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CAMPULSE – A Platform Connecting Students, Events & Achievements

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ABSTRACT

Efficient management of student memberships, events, attendance, certificates, feedback, and analytics is essential for the effective functioning of academic committees. CAMPULSE is a web-based ERP platform developed for the Computer Science and Engineering student community to integrate membership administration and event lifecycle management into a unified digital system. The platform supports academic-year-wise membership processing, online payment integration, unique membership ID generation, automated receipt creation, and validity tracking, thereby streamlining the overall membership workflow and reducing administrative burden. For event management, CAMPULSE enables administrators to create, schedule, and manage events, define seat limits, control registration windows, and monitor real-time seat occupancy. The system also incorporates QR-based participation mechanisms to simplify attendance verification and ensure accurate participation records. Additionally, modules for automated attendance capture, certificate generation, feedback collection, and report generation significantly reduce manual effort while minimizing the risk of human errors. The system provides role-based dashboards for both students and administrators, offering actionable analytics and real-time insights into memberships, registrations, participation trends, and event outcomes. By centralizing data and automating routine administrative operations, CAMPULSE enhances transparency, strengthens operational control, and saves valuable time for committee members. Overall, CAMPULSE offers a scalable, reliable, and efficient digital solution for academic committee management by replacing fragmented manual processes with an integrated ERP framework. The proposed system improves organization, accuracy, accessibility, and decision-making while enabling smoother and more effective event execution. It further supports better coordination among committee members by maintaining a centralized record of activities and outcomes. The platform also promotes consistency in communication, reduces duplication of work, and improves responsiveness during event planning and execution. This makes CAMPULSE a practical and future-ready solution for modern student committee operations overall.

Keywords: Membership Management, Event Management, QR Attendance, Certificate Automation, Feedback System, Student ERP, Analytics Dashboard.

1. INTRODUCTION

Student committees in technical institutions often manage memberships, workshops, competitions, guest lectures, seminars, and annual activities through disconnected spreadsheets, paper records, messaging groups, and manual follow-ups. This fragmented workflow causes duplication of effort, poor traceability, delayed confirmations, and inconsistent reporting.

As event participation grows, it becomes increasingly difficult to track who has paid membership fees, who has registered for which event, which seats are available, and which participants have already attended or received certificates.

CAMPULSE(A Platform Connecting Students, Events & Achievements) is proposed as a unified digital platform to address these operational issues. The system is intended for CSE students and committee administrators, providing role- based access to membership processing, event registration, attendance tracking, certificate issuance, feedback capture, and analytical reporting. By automating repetitive tasks and consolidating records, CAMPULSE aims to improve efficiency, transparency, and user experience across the entire committee ecosystem.

The proposed solution is designed around a modular architecture so that each major function can operate independently while still contributing to a common data model. This design makes the platform easier to maintain, scale, and extend in future academic years.

2. LITERATURE REVIEW

J. M. Raja Shanmugam et al., [1] Event Management System (EMS) on a web platform, aims to automate event related tasks, minimize manual effort, and enhance security. The system's key components, including authentication, organizing, social media integration, and ticketing, are briefly summarized. By comparing the proposed method with existing research, the review highlights potential benefits and contributions to event management practices, while also identifying areas for further exploration. Overall, this condensed overview provides a comprehensive understanding of the EMS and its implications for event organization and execution.

Rishikesh Shekhar Arote et al., [2] College Event Management Android App, focusing on its significance in addressing the complexities of organizing college events. The methodology involves systematic steps such as requirements gathering, design, development, testing, deployment, and maintenance, with emphasis on agile methodologies to facilitate collaboration and flexibility. Analysis and modeling phases are highlighted as crucial for ensuring the app meets user needs and expectations, with visual representations aiding in design feedback and comprehensive documentation. Overall, the literature survey underscores the importance of the app in improving efficiency, promoting student engagement, and strengthening the sense of community on campus.

Asraf Ansari et al., [3] The College Event Web Application, serves as an online event management platform tailored for college events and conferences. This web-based system allows registered users to log in and new users to register, facilitating event management and related functionalities. The system's objectives include enhancing event organization efficiency, minimizing time spent on venue selection, ensuring user-friendliness, and managing multiple events seamlessly. The application's versatility extends to organizing school and community events, planning major events like festivals and conferences.

