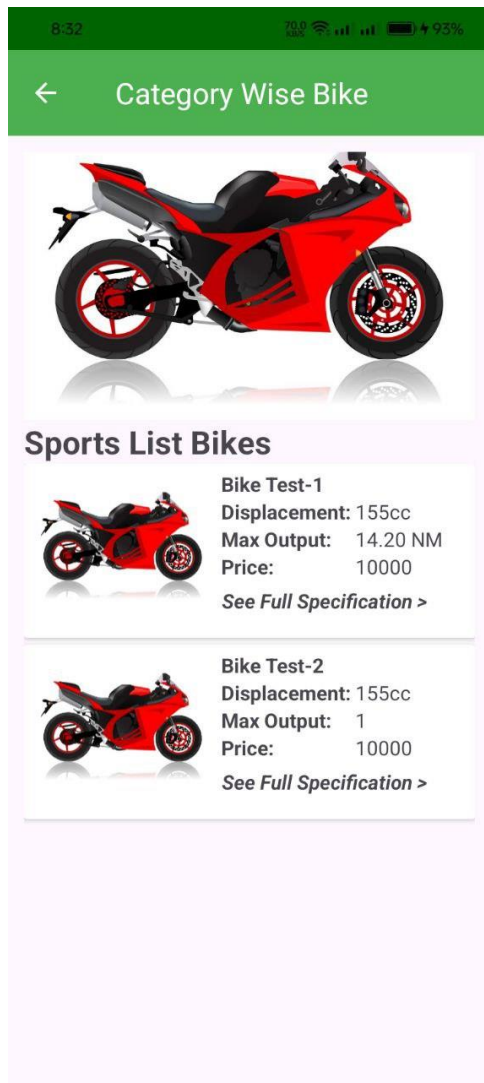


Figure 5.3: Category wise bikes and forum section.

An user can share your thoughts in the forum section located at the middle bottom of the page. This space is designed for community interaction and feedback. We encourage you to participate and contribute your insights.



Figure 5.4: Bike Details

5.3 Performance Analysis

Types of Tests:

Performance testing: Test the system's performance under various loads to determine its stability and responsiveness.

UI Testing: Check that the User Interface is well-maintained and well-decorated.

Compatibility Testing: Ensure that the application is compatible with different sizes of screen and Android versions.

System Testing: Check whether the system's overall operation and behaviour meet the required standards.

Testing Environments:

Testing Tools: Installing testing tools for executing non-functional testing (Apache JMeter, Postman, and Newman).

User Acceptance: Conduct user acceptance testing (UAT) in a controlled testing environment with real users or stakeholders.

By executing these testing conditions and processes, "Bike Buddy: Trusted Companion on Two Wheels" ensures a new and dependable user interface, functionality, compatibility, and general user satisfaction before launch, hence minimizing problems and improving the user experience.

5.4 Summary

After our testing procedures, we determined that our application successfully passed all tests. Despite encountering numerous challenges, it effectively overcame them. This confirms the application's readiness for deployment and its ability to deliver a reliable user experience. The testing phase is crucial for identifying bugs and errors within the system. This process provides an opportunity to rectify issues and enhance overall quality. As a result, the system's reliability and performance are significantly improved before deployment.

CHAPTER 6

Impact on Society, Environment, and Sustainability

6.1 Impact on Life

The "Bike Buddy: Trusted Companion on Two Wheels" implementation has the potential to significantly improve life in various ways:

Enhanced Biking Efficiency: By making bike purchases and maintenance easier for riders, time is saved and efficiency is raised. Processes are streamlined by this system, which facilitates finding bike specifications, repair shops, and fuel stations.

Enhanced Accessibility: Promoting integration in the administration of bikes by providing features and a simple interface that responds to various user demands, including those of people with limitations.

Personalized Biking Experiences: Increases customer satisfaction by providing customized itineraries and recommendations, making the biking experience more engaging and enjoyable.

Support for Businesses and Organizations: Streamlined bike logistics help businesses and organizations plan employee bike-related activities more effectively, potentially lowering costs while increasing productivity.

