

# CampusConnect: A MERN Stack Web Application for Event and Club Coordination

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**Abstract**— Campus Connect works as this smart social network just for college students. It helps boost how they get involved in campus stuff. A lot of students end up missing out on events or clubs. Workshops too. Networking things. Thats because theres no single spot that keeps things personal and up to date for everyone. The platform fixes that with AI. It suggests activities that match what each student likes. Their classes. What they do outside of school. Plus it acts as one main place to find events. Track when slots are open. Register without hassle. Get alerts right when they need them. So students dont skip updates that matter. It mixes personal touches with easy access in real time. That way it ramps up how students connect. Makes things more inclusive. Helps build the community on campus.

**Index Terms**— Campus engagement. Event recommendation. MERN stack. Collaborative learning. Campus app. Sustainable education. Student networking

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## I. INTRODUCTION

College life is more than just sitting in classes. It is about all these different experiences that really help students grow on a personal level and in their careers too. You know, stuff like campus events, clubs, seminars, and networking chances. They make campus life so much better. They push students toward teamwork, new ideas, and even leadership. But still, a bunch of these opportunities just go unnoticed. Students do not always have one easy place to track everything happening around them.

Universities right now rely on all these scattered methods to get the word out. Like notice boards, WhatsApp groups, emails, that kind of thing for events or club announcements. These ways are pretty messy. They are disorganized. And they do not reach everyone in time. So participation ends up low. Students miss out on stuff that could make their college time way better. Without some smart system that pulls it all together, there is this gap between organizers and students. Engagement just falls off.

Technology has advanced a lot though. AI and data-driven platforms can fix that gap pretty much. Personalized recommendations have already changed things in e-commerce and entertainment. The same thing could happen on campus. AI could recommend events and activities based on a students interests, their courses, and the clubs they join. That would definitely raise awareness. It would get more people actually showing up.

CampusConnect deals with these problems directly. It is like a smart social network built just for students. Picture it as one central place to browse activities, sign up for events, and

get suggestions that fit your profile. The platform uses AI for those recommendations. It tracks availability in real time. It sends notifications when you need them. Students stay connected and involved that way. Organizers have tools for handling events, seeing who signs up, and getting data insights.

CampusConnect really encourages everyone to get in on it, stay informed, and participate. It makes the campus feel more alive and group-focused. Students can get the most out of college like that. Universities end up with stronger communities. In the end, the platform helps with real student growth. It opens up chances for learning, making connections, and developing personally, all through digital means.

CampusConnect does more than just get students involved. It fits into larger ideas for sustainable smart campuses. It brings tech right into everyday student life. That means less old ways like shouting announcements, paper flyers, or scattered messages. Going digital makes access easier. It gives everyone a fair shot, even students who might otherwise miss out. So yeah, CampusConnect shows progress toward a new, open, tech-forward approach to education.

## II. LITERATURE SURVEY

**[1] Artificial Intelligence in Higher Education: A Systematic Review** Celik and some others put out this review in 2024 on artificial intelligence in higher education. They went over a bunch of applications pretty thoroughly. Things like tutoring tools, grading that happens automatically, and learning setups with simulations. All that stuff helps create academic experiences tailored to each student. Still, it misses

out on engaging with extracurriculars directly. The big limitation here is the focus stays mostly on academic side. No real ties into campus social setups.

**[2] AI in Higher Education: A Systematic Literature Review** Frontiers in Education in 2024. It is a systematic literature review on AI in higher education. They dug into ethical issues, privacy concerns, and how to scale things up in universities. The study pushes for systems that are transparent and include everyone. That lines up well with what CampusConnect aims for in terms of fair access. But the limitation is it stays conceptual. Not much on actual implementation details

**[3] AI in Higher Education: Student and Faculty Perspectives** Campbell University had this piece in 2025 about student and faculty views on AI in education. They summed up data from surveys on attitudes. Turns out there is strong interest in tools that personalize learning. At the same time, worries pop up about data privacy and who controls things. Limitation though, it is just based on surveys. Lacks any deep technical info or details on system designs.

**[4] Learning Recommendations from Educational Event Data** Springer published something in 2024 on learning recommendations from educational event data. They suggested a framework for recommending events using data from campus management systems. It works with personalized feeds drawn from academic calendars and student profiles. That supports planning around school stuff. But it is limited to academic planning only. Does not cover clubs or social events at all.

