Ayush Chakraborty

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Bangalore, India

Education

Bachelor of Technology in Computer Science and Engineering Expected May 2027
PES University, Bangalore
CGPA: **9.28 / 10.0 (Top 5% of batch)**

Relevant Coursework: Machine Learning, Database Management System, Big Data, Software Engineering, Computer Networks, Operating Systems

Experience

Research Intern — The Innovation Lab, PES University June 2025 – August 2025
Selected as 1 of 26 interns from 1000+ applicants.

- Co-developed **SUBGNN** with 3 research interns: a scalable subgraph isomorphism framework that accelerates search on large-scale graphs via a filter-and-verify architecture.
- Designed a multi-stage pipeline using METIS for graph partitioning and Graph Neural Networks (GNNs) to generate topology-aware vector embeddings for efficient candidate filtering.
- Built the retrieval stage using FAISS to prune the search space, achieving an **82.5% mean speedup** (on CORA) and **91.18% node mapping accuracy** (on OGBN-Arxiv, 170k nodes) compared to traditional solvers.

Projects

Transformer Model & C Serving Layer — *C, PyTorch, Python* Dec 2024 – March 2025

- Implemented a decoder-only Transformer architecture from first principles in PyTorch, incorporating multi-head self-attention and positional embeddings to perform autoregressive language modeling.
- Built a C serving layer to execute the Python inference process via standard I/O streams and achieved real-time token streaming by manipulating standard I/O buffers to pipe generated tokens immediately to the client, replicating the user experience of production LLMs.

CRDT-Based Distributed Key-Value Store — *Rust, CRDTs, Tokio* Sep 2025 – Present

- Co-developed a leaderless, eventually consistent key-value store in Rust, leveraging Conflict-free Replicated Data Types (CRDTs) to enable mathematically verifiable convergence without central coordination.
- Built an asynchronous P2P gossip protocol for highly concurrent node-to-node state synchronization and anti-entropy mechanisms.

Redis-like In-Memory Store — *C++, TCP Sockets, Event Loop* Oct 2025 – Present

- Built a single-threaded, event-driven server using non-blocking I/O to handle concurrent clients without context-switching overhead.
- Implemented a custom chained hash table for O(1) lookups and the RESP serialization protocol to manage efficient binary data transmission.

Distributed Systems Implementation (MIT 6.824 Labs) — *Go, RPC, Concurrency* Nov 2025 – Jan 2026

- Built a fault-tolerant MapReduce system handling worker failures and stragglers via a custom RPC coordinator.
- Developed a Raft consensus module to guarantee strong consistency across sharded key-value pairs, implementing leader election and log replication.

Technical Skills

Languages: C++, C, Rust, Python, Go
Technologies: PyTorch, Docker, Tokio, Redis, FAISS, Git, Linux/Bash, MySQL, MongoDB, LaTeX
Certifications: Deep Learning Specialization, Machine Learning Specialization (DeepLearning.AI)

Honors & Awards

- **Prof. MRD Merit Scholarship:** Awarded consecutively (Sem 1–4) for maintaining rank in the **top 5%** of the batch.
- **State Merit Scholar:** Ranked **1437** out of **200,000+** candidates (**Top 0.7%**) in the State Engineering Entrance Exam (KCET).