Ram Sharan Chaulagain

Research Interests

Design and evaluation of large-scale interconnection networks, network topology and routing algorithms, high-performance computing, software-defined networking, network performance modeling and simulation, distributed systems, and optimizing network performance for emerging AI/ML workloads.

Education

Ph.D., Computer Science June 2025
Florida State University, Tallahassee, FL *Advisor: Dr. Xin Yuan*
Dissertation: Design and Evaluation of Adaptive Routing for the Next Generation of Interconnection Networks.

M.S., Computer Science Jan 2025
Florida State University, Tallahassee, FL

Bachelor's in Computer Engineering January 2017
Tribhuvan University, Nepal *Advisor: Dr. Subarna Shakya*
Undergraduate Thesis: Distributed High Performance Computing using JAVA

Research Experience

Research Assistant Aug, 2018 – Present
Department of Computer Science, Florida State University, Tallahassee, FL

- Analyzed communication characteristics of HPC (Lammps, Nekbone, Milc) and Deep Learning (Cosmoflow) applications. Developed SDN-based adaptive routing schemes tailored to these communication patterns for the Dragonfly interconnect fabric, which avoids congested paths yielding higher throughput.
- Enhanced UGAL routing scheme improving the accuracy of the latency estimation for UGAL with local information showcasing proactive mitigation of the potential network congestion with imbalanced network traffic.
- Simulated large-scale interconnect systems to identify bottlenecks using various synthetic and application workloads on supercomputers like PSC's Bridges, ALCF's Polaris, and Theta.

Research Intern May 2020 – Aug 2020
Argonne National Lab, Chicago, IL

- Designed a deep-learning-based routing algorithm matching existing theoretical routing (UGAL-G) with 6% improvement over the existing state-of-the-art UGAL-L routing algorithm for adversarial traffic pattern and published a research poster in Super Computing Conference 2020.

Research Intern May 2019 – Aug 2019
Argonne National Lab, Chicago, IL

- Developed a counter-based method using local router information for early detection of global link congestion before backpressure and researched congestion mitigation in Dragonfly topology using the CODES simulator.
- Contributed to a CODES interconnect simulator, enhancing the dragonfly-link-stat instrumentation file to log terminal-received packet latency.

Teaching & Outreach

Graduate Teaching Assistant Fall 2022, Spring 2023
Florida State University, Tallahassee, FL

- **CEN 4020 Software Engineering**: Recitation, Grading, and TA help-desk hours.
- **CGS 2100 Microcomputer Applications (Online)**: Grading and TA help-desk hours.
- **CGS 2060 Computer Fluency (Online)**: Grading and TA help-desk hours.

Educational Technology R&D Aug 2018 – Jan 2022
College of Education, Florida State University, Tallahassee, FL

- **Virtual Agents Design**: Designed pedagogical, conversational, and interactive virtual agents for a VR simulation-based learning environment, and developed a scalable framework of core design elements for personalized instruction.

- **ML Model Development**: Designed and developed a Bayesian-network classification and prediction model in Unity based 3D game to assess math competency of the players (Middle school students) based on their math competency, achieving 85% accuracy.

Programming Skills

Programming Languages: C, C++, Python

Parallel Programming Frameworks: POSIX Threads, OpenMP, MPI, CUDA, NCCL

Infrastructure Tools: Git, MySQL, Docker, Terraform

Others: PyTorch, TensorFlow, AWS, Linux scripting, Microcontroller programming, LaTeX, Netica, Linden Scripting

Honors, Awards & Service

Dean's Award for Doctoral Excellence (DADE) (2024): Florida State University: Award amount $3000

Outstanding Research Assistant Award (2024): Department of Computer Science, Florida State University

Best Research Presentation Award, CS-Expo'25: Department of Computer Science, Florida State University

Technical Program Committee Member: IEEE Hot Interconnects 2025

Artifact Evaluation Committee Member: ACM Symposium on Operating Systems Principles 2025

References

- **Dr. Xin Yuan**: Professor, Department of Computer Science, Florida State University
  Email: xyuan@cs.fsu.edu; Phone: +1-850-728-4104
  Address: Department of Computer Science, Florida State University, Tallahassee, FL 32306
  (PhD Advisor)
- **Weikuan Yu**: Department Chair, Department of Computer Science, Florida State University
  Email: wyu3@fsu.edu; Phone: +1-850-644-5442
  Address: 1017 Academic Way, 253 Bldg. LOV, Dept. of Computer Science, Tallahassee, FL 32306
  (Department Chair)
- **Sudