PRINCE MODI

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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 – July 2027*
Relevant Coursework: Graduate Operating Systems, Recommender Systems, Software Engineering

Ganpat University, India | *B. Tech. Computer Engineering, GPA - 3.96/4.00* *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); June 2024–Nov 2024 (Voluntary Researcher)*
Developing a federated learning framework

- Developed an asynchronous **federated 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 **server/client** architectures 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.
- Managed and maintained an **80+** node **edge cluster** (Nvidia Jetsons, Raspberry Pis) to support lab research.
- 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

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.

Key-Value Store Personal Project | *Python, Sockets* *December 2020*

- Engineered an asynchronous key-value database server using sockets with a custom **communication protocol** inspired by Redis to handle client-server exchanges.