Environment Impact: By simplifying bike decisions and reducing complications, it indirectly contributes to reducing carbon footprints linked to needless bike trips and multiple transactions.

Financial Impact: The platform could encourage bike-related enterprises and assist local and national economies by encouraging more seamless biking experiences.

Technology Use: Promotes digitization and innovation in the biking industry through the use of technology, paving the way for future advancements in bike management systems.

Education and accessibility: By allowing users to experience and discover new places, it promotes intercultural communication and increases global awareness.

In the end, "Bike Buddy: Trusted Companion on Two Wheels" makes life better by organizing bike arrangements more efficiently, enhancing user satisfaction, encouraging accessibility, and raising business output in the riding area.

6.2 Impact on Society and Environment

There are several ways in which "Bike Buddy: Trusted Companion on Two Wheels" might help the environment:

Decreased Paper Use: By digitizing the planning and administration of bikes, plans, and

other documentation are no longer necessary, saving paper and cutting down on waste.

Optimal Travel Planning: Helps reduce fuel usage and carbon emissions by cutting down on unnecessary bike trips and optimizing routes by providing nearby services.

Bike Buddy promotes environmentally beneficial riding habits by offering customized recommendations for eco-friendly biking equipment and maintenance schedules. This reduces the environmental effect of riding by assisting users in maintaining their bikes more effectively.

Reduced Travel and Remote Work: The app's extensive database of nearby service facilities and fuel stations facilitates more effective route planning for users, cutting down on pointless travel. By reducing the number of trips and the distance traveled for commuting, this efficient coordination lowers carbon emissions.

Data-Driven Sustainability Measures: By utilizing data analytics to provide insights into biking trends and behaviors, **Bike Buddy** helps users and service providers make informed decisions that reduce environmental impacts. For example, identifying peak times for service center visits can lead to better resource allocation and reduced waste.

While its direct environmental impact may be indirect, "**Bike Buddy: Trusted Companion on Two Wheels**" can contribute to environmental conservation efforts in the biking industry by streamlining logistics, promoting sustainable choices, and reducing unnecessary travel.

6.3 Ethical Aspects

The development and implementation of "**Bike Buddy: Trusted Companion on Two Wheels**" involve various ethical considerations:

Data Security and Privacy: Ensuring strong security and privacy protocols to safeguard user data, including payment information, travel preferences, and personal data, following data privacy laws and obtaining explicit user consent before data collection and usage.

Transparency and User Consent: Providing users with clear information about data usage, privacy policies, and service terms, and obtaining explicit consent before collecting and using user data.

Fair and Unbiased Recommendations: Ensuring that travel options and personalized suggestions are impartial, fair, and not influenced by hidden or commercial agendas.

Accessibility for All Users: Designing the platform to accommodate users with disabilities and following accessibility principles to ensure inclusivity for all users.

Responsible AI and personalization: Using machine learning and AI algorithms to provide personalized suggestions in an ethical manner that doesn't violate user privacy or influence user choices.

Accountability and Transparency in Business Practices: Avoiding dishonest business practices and maintaining integrity and transparency in pricing, services provided, and

customer support.

By incorporating ethical principles into the development and management of "Bike Buddy," the platform can prioritize user privacy, equity, transparency, accessibility, and ethical business practices, fostering trust and integrity among its stakeholders and users.

6.4 Sustainability Plan

"Bike Buddy: Trusted Companion on Two Wheels" has to develop a sustainability plan that includes putting strategies in place to guarantee sustainability over the long run, lessen environmental effect, and encourage moral and responsible conduct. Here is a synopsis of it.

Ecological Durability: Cutting Down on Carbon Footprint: Raise awareness of bicycling as an environmentally beneficial method of transportation by informing consumers of its advantages over motorized transit.

Optimal Routing: To save time and energy on the road and lessen the total impact on the environment, employ algorithmic refinement to recommend the most effective bike routes. Partner with eco-friendly bike manufacturers, service providers, and bike-sharing programs to encourage sustainable options inside the app through eco-certified partnerships.

