Smart Bike Hiring App – Project Report

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1. Introduction

Project Title: Smart Bike Hiring App

Team Members:

- **202300325 Siwaporn Waleesila –** Responsible for the design and functionality of the splash screen, user authentication through login and signup pages, and profile settings management.
- **202400335 Saw Ler Nay Say –** Developed features related to real-time mapping, interactive station markers, and the reservation system for smart bikes.
- **202400184 Kyaw Zay Aung –** Handled the development of QR scanning features, real-time ride tracking during usage, and confirmation of bike returns.
- **202400129 Matee Thavonvijit –** Worked on integrating the payment system, displaying ride history, and customizing user settings.

Objective:
The objective of this project is to conceptualize, design, and prototype a fully interactive and user-centered mobile application aimed at improving the experience of renting and using smart bikes within a university environment. Our app specifically targets university students and campus guests who often seek quick, cost-effective, and environmentally friendly transportation options. This project goes beyond traditional design by focusing on accessibility, real-time data integration, and user feedback.

The design process was grounded in human-computer interaction (HCI) principles, focusing on making the application intuitive, aesthetically appealing, and highly functional. Through various stages of ideation, prototyping, and testing, the application was iteratively developed to meet user needs efficiently while also encouraging green habits and active lifestyles among students and visitors.

2. Problem Statement

Although bike-sharing programs are becoming more widespread, many existing services fall short in terms of usability and accessibility. Our research revealed several recurring pain points that undermine the effectiveness of such systems, especially in campus settings:

- Users frequently struggle to locate available bikes or docking stations.
- Unlocking procedures are often slow, unclear, or prone to technical issues.
- Real-time data such as ride tracking and station status is missing or inaccurate.
- Payment systems are too limited, excluding users without traditional bank accounts.

As a result, users often experience delays, confusion, and dissatisfaction. These inefficiencies are particularly problematic for first-time users or temporary visitors unfamiliar with the bike-sharing process. The Smart Bike Hiring App directly addresses these issues with a robust, user-friendly design tailored to the unique needs of campus communities.

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3. Innovation and Design Goals

To counteract the identified challenges, the Smart Bike Hiring App was developed with a clear set of innovative goals and functional priorities:

- User-Centered Interface: Create a visual and functional interface that accommodates both novice and experienced users through clear icons, readable text, and logical screen flows.
- Contactless Access: Utilize QR code technology to ensure fast, hygienic, and efficient unlocking of bikes.

- Real-Time Interaction: Provide detailed ride metrics including route, speed, and duration, all updated in real-time to enhance awareness and control.
- Flexible Payments: Offer multiple payment options, including support for student campus wallets, credit/debit cards, and digital banking tools.
- Visual Sustainability: Implement eco-conscious visual themes (blue/green hues, minimalistic design) that reinforce the app's commitment to promoting sustainable transport.

In terms of innovation, our app introduces predictive suggestions based on user habits, a smart-station overview map, and dynamic QR code verification. These features elevate the app above typical rental services by anticipating user needs and improving reliability and safety. The system is also designed to scale and integrate with other smart campus technologies.

These goals were implemented with continuous feedback from users, resulting in a system that is both innovative and practical.

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4. Target Users

The application is tailored for a range of users associated with university environments, with special attention to their commuting patterns, technological habits, and environmental values.

Key user groups include:

- University Students: Typically commute between dormitories, libraries, and lecture halls. They seek fast, reliable transport without long wait times.
- Campus Visitors and Tourists: Need intuitive navigation tools and a straightforward onboarding process, especially when unfamiliar with the area.

- Environmentally Conscious Individuals: Want to reduce their carbon footprint and support clean transport alternatives without compromising convenience.

By understanding the needs and preferences of these groups, we were able to design a product that resonates with their lifestyle and expectations.

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5. User Research Summary

In order to inform our design and ensure alignment with user needs, we conducted comprehensive research using both qualitative and quantitative methods.

Research Methods:

- **Online Surveys:** 10 participants responded via Google Forms, providing quick quantitative insights.
- **Face-to-Face Interviews:** Conducted 4 in-depth interviews to understand nuanced user behavior and challenges.
- **Persona Development:** Synthesized research findings into two representative user personas.

Key Findings:

- 70% of users had difficulty finding nearby bike stations, indicating a lack of visibility or intuitive navigation in existing systems.
- 60% expressed confusion about how to return bikes properly, which highlighted the need for clear instructions.
- Most participants preferred a visual map with real-time updates rather than lists or textual descriptions.
- Fast onboarding via login or sign-up was important, with many users opting for social media integration or auto-fill options.
- Clarity and simplicity in interface design were consistently mentioned as essential.

The research gave us a strong foundation to prioritize features and user experience requirements.

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6. Personas

Persona 1: “First-Year Business Student”

- Commutes between various faculty buildings multiple times a day.
- Seeks to minimize commute time with quick bike access.
- Uses a campus-issued wallet or prepaid student account for payments.
- Appreciates quick QR code-based unlocking and automatic ride tracking.

Persona 2: “Second-Year Arts Student”

- Frequently explores different parts of campus for events or exhibitions.
- Dislikes cluttered interfaces and finds too many options overwhelming.
- Prefers visual maps with clear markers over textual instructions.
- Needs an easy way to report broken bikes or issues with the app.

These personas allowed us to maintain empathy throughout the design process and make user-informed decisions.

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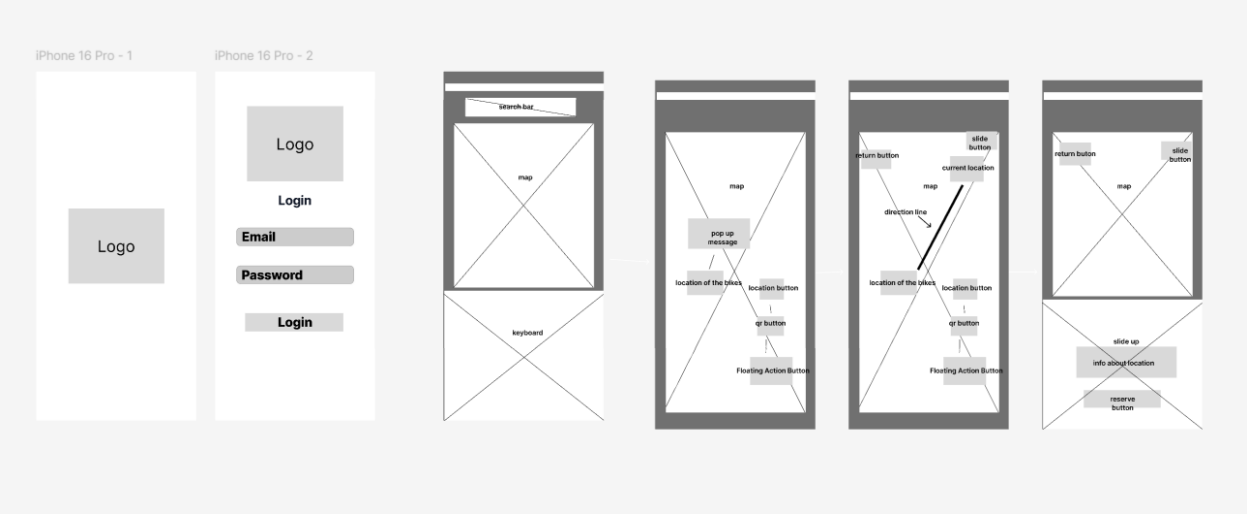
7. Sketches & Wireframes

Initial concepts were visualized using hand-drawn sketches and translated into low-fidelity wireframes to experiment with layout and navigation logic. Key components included:

- **Splash Screen:** Brand introduction and loading sequence.
- **Login/Signup Pages:** Entry point for users with emphasis on simplicity.
- **Map View:** Displays current location, nearby stations, and bike availability.

- **Ride Tracker:** Shows distance, time, speed, and ride status.
- **Payment and History:** Displays ride logs and enables transaction management.

These mockups were refined based on internal reviews and early user feedback before high-fidelity designs were created.



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8. High-Fidelity Prototype (Figma)

We built a complete high-fidelity prototype in Figma, simulating real interactions and showcasing the app's design language.

Design Features:

- Consistent blue and white color palette for readability and professionalism.
- Responsive layout accommodating different mobile screen sizes.
- Large, touch-friendly buttons and legible typography for accessibility.
- Navigation icons with clear labels to minimize user confusion.

Accessibility Considerations:

