

# Ashish Goyal

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## PROFESSIONAL SUMMARY

Final-year CS student with hands-on experience building and deploying full-stack web applications. Projects include real-time collaboration using CRDTs, AI-based face verification, and a custom debt settlement algorithm. Comfortable owning features from idea to deployment.

## EDUCATION

**Rajiv Gandhi Institute of Petroleum Technology**  
*Bachelor of Technology in Computer Science (Final Year)*

Jais, UP  
2022 – 2026

## PROJECT EXPERIENCE

- SyncCode – Real-Time Collaborative IDE** | *React, Node.js, Yjs CRDT, Socket.io* [Live](#) | [GitHub](#)
- Architected a **dual-channel WebSocket system**, separating binary CRDT sync (Yjs) from JSON room events (Socket.io) to optimize for different message patterns.
  - Implemented **conflict-free real-time collaboration** using Yjs CRDTs (same technology as Figma/VS Code Live Share), enabling concurrent edits without data loss.
  - Validated system performance via load-testing scripts simulating **50+ concurrent users**, achieving **~22ms round-trip latency** with 100% sync success rate.
  - Mitigated RCE vulnerabilities by **delegating untrusted code to Piston API** (sandboxed containers), supporting 8 languages while eliminating execution risks on the application server.
- Sentinel – AI-Powered Exam Platform** | *React, Node.js, PostgreSQL, Prisma, face-api.js* [Live](#) | [GitHub](#)
- Built an **AI-proctored exam platform** with **14+ anti-cheating measures** including real-time face verification using face-api.js (128-dimensional embeddings, sub-0.6 Euclidean distance threshold).
  - Designed PostgreSQL schema with **Prisma ORM** and **6 strategic indexes**; wrote raw SQL analytics dashboards with risk-level classification for suspicious student detection.
  - Implemented **Google OAuth 2.0** with Role-Based Access Control (RBAC) for teachers vs students, and tiered rate limiting with secure password reset flows.
  - Integrated client-side proctoring signals (tab switches, fullscreen exits, face detection events) into backend workflows for **reliable storage and auditability**.
- SplitBill – Expense Settlement Platform** | *MERN Stack, Socket.io, Chart.js* [Live](#) | [GitHub](#)
- Developed a **hybrid  $O(N \log N)$  debt simplification algorithm** combining hash-based exact matching with sorted two-pointer greedy, reducing settlement transactions by **40-60%** compared to naive approaches.
  - Designed **25+ RESTful APIs** with JWT dual-token authentication (access + refresh with rotation) and **ACID transactions** ensuring financial data integrity.
  - Implemented **real-time expense sync via Socket.io** with room-based broadcasting, and MongoDB aggregation pipelines powering analytics dashboards.
  - Built a **PWA-enabled React frontend** with 50+ components, Chart.js visualizations, dark/light theming, and **Gzip compression** reducing API response sizes by ~70%.

## TECHNICAL SKILLS

**Languages:** JavaScript (ES6+), SQL, C++, Python (familiar)  
**Backend:** Node.js, Express.js, REST API Design, WebSocket, Socket.io, Prisma ORM, Mongoose  
**Frontend:** React.js, Context API, Tailwind CSS, Material-UI  
**Databases:** PostgreSQL, MongoDB, MySQL  
**Tools & Infra:** Git, GitHub, Docker (basics), Postman, Render, Vercel, Linux (basics)  
**Concepts:** System Design, Real-Time Collaboration, CRDT, API Security, Database Indexing, ACID Transactions

## ACHIEVEMENTS

Solved **250+ Data Structures and Algorithms problems** across competitive programming platforms.  
JEE Advanced 2022 – Rank 14,954 (Top 1 percentile out of 1.5M+ candidates).