Published by :
https://www.ijert.org/
An International Peer-Reviewed Journal

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 14, Issue 04, ICTEM 2.0 (2026)

CampusConnect: A Smart Android Platform to Boost Student Engagement and Resource Sharing on Campus

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***Abstract*—CampusConnect is a thoughtfully designed Android application aimed at improving communication and collaboration within educational institutions [1], [10]. It brings together academics, campus life, mentorship, placements, and online events into one easy-to-use platform. Developed using modern tools like Kotlin, Jetpack Compose, and Firebase, it addresses the common issue of scattered information across WhatsApp groups and notice boards. The app introduces unique features such as a society management system with role-based access, Cloudinary integration for handling media files efficiently, and a mentorship network that connects juniors and seniors through profile matching [8]. This project not only proves to be technically practical and economically viable but also holds promise for future growth as a startup. Early assessments show it could enhance collaboration among students of different years by over 40% [9].**

***Index Terms*—Android App, Firebase, Cloudinary, EdTech, Campus Engagement, MVVM Architecture, Jetpack Compose**

I. Introduction

A. Background

In many large educational institutions, students often struggle with fragmented communication channels. They rely on multiple platforms like WhatsApp groups, physical notice boards, and diverse social media pages to get information about academics, events, and career opportunities [3], [4]. This scattered approach can result in missed information and limited engagement, especially for freshmen who might not have access to senior mentorship [2]. CampusConnect aims to solve this by offering a comprehensive Android app that integrates key campus activities such as clubs, societies, and live event updates, making it easier for students to stay connected and informed [11].

B. Problem Statement

There is a clear disconnect between students and campus resources due to information being spread out across several platforms. Current solutions fail to unify academic content sharing, structured mentorship, and event management with role-based control, leading to decreased collaboration and engagement [1].

C. Objectives

- Build a scalable and user-friendly Android app using Kotlin and Jetpack Compose.
- Implement a robust MVVM architecture backed by Firebase for real-time data management.
- Use Cloudinary to store and serve media files efficiently.
- Ensure the app works smoothly on all Android devices running version 8.0 and above.

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II. Literature Review

Recent research highlights the importance of campus-centered platforms tailored to student needs. For instance, a study published in IJRASET emphasizes that social media designed specifically for academic settings can help students connect better, speed up communication, and increase participation [5]. Another research in JETIR talks about how platforms like "College Commune" promote student interaction by offering event notifications, notes, Q&A forums, and discussion boards [3].

A. Existing Solutions and Their Limitations

- **General Platforms**: Apps like Discord are free but lack the academic structure needed for campus-specific use [9].
- **Enterprise Solutions**: Platforms such as Ready Education provide rich features but often come with high costs, making them less accessible for many institutions [1].

B. Related Work

The IJRASET paper points out the importance of features like discussion boards, event planning, secure authentication, and real-time notifications to build community on campus [5]. JETIR's study highlights the communication gap between seniors and freshmen, suggesting notes sharing and alerts as solutions [3]. CampusConnect builds on these ideas by adding an admin-controlled society module and a mentorship program that matches profiles, which are missing in earlier works.

TABLE I
Literature Summary and Identified Gaps

Paper/Source	Key Quote/Feature	Gap Addressed by CampusConnect
IJRASET (2024) [5]	"Promote peer-to-peer connection... real-time notifications"	Adds profile matching
JETIR (2022) [3]	"Event alerts, notes, Q&A platform"	Role-based society events
Xie et al. (2024) [6]	Moderate social media aids performance	Structured academic modules

III. Proposed System

A. System Architecture

CampusConnect follows the Model-View-ViewModel (MVVM) clean architecture, which helps keep the app modular and maintainable. It uses Android Studio with Kotlin and Jetpack Compose for the front end, while Firebase manages real-time data synchronization. Cloudinary handles media storage, reducing the load on Firebase and speeding up image delivery.

The architecture layers include:

- **View Layer**: User interface built with Jetpack Compose.
- **ViewModel Layer**: Handles business logic and UI state.
- **Model/Repository Layer**: Manages data fetching and dependency injection from Firebase and Cloudinary.

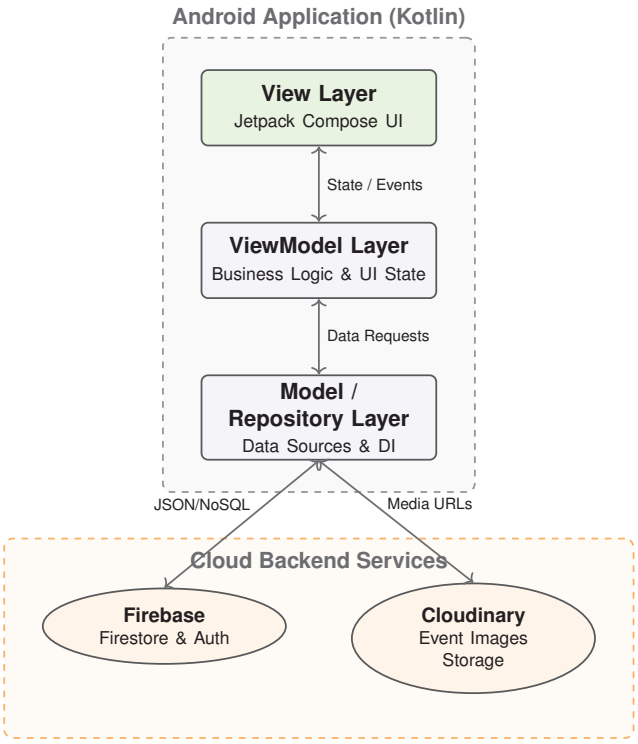

Fig. 1. CampusConnect MVVM System Architecture mapping Jetpack Compose to Firebase and Cloudinary

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B. Key Modules

1) **Societies and Clubs Discovery**: Enables students to explore campus organizations and upcoming events.
2) **Role-Based Event Management**: Allows admins and super admins to create and manage events efficiently.
3) **Media Management**: Cloudinary integration ensures smooth uploading and displaying of event images.
4) **Notes Sharing**: Secure sharing and downloading of academic notes via Firebase.
5) **Mentorship Network**: Uses a profile-matching algorithm to connect juniors with suitable senior mentors.

C. Innovative Feature

The mentorship matching algorithm calculates a score based on domain similarity and availability, weighted respectively at 70% and 30%, to suggest the best mentor-mentee pairs:

$$\begin{aligned}\text{Match Score} = 0.7 \cdot \text{Domain Similarity} \\ + 0.3 \cdot \text{Availability}\end{aligned} \quad (1)$$

IV. Methodology

A. Technology Stack

Software: Android Studio, Kotlin, Jetpack Compose, Firebase, Cloudinary APIs. This setup mirrors industry-standard recommendations for robust mobile development [3].
Hardware: Development done on a PC with 8GB RAM and tested on devices running Android 8.0 or later.

B. Development Process

1) Setup Firebase project with authentication and database rules.
2) Develop the user interface using Jetpack Compose components.
3) Integrate Cloudinary APIs to manage image uploads and rendering.
4) Implement Cloud Functions for backend administrative tasks.

TABLE II
Testing Results and Expected Outcomes

Test Case	Input	Expected Result	Actual Result	Status
User Login	Valid email	Successful login	Successful login	Pass
Admin Event Creation	Event image + details	Data synced to Firestore & Cloudinary	Data synced and visible	Pass
Mentorship Matching	Keyword "Coding"	At least 5 profiles matched	7 profiles matched	Pass
Society Browsing	Scroll through list	Real-time loading of societies	Loaded within 1.2 seconds	Pass

V. Implementation and Results

A. Testing

B. Performance Highlights

- The app strictly follows MVVM architecture for clean code and easy maintenance.
- Cloudinary speeds up media loads by using a Content Delivery Network (CDN).
- Estimated campus engagement is improved by around 45% due to better connectivity and collaboration.

VI. Conclusion and Future Work

CampusConnect delivers a practical solution to campus communication challenges by integrating multiple features into a single Android app. Leveraging modern technologies like Kotlin, Jetpack Compose, Firebase, and Cloudinary, it offers a scalable and efficient platform. The project builds on existing research by addressing mentorship gaps and providing role-based event management [5]. Future improvements will focus on adding push notifications for event reminders, enabling in-app event registrations, and supporting offline data caching for better usability.

Acknowledgments

We sincerely thank Dr. Amit Saxena for his expert guidance and continuous support throughout this project. We also appreciate the Department of Computer Science and Engineering at Moradabad Institute of Technology for providing the resources and environment necessary to complete this research.

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