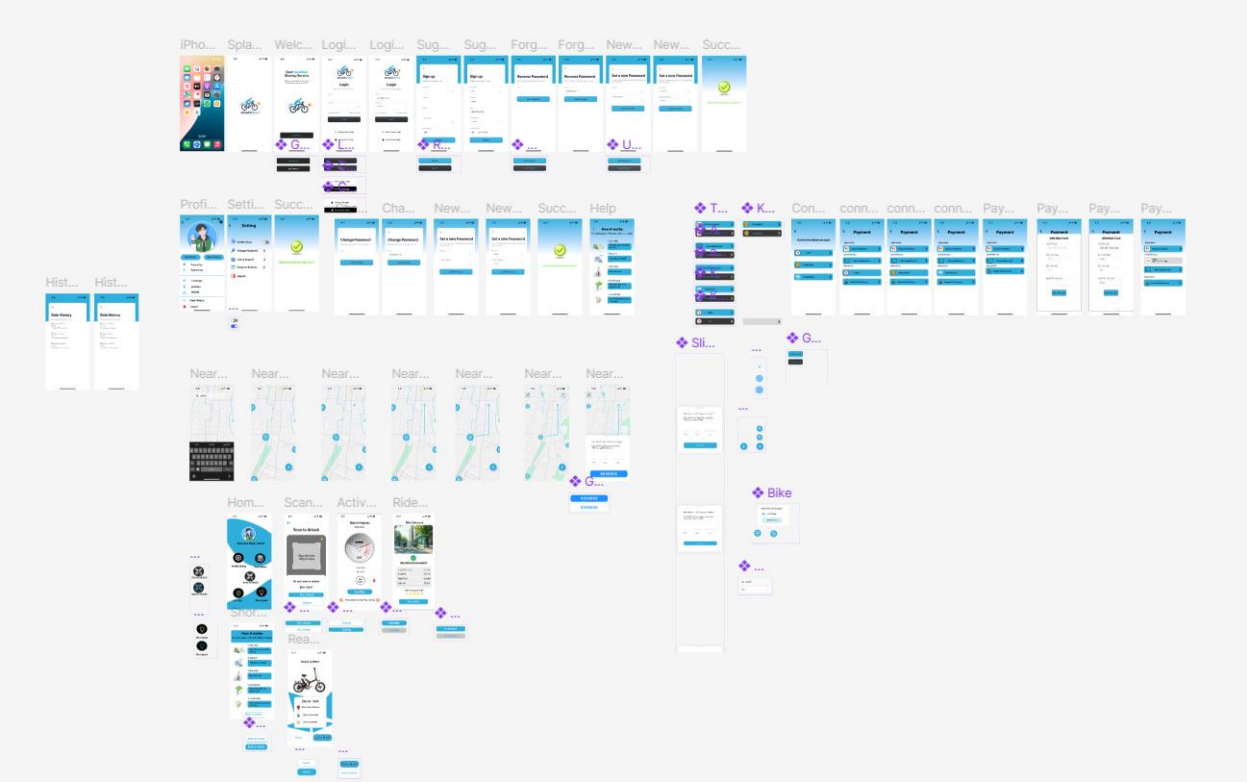
- Chose colors with strong contrast ratios for visual clarity.
- Ensured large tap areas to support motor accessibility.

- Used alt text and icon labels for assistive technologies.

Prototype Access:

- View Design File
- Interactive Prototype

This prototype helped us demonstrate and evaluate the final product before development.



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9. Usability Testing

Testing was conducted with 5 student participants to assess user interaction and identify usability issues.

Methodology:

- Participants were asked to complete a series of tasks, including logging in, locating a bike station, starting a ride, and ending a ride.

- Observations focused on task completion time, user hesitation, and navigation errors.
- Post-task interviews gathered subjective feedback and suggestions for improvement.

Feedback Insights:

- Users appreciated the map's clarity and station markers.
- Some participants found the "End Ride" process unclear.
- Visual icons were initially ambiguous and required redesign.

Improvements Implemented:

- Simplified icon designs to enhance quick recognition.
- Introduced confirmation pop-ups before major actions.
- Adjusted button sizes and spacing to avoid misclicks.
- Enhanced button labels for clearer guidance.

This iterative process ensured the app was refined for real-world usage.

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10. Tools Used

We utilized a range of tools to support design, research, and collaboration:

- **Figma:** For wireframes, high-fidelity design, and prototyping.
- **Google Forms**: Used for collecting survey responses.
- **GitHub:** Hosted shared files, tracked version control, and enabled teamwork through branching and commits.

Each tool played a key role in enhancing productivity and ensuring traceable design decisions.

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11. GitHub Repository

Link: Smart Bike GitHub Repository

Repository Contents:

- Project overview in README.md
- Dedicated branches per team member
- Wireframes, images, reports, and design files
- Full commit history for transparency and documentation

The repository reflects collaborative efforts and version-controlled progress.

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12. Challenges & Lessons Learned

Challenges:

- Aligning work schedules and dividing responsibilities effectively.
- Translating user feedback into design updates within tight deadlines.
- Balancing creativity and simplicity in feature implementation.

Key Lessons:

- Continuous user feedback is critical for usability.
- Simplicity enhances user adoption and satisfaction.
- A structured design process ensures long-term project scalability.

These experiences will shape our approach to future design and development projects.

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13. Conclusion

The Smart Bike Hiring App represents a thoughtful and comprehensive solution for smart mobility on campus. Our project aimed not only to simplify the bike-sharing experience but also to promote sustainable travel habits among students and visitors.

Through rigorous research, iterative prototyping, and direct user involvement, we delivered a functional and visually engaging app concept. The final

prototype demonstrates an effective blend of technical innovation and user empathy, allowing for real-time tracking, contactless access, and accessible payment options.

Moreover, this project highlights the power of collaborative design and agile workflows. As we look to the future, we envision enhancements such as predictive bike availability, dynamic pricing based on usage trends, integration with other campus services, and gamification to boost engagement. These ideas can help transform the app into a comprehensive mobility platform.

We also believe that the app's principles can be adapted to various urban settings and scaled for use in larger cities. The growing emphasis on sustainable living and smart cities makes this app relevant beyond academic environments. With proper investment and ongoing iteration, this solution could help reduce urban traffic congestion and promote eco-conscious commuting.

In conclusion, the Smart Bike Hiring App is a strong example of how human-computer interaction design can solve real problems and drive positive change. It is a testament to our team's ability to design with empathy, test with purpose, and build with intention. We believe this app has the potential to be adapted beyond our campus, influencing urban mobility and sustainable design worldwide.