Ramanuja Kalkunte

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Personal Statement

I am a researcher with a background in *Networking* and a growing interest in applying *Machine Learning (ML)* to real-world problems. I seek opportunities to develop user-centric solutions that enhance decision-making for network operators, leveraging ML where it provides meaningful value to improve operational outcomes.

Education

- **Ph.D.** (*Candidate*), Computer Science, University of California, Davis, USA, 2020 – Present
  - **M.S.**, Computer Science
  - Thesis: "*Resource Provisioning and Traffic Management in Multi-Band Optical Networks*", **GPA**: 4.0 / 4.0
  - Advisors: Professor Biswanath Mukherjee and Professor Massimo Tornatore
- **M.S.**, Electrical Engineering, San José State University (SJSU), USA, 2018 – 2019
  - Project: "*Resource Allocation using Hose Model in Optical Networks*", **GPA**: 3.6 / 4.0
  - Advisor: Professor Juzi Zhao
- **B.E.**, Electronics and Communication Engineering, Visvesvaraya Technological University, India, 2011 – 2015
  - Project: "*Traffic Collision Avoidance System*", **GPA**: 3.3 / 4.0

Professional Experience

- **San José State University**, **USA**, Research Assistant, Department of Electrical Engineering, 2018 - 2019.
  - Develop deterministic algorithms that aid in mapping virtual networks in Elastic Optical Networks (EONs) to improve resource utilization
- **Tech Mahindra**, **India**, Associate Software Engineer, 2015 - 2016.
  - Actively monitored processes using Tivoli platform
  - Improved monitoring efficiency by proactively observing dependent processes
- **Hindustan Aeronautics Limited**, **India**, Student Intern, 2015.
  - Analyzed various techniques of the standard Traffic Collision Avoidance System (TCAS) used in aircrafts
  - Verified the precision, power, and directionality functions of TCAS

Research Experience

Machine Learning (ML)

- **Effective Network Upgrades in Multi-band (MB) EONs**
  - Develop strategies using ML tools, such as LSTM, to reduce CapEx during network upgrades
- **Resource Re-provisioning in MB Optical Networks**
  - Develop ML models to estimate signal quality for network path provisioning based on current network state

Traffic Engineering in EONs

- Develop strategies to enhance network throughput by exploiting diverse traffic characteristics
- Design and implement novel re-provisioning strategies to reduce blocking probability and delay network upgrades

Publications

- F. Shirin Abkenar, **R. Kalkunte**, Venkata V. Garbhapu, S. Ferdousi, S. Xu Y. Hirota, M. Shiraiwa, A. Attarpour, M. Tornatore, Y. Awaji, and B. Mukherjee, Federated Privacy-Preserving Strategy for Generalizing Soft-Failure Localization in Multi-Carrier Optical Networks, in *International Conference on Optical Network Design and Modeling (ONDM)* (2025).

- R. Gao, **R. Kalkunte**, F. Shirin Abkenar, S. Ferdousi, M. Ibrahimi, M. Tornatore, and B. Mukherjee, Seamless Upgrade from C+L to C+L+S Bands in Optical Networks with Interim Lightpath Re-Allocation, in *ONDM* (2025).
- **R. Kalkunte**, F. Shirin Abkenar, S. Ferdousi, R. K. Jana, A. Srivastava, A. Mitra, M. Tornatore, and B. Mukherjee, Increasing Information-Carrying Capacity by Exploiting Diverse Traffic Characteristics in Multi-Band Optical Networks, in *IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)* (2024).
- **R. Kalkunte**, R. K. Jana, S. Ferdousi, A. Srivastava, A. Mitra, M. Tornatore, A. Lord, and B. Mukherjee, GSNR-aware resource re-provisioning for C to C+L-bands upgrade in optical backbone networks, *Photonic Network Communications* (2024).
- **R. Kalkunte**, F. Shirin Abkenar, R. K. Jana, D. Aureli, S. Ferdousi, A. Srivastava, A. Mitra, M. Tornatore, and B. Mukherjee, An Effective Strategy for Link Upgrade from C to C+L Band in Elastic Optical Backbone Networks, in *IEEE ANTS* (2023).
- J. Zhao, V. Kohirkar, P. Nigade, **R. Kalkunte**, L. Posham, and S. Subramaniam, Static virtual network mapping with advance reservation in elastic optical networks, in *International Conference on Computing, Networking and Communications (ICNC)* (2023).

Academic Projects

NSF: Migration to Next-Generation Multi-Band Optical Networks
- Developed strategies to enhance network performance by building simulators which replicate real-world environments and evaluated them in multi-band optical networks
- Use physical-layer information to build and train ML models for signal quality prediction.
- Tools: Python, Linux, machine learning, and graph theory

Studying routing protocols in 802.11
- Objective: Simulate protocols like DSR, AODV, and DSDV using NS-3 to analyze delay and throughput.
- Tools: Python, Linux, and NS-3

Technical Skills

Programming Languages: Python, Java, C/C++, and familiarity with data structures

Libraries: Scikit-learn, Tensorflow, Pandas, NumPy, Matplotlib

Honors and Academic Awards

- Student Travel Grant for IEEE ANTS 2024
- Awarded *Graduate Student Research Fellowship* to pursue Ph.D. at UC Davis, 2020
- Awarded *Best Masters Project*, SJSU, 2019
- GradSlam Finalist, SJSU, 2019

Teaching

- ECS 152A: Computer Networks, *UC Davis*
- ECS 154A: Computer Architecture, *UC Davis*

Reviewer for IEEE Conferences

- Transactions on Networking (TNET)
- Asia Communications and Photonics Conference (ACP)
- International Conference on Advanced Networks and Telecommunications Systems (ANTS)
- Global Communications Conference (GLOBECOM)
- International Conference on High Performance Switching and Routing (HPSR)
- International Conference on Communications (ICC)
- Network of the Future (NoF)
- Reliable Networks Design and Modeling (RNDM)