CampusConnect

Project Overview: CampusConnect is an advanced academic collaboration platform designed for students and faculty to interact, solve doubts, upload and review projects, and engage in mentorship across departments. It combines secure communication, AI assistance, and a user-friendly interface for real-world deployment in academic institutions.

Project Objectives: - Enable secure, 1-on-1 encrypted communication for students and mentors - Allow students to upload and showcase projects - Integrate AI tools to assist with doubt solving, idea generation, and code suggestions - Facilitate cross-department mentorship mapping - Build a searchable, smart academic knowledge base

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Core Modules & Features:

1. **User Authentication & Roles**
    - Secure registration and login (JWT-based)
    - Role assignment: Student, Faculty, Admin
2. **Encrypted Private Messaging System**
    - 1-on-1 messaging similar to WhatsApp
    - AES/RSA-based encryption
    - Chat history, file sharing, and real-time sync (Socket.io)
3. **Project Upload & Discussion**
    - Upload project title, description, files, screenshots, GitHub links
    - Other users can view and ask questions via private chat
4. **Mentor Mapping System**
    - Search and filter faculty by expertise
    - Request mentorship across departments
    - Once accepted, opens a private encrypted thread
5. **AI Assistant Features**
    - Doubt solving using NLP (OpenAI/HuggingFace models)
    - Project idea generator (topic, tech stack, datasets)
    - Code debugging assistant
    - Voice-to-text doubt input (Whisper/Google Speech API)
    - AI-based feedback for uploaded projects
    - Mentor recommendation engine based on interest/domain
    - Chat summarizer and thread prioritizer
6. **Smart Knowledge Base**
    - Save every useful doubt + answer

- Semantic search with vector DB (e.g., FAISS)
- Auto-tagging and topic-wise filtering

7. **Voice/Video Communication**
    - WebRTC-based calling
    - Screen sharing for explanation/presentations
8. **Polls, Announcements & Notifications**
    - Create polls, receive real-time notifications
    - Admin announcements across the platform

Technology Stack: - **Frontend**: React.js, Tailwind CSS, TypeScript, shadcn/ui - **Backend**: FastAPI / Node.js, SQLAlchemy, JWT Auth, Socket.io - **Database**: PostgreSQL / MongoDB - **AI/NLP**: OpenAI API, HuggingFace Transformers, Whisper - **Real-Time**: WebSockets + Socket.io - **File Storage**: Firebase / AWS S3 - **Encryption**: Web Crypto API / crypto-js / RSA - **Deployment**: Docker, Render / Railway / Vercel

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Step-by-Step Implementation Plan:

Phase 1: System Architecture & UI Planning - Finalize all features and modules - Create UI wireframes for chat, project, AI assistant, mentor view - Design DB schema

Phase 2: Core Platform Setup - Set up authentication (JWT) - Build encrypted chat system (1-1 private messaging) - Implement project upload and file sharing

Phase 3: AI Integration - Stage 1 - Integrate basic AI doubt solver using OpenAI/HuggingFace - Add AI project idea generator module

Phase 4: Mentorship & Knowledge Base - Build mentor mapping and chat initiation system - Create AI-assisted searchable knowledge base with saved queries

Phase 5: Advanced AI Features - Add feedback generator for project uploads - AI mentor suggestion based on interests - Voice-to-text integration for doubt input - Chat summarization + smart prioritization

Phase 6: Deployment & Testing - Full integration testing - UI/UX improvements - Dockerization and cloud deployment - Beta testing with selected users

Phase 7: Final Launch + Feedback Loop - Full deployment across campus - Collect usage metrics and feedback - Continuous improvement and AI tuning

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End Goal: To create a secure, intelligent, scalable academic platform that improves communication, learning, and project collaboration for both students and faculty across departments.