Responsible Data Handling:

Responsible Data Handling: Privacy Compliance: Regularly update privacy policies to ensure compliance with international data protection laws while safeguarding user privacy.

Data Encryption and Security Measures: To prevent user data breaches, constantly improve data encryption and security processes.

Data Minimalism: Adhere to the recommendations for data minimization, collecting and storing as little user data as is necessary to guarantee platform functionality.

Social Accountability:

Improve your accessibility Make sure the app is inclusive by routinely evaluating and enhancing its accessibility features to support users with impairments.

Community Engagement: Encourage community involvement via the app, support charity organizations, and publicize local bike events to promote your local bicycling communities.

Constantly seek input from users to improve and improve app features, making sure they satisfy their needs and preferences. This is known as continuous improvement.

Innovation and Adaptation: Keep up with technology developments and provide new functions to enhance user experience and boost productivity.

Monitoring and Reporting: Keep an eye on privacy compliance, user satisfaction, and the

environmental impact of the app while reporting to stakeholders on a regular basis.

Moral Business Conduct:

Open and Honest Procedures: To win over customers' trust and loyalty, be open and honest about prices, services rendered, and company policies.

Fair Partnerships: Create equitable and fair partnerships with suppliers and stakeholders in order to uphold ethical standards.

Training and Awareness: Employee Engagement By offering staff members training on moral conduct and environmentally friendly methods, you may promote a culture of accountability.

Wellness Initiatives: To guarantee a motivated and healthy staff, implement initiatives that promote employee well-being and work-life balance.

This sustainability plan's objective is to direct "Bike Buddy" toward upholding moral principles, respect for the environment, and continuous improvement while coordinating the app's expansion with responsible and sustainable policies.

6.5 Summary

The goal of Bike Buddy: Trusted Companion on Two Wheels is to promote sustainability, the environment, and society. By offering location-based services and thorough bike information, it improves societal well-being by making the process of purchasing and maintaining a bike easier. Through its digital platform, the app advocates for two-wheeled vehicles, lowers paper waste, and saves fuel use. In order to provide users with safe and welcoming experiences, Bike Buddy is dedicated to responsible data processing, privacy, and accessibility. Bike Buddy creates a sustainable standard for the sector by encouraging ethical behavior and constant development, which benefits both users and the larger community.

CHAPTER 7

Conclusion and Future Work

7.1 Conclusions

In the field of biking information apps, "Bike Buddy: Trusted Companion on Two Wheels" represents a major development. With careful design, smooth technology integration, and a user-centric mindset, this platform aims to make riding easier for both casual and enthusiast riders. Bike Buddy prioritizes data privacy and ethical principles while meeting a wide range of user demands with its uniform, user-friendly design, specific suggestions, and strong security procedures.

The platform's dedication to ethical standards, commitment to continuous development, and environmental sustainability efforts all serve as examples of its commitment to ethical business practices. Unlike challenges faced throughout the process of creation and testing, the project's capacity to improve riding experiences, promote environmentally friendly behavior, and simplify bicycle logistics is what will determine its success. In the ever-changing world of cycling information and services, Bike Buddy's continued relevance and influence will depend mainly on its ability to develop, adapt, and receive ongoing feedback.

7.2 Further Suggested Works

"Bike Buddy: Trusted Companion on Two Wheels" presents numerous opportunities for further work and enhancement:

Implementation of AI: Explore the use of AI and ML techniques to enhance the accuracy and personalization of biking recommendations, continuously improving the platform's suggestion engine.

Augmented Reality (AR) and Virtual Reality (VR): Introduce AR and VR features for immersive experiences, allowing users to virtually explore biking routes, gear, and accessories before making a purchase.

E-commerce Integration: Transition Bike Buddy into an e-commerce platform where users can purchase biking gear, accessories, and services directly through the app, offering a one-stop solution for all biking needs.

Blockchain Technology Integration: Implement blockchain technology to enhance trust and security in transactions and data management through transparent and secure processes.

