

Abhinav Kumar Singh

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SUMMARY

Backend-focused computer engineering student with hands-on experience designing scalable distributed systems, high-throughput microservices, and low-latency real-time platforms. Strong expertise in algorithms, system design, concurrency, and performance optimization, with a track record of delivering production-grade systems at scale.

EDUCATION

Thapar Institute of Engineering and Technology

Bachelor of Engineering in Computer Engineering

Aug 2024 – May 2028

Patiala, Punjab

Dewan Public School

Senior Secondary Class XII

Apr 2018 – Mar 2023

Meerut, Uttar Pradesh

EXPERIENCE

Software Engineering Intern | COE-FS, Thapar University

Site

Mar 2026 – Present

Patiala, Punjab

- Architected a production-grade research platform serving **100+ active users** using **FastAPI microservices, PostgreSQL, and Next.js**, improving backend scalability and request throughput under concurrent workloads.
- Designed **10+ RESTful APIs** with **SQLAlchemy ORM**, reducing query latency through optimized schema design, indexing, and efficient data access patterns.
- Orchestrated containerized deployment using **Docker, Nginx, and CI/CD pipelines**, ensuring reproducible builds and high system reliability across Linux environments.

PROJECTS

LSSD Pipeline — Fault-Tolerant HPC Job Scheduler

Jan 2026 – Present | GitHub

- Developed a distributed job scheduler using **Python, FastAPI, Redis, and gRPC** implementing **Raft consensus** across **1,000 nodes**, coordinating **1,000+ concurrent jobs** with sub-second scheduling latency and fault-tolerant state replication.
- Built a real-time observability dashboard using **Next.js and Three.js/WebGL**, visualizing cluster health, task distribution, and throughput metrics for live system monitoring.

Lumo — Collaborative Whiteboard Platform

Nov 2025 – Dec 2025 | Demo

- Engineered a low-latency collaborative system via **WebSockets (Socket.IO)** across **8 channels**; exposed **42 REST endpoints** secured with **JWT authentication** for session management.
- Integrated **OpenAI GPT-4** for automated diagram generation and contextual sketch interpretation, enhancing productivity through AI-assisted workflows.

Monte Carlo Particle Collision Simulator

Sep 2025 – Oct 2025 | Demo

- Implemented a high-performance simulation engine using **Python and SciPy**, processing **100,000+ physics events** in under **0.15s** — a **60% improvement** over baseline — with an interactive **Next.js + WebGL** visualization frontend.

Open Source: Active contributor across backend systems, distributed architectures, and performance-critical applications.

POSITION OF RESPONSIBILITY

Technical Coordinator | Microsoft Learn Student Chapter, TIET

Jul 2025 – Present

- Launched a hackathon management platform supporting **100+ teams** during Makeathon 7, evolving into a reusable campus-wide event orchestration system. Play Store
- Mentored **10+ developers** in open-source contributions, backend architecture, and engineering best practices.

Technical Executive Committee Member | URJA TIET

- Maintained large-scale event infrastructure for URJA, Thapar's annual national sports fest, ensuring platform stability for **10,000+ participants** during peak load.

TECHNICAL SKILLS

Languages: Python, C++, C, JavaScript, TypeScript

Backend: FastAPI, Node.js, REST APIs, Microservices, WebSockets, Socket.IO, gRPC

Frontend: React, Next.js, TailwindCSS, Three.js, WebGL

Databases: PostgreSQL, MongoDB, Redis, SQLAlchemy

Infrastructure: Docker, Kubernetes, Nginx, CI/CD, Linux, Load Balancing, Containerization

Cloud: AWS (EC2, S3, Lambda), Azure, Render

Messaging: Redis Streams, Event-Driven Architecture

Data: NumPy, SciPy, Pandas, Scikit-learn

Core: Distributed Systems, Data Structures, Algorithms, OOP, System Design, Networking, Performance Optimization, SDLC, Agile

ACHIEVEMENTS

- **1st Prize — Agentic AI Hackathon**, Ulster University, UK Certificate
- **Cyber AI Innovation Award**, University of Derby, UK Certificate
- **Most Innovative Idea**, Pitchcraft — GTBIT Delhi Certificate