PRINCE MODI

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TECHNICAL SKILLS

- Programming Languages (proficiency): Python (proficient), Java (familiar), Go (familiar), Lua (familiar)
- Tools and Technologies: Linux, Docker, Git, gRPC, PyTorch, MQTT, Redis, REST APIs, MongoDB, PostgreSQL, NeoVim

EDUCATION

University of California San Diego | *Master of Science in Computer Science and Engineering.* *Sep 2025 – July 2027*
Incoming graduate student at UCSD, with a focus on Distributed Systems specialization

Ganpat University, Kherva, India | *Bachelor of Technology in Computer Engineering, GPA - 3.96/4.00* *Aug 2018 – July 2022*
Achievement: Academic scholarship recipient for securing 2nd rank out of 60+ students

EXPERIENCE

Indian Institute of Science (IISc), Bengaluru
Project Associate (DREAM: Lab) *Jan 2023 – Nov 2024*
Developing a federated learning framework ("ACADEMIC CONFERENCE PARTICIPATION" section, point 1)

- Built an asynchronous federated learning framework (Flotilla) in Python, optimized for edge hardware deployment
- Implemented server and client sides using MQTT and gRPC for efficient message passing and coordination in federated learning
- Designed a custom Redis-based state store with a checkpointing mechanism to provide resilience, allowing recovery from complete server failures without data loss or disruption to federated learning progress
- Integrated client selection and aggregation strategies from current research, providing flexibility in choice to optimize performance, accuracy, and turnaround times for federated learning in the Flotilla framework
- Collaborated with PhD students under the guidance of Prof. Manik Gupta (BITS Pilani) and Prof. Yogesh Simmhan (IISc) to ensure the overall scalability, modularity, reliability, and operability of the Flotilla framework
- Configured and managed an 80+ node edge cluster (Nvidia Jetsons, Raspberry Pis), supporting lab research infrastructure and multiple projects, including Flotilla

Remote Contributions ("MANUSCRIPTS" section, point 1)

- Developed Docker images for the Flotilla framework's server and client components, and deployed the images on a clustered environment with 1000+ clients, to study the scalability and performance of the federated learning operations
- Assisted in manuscript writing and designed, conducted, and analyzed experiments to support the submission

Autonomous drones for path planning ("ACADEMIC CONFERENCE PARTICIPATION" section, point 2)

- Designed workflows for autonomous drones to assist visually impaired individuals with path planning and obstacle avoidance, collaborating with a PhD student and supervising 4 interns
- Applied computer vision and machine learning techniques, including CNNs (e.g., YOLO) and depth estimation models

Sterlite Technologies Limited, Ahmedabad
Software Engineering Intern (Intellza) *Jan 2022 – Aug 2022*

- Developed Intellza, a unified data storage and analytics platform, alongside a cross-functional team. Responsible for developing and integrating a module to maintain and track schema changes for MongoDB on Intellza using LiquiBase
- Created Docker images and optimized the existing images as per Docker's recommendations, reducing the image size to 35% and improving the build times of the projects CI/CD pipeline by 50%

TEACHING EXPERIENCE

Indian Institute of Science, Bengaluru
Teaching Assistant, Data Engineering at Scale *Aug 2023 — Dec 2023*

- Taught a graduate-level course to a class of 40+ students, comprising topics such as HDFS, Map-Reduce, Apache Spark
- Facilitated and led a 2-hour lab session per week, prepared and graded assignments, conducted one-on-one office hours and conducted doubt-clearing sessions

PUBLICATIONS

- Roopkatha Banerjee, **Prince Modi**, Jinal Vyas, Abhijit Sri Chundru, Tejas Chandrashekhar, Harsha Varun Marisetty, Manik Gupta and Yogesh Simmhan. Flotilla: A Scalable, Modular and Resilient Federated Learning Framework for Heterogeneous Resources accepted at Journal of Parallel and Distributed Computing (JPDC, one of the top journals for distributed systems, rated CORE A)

POSTERS PRESENTED

- Roopkatha Banerjee, **Prince Modi**, Harsha Varun Marisetty, Manik Gupta and Yogesh Simmhan. Towards a Modular Federated Learning Framework on Edge Devices. 30th IEEE International Conference on High Performance Computing, Data, and Analytics (HiPC), 2023
- Suman Raj, Swapnil Padhi, Ruchi Bhoot, **Prince Modi** and Yogesh Simmhan. Towards Collision Avoidance for UAVs to Guide the Visually Impaired, Late-Breaking Results Abstracts. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023

PROJECTS

github.com/prince-modi

Git Clone *Personal Project* *April 2024*

- Implemented a version control system in Python as a command line tool, replicating the features of Git, compatible with existing Git's repository format "0"
- Ensured support for repository initialization, status checks, tags, references, branch creation, checkouts, and commits

BitTorrent Client *Optional Coursework Project* *December 2021*

- Implemented a peer-to-peer file sharing program utilizing Python's AsyncIO library and the BitTorrent protocol to discover and establish connections with peers to exchange pieces of data between each other
- Built an event loop to handle semantics regarding the protocol, which includes managing connections to peers and managing the exchange of pieces of data
- Developed a Bencode Parser to encode and decode the ".torrent" files and the messages required by the BitTorrent protocol

Key-Value Store *Personal Project* *December 2020*

- Implemented an asynchronous key-value database server, using sockets involving a protocol inspired from Redis' Communication Protocol for communication between server and client
- Handles commands like GET, SET, DELETE, FLUSH, MSET, and MGET for several data-types, from binary to hashmaps

GIST *Coursework Project* *April 2020*

- Utilized the YouTube API to extract the auto-generated captions of a video and summarize the main ideas. Used Python's NLTK library, cosine similarity of words, and a small BART (bidirectional encoder) model to generate shorter text
- Incorporated advanced functionality, such as storing the previously generated summaries using SQLite database as a cache and created a functional user-interface with Python's Tkinter library

PROFESSIONAL AND ACADEMIC DEVELOPMENT

- 6.824: Distributed Computer Systems by Robert Morris, MIT OpenCourseWare *August 2021*
- Algorithms: Design and Analysis I, II by Tim Roughgarden, Stanford University, edX *June 2021*
- The Bits and Bytes of Computer Networking by Google, Coursera *January 2021*

VOLUNTEERING

Indian Institute of Science, Bengaluru, India | *Senior Student Volunteer*

Core team member, 23rd IEEE/ACM CCGrid *May 2023*

- Co-organized the 23rd IEEE/ACM CCGrid conference with a footfall of 300+ participants, coordinated 3 poster presentation sessions over 5 days; assisted special guests such as keynote speakers and senior faculty

IISc Open Day 2023 | *Student Volunteer* *March 2023*

- Coordinated the presentation sessions for the DREAM: Lab projects

Agaria Welfare Center *January 2016*

- Provided tutoring to children and participated in outreach programs to raise awareness about illiteracy issues

OTHERS

- **Interests:** Reading (Currently reading: The Memory of Light, WoT Book 14; Dune, Book 1); Tennis; Pickleball; Formula 1; Home Lab - PiHole (DHCP, DNS), PFSense (Router)
- **Languages:** English, Gujarati, Hindi (trilingual, native), Spanish (beginner)