Improve Sustainability Features: Expand eco-friendly options and environmental initiatives, further promoting partnerships and sustainable biking practices.

Voice-Activated Assistance: Increase accessibility and convenience by introducing voice-

activated tools for hands-free trip management and planning.

Community Engagement and Social Integration: Incorporate social features to foster community interactions, enabling users to share biking tips, recommendations, and experiences.

E-commerce Integration: Transition Bike Buddy into an e-commerce platform where users can purchase biking gear, accessories, and services directly through the app, offering a one-stop solution for all biking needs.

Blockchain Technology Integration: Implement blockchain technology to enhance trust and security in transactions and data management through transparent and secure processes.

Improve Sustainability Features: Expand eco-friendly options and environmental initiatives, further promoting partnerships and sustainable biking practices.

Voice-Activated Assistance: Increase accessibility and convenience by introducing voice-activated tools for hands-free trip management and planning.

Community Engagement and Social Integration: Incorporate social features to foster community interactions, enabling users to share biking tips, recommendations, and experiences.

Constant Security Measures: Implement cutting-edge security protocols to protect user data while keeping pace with evolving cyber security threats.

By embracing these opportunities for growth, "Bike Buddy" can evolve into a more innovative and comprehensive biking platform, offering enhanced functionality, increased accessibility, and a more rewarding user experience for cyclists worldwide.

7.3 Limitations

There are many issues with "Bike Buddy: Trusted Companion on Two Wheels" that may affect how well it works and how many people use it. The app's functionality and dependability might be jeopardized by any disruptions in data sources or technical problems because it depends on real-time data and technological infrastructure. It may also be difficult to promote broad user acceptance, particularly in areas where bicycling applications are not currently widely used. Furthermore, even with strong security measures in place, there are still dangers involved in the gathering, managing, and storing of user data, which may discourage certain users. Due to a lack of thorough data or local relationships, the app's initial geographic reach may be restricted. Additionally, developing and maintaining sophisticated features like AI, AR/VR, and blockchain integration requires significant resources, which can be difficult for startups or smaller businesses. There might be disputes within the cycling community if Bike Buddy develops to incorporate e-commerce and other features that put it in direct competition with already-existing bike

and e-commerce platforms. Maintaining Bike Buddy's legitimacy and sustained growth depends on resolving these conflicts of interest and restrictions, which calls for constant attempts to strike a balance between business goals and morally and aesthetically-driven operations.

Reference

- [1] BanglaMotor: Safety First, Drive Carefully. (n.d.). Retrieved February 26, 2024, from <https://www.banglamotor.net>.
- [2] BikeBD - Most Popular Bike Portal of BD (Feb 2024). (n.d.). Retrieved February 26, 2024, from <https://www.bikebd.com>.
- [3] DeshiBiker.com - Live Free, Ride Safe. (n.d.). Retrieved February 26, 2024, from <https://deshibiker.com>.
- [4] MotorcycleValley: Bike Price in Bangladesh 2024. (n.d.). Retrieved February 26, 2024, from <https://www.motorcyclevalley.com>.
- [5] Motorcycle Price in Bangladesh 2024, Bikes Prices, Specs, News (n.d.). Retrieved February 26, 2024, from <https://www.motorcyclebd.com>.
- [6] BikeWale: New Bikes, New Scooters, Electric Bikes. (n.d.). Retrieved February 26, 2024, from <https://www.bikewale.com>.
- [7] BikeDekho - New Bikes & Scooters, Bike Prices, Buy & Sell Used (n.d.). Retrieved February 26, 2024, from <https://www.bikedekho.com>.
- [8] Luo, R. and Shen, Y., 2009, July. The design and implementation of public bike information system based on Google Maps. In 2009 International Conference on Environmental Science and Information Application Technology (Vol. 2, pp. 156-159). IEEE.
- [9] Caggiani, L., Camporeale, R. and Ottomanelli, M., 2017, June. A real time multi-objective cyclists route choice model for a bike-sharing mobile application. In 2017 5th IEEE International Conference on Models and Technologies for Intelligent Transportation Systems (MT-ITS) (pp. 645-650). IEEE.
- [10] Purwanda, I.G., Adiono, T., Situmorang, S., Dawani, F., Samhany, H.A. and Fuada, S., 2017, September. Prototyping design of a low-cost bike sharing system for smart city application. In 2017 International Conference on ICT For Smart Society (ICISS) (pp. 1-6). IEEE.

