Nitika Saran
CS Ph.D Student, Cornell University

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Education

Cornell University — Ithaca, NY
Ph.D. in Computer Science — *August 2021 – present*

Indraprastha Institute of Information Technology — Delhi, India
B.Tech in Computer Science and Engineering — *July. 2014 – May. 2018*

Research Interests

Networking, Distributed Systems, Systems for ML

Research Experience

Oblivious Reconfigurable Networks — Ithaca, NY
Cornell University — *Jan 2023 - present*
Advisors: Hakim Weatherspoon, Vishal Shrivastav, Robert Kleinberg
Reconfigurable networks leverage the bandwidth and flexibility benefits of optical circuit switches to support next-generation data center-scale networks. Oblivious designs circumvent traffic estimation errors and latency. The goal of this work is to build practical and scalable reconfigurable networks.

Decentralized Traffic Engineering — Sunnyvale, CA
Google Systems Research Group — *May 2022 - present*
Advisor: Sylvia Ratnasamy
Working on traffic engineering (TE) algorithms for a proposed new architecture of Google's backbone wide area network, to improve fault-tolerance and simplicity. The goal of this work is to characterize availability and performance impact of a simplified WAN design.

Low-cost, Scalable training of Massive Deep Learning Models — Bangalore
Microsoft Research — *Sep 2019 - July 2021*
Advisors: Muthian Sivathanu, Ramachandran Ramjee
Research Fellowship in the MSR Systems group. I built Varuna, a training framework for large language models with up to 200 billion parameters, to enable elastic training with low-priority preemptible VMs and commodity networking. I was co-first author of an award-winning paper we wrote on Varuna, published at EuroSys 2022. Code for this project is open sourced here.

Publications

dSDN: A Decentralized SDN Architecture for the WAN
Alex Krentsel, **Nitika Saran**, Sylvia Ratnasamy, Rob Shakir, Ankit Singla
preprint, 2024

Shale: A Practical, Scalable Oblivious Reconfigurable Network
Daniel Amir, **Nitika Saran**, Tegan Wilson, Hakim Weatherspoon, Vishal Shrivastav, and Robert Kleinberg,
preprint, 2024

Breaking the VLB Barrier: Improving Oblivious Reconfigurable Networks with High Probability
Tegan Wilson, Daniel Amir, **Nitika Saran**, Vishal Shrivastav, Robert Kleinberg, and Hakim Weatherspoon
to appear at **STOC 2024**

Varuna: Scalable, Low-cost Training of Massive Deep Learning Models
Nitika Saran, Sanjith Athlur, Muthian Sivathanu, Ram Ramjee, Nipun Kwatra
EuroSys 2022, *Awarded Best Paper!*

Industry Experience

Microsoft Development Centre Bangalore
Software Engineer *July 2018 - Aug 2019*
Teams is a collaborative app in the Office365 suite. I worked on a new calendering experience in Teams using ReactJS and Apollo Client. Contributed towards key performance and accessibility feautures in the app before it's launch. Re-designed parts of the DOM tree and react rendering to bring down page load times.

Inkers Bangalore
Engineering Intern *May - July 2017*
Integration and optimization of visual SLAM techniques for drones. Worked on Direct Sparse Odometry, ORB-SLAM.

Teaching & Volunteering

- **Head TA, Computer Architecure** 2024
- **Head TA, Introduction to Networking** 2023
- **Head TA, Operating Systems** 2022
- **TA, Data Structure & Algorithms** *IIIT Delhi, 2017*
- **TA, Discrete Math** *IIIT Delhi, 2017*
- **Tutor, ASTHA** Classes and recreational activities for disabled children after school hours. *2015*

Selected Course Projects

- **Optimistic Concurrency Control for Java Databases** Implemented optimistic locking for transactions in Java's EclipseLink object relational mapping libraries. Explored the isolation vs scalability trade-offs with various read and write workloads.
- **Heterogenous Address Space** Prototype to evaluate designs of virtual address space, that integrate various storage technologies including DRAM, remote memory using RDMA, and SSD. Explored hierarchical as well as flat designs.
- **Voice Controlled Robot** Course project for engineering design. Built a moving robot using Arduino and a voice recognition chip to follow 6 voice instructions like forward, left, stop etc. I did the high-level design and Arduino coding. Tools: Arduino Uno, HM2007

Programming Skills

Programming Languages: C/C++, Python, Bash, Bluespec SystemsVerilog, Java, Javascript
Tools and Frameworks: Git, Linux, LaTeX, Azure, PyTorch, ReactJS

Languages

Native: English, Hindi
Coversational: French