

Sourav Sharma

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Education

Indian Institute of Science Education and Research Bhopal, B.Tech in CSE

Aug 2024 – July 2028

Experience

Software Engineer Intern, IITB Trust Lab - Mumbai, India

May 2026 – Present

- Closed correctness gaps in AI-driven C-to-Rust transpilation by building an automated verification pipeline using differential testing, Miri memory-safety checks, and Clippy static analysis, benchmarked against the GNU coreutils reference suite.
- Quantified the specification-correctness tradeoff for AI-assisted code migration across 150 benchmark runs spanning 30 utilities and 5 specification levels (L0–L4), using proptest property-based testing with mutation-testing validation to scale verification rigor beyond manual review.

Summer Fellow, ACM India Summer School (Cryptography) - Hyderabad, India

Jun 2026 – Jun 2026

- Recovered K3 subkey bits on 4-round DES via linear and differential cryptanalysis using 10,000 chosen plaintexts, and estimated a 0.56 differential characteristic probability for 4-round Salsa20.
- Executed timing attacks and Correlation Power Analysis (CPA) against AES and RSA implementations, extracting key material from physical side-channel leakage rather than algorithmic weakness as part of a 9-day residential program at IIT Hyderabad (TCS Research-sponsored).

Research Intern, GeoAI4Cities Lab - Bhopal, India

Dec 2024 – Jan 2025

- Cut manual annotation time by 50% by engineering an automated Python labeling pipeline for 3D point-cloud segmentation on large-scale geospatial datasets, reducing reviewer overhead in a production research environment.

Projects

Titan-KV, Distributed Key-Value Store (Rust)

2026 | [Project Link](#)

- Engineered a distributed key-value store in Rust, implementing a Raft consensus module, leader election, log replication, and quorum-committed linearizable writes over an async gRPC (tonic) network layer with automatic leader-redirect handling for client requests.
- Designed a custom LSM-Tree storage engine (WAL with CRC32-C framing, Bloom-filter-indexed SSTables, multi-way compaction) benchmarked at 847K reads/sec and 411K writes/sec; verified correctness via proptest differential testing against a BTreeMap oracle, Miri (zero-unsafe), and chaos tests simulating network partitions and leader crashes.

NanoMatch, Ultra-Low Latency Order Matching Engine (C++)

2026 | [Project Link](#)

- Engineered a high-performance Limit Order Book in C++17 with price-time priority matching, leveraging cache-aligned memory pools and lock-free SPSC queues to achieve deterministic sub-microsecond order processing at scale.
- Optimized critical execution path via zero-copy mmap ingestion of NASDAQ ITCH binary data; established a latency benchmarking harness (p50/p90/p99) using rdtsc and Google Benchmark, validating performance gains through Linux perf flame graph analysis.

Huffman File Compressor (C++)

2025 | [Project Link](#)

- Engineered a from-scratch lossless compression engine in C++17, custom binary serialization, bitwise packing, and min-heap tree construction achieving 40–55% file size reduction at $O(N \log N)$, with all processing held in-memory to eliminate disk I/O.
- Built a multi-threaded HTTP server (cpp-httplib) from scratch to serve a real-time interactive Huffman tree visualizer, plus self-verifying unit tests validating correctness across edge cases, empty files, repeated inputs, the full 256-byte spectrum.

Skills

Languages: C++ (Primary), Rust, C, Python, C#

Core Areas: Distributed Systems, Concurrency & Async Programming, Networking, Operating Systems, System Design, Data Structures & Algorithms

Tools & Tech: gRPC/Protocol Buffers, Tokio, Git, Linux, Google Benchmark, Criterion, Miri, Clippy

Certifications & Academic Achievements

- Finalist in Reverse Coding X by IIT Madras & IMC Trading
- Global Rank 1493 out of 8793 in IEEEExtreme 19.0, AIR 476
- Cryptography I by Dan Boneh

Link
Team: [Syntax Solvers](#)
Stanford Online | 2026

Positions of Responsibility

- AI & ML Tech Lead, Google Developer Group on Campus, IISER Bhopal
- Coordinator, Squash Club, IISER Bhopal
- Student Volunteer, Placement Cell, IISER Bhopal

Oct 2024 - Sep 2025
Aug 2025 - Present
Mar 2025 - Oct 2025