Appendix A

Course Outcomes, Complex Engineering Problems (EP) and Complex Engineering Activities (EA) Addressing

Title: BIKE BUDDY: TRUSTED COMPANION ON TWO WHEELS

Student ID: 201-15-14228

201-15-14229

CO Description for FYDP

CO	CO Descriptions	PO
Phase -I		
CO1	Integrate recently gained and previously acquired knowledge to identify an android based bike information problem for the Final Year Design Project (FYDP)	PO1
CO2	Analyze different aspects of the goals in designing a solution for this FYDP	PO2
CO3	Explore diverse problem domains through a literature review, delineate the issues, and establish these goals for the FYDP	PO4
CO4	Perform economic evaluation and cost estimation and employ suitable project management procedures throughout the development life cycle of the FYDP	PO11
Phase -II		
CO5	Design and develop technical solutions and system components or processes that meet specified requirements, ensuring compliance with public health and safety standards, as well as considering cultural, socioeconomic, and environmental factors in this FYDP	PO3
CO6	Choose and apply appropriate methodologies, resources, and contemporary engineering and IT technologies to address complex engineering processes, encompassing prediction and modeling, while adhering to relevant constraints in this FYDP	PO5
CO7	Analyze societal, health, safety, legal, and cultural considerations, along with associated responsibilities, in the context of professional engineering practice and the resolution of this problem, employing logical reasoning guided by contextual understanding.	PO6
CO8	Comprehend and evaluate the enduring sustainability and impact of professional engineering endeavors in addressing intricate engineering challenges within social and environmental frameworks.	PO7
CO9	Implement ethical principles and adhere to professional standards and norms in this FYDP	PO8
CO10	Capable of operating proficiently both individually and as a team member or leader across diverse teams and interdisciplinary settings in this FYDP.	PO9

CO11	Proficiently communicate with the engineering community and broader society regarding complex engineering endeavors, including the ability to comprehend and generate comprehensive reports and design documentation, as well as provide and receive clear instructions throughout this FYDP.	PO10
CO12	Acknowledge the importance of self-directed and life-long learning within the evolving landscape of technology, and possess the readiness and capability to engage in lifelong learning endeavors.	PO12

Addressing CO (1 to 8), Knowledge Profile (K), Attainment of Complex Engineering Problems (EP), and Attainment of Complex Engineering Activities (EA)

Addressing CO (1 to 8), Knowledge Profile (K), Attainment of Complex Engineering Problems (EP):

SN	EP Definition	Attainment	CO	Justification (with Knowledge Profile)	References
1.	EP1: Depth of Knowledge required	Yes	CO1, CO2, CO3, CO5, CO6, CO7 and CO8	The project covers Engineering Fundamentals (K3) through process modeling, data design, and front-end development, showcasing strong engineering principles application. The project tackles Specialist Knowledge (K4) by integrating front-end and back-end design, interaction design, and user experience (UX), utilizing XML for the front end, and PHP, JAVA for the back end, demonstrating expertise in web-based travel management system development.	Page no: [9-16], Section: [3.1, 3.2, 3.3, 3.4] Page no: [17,18], Section: [4.2, 4.3]
				The project applies engineering practice & design (K5) by integrating design requirements like user interface, security, scalability, customization, compatibility, accessibility, and reliability, ensuring a robust and user-centric bike information system aligned with design principles. The project addresses engineering practice & technology (K6) by employing XML,	Page no: [9-14], Section: [3.1, 3.2, 3.3, 3.4] Page no:

