

TECHSPRINT 2025

CAMPUS COMPANION – AI POWERED STUDENT HUB

PROBLEM STATEMENT

Students struggle to manage day-to-day campus life information such as:

- Class timetable, room changes, and substitute schedules
- Assignments, lab submissions, exams, and project deadlines
- Club events, registrations, duties, and responsibilities
- Sports, competitions, and important campus announcements

This information is scattered across WhatsApp groups, PDFs, notice boards, CR messages, and seniors, making it hard to:

- Find **accurate, updated** information quickly
 - Get **personalized** details (branch / batch / section / club)
 - Track **what is important today** vs what can be ignored
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PROPOSED SOLUTION

A web-based **Campus Companion** that acts as a personalized AI hub for every student:

- Central dashboard showing today's classes, deadlines, events, and duties, filtered by branch, batch, and interests
- Unified search + Gemini-powered Q&A for any campus query (timetable, exams, clubs, rules, events)
- Admin and club panels to create events, assignments, and official posts using a simple UI
- Feedback and learning loop (upvote/downvote responses, pin answers, follow-up threads) so the system improves over time

The application is built fully on React + Firebase Realtime Database with Gemini API, without a separate backend server.

TARGET USERS

- **Freshers** – 1st year students needing quick, reliable campus information
 - **Existing Students** – All years and all branches
 - **Club Coordinators and CRs** – Managing events and member tasks
 - **Faculty / Admin (Optional)** – For managing official events and notices
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TECH STACK

Component	Technology
Frontend	React.js (SPA, component-based UI, responsive design)
AI Engine	Gemini API (Google) – natural language Q&A, summarization, content generation
Authentication	Firebase Authentication (email/password, Google login)
Database	Firebase Realtime Database (structured campus data, queries, events, profiles)
Security	Firebase Security Rules (role-based access: student / admin / club_admin)
Hosting	Firebase Hosting (single-page app deployment)

SYSTEM ARCHITECTURE

Core Data Structure (Firebase RTDB)

- /users/{uid} – User profile, preferences, roles, college ID, batch
- /timetable/{branch}/{batch} – Class schedule, room numbers, instructor details
- /assignments/{branch}/{batch} – Assignments, labs, project deadlines with submissions
- /events/{clubId} – Club events, sports competitions, hackathons, workshops
- /queries/{threadId} – User queries, AI responses, feedback, follow-ups, votes
- /roles/{uid} – Access control (student, admin, club_admin)
- /clubs/{clubId} – Club information, tags, member count, contact

High-Level Flow

1. User logs in via Firebase Auth; profile fetched from /users/{uid}
 2. Dashboard fetches relevant data (branch, batch, interests) from RTDB
 3. User asks a question; query stored in /queries and sent to Gemini with RTDB context
 4. Gemini generates answer; stored back in RTDB and displayed with follow-up options
 5. Admins manage events, assignments, and notices via protected RTDB paths with role verification
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CORE MODULES

A. Student Module

1. Authentication & Personalization

- Login / Signup with Firebase Authentication
- Smart onboarding form capturing:
 - Name, College ID, Branch, Batch, Section
 - Clubs and sports interests
 - Preferred notification types
- Profile stored in RTDB and used to customize entire dashboard experience

2. Personalized Dashboard

Today's Overview Card:

- Today's classes with time and room location
- Assignments due soon (within 3 days)
- Events happening today or tomorrow
- Quick count of unsolved queries

Upcoming Section:

- Exams and project milestones (next 2 weeks)
- Club events and registrations
- Important campus announcements

Quick Actions:

- "Ask a Question" button (floating or sticky)
- "View My Timetable" link
- "See All Events" navigation

3. Unified Search & AI Q&A

Single search bar supporting two modes:

- **Keyword Search** – Across timetable, assignments, events, FAQs
- **AI Ask Mode** – Natural language queries via Gemini

Example Queries:

- "Show my classes after 2 PM today"
- "All CSE-A assignments due this week"
- "When is the AI Club orientation?"
- "What are exam rules for makeup tests?"

4. Query Threads & Follow-ups

Every question creates a **persistent thread** with:

- Original question and timestamp
- AI-generated answer with sources
- User follow-up questions in chronological order

- AI follow-up responses
- Community feedback if multiple students ask similar questions

User Actions:

- Pin best answer to top of thread
- Mark thread as "Solved" or "Closed"
- Add to "Saved Answers" archive for future reference
- Upvote ↑ / Downvote ↓ responses (trains AI model)

5. Assignments & Duties Manager

- Assignment and homework list filtered by branch, batch, and subject
- Display: Title, Description, Due Date, Submission Link, Status
- "My Duties" card for:
 - Event volunteering assignments
 - Lab responsibilities and group assignments
 - Class representative tasks
- Status toggles: "Not Started" → "In Progress" → "Done"
- Automatic reminders 24 hours and 2 hours before deadline

6. Clubs & Events Hub

Explore Tab:

- Upcoming events from joined clubs (personalized)
- Browse popular events across campus
- Filter by date, club, event type, branch requirement

Event Details Page:

- Date, time, venue, description
- Organizer and contact information
- Event tags (e.g., CSE, First Year, Workshop)
- Current enrollment count and capacity

Actions:

- "Enroll / Register" button with confirmation
- Comment and reaction interface (emoji reactions, text comments)
- Waitlist support if event reaches capacity
- Share event to WhatsApp / Copy link

7. Notifications Center

Lightweight in-app notification hub:

- Deadline reminders (configurable timing)
- Event registration closing alerts
- New announcements from clubs or admin
- AI response ready notifications (for follow-ups)
- All notifications stored locally; no OS push needed

B. Admin & Club Module

1. Role-Based Access Control

- **Roles:** student, club_admin, admin
- Role data stored in /roles/{uid} in RTDB
- Enforced via Firebase Security Rules (client-side role checks + server-side rule validation)
- No custom backend needed; pure Firebase rule-based security

2. Admin Dashboard

Admin Login:

- Secure email/password login with admin role verification
- Admin-only pages protected by role check before rendering

Core Features:

- Create and edit official notices and campus announcements
- Create assignments (branchwise, batchwise, or subject-wise)
- View aggregated common student queries to understand pain points
- Browse feedback on AI responses (upvote/downvote analytics)

3. Club & CR Panel

Club Admin Capabilities:

- Create and manage club events:
 - Event title, description, date, time, location
 - Capacity and enrollment tracking
 - Deadline for registration
 - Event status (Upcoming / Live / Closed / Results)
- Post branchwise or batchwise announcements
- View event enrollments, attendee list, and comments
- Mark attendance and post event results

CR Responsibilities:

- Add duties and tasks for class volunteers
- Create class announcements (section-wide or batch-wide)
- See feedback from students via queries and surveys

4. AI-Assisted Content Creation

- Admin/club enters rough text for announcements or event descriptions
- Gemini suggests:
 - Polished, professional description
 - TL;DR summary (one-liner)
 - Auto-generated event tags based on content
 - Recommended posting time for reach

KEY FEATURES

1. **College-Specific AI Campus Assistant** – Central knowledge hub for timetable, events, assignments, and campus rules using Gemini
 2. **Personalized Dashboard** – Filtered by branch, batch, section, and individual interests; shows only relevant cards and deadlines
 3. **Unified Search + AI Q&A** – Single search bar for keyword search and natural-language Gemini queries across all campus data
 4. **Role-Based Access Control** – Student / Club Admin / Admin roles with Firebase Security Rules, no backend server needed
 5. **Threaded Q&A System** – Questions create persistent threads with AI answers, follow-ups, pinning, and archiving for future reference
 6. **Smart Event & Assignment Manager** – Create, enroll, track, and receive reminders for assignments, clubs events, and duties
 7. **Feedback-Driven AI Improvement** – Upvote/downvote responses; system learns better prompts and becomes more accurate over time
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DEMO FLOW (Hackathon Pitch)

Step 1: Login & Onboarding

Judge logs in as a student, selects:

- Branch: CSE
- Batch: 2025
- Interests: AI/ML, Competitive Programming, Cloud Computing

Step 2: Personalized Student Dashboard

Display shows:

- "Today's Classes" – Morning and afternoon timetable
- "Upcoming Deadlines" – DSA assignment due tomorrow, EC lab report due in 2 days
- "For You Events" – AI Workshop (AI Club), Football match (Sports)
- "Unsolved Questions" – 2 questions pending AI response

Step 3: Ask a Question

Judge types in search bar: "**What classes do I have tomorrow and where are they?**"

- AI fetches timetable from RTDB, generates readable response with time and room
- Response appears in a thread with follow-up option

Step 4: Follow-up & Pin

Judge asks follow-up: "**Show only lab sessions this week**"

- New AI response filters and displays lab timetable in a nice format
- Judge pins the best answer to use it as reference

Step 5: Event Registration

Judge browses Events tab, sees "**AI Workshop – Introduction to Gemini API**"

- Clicks "Register"
- Enrollment confirmed; judge added to attendee list
- Can see comments from other students

Step 6: Switch to Admin View

Demo switches account to admin role

- Admin dashboard shows:
 - "Create New Assignment" form
 - "Create Event" form
 - Common student queries aggregated and analyzed

Step 7: Create Event as Admin

Admin fills:

- Title: "Debugging Workshop – For Beginners"
- Description: "[rough text]"
- Gemini suggests: polished description + tags
- Admin publishes; instantly visible to all CSE students

Step 8: Back to Student View

Student dashboard auto-updates, showing the newly created event card

FUTURE SCOPE

- **Multilingual Support** – Campus queries in English, Hindi, and Malayalam with context-aware Gemini responses
- **Voice Assistant Mode** – Microphone input for questions; voice output for answers (text-to-speech)
- **PDF Upload & Parsing** – Admin uploads circulars, notices, and syllabus PDFs; automatically parsed and indexed for Q&A
- **College ERP Integration** – Read-only access to attendance, marks, official records (if ERP provides APIs)
- **Advanced Analytics Dashboard** – Admin insights: engagement per branch, most common doubts, event reach, AI accuracy metrics
- **Offline Mode** – Cache frequently accessed data; answers work without internet

WHY THIS PROJECT?

- **Meaningful Gemini Integration** – Uses Gemini API for context-aware Q&A, summarization, and content generation; not just a demo chatbot
- **Solves Real Campus Problem** – Information scattered across WhatsApp, notice boards, PDFs; this centralizes and personalizes it
- **Fully Working MVP** – Complete feature set achievable within hackathon timeframe using React + Firebase + Gemini

- **Scalable to Any Campus** – Architecture supports any college; only Firebase data and configuration changes, no code rewrite
 - **High Adoption Potential** – Valuable for students, clubs, and faculty; likely to be used beyond hackathon if deployed
 - **No Custom Backend** – Firebase handles auth, database, security rules, and hosting; reduces complexity and infrastructure cost
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IMPLEMENTATION ROADMAP (For Reference)

Phase 1 – Core (MVP, Hackathon Focus)

- User authentication and profile management
- Personalized dashboard with cards
- Search and Gemini Q&A integration
- Basic query threads with feedback

Phase 2 – Admin & Events

- Admin and club roles with security rules
- Event creation and enrollment
- Assignment manager
- Duty assignment interface

Phase 3 – Polish & Analytics

- In-app notifications
- Response feedback analytics
- UI/UX refinement
- Demo data prefill for all branches

Phase 4+ – Advanced Features

- Multilingual support
- PDF upload and parsing
- Voice assistant
- ERP integration