

Campus Mobility and Student Services: A Unified Mobile Application for Smart Campus Living

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Abstract

Campus students, especially those living in hostels, face various challenges related to transportation, communication with campus administration, maintenance issue reporting, and exchange of educational resources. Existing solutions address these requirements through separate applications, resulting in fragmented services, inconvenience, security concerns, and reduced efficiency. The proposed system presents a unified mobile application that integrates multiple campus related services into a single secure and user friendly platform. The application incorporates a Travel Buddy module for ridesharing, a complaint management system for hostel maintenance issues, a circular notification service for institutional announcements, and a marketplace for exchanging secondhand goods among verified students. The application is developed using the Flutter framework and Firebase services, including Firebase Authentication, Cloud Firestore, and Cloud Storage. Role Based Access Control (RBAC) is implemented to provide controlled access to system functionalities and protect user data. Firebase based cloud infrastructure enables real time data synchronization, secure data storage, and reliable service management. The proposed application consolidates essential campus services into a single digital platform, improving operational efficiency, facilitating student administration communication, and promoting secure resource sharing within the campus community.

Keywords - Campus mobility; Complaint management; Flutter; Student services.

I. INTRODUCTION

Rapid development in mobile technology has changed the way in which services are provided to the students by educational organizations. Although this development has taken place, several activities related to campus, such as coordination for transportation services, lodging complaints, distribution of official news, and sharing of study material is still done through different platforms.

This creates a lot of problems including inefficiency in communication among others for students, especially those living in hostels.

Students generally depend on third party applications for transportation purposes, online marketplaces for selling and purchasing second hand items and official website for lodging their complaints in hostels. However, these third party applications are not made specifically for use by students of educational institutions and therefore lack features such as verification of the students identity, access control and services specific to campus organization.

In an attempt to solve these problems, this paper suggests Campus Mobility and Student Services, which is an application that brings together various campus facilities in one secure platform. The application has the modules of ride sharing, complaints management, circulars notification, and a student market place. The application has been built using Flutter for the frontend and Firebase for the authentication process, cloud storage, and real time database management, and it ensures security by ensuring that the user is verified and his/her roles authenticated. By combining all the necessary campus facilities in one mobile application, this paper's suggested solution increases convenience, ensures effective communication between students and administration, resource sharing, and safety on campus.

II. LITERATUREREVIEW

Various researches have been conducted regarding the different problems faced by students in educational institutions ranging from transportation to communication, complaints handling, and university markets.

Al-Waeli and Hassan [3] developed a Student Complaint Management System to digitize complaint submission and tracking in educational institutions. The system uses PHP and MySQL to allow students to

complaints and monitor their status. The study observed improved accessibility and systematic complaint handling. However, it focuses only on complaint management and does not integrate transportation, circulars, or marketplace services.

Kommey et al. [13] proposed a Ride Sharing System for the university community that supports ride advertisement, booking, geo-location, routing, and notifications. The system facilitates communication between drivers and passengers and improves campus transportation coordination. However, it is primarily focused on ride sharing and does not provide other student services such as complaints, circulars, and marketplace facilities.

Brofors et al. [7] developed LiU Marketplace, a digital marketplace designed exclusively for university students. The system uses university Single Sign-On (SSO) to verify users and provides a controlled environment for student-to-student transactions. The study highlights the importance of verification and trust in student marketplaces. However, it is limited to buying and selling and does not integrate other campus services.

Dharshini et al. [6] proposed a Campus Carpooling system using a Hybrid Ride sharing Algorithm (HRA) to improve the matching of students with suitable rides. The approach focuses on optimizing ride-sharing and improving transportation coordination among students. However, the system is restricted to transportation and does not integrate complaint management, circular dissemination, or student marketplace services.

Recent studies have explored mobile-based campus management solutions, but most focus on individual services. This highlights the need for a unified application integrating transportation, complaint management, announcements, and student marketplace services through secure authentication, data synchronization, and a user-friendly interface.

III. CAMPUS MOBILITY AND STUDENT SERVICES

The proposed application, Campus Mobility and Student Services, adheres to a modular design approach in which each individual feature is developed separately as modules. The modular structure increases the scalability and efficiency of the system.

This application uses Firebase Authentication and logging in securely. On successful login, users are authenticated and are assigned roles as either Students or Administrator. According to the assigned roles, the users are then directed to the relevant dashboards.

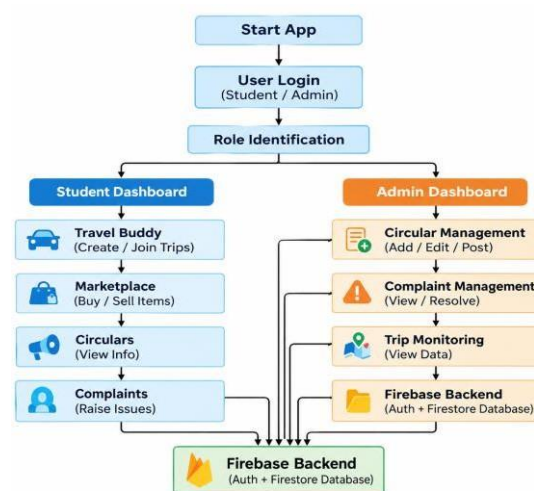


Fig.1.Methodology

The major functional modules of the application include:

- The login and registration is the entry point of the application. It allows users to access the system securely using their registration number and password. During registration, user details such as name, registration number, phone number, department, and password are entered. After successful login, role identification is performed and access is redirected to the respective dashboard. Controlled entry helps ensure that only authorized users can access the application.
- The Travel Buddy module is designed for travel coordination within the campus community. In this module, a user can create a trip by entering the destination, date, time, seats available, and contact details. Once the trip is added, it becomes visible to other users in the system. Other users can view the travel details and join the trip if it matches their requirement. Shared visibility of travel plans helps reduce cost, improve coordination, and support convenient travel arrangements. Only active trips are shown to users, and expired trips can be removed after the given date and time.
- The Complaint Box module is used to submit and track complaints related to hostel or campus issues. Student users can add a complaint by selecting a category and entering the complaint description. After submission, the complaint is marked as pending. Students can only view the complaint and its status. The option to change the complaint status is not available to students. Only the admin can review the complaint and update it as resolved. Once the admin resolves the complaint, the same update is reflected on the student side. Clear separation of access improves transparency and keeps complaint handling organized.

- The Circulars module is used for displaying important announcements in the application. The circulars are divided into categories such as college circulars, hostel circulars, and class circulars so that users can easily identify the required information. Students have only view access to this module. The circulars are posted by the admin, and once they are added, they are reflected in the dashboard of all users. Organized display of official announcements improves communication and reduces the possibility of missing important updates.
- The Marketplace module is developed for buying and selling college related items in the application. Users can post useful items such as books, drafters, 31 aprons, and other academic materials by entering item details like item name, price, description, and phone number. Once posted, the item becomes visible in the marketplace list for other users. This creates a campus based exchange platform and makes it easier to share useful materials inside the campus community. Firebase Cloud Firestore serves as the realtime database that will contain user details, complaints, circulars, market place items, and travel information. The authentication process of accessing the application is handled by Firebase Authentication.

IV. RESULTS AND DISCUSSION

The development of Campus Mobility and Student Services app using Flutter and Firebase was done successfully. The mobile app is designed such that multiple campus services are merged into a single mobile app for access by authenticated users to transportation, complaints, campus notifications, and marketplace services. There are pages for login and registration of users for authentication purposes. Once authenticated, the user is redirected to Home Dashboard where he/she can access all the services.