**[5] AI-Based Event Recommendation & Management System** JETIR in 2023. It is an AI-based event recommendation and management system. The system suggests events based on what students like and their past attendance. It uses a hybrid filtering approach and handles real-time updates. Sounds useful. Limitation is it is at prototype stage. No testing for scalability across different campuses.

**[6] Intelligent Recommendation Systems: Literature Review** The IEEE piece from 2024, you know, went over ML-based recommendation systems in a literature review. It talked about behavior analysis and semantic technologies. Those approaches fit right into CampusConnect's hybrid engine pretty well. Still, the thing has a broad scope. It is not tailored to campus-specific constraints at all.

**[7] Context-Aware Campus Events Suggestion Using Mobile Sensing** ACM UbiComp paper from 2018 on context-aware campus events suggestion using mobile sensing. They explored data from location and activity to suggest events on campus. It handles dynamic personalization based on real-time context. The limitation, though, is that it is an older study. Plus, it sticks to mobile-only design.

**[8] Hybrid Recommendation System for Cultural Events** IEEE Big Data one from 2019 showed a hybrid recommendation system for cultural events. It combined

collaborative and content-based filtering, and that worked effectively for suggestions. But it focused on cultural events. It lacks integration with academic stuff.

**[9] Survey of Event Recommendation Systems** IARJSET in 2024 categorized event recommendation systems. They broke them into content-based, collaborative, context-aware, and hybrid types. That taxonomy, I mean, helps guide the architecture for CampusConnect. Limitation here is no benchmark comparisons. And the survey quality, it varies.

**[10] Event Attendance Prediction & Personalized Recommendation** Awad's work in 2023 used historical event logs and ML to predict attendance. It also recommended events personally. Features like popularity and timing, those are useful for CampusConnect. But it is thesis-level scope. Not tested across multiple institutions.

**[11] MERN Stack Based Online Learning Platform** JETIR paper from 2023 presented a MERN stack based online learning platform. It highlighted scalability and accessibility in an LMS. That validates the stack for modular campus platforms. Limitation, it focused on learning modules. Lacks event coordination features.

**[12] AI-Powered E-Learning Platform Using MERN Stack** IJRPR in 2024 developed an AI-powered e-learning platform using MERN stack. It had modular LMS with role-based access and dynamic content rendering. The architecture parallels CampusConnect's design basically. But it is academic-centric. Does not include social or club features.

**[13] BrightPath: MERN for Engineering Education** BrightPath, from IRJET in 2024, showcased a MERN app for engineering education. It was interactive and affordable for students. Supports real-time updates and user-friendly design. Limitation is narrow domain. Not generalized for broader campus use.

**[14] Improving Smart Conference Participation through SARVE** The IEEE Access paper from 2021 introduced SARVE for improving smart conference participation. It is a social-aware recommendation model. That aligns with CampusConnect's goal of fostering collaboration. But designed for conferences. Needs adaptation for student events.

**[15] Understanding Latent Factors of Event Popularity** ACM Web Intelligence study from 2019 looked at understanding latent factors of event popularity. It analyzed what drives student interest in events. Offers insights into personalization and engagement strategies. The focus is on popularity metrics. Lacks recommendation engine integration.

### III. PROPOSED METHODOLOGY

CampusConnect basically goes for building just one platform. It ramps up student engagement with custom features, quick updates, and straightforward event handling. The setup relies on AI to pick out relevant campus events. It

looks at each student's interests, their classes, and what clubs they are in. This beats the old way with bulletin boards or emails all over the place. Students end up knowing about chances that fit right into their schoolwork and personal stuff.

At the heart of making things personal, there's this mix of recommendation tech. It pulls together content matching and group-based filtering. They grab data from what students browse, their school activities, and past events they joined. Profiles update on the fly like that. Then NLP comes in to pull key words from event info and line them up with user likes. Oh and they track spots in real time too. Once full, signups close automatically. Event status keeps getting checked nonstop.

Students can poke around for clubs and happenings tied to their major, hobbies, or old participations. That makes finding things easier in a way. It levels the playing field so every group gets fair shots at opportunities. Inclusivity gets a boost there. Event organizers benefit as well. The tools let them handle attendance tracking, push out news, and dig into how people engage. All pretty efficient.

