

TECHNICAL SKILLS

- **Languages:** Python (proficient), C, Java, Bash/Shell
- **Systems & Cloud:** Linux/Unix, Docker, CI/CD, AWS (EC2), Cloudflare Tunnels
- **Distributed Protocols:** gRPC, Protocol Buffers, MQTT, REST APIs
- **Data & Tools:** Redis, PostgreSQL, MongoDB, Git, PyTorch, Neovim

EDUCATION

University of California, San Diego | *MS Computer Science*

Sep 2025 – June 2027

Relevant Coursework: Graduate Operating Systems, LLM System Optimization

Ganpat University, India | *B. Tech. Computer Engineering*

Aug 2018 – July 2022

Relevant Coursework: Operating Systems, Cloud Computing

WORK EXPERIENCE

Indian Institute of Science (IISc), Bangalore

Project Associate (Distributed Systems)

Jan 2023–Apr 2024 (Full-time); Apr 2024–Nov 2024 (Voluntary Researcher)

Developing a federated learning framework

- Developed a **distributed machine learning framework** (Flotilla) in Python, achieving **92.5%** performance retention while scaling to **1000+** clients, and outperforming state-of-the-art systems by reducing overhead to just **1.7%** (vs. 55%).
- Implemented a **multi-threaded server/client** architecture using MQTT and gRPC for efficient message passing across **1000+** concurrent endpoints.
- Built a highly resilient, **Redis** based state store with **checkpointing**, for resilience against server failures and enabling session recovery in under **820ms**.
- Integrated **federated learning strategies** from state-of-the-art research papers, to improve training times.
- Deployed custom **Docker** images for Flotilla on **1000+** clients, enabling large-scale **scalability** studies.
- Wrote in-depth **system architecture** and scalability analysis, published in **JPDC 2025** and **HiPC 2023**.

Autonomous drones for path planning

- Developed workflows for autonomous drones to assist visually impaired individuals (Presented at **IROS 2023**), utilizing CNNs (YOLO) and depth estimation models to achieve real-time obstacle avoidance and path planning.

Sterlite Technologies Limited, Ahmedabad

Software Engineering Intern (Intellza)

Jan 2022 – Aug 2022

- Refactored existing **Docker** images, reducing image size by **35%** and accelerating the CI/CD pipeline build times by **50%**.
- Integrated a Liquibase module to track **MongoDB** schema changes, improving version control reliability.

PUBLICATIONS AND POSTERS

scholar.google.com

- Roopkatha Banerjee, **Prince Modi**, et al. Flotilla: A Scalable, Modular and Resilient Federated Learning Framework for Heterogeneous Resources. *Journal of Parallel and Distributed Computing (JPDC)*, 2025.
- Roopkatha Banerjee, **Prince Modi**, et al. Towards a Modular Federated Learning Framework on Edge Devices. *30th IEEE International Conference on High Performance Computing, Data, and Analytics (HiPC)*, 2023 (Poster).

PROJECTS

github.com/prince-modi

System Performance Characterization | *C, Linux (Armbian)*

December 2025

- Developed a suite of micro-benchmarks to evaluate the Rockchip RK3588S SoC, utilizing **ARMv8** cycle counters to measure CPU scheduling and OS primitive latencies with nanosecond precision.

Git Clone Personal Project | *Python, CLI, SHA-1, Zlib*

April 2024

- Reverse-engineered Git's **content-addressable file system**, implementing the .git directory structure, SHA-1 hashing logic, and Zlib compression to manage blob, tree, and commit objects.
- Developed core **plumbing** commands and **porcelain** commands to achieve full interoperability with standard Git repositories.