# Aditya Kumar

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## EDUCATION

**Delhi Technological University, Delhi** 2024 – 2028
*Bachelor of Technology in Information Technology* **CGPA: 8.65**

**Lucknow Public School, Uttar Pradesh** Year: 2023
*Senior Secondary School (Class XII)* 12th Grade: 89.8%

**Lucknow Public School, Uttar Pradesh** Year: 2021
*High School (Class X)* 10th Grade: 95.6%

## TECHNICAL SKILLS

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|---|---|
| **Programming Languages** | **C++**, Python, C, Java, Dart, SQL |
| **Core Concepts** | Data Structures & Algorithms, Object-Oriented Programming, Operating Systems, Multithreading & Concurrency, Compiler Design, Relational DBMS, Computer Networks, Low Level Design |
| **Backend & Cloud** | PostgreSQL, Supabase (Auth, Storage, Edge Functions/Deno, Row Level Security), SQLite |
| **Mobile & Frontend** | Flutter, Riverpod, HTML/CSS |
| **Developer Tools** | Git, GitHub, CMake, VSCode, Linux |

## PROJECTS

**Limit Order Book Engine** GitHub *Low-latency / Systems Programming (C++)*
*C++20, CMake, Intrusive AVL Tree, Memory Pools, ASan/UBSan*

- Built a C++20 **matching engine** with strict **price-time priority**: crossing limit orders sweep the opposite side and rest the remainder, market orders execute IOC, and modifies follow exchange rules (size cuts keep queue position; reprices re-queue).
- Indexed price levels in an **iterative intrusive AVL tree** whose nodes double as heads of **intrusive FIFO** order queues; hash-mapped lookup gives $O(1)$ average cancels, and cache-line-sized (64-byte) order and level nodes come from **fixed-capacity memory pools**, never individually heap-allocated.
- Measured **6.1M ops/sec** single-threaded with per-op **p99 under 550 ns** (11-run medians, timer overhead included) on 500K mixed adds, cancels, modifies, and market orders against a 100K-order book spread over 5,000 price levels per side.
- Designed a fail-safe API: `[[nodiscard]]` status codes reject duplicate IDs, unknown IDs, and zero quantities before any state changes, fills append to a caller-owned buffer to keep per-call allocation out of matching, and the engine runs clean under **ASan/UBSan**.

**Connecta — Digital Business Card Platform** GitHub | Try the app *Cross-Platform Mobile / Full-Stack*
*Flutter, Dart, Riverpod, Supabase (PostgreSQL, Auth, Storage, Edge Functions/Deno)*

- **Built and shipped** a cross-platform Flutter app (Riverpod) for digital business cards with an **in-app QR scanner** and an offline vCard QR mode, then migrated its backend from Firebase to **Supabase**.
- Modeled mutual connections as **SECURITY DEFINER** Postgres RPCs that write both directions in **one transaction** (idempotent, self-connections rejected) behind a table with no client write policy; the list loads via one foreign-key join.
- Wrote a Deno **Edge Function** for account deletion that verifies the JWT server-side, purges the user's storage, and deletes the auth user, letting `ON DELETE CASCADE` clear the profile and both sides of every connection.
- Drove auth and onboarding from a **derived Riverpod state machine** over a single shared session stream, with no imperative auth navigation, and moved image decode, resize, and encode into a **background isolate** to keep uploads off the UI thread.

**Micromouse — Autonomous Maze-Solving Robot** ***2nd Place*** *of 47 registered teams, DTU Invictus*
*C++, Raspberry Pi Pico, VL53L0X ToF Sensors, N20 Encoder Motors, Flood-Fill Algorithm*

- **Led a 3-person team** and wrote the C++ navigation stack for an autonomous maze-solving robot on a Raspberry Pi Pico, implementing **Flood-Fill** to compute shortest paths in real time as the maze was explored.
- Interfaced with VL53L0X time-of-flight sensors and N20 encoder motors, replacing prior timing-based movement with **encoder feedback** for precise, repeatable turns.
- Diagnosed a failed side sensor mid-competition and **re-engineered the navigation logic on the spot** to substitute the front sensor for lateral readings, rotating in place to sample and reorienting before continuing.

## ACHIEVEMENTS & EXTRACURRICULARS

- **Knight (Top 6% globally)** on LeetCode (max rating 1862). handle: kraditya23
- Secured **global ranks 125 and 224** in CodeChef Starters 237 and 236 respectively. handle: kraditya23
- Secured **99.6 percentile** in Joint Entrance Examination (JEE) Main 2024 among 1.4 million candidates.
- Ranked in the top 9% nationally in Joint Entrance Examination (JEE) Advanced 2024.
- **Campus Coordinator, Green Lungs Plantation Drive:** Coordinated between APJ Hostel and Green Lungs Universal Foundation; managed site assignments and task allocation for 100+ participants including faculty and students.