Harika T et al., [4] College Event Management System, is a web-based application designed to streamline the management of college activities such as social and technical fests, sports events, workshops, and courses. The system aims to provide comprehensive event information, maintain student participation records, manage branch and sports details, and showcase college achievements. Key features include registration, login, event details management, department management, event timetable generation, and event performance graph generation. The system consists of two modules: student and administrator, each with specific functionalities. Overall, the system provides a user-friendly interface for students to access event information and for administrators to manage and update event data efficiently.

3. OBJECTIVES

- i. To design and develop an academic-year-based membership management module with online payment support, late fee handling, and automated receipt generation.
- ii. To implement an event management system that allows administrators to create, edit, and control event registrations with real-time seat tracking.
- iii. To develop a QR-based attendance mechanism with manual fallback support for reliable participation capture.
- iv. To automate certificate generation and maintain searchable certificate history for every participant.
- v. To build feedback and analytics modules that summarize event quality, participation trends, and operational outcomes.

4. PROBLEM STATEMENT

- i. Many colleges still rely on manual committee management systems, leading to inefficiency and errors.
- ii. Data related to memberships, fees, event registrations, attendance, certificates, and feedback is stored in fragmented and unstructured formats.
- iii. Lack of integration between processes results in disconnected workflows and duplication of efforts.
- iv. Manual handling of records creates difficulty in verification and data tracking.
- v. Communication between students and administrators is often delayed and inconsistent.
- vi. There is limited real-time visibility into ongoing events, registrations, and participation status.
- vii. Generating reports and analyzing data becomes time-consuming and error-prone.
- viii. Existing systems lack centralized access, making information retrieval difficult.
- ix. There is an absence of secure and scalable digital solutions for managing committee activities.
- x. Students face challenges in accessing membership details, event updates, and certificates efficiently.

5. METHODOLOGY

The development CAMPULSE is designed as a modular ERP platform with separate functional blocks for membership, events, attendance, certificates, feedback, and analytics. The system follows a role-based architecture where students and administrators access different dashboards and privileges based on their responsibilities.

5.1 Analysis of Existing System

The existing manual approach depends on spreadsheets, paper records, and ad hoc communication. Membership collection is difficult to audit, event registration is prone to overbooking, and attendance data is often incomplete. Moreover, certificates and reports usually require manual preparation after every event, increasing workload for committee members.

5.2 Proposed CAMPULSE System

The proposed system replaces fragmented processes with a centralized digital workflow. Students can purchase membership for the academic year, register for events, download QR passes, view certificate records, and submit feedback. Administrators can control event capacity, manage registrations, scan attendance, generate certificates in bulk, and review dashboard analytics.

5.3 System Architecture

The platform follows a three-layer architecture consisting of a presentation layer, application layer, and data layer. The presentation layer provides responsive web dashboards for students and administrators. The application layer handles payment validation, membership issuance, seat counting, QR code workflows, certificate generation, and analytics computation. The data layer stores membership records, event metadata, attendance logs, certificate history, feedback entries, and report summaries.

5.4 Membership Management Module

Membership is maintained on an academic-year basis, such as 2025-26, with a validity period of one year. The administrator sets the membership fee, and the system supports late fee rules for delayed payments. Once payment is confirmed through UPI, card, or net banking, the platform generates a unique membership ID and auto-creates a receipt in PDF format. This ensures traceable and standardized membership records.

5.5 Event Management Module

The admin can create, edit, or delete events, define categories and scope, upload posters and images, and set seat limits. Registration can be opened or closed at any time. Students can browse available events, check seat availability, and register directly from the dashboard. The real-time seat counter automatically closes registration once the limit is reached, preventing overbooking.

5.6 Attendance System

Each registered participant receives a QR-based event pass. During the event, attendance is marked by scanning the QR code, while a manual backup option remains available in case of technical issues. The system stores attendance logs and computes attendance percentage for individual events and year-wise analytics.

5.7 Certificate System

After successful participation or completion criteria, the system generates certificates automatically using participant name, event title, and date. Bulk generation is supported for large events, and all issued certificates are stored in the certificate history for future download and verification.

