PRINCE MODI

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TECHNICAL SKILLS

- **Languages:** Python (proficient), C, Go, 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 | *Master of Science in Computer Science* *Sep 2025 – July 2027*

Coursework: Graduate Operating Systems, Recommender Systems, Software Engineering

Ganpat University, India | *Bachelor of Technology in Computer Engineering, GPA - 3.96/4.00* *Aug 2018 – July 2022*

Coursework: Operating Systems, Cloud Computing, Big Data Analytics

WORK EXPERIENCE

Indian Institute of Science (IISc), Bengaluru

Project Associate (Distributed Systems) *Jan 2023–Apr 2024 (Full-time); June 2024–Nov 2024 (Remote Contributions)*

Developing a federated learning framework

- Constructed 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%).
- Engineered server/client architectures using MQTT and gRPC for efficient message passing across 1000+ concurrent endpoints.
- Architected a Redis-based state store with checkpointing, ensuring system resilience against server failures and enabling session recovery in under 820ms.
- Integrated federated learning strategies from state-of-the-art research papers, to improve node clustering.
- Administered an 80+ node edge cluster (Nvidia Jetsons, Raspberry Pis) to support continuous lab research operations.
- Deployed custom Docker images for Flotilla on 1000+ clients, enabling large-scale scalability studies.
- Authored system architecture and scalability analysis, accepted for publication in JPDC 2025 and HiPC 2023.

Autonomous drones for path planning

- Formulated workflows for autonomous UAVs to assist visually impaired individuals, utilizing CNNs (YOLO) and depth estimation models; poster presented at IROS 2023.

Sterlite Technologies Limited, Ahmedabad

Software Engineering Intern (Intellza) *Jan 2022 – Aug 2022*

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

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).
- Suman Raj, Swapnil Padhi, Ruchi Bhoot, **Prince Modi**, and Yogesh Simmhan. Towards Collision Avoidance for UAVs to Guide the Visually Impaired. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 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 (hash-object, write-tree) and porcelain commands (commit, log) 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.