BITSOnWheels: A Bicycle Sharing Platform for BITS Pilani

Riteshbabu Allam (2025H1120138), Parth Dutta (2025H1120139)
Aditya Ashok Pise (2025H1120148), Harsh Wankhade (2025H1120151)

Abstract

Problem Statement

In universities, many students own bicycles, but most of the time those cycles just sit idle when not in use. On the other hand, there are many students who don't own a cycle but often need one for a short trip within the campus. This creates a mismatch: some students have extra cycles lying unused, while others struggle to get one when needed.

Proposed Solution

To fix this, we are building **BITSOnWheels**, a campus-only bicycle renting platform. Here, cycle owners can list their bicycles when they aren't using them, and other students can quickly rent them for a small fee. The platform will act as a trusted middleman, making it easy to book, track, and use bicycles fairly and safely within the campus.

For development, we are following the **Rapid Application Development (RAD) model**, which allows us to quickly build prototypes, gather feedback, and refine the system. This ensures that the platform evolves based on student needs and can be deployed faster with continuous improvements.

Functional Requirements

1. **User Accounts** – Secure login via institute email.
2. **Bicycle Listing** – Owners can register bicycles with details.
3. **Search** – Renters filter bicycles using various parameters.
4. **Payments** – Transactions can be handled offline.
5. **Scheduling & Booking** – Renters request bicycles for specific durations, owners accept/reject
6. **Notifications** – For confirmations, rental start, and return
7. **Ratings & Feedback** – Renters and owners review each other.

Non-Functional Requirements

- **Usability**: Simple, mobile-friendly design for rapid adoption.
- **Campus Verification**: Restricted to BITS students for trust and security.
- **Reliability**: Mechanisms to prevent double-booking and ensure consistency.
- **Security**: Protection of payment information and user data.

Tech Stack Utilized

- **Frontend**: Flutter (Dart)
- **Backend**: Spring Boot (Java)
- **Database**: PostgreSQL / MongoDB
- **IDE/Tools**: VS code, Git/Github

Conclusion

BITSOnWheels represents a novel, student driven initiative to promote sharing economy practices within the BITS Pilani campus. By combining the convenience of digital platforms with the practicality of bicycle sharing, it ensures optimal utilization of existing resources while meeting the mobility needs of non-owners. The application supports essential features like secure authentication, listings, booking, payments, notifications, and ratings, while maintaining usability, security, and reliability. With future enhancements, the platform can evolve into a comprehensive, campus-wide bicycle sharing ecosystem. Overall, BITSOnWheels not only solves a pressing logistical challenge but also helps in collaboration, sustainability, and innovation within the student community.

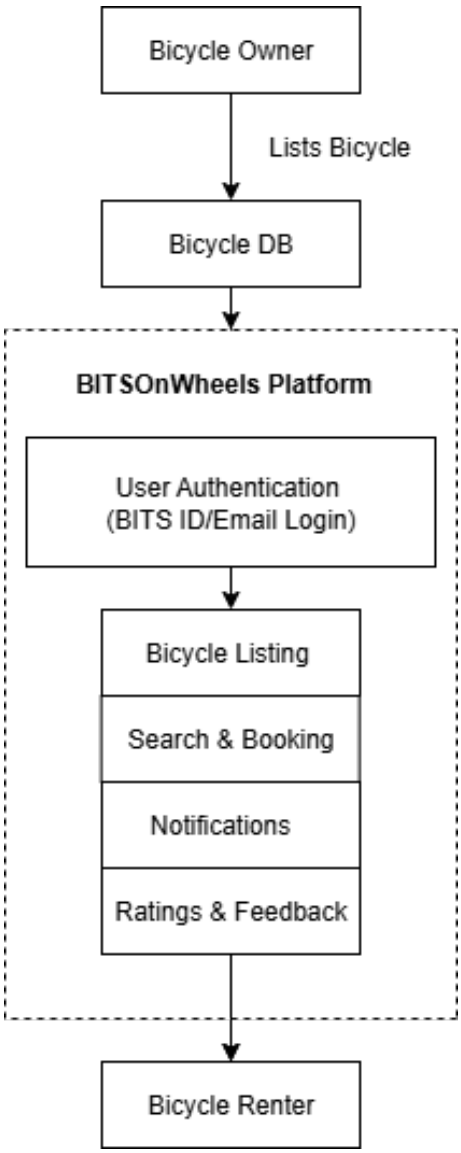

Figure 1: Conceptual Diagram of BITSOnWheels