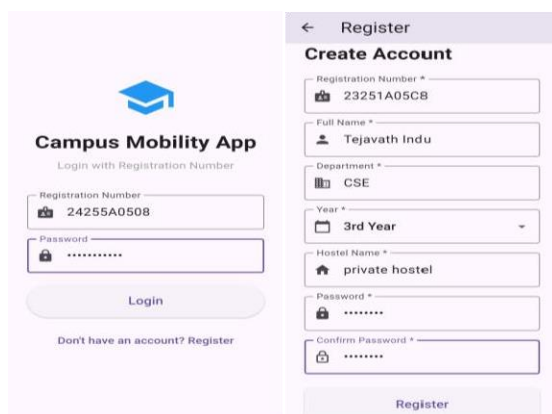


Fig.2&3.LoginPage&RegistrationPage

As shown in Figure 2 & 3, the login and registration pages serve as the entry points to the application. Registered users can log in using their registration number and password, ensuring secure access for authorized users. New users can create an account by providing their name, registration number, department, year, and password, which can then be used to log in.

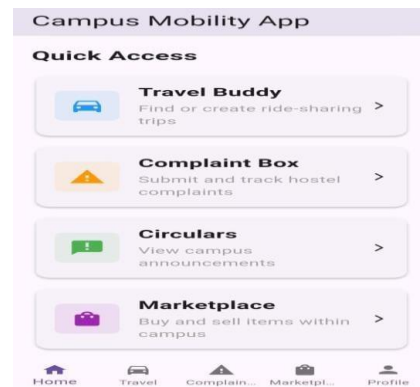


Fig.4.HomeDashboard

As shown in Figure 4, the Home Dashboard serves as the centralized control panel after successful login. It provides direct access to key services such as Travel Buddy, Complaint Box, Circulars, and Marketplace from a single screen. This improves usability and eliminates the need for multiple applications, fulfilling the project's objective of consolidating campus related services into one mobile application.

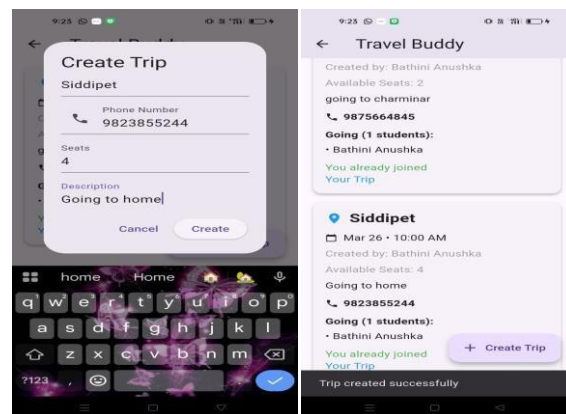


Fig.5.TravelBuddy

As shown in Figure 5, the Travel Buddy module helps users manage travel activities conveniently and economically. It displays available trips along with details such as destination, date, time, seats, and contact information. Users can also add new trips, which become visible to all users. This helps users find others travelling to the same destination and simplifies travel arrangements.

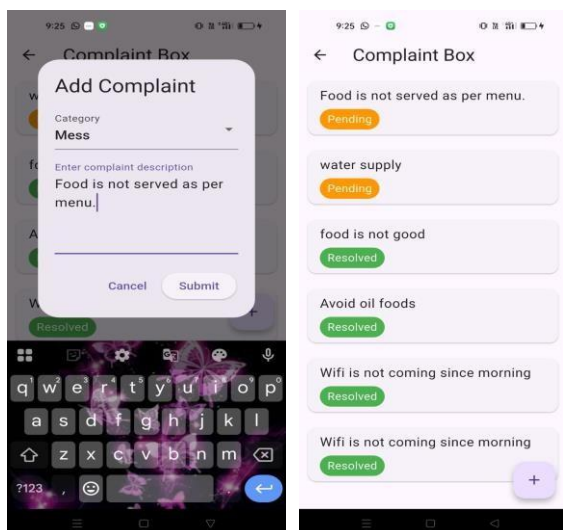


Fig.6.ComplaintBox

As shown in Figure 6, the Complaint Box module allows students to submit and track hostel or campus related complaints. Complaints are displayed in a card based format with statuses such as Pending or Resolved, improving transparency. Students can submit complaints by selecting a category and describing the issue, but only the admin can change the status from Pending to Resolved. Circulars module contains categorized circulars for college, hostels, and clubs so that students are notified instantly about any important information.