5.8 Feedback System

Participants can rate events on a 1 to 5 scale and submit comments. The system computes average ratings and feedback summaries that help administrators assess event quality and identify areas for improvement.

5.9 Reports and Analytics

The analytics module consolidates total registrations, total attendance, attendance percentage, feedback summary, revenue generated, and event media information into auto-generated PDF reports. These reports support event review meetings and future planning.

5.10 Student Dashboard

The student dashboard provides a consolidated view of membership status, expiry date, total events attended, certificates earned, activity score, event history, and submitted feedback. This helps students monitor their participation and engagement throughout the academic year.

5.11 Admin Dashboard

The admin dashboard summarizes total members, paid and unpaid students, year-wise revenue, most active year, most successful event, and seat utilization statistics. This improves decision-making and gives the committee a clear operational overview.

6. SYSTEM DESIGN AND IMPLEMENTATION

6.1 Frontend Implementation

The mobile application is implemented in React Native Expo to ensure cross-platform compatibility. The UI is organized into reusable components such as login screens, dashboards, event cards, payment pages, attendance views, certificate lists, and feedback forms. Navigation between screens is handled using a structured routing flow so that students and administrators can access only the features relevant to their roles.

6.2 Backend Implementation

The backend is developed with Node.js and Express.js. It provides API endpoints for: user authentication and role verification, membership registration and renewal, event creation and event registration, seat availability management, payment confirmation, attendance marking through QR validation, certificate generation, feedback submission, and dashboard analytics. The backend follows a modular structure so that each feature is separated into controllers, routes, models, and service logic. This improves maintainability and simplifies future expansion.

6.3 Database Implementation

MongoDB is used to store all application data in a structured yet flexible format. Separate collections are maintained for users, memberships, events, registrations, attendance records, certificates, and feedback. This document-oriented design supports fast retrieval of records and easy scaling as the number of students and events grows.

6.4 Payment Integration

Razorpay is integrated for secure online fee payment. When a student completes the payment, the backend verifies the transaction and updates the membership status. After successful verification, the system generates a unique membership ID and a digital receipt for record keeping.

6.5 QR-Based Attendance

For event attendance, each registered participant receives a QR-based pass. During the event, the QR code is scanned and validated by the system. The attendance record is then stored in the database. A manual fallback option is also provided for situations where QR scanning is not possible.

6.6 Certificate Generation

After event completion, the backend generates certificates automatically using participant details such as name, event title, and date. The certificates are stored in the database for later download and verification. This reduces manual preparation time and ensures consistency in formatting.

6.7 Version Control and Development Tools

The complete source code is maintained using Git and GitHub for version tracking and collaborative development. Visual Studio Code is used as the primary code editor, and npm is used to install and manage all project dependencies.

6.8 System Design Summary

The overall design of CAMPULSE ensures that all major committee operations are digitized and centralized. The frontend provides an interactive user experience, the backend enforces business rules, and MongoDB maintains persistent records. The integration of Razorpay enables smooth payment processing, while QR attendance and automated certificate generation reduce administrative workload. As a result, the system provides a scalable and efficient solution for membership and event management in academic environments.