The build uses React.js up front, Node.js with Express in the back, and MongoDB to manage the data. It's a web app overall. JWT handles secure logins. Deployment on cloud keeps it scalable. These parts all come together in CampusConnect. It's an AI-driven tool that patches holes in current setups. Plus it pushes for collaboration and real community building around campus. Main steps in the method as follows:

### System Architecture

CampusConnect puts together a full web platform. It mixes in scalable tech that's secure too. Plus some AI parts. The setup has three main layers. Frontend. Backend. And database. Each one handles its own job. That way everything runs smooth. Users get a good experience. The whole thing scales up easy. It's simple to keep up with. And flexible for changes down the line. All because of that modular setup.

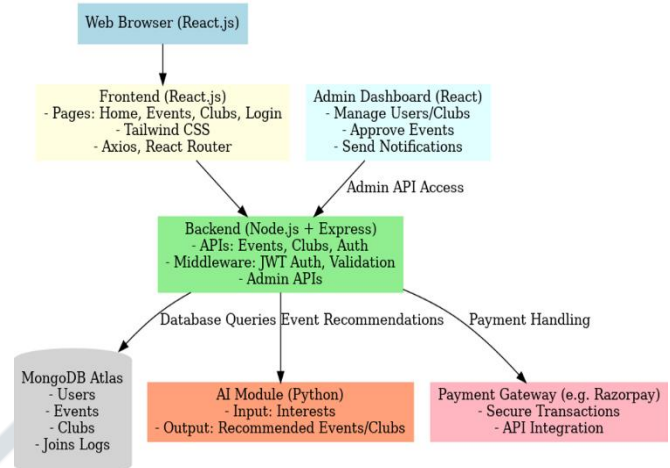
They built the frontend using React.js. Styled it with Tailwind CSS. That gives admins, organizers, and students something responsive. User friendly too. React Router handles moving between pages. Like for managing clubs. Finding events. Signing up. Logging in. Users can pull up info from any device that browses the web. Pretty straightforward.

Backend runs on Node.js. With Express.js framework. It manages APIs safely. Data swaps back and forth quick between client and server. They use JWT. And Passport.js. For auth and roles. So students, organizers, admins each get what they need. No more, no less. Other services back there check slot availability. Handle registrations. And tie in AI recs through microservices.

Database side uses MongoDB. Stores profiles. Event details. Clubs. Who joined what. Preferences. The app deploys on clouds like Heroku. Or Vercel. MongoDB Atlas too. Keeps things scalable. Always up. AI modules fit in here.

For personal touches. NLP to get events. Leads to smart recs in real time.

All these pieces team up. Make a secure spot. Scalable. Smart. Admins and organizers run events easy. Get analytics that help. Students hunt for stuff. Register no hassle. Get recs tailored just for them.



### System Implementation

CampusConnect got put together with this modular setup. It keeps things simple for deploying, scaling up, and staying flexible overall. They picked the MERN stack for building it, you know, MongoDB, Express.js, React.js, and Node.js. That combo gives a solid foundation for a web app that's engaging and dynamic, pretty much.

The frontend and backend got developed separately first. That way responsibilities stay clear. Then they linked them up using RESTful APIs. React.js handled the front-end user interface. Tailwind CSS came in for styling it all. React Router made navigation smooth between modules, like login, registration, home page, event discovery, and club management. Before diving into code, they did prototypes in Figma during design. Ensured the user experience stayed consistent and easy to use.

On the backend side, Node.js and Express.js took care of it. Handled data communication, server-side logic, API requests too. Authentication and authorization used JWT, those JSON Web Tokens, along with Passport.js. Gave safe role-based access for admins, organizers, students. API endpoints managed stuff like creating events, tracking slots, real-time notifications. Kept everything responsive and reliable.

MongoDB worked well for the database. Stores unstructured data effectively, user profiles, event details, participation records and such. They used a schema-based modeling with Mongoose. Helped keep data consistent, queries fast. For deployment, cloud platforms ensured scalability and availability. Like MongoDB Atlas for hosting the database, Heroku or Render for backend, Vercel or Netlify for frontend.

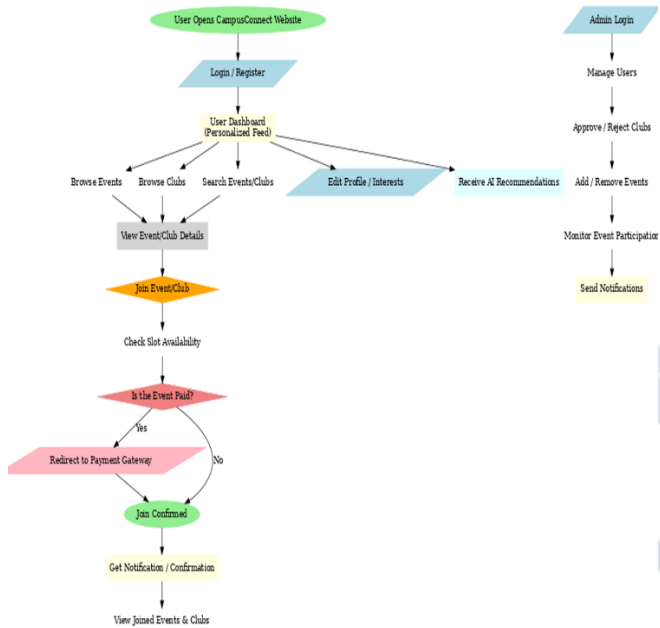
The AI module integrated as microservices. Looks at

student profiles, suggests events. Uses collaborative filtering mixed with content-based. Natural language processing handled event descriptions. Mapped them to user interest tags. So the system dynamically offers personalized recommendations for clubs and events.

Anyway, putting CampusConnect out there shows how web tech, cloud deployment, AI recommendations come together. Creates a secure, scalable platform that's smart too. Enhances campus life, boosts student engagement just like that.

recommendations. It applies NLP for event parsing. Filters combine in smart ways. Results fit students perfectly. The single platform reduces scattered communication.

In terms of metrics, event discovery sped up. More folks joined. Organizers saved time compared to manual work. On the user side, students felt more aware of opportunities. They connected better. Versus other approaches like context-based or group filtering, this one scales nicer. It adapts easier. Engagement stays fresh. These results prove the system advances campus connections. It goes way beyond standard approaches.



**Fig. 1.** Block diagram of the implemented system

**IV. RESULTS AND COMPARISON**

The CampusConnect ended up as this solid web app. It tackled all the key problems from the original setup. Students signed up without any worries. They checked out personalized event ideas. Clubs popped up easy for them to find. Real-time notifications showed up too. Organizers got tools for creating events. They managed them smoothly. They kept track of sign-ups. Slot availability updated live. Admins handled the whole thing. Access levels matched their roles. That way, campus activities ran without glitches.

During testing, the recommendation feature pulled from user info. It used likes and past activities. A tech student might see matching workshops. Someone into culture got club meetings or contests suggested. Slot checks happened instantly. Events stayed under capacity. Alerts reached students fast. That cut down on missed opportunities. Overall, CampusConnect ramps up participation. It personalizes stuff. It opens doors more than old methods. When you look at other systems, improvements stand out. Things like WhatsApp groups or bulletin boards lack personalization. They do not update in real time. Earlier studies focused on school-wide suggestions. Or they needed huge static datasets. Those felt rigid for daily student life. CampusConnect uses AI for

**V. CONCLUSION AND FUTURE WORK**

The CampusConnect platform kind of pulls everything together in a smart way. It helps connect students with campus stuff by putting all the event info in one spot. Plus it uses AI to give personalized recommendations that fit what people like. You have things like user profiles that update based on interests. Real-time tracking for slots too. Secure logins and access levels depending on your role. All that boosts how students get involved. It makes organizers work smoother. And it helps make the whole campus feel more inclusive. Now compared to old school ways like notice boards or WhatsApp chats or those scattered websites. CampusConnect wins big on getting the word out. It's easier to reach everyone. And it keeps folks engaged way better. So students can stay in the loop with schoolwork and fun activities without hassle. Right now it's all web-based. But down the line they could add a mobile app for push alerts on the go. Maybe weave in deeper AI like deep learning to nail those suggestions even more. Oh and beef up the analytics so admins see real patterns in how students join in. They might toss in alumni links or internship finds too. Even ways to team up across campuses. That would turn it into more than just events. Pretty much a full-on digital buddy for making campuses lively and linked up. Inclusive smart spots all around.

**REFERENCES**

- [1] Ozanfari and Youssef along with their team back in 2021 put forward this recommendation setup. It uses TF-IDF combined with expanding keywords to link students up with events and groups that actually fit. You know, the whole idea pushes for discovering stuff personalized around what interests someone or their group ties. Still, it leans too much on text-based info from metadata. Scaling that out to all sorts of campuses, well, that stays pretty iffy..
- [2] Improving Smart Conference Participation through SARVE from Asabere and the others in 2021. They built it as a recommendation tool aware of social stuff. Basically enhances suggestions for events in groups by looking at connections people have and what they like. Oh and the limitation here. It got made for pro conferences mostly. So for platforms all about students, you'd need to tweak it a bunch.

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- [3] Event Organization 101: Understanding Latent Factors of Event Popularity Zhang and Lv back in 2019. They looked into those hidden things that make events popular. You know, stuff like when it happens, where its at, and all that social media chatter around it. Their results, they really help when youre trying to boost how visible an event is and get more people engaged. Still, its got this limitation. It sticks mostly to measuring popularity numbers. Doesnt really get into ways to personalize things for folks.
- [4] Using Social Elements to Recommend Sessions in Academic Moritz and the team in 2020. They came up with a system to recommend sessions at academic events. It pulls in social bits, like who your peers are going to and what interests you share. Pretty much suggests sessions based on that. Oh and, its mainly for academic stuff. Doesnt do much for things like clubs or extracurricular events.
- [5] Goal-Based Course Recommendation using RNNs Jiang and Pardos came up with this RNN-based model back in 2021. They aimed it at recommending courses that fit students long-term academic goals. Thing is, it stays pretty focused on curriculum stuff. It does not really handle social recommendations or ones tied to events.
- [6] Early Academic Performance Prediction and Recommendation Bousalem and Qazdar along with others worked on predictive models in 2020. These forecast student performance and even suggest study strategies. Still, the approach is all academic-centric. It lacks any real tie-in with campus engagement tools, you know.
- [7] EventRecommender: A Collaborative Approach for Social Event Discovery Fang and team introduced EventRecommender in 2019. It uses collaborative filtering to discover social events based on user behavior and preferences. The problem there is it needs huge datasets to work well. Plus, the cold-start issue just hangs around.
- [8] Context-Aware Campus Events Suggestion using Mobile Sensing Lee and colleagues in 2018 went with mobile sensing data. That includes location and activity info to suggest campus events on the fly. But the design is mobile-only. So accessibility for folks using web-based stuff gets limited.
- [9] Hybrid Recommendation System for Cultural Events Meng and others built a hybrid system in 2019 for cultural events. They mixed content-based and collaborative filtering methods. It is domain-specific though. Adapting it for academic or club events would take some work.
- [10] Student Club Recommendation Based on Social Gupta and Verma developed a graph-based model in 2018 for student club recommendations. It draws on social network analysis. Still, it assumes you have detailed social graphs available. Privacy concerns could pop up pretty easily.
- [11] CampusMate: A CampusMate sometimes. Patel and Desai came up with it back in 2020. They built the whole thing on Firebase, you know, and threw in some machine learning too. Basically, it pushes out real-time updates for campus events. Still, the main issue there is how its all mobile-focused. It really lacks a solid web setup. That means not everyone can access it easily.
- [12] A recommender system for campus activities. Chen and Luo suggested it in 2018. The idea was to match up events with students based on what they do and what interests they say they have. It pulls from behavioral data and all that. But yeah, scalability is a problem. It does not grow well. And it depends a lot on people manually tagging their interests.
- [13] Discovering Popular Campus Events from Social Media Yang and Li looked into that in 2019. They went through social media trends to spot the hot campus events. Then they tried predicting how engaged folks would be. Pretty straightforward approach. The downside, though, is how it relies on outside platforms. Real-time tying in is tough. It just does not integrate smoothly.
- [14] AI-Powered Campus Scheduler for Personalized Event Planning sounds fancy. Turing and Ma rolled it out in 2020. This one automates joining events by checking your calendar and what you like. It personalizes the whole planning bit. I mean, convenient in theory. But it needs all your detailed schedules. That brings up privacy stuff right away. People worry about that.
- [15] University Social Portal for Engagement and Collaboration. Rao and Mehta made it with the MERN stack in 2020. It connects students to clubs and events, helps with that collaboration side. Keeps things engaging on one campus. The limitation hits hard, though. Its stuck to a single university. No real way to work across different schools.
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