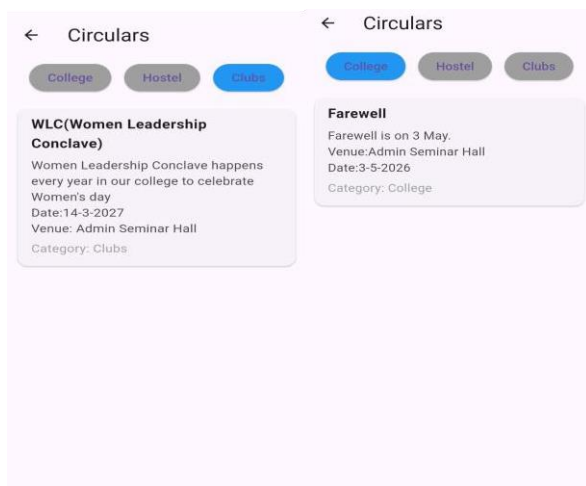


Fig.7.Circulars

As shown in Figure 7, the Circulars feature displays essential campus announcements in three categories: College Circulars, Hostel Circulars, and Class Circulars. Only admins can post circulars, which are then visible on the dashboard of all users. This provides a centralized and user friendly platform for effective campus communication. Marketplace module allows students to purchase and sell books, gadgets, and many other useful things in campus premises.

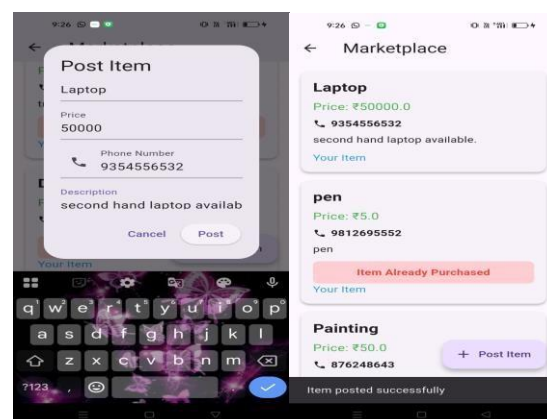


Fig8:MarketPlace

As shown in Figure 8, the module allows users to buy and sell college related items such as books, drafting equipment, and aprons. Each listing displays the item name, price, contact details, and description. Users can also post items by entering the required details, after which they become visible to other users. This facilitates convenient and efficient exchange of items within the campus.

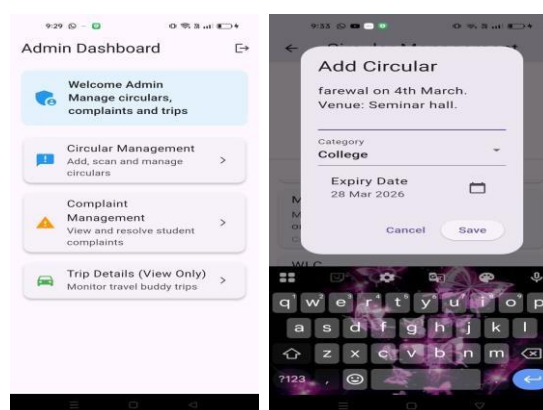


Fig.9.AdminDashboard&CircularManagement

As shown in Figure 9, the Circular Management Module enables admins to post official announcements in the application. The Add Circular interface provides two posting methods: scanning with text extraction, and manual entry. Once posted, the circulars are displayed in the Circulars section of all students' dashboards, enabling effective and centralized communication

On the whole, the designed application shows how efficiently multiple campus services can be integrated into one single mobile application. The design not only facilitates communication but also saves time and efforts for everyone.

V. CONCLUSION

Campus Mobility Application will be able to offer a comprehensive approach to student service management, covering travel, market, circulars, and complaints. By using Flutter & Firebase, it ensures there is access to realtime data, authentication security, and user friendly interface for both the user and the administrator.

As a result, it improves campus communication, reduces manual work and offers coordination among users. In other words, it is efficient and practical enough for the existing campus management systems.

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