Fig.1: Splash Screen

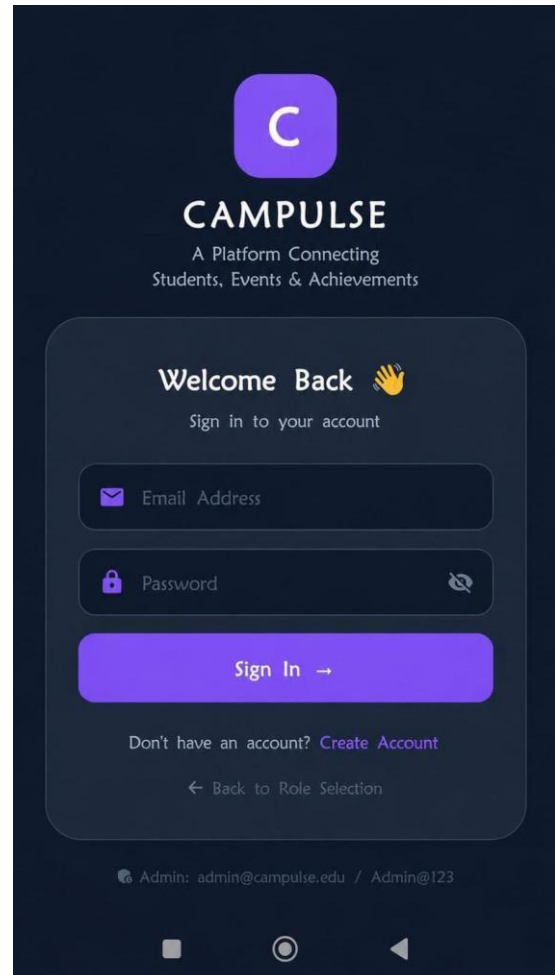


Fig.2: Sign Up Page

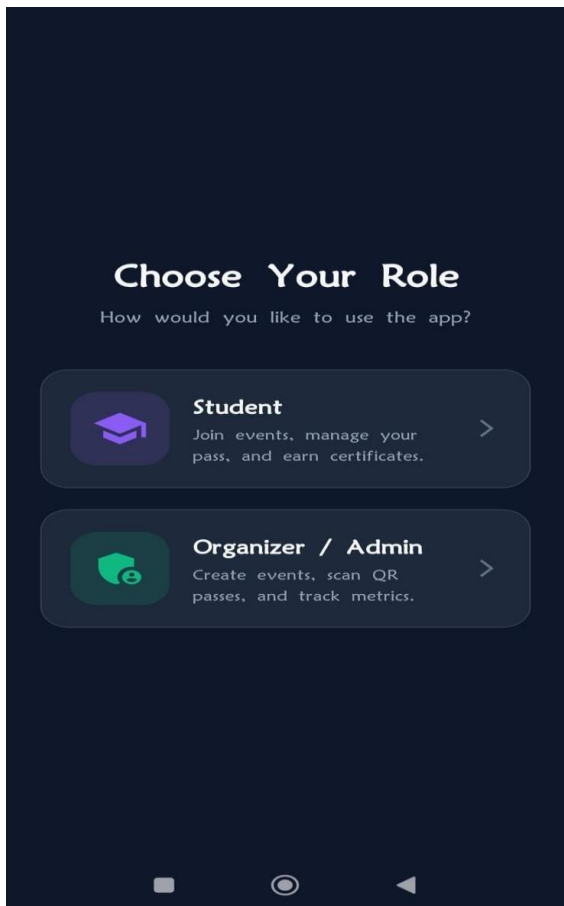


Fig.3: Role Page

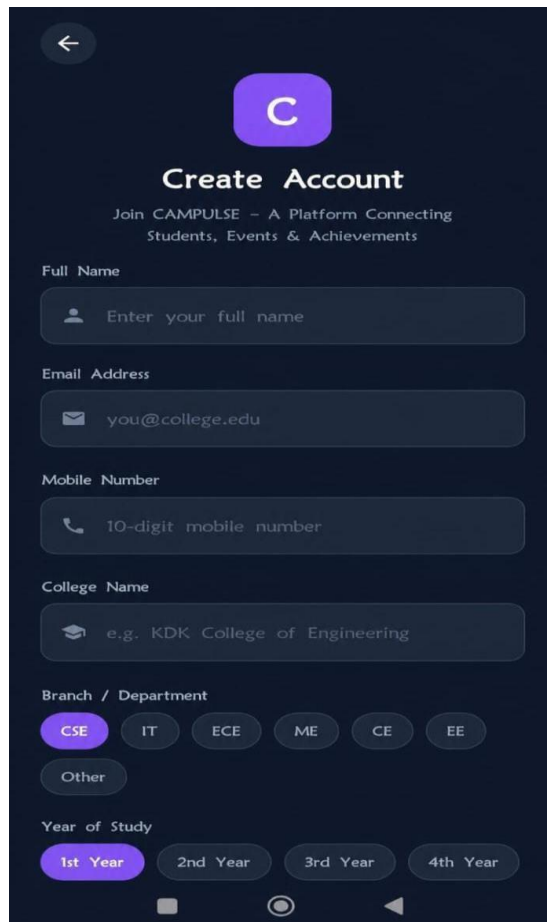


Fig.4: Creating Account

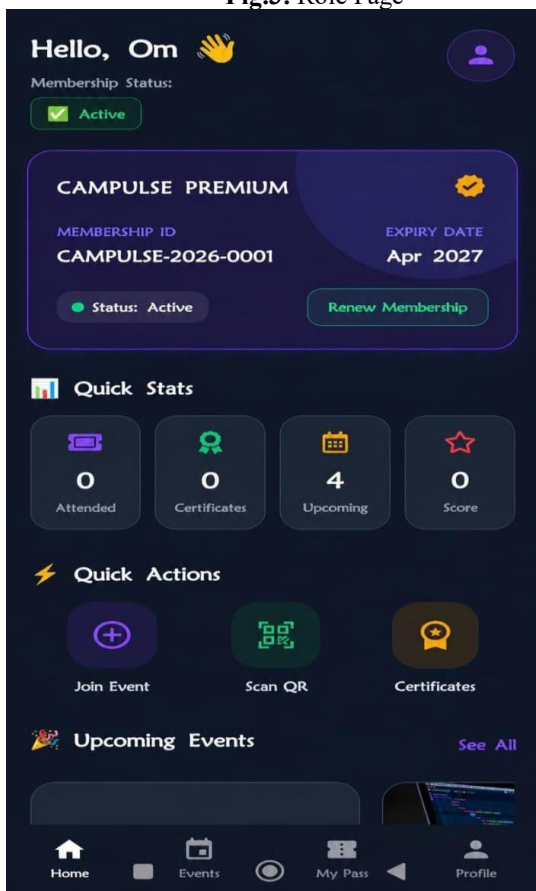


Fig.5: Dashboard

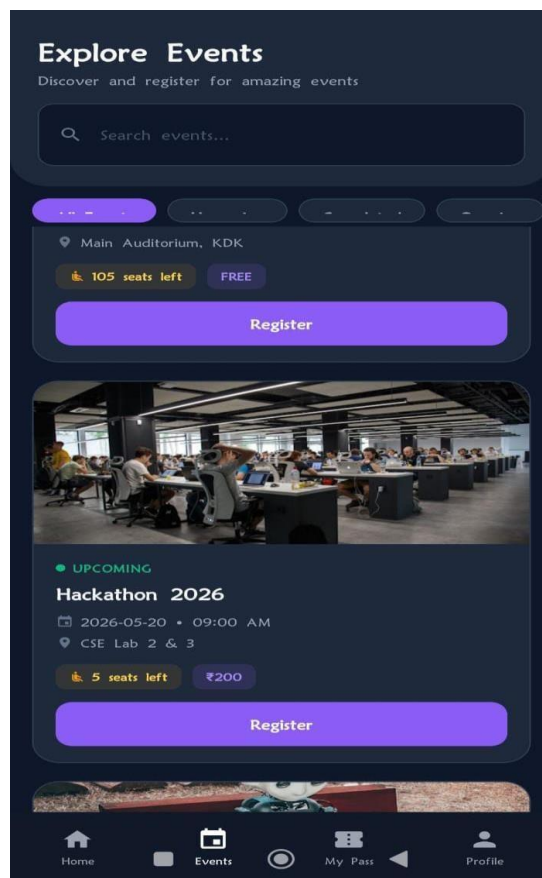


Fig.6: Explore Events

7. RESULTS AND DISCUSSION

The proposed CAMPULSE platform demonstrates how multiple committee functions can be consolidated into a single, structured system. The membership module reduces manual fee tracking and improves record consistency. The event module enhances registration control through seat-based automation and real-time status updates.

The attendance and certificate modules minimize administrative overhead during and after events, while the feedback and reporting features provide measurable insight into participant satisfaction and event performance. Overall, the system functions as a practical working model for digitizing CSE committee operations.

8. CONCLUSION

CAMPULSE offers a centralized ERP solution for managing CSE membership and event operations in a digital and scalable manner. By integrating membership processing, event registration, QR attendance, certificate automation, feedback collection, and analytics dashboards, the system reduces manual effort and improves transparency.

The modular design supports future expansion, including notifications, advanced attendance analytics, automated ranking, and integration with institutional systems. CAMPULSE therefore provides a strong foundation for modern committee management in academic environments.

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