				JAVA, PHP.	[17,18], Section: [4.2, 4.3]
				The project covers research literature K8 by reviewing analogous platforms, UI/UX studies, security protocols, personalization algorithms, and industry trends, enabling informed decision-making for integrating innovative features into this system.	Page no: [4-5], Section: [2.2, 2.3]
2.	EP2: Range of Conflicting Requirements	Yes	CO2, and CO7	The project confronts EP-2 by addressing challenges like integrating diverse features while maintaining user experience, balancing security with functionality, scalability, real-time data synchronization, evolving industry standards, privacy regulations compliance, and implementing effective recommendation systems through careful planning, flexible development, and continuous adaptation.	Page no: [7] Section: [2.4]
3.	EP3: Depth of analysis required	Yes	CO2, and CO6	The project tackles EP-3 by prioritizing solutions like contemporary front-end design for enhanced user experience and selecting Laravel for streamlined back-end development, addressing challenges such as user interaction optimization, platform accessibility, and scalability to provide a superior bike information system.	Page no: [10, 17], Section: [3.2, 4.2]
4.	EP4: Familiarity of Issues	Yes	CO8	The project fulfills EP-4 by integrating insights from bike information into development, optimizing processes, enhancing user experience, ensuring data security, and contributing to industry efficiency and effectiveness, bridging Computer Science and Engineering with the travel domain for impact beyond CSE boundaries.	Page no: [4,5], Section: [2.2, 2.3]

5.	EP5: Extends of application codes	No	CO5	N/A	N/A
6.	EP6: Extends of stakeholders involved and conflicting requirements	No	CO8	N/A	N/A
7.	EP7: Interdependence	Yes	CO5	The project meets CEP, EP-7 by addressing high-level problems across stages, ensuring data integrity, security, and performance in database implementation, optimizing user experience through intuitive front-end design, and conducting comprehensive testing.	Page no: [10,14], Section: [3.2,3.3]

Addressing CO11 with Complex Engineering Activities (EA) [Some or all of the following]:

SN	EA Definition	Attainment	CO	Justification	References
1.	EA1: Range of resources	Yes	CO11	The development of this system leverages a skilled team across domains, meticulous financial resource allocation for infrastructure, marketing, and development, and utilizes tools like XAMPP, Android Studio, and various programming languages, and databases for effective execution.	Page no: [10], Section: [3.2]
2.	EA2: Level of interaction	No		N/A	N/A
3.	EA3: Innovation	No		N/A	N/A
4.	EA4: Consequences for society and the environment	Yes		This project emphasizes social impact and environmental sustainability by promoting sustainable bike practices, and ensuring ethical considerations such as strong security, privacy, and transparent business practices, fostering societal well-being and environmental stewardship.	Page no: [25-27], Section: [6.1, 6.2, 6.4]

5.	EA-5: Familiarity	Yes		The Comparative Analysis for "Bike Buddy: Trusted Companion on Two Wheels " evaluates market competitors like Bike BD and to highlight bikes unique features, security, personalization, and customer engagement, enriching market understanding and informing strategic decisions for enhanced competitiveness and value proposition.	Page no: [5], Section: [2.3]
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Addressing CO (4, 9, 10, and 12):

SN	COs	Attainment	Justification	References
1	CO4	Yes	The project captures CO4 by integrating financial management practices, including budgeting, resource allocation, cost management, and risk mitigation, ensuring efficient fund distribution, monitoring expenditures, and identifying optimization areas while maintaining quality.	Page no: [14], Section: [3.4]
2	CO9	Yes	The project upholds ethical practices by prioritizing user privacy, maintaining transparency in data usage, providing fair suggestions, respecting cultural sensitivities, and promoting accessibility, fostering trust, transparency, and integrity among stakeholders.	Page no: [26], Section: [6.3]
3	CO10	No	N/A	N/A
4	CO12	Yes	The project's implementation phase emphasizes lifelong learning through diverse testing protocols, automated frameworks, and ensuring ongoing improvement and adaptation to emerging tech trends, with results analysis refining the platform for enhanced effectiveness.	Page no: [110], Section: [3.2]

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