

SAHARSH LAUD

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ACADEMIC DETAILS

Year	Degree / Board	Institute	CGPA / Marks
2026	M.Tech in Computer Science & Engineering (Dept. Rank 2)	Indian Institute of Technology Delhi	8.92
2023	B.Tech in Computer Science and Engineering (Gold Medalist)	Symbiosis University, Indore	9.63
2018	ISC	Laurels School International, Indore	93%
2016	ICSE	Laurels School International, Indore	95%

IIT DELHI THESIS

Title: A Standard and Reference Implementation for Data-flow Management in Geospatial Workflows (**Thesis Defended**)

Supervisor: Prof. Aaditeshwar Seth

Description: Geospatial pipelines chain dozens of algorithms; changing one forces a full re-run with no record of which dataset came from which code version. Designed and built **STACD**, a workflow-orchestration & data-lineage platform (STAC extension) on **Apache Airflow**, in production for **20+ organizations** across **1,000+ villages**, adopted as the lab standard.

- Defined the STACD spec (five new object types, STAC-compatible). Built a **Python compiler** converting declarative **YAML workflows** into executable **Airflow DAGs** with automatic dependency resolution, replacing manual triggering of **40+ algorithms** with single-click execution.
- Designed a priority-based **dual-mode execution engine** dispatching tasks over **REST APIs or isolated Docker containers**, with version management for algorithms, datasets and DAGs, and **five recomputation modes** that re-run only affected subgraphs, backed by a SQL execution logger and lineage tracking.
- Built a Flask-based STAC catalog server; integrated **Google OAuth** and per-DAG **role-based access control** in the Airflow webserver; deployed the multi-container architecture behind an **Nginx** reverse proxy on a Linux server.
- Migrated the CoRE Stack **Django** backend from asynchronous **Celery** to synchronous REST over **Google Earth Engine** and **Google Cloud**; owned testing, debugging and reliability across satellite, drone and bioacoustics pipelines.

PUBLICATIONS & PATENTS

- STACD: STAC Extension with DAGs for Geospatial Data and Algorithm Management**, 2nd ACM SIGPLAN International Workshop on Programming for the Planet (PROPL '25), Singapore, 2025, pp. 14–23 (**First Author**)

WORK EXPERIENCE

ICTD Lab, IIT Delhi: *Infrastructure & Systems Coordinator*

(Jul 2024 – Present)

- Administer lab research infrastructure: server monitoring, troubleshooting, VM deployment/migration; configured NVIDIA/CUDA and benchmarked a Tesla T4 GPU; onboarded research groups onto standard Docker practices.

PROJECTS

- Visual Question Answering with Multi-Modal Transformers:** Fused a ResNet-101 image encoder with a 6-layer transformer text encoder via **cross-attention** and **BERT embeddings** with focal loss, reaching **77% accuracy** on CLEVR. Error analysis on zero-shot transfer traced the accuracy drop to spurious attribute correlations.
- GitHub RAG Analytics:** Built a **text-to-SQL** agent using semantic schema retrieval (sentence-transformers), LLM-generated SQL and a **self-correcting** execution loop. Scored **19/24** on questions across difficulty tiers; error analysis surfaced silent schema-assumption failures.
- xv6 Kernel Memory Management:** Implemented **demand paging** in the xv6 kernel (C) with a swap-slot disk partition, a page-fault handler bypassing the log layer, and an adaptive **page-replacement** policy driven by free-page thresholds.
- Adaptive eBPF Firewall:** Built kernel-level packet filtering at the **XDP** hook with default-deny whitelisting via BPF hash maps (O(1) rule lookup), plus a Python daemon for real-time anomaly detection and an **Isolation Forest** classifier for slow-rate attacks.
- Decision Trees & Neural Networks from Scratch:** Implemented pruned decision trees (8,185→65 nodes) and neural networks without ML libraries, reaching **89.2%** on GTSRB; hand-derived backpropagation and gradient descent.
- Mini Browser:** Multi-threaded C++/Qt browser with a custom Flex/Bison **HTML parser** (DOM tree), concurrent pthread fetch/parse pipelines and mutex-guarded page caching.
- LaTeX-to-Markdown Compiler:** Flex/Bison toolchain in C++ that parses LaTeX into an AST and emits Markdown.
- Course Projects:** SDN controller (Dijkstra routing, ECMP); reliable UDP transport with TCP Reno congestion control; Contra-style 2D platform shooter in Unity (C#).

INTERNSHIPS

BlobCity iSolutions, Mumbai: *AI Intern*

(Jul 2021 – Sep 2021)

- Authored **48 open-source ML templates** in Python (regression, classification, clustering, anomaly detection, time-series; SVM, Random Forest, KNN, BIRCH, PCA) with reusable preprocessing pipelines and standardized metadata, for BlobCity's 1,000+ template AI Seed library.

SCHOLASTIC ACHIEVEMENTS

- Gold Medalist, B.Tech:** Highest academic standing in the graduating CSIT batch, Symbiosis University, Indore (**2023**)
- Research & Innovation Award:** Awarded for STACD by the IIT Delhi Alumni Association at Open House (**2025**)
- Perfect 10.0 SGPA:** Most recent M.Tech CSE semester at IIT Delhi (**2025**)

TECHNICAL SKILLS

- Languages:** C, C++, Python, SQL, OCaml, Prolog, JavaScript, C# | **ML:** PyTorch, LLMs, scikit-learn, NumPy, Pandas
- Systems & Tools:** Linux, Docker, Airflow, Nginx, Flask, Django, Git, eBPF/XDP, Mininet, GDB, Wireshark, Flex/Bison, Google Earth Engine, GCP
- Core CS:** Data Structures & Algorithms, Operating Systems, Computer Networks, System Design, Databases, Distributed Systems, Machine Learning, Network Security

EXTRA CURRICULAR ACTIVITIES

- Content Creator:** Built and grew a YouTube channel with **14K+** subscribers, **27M+** views, and an **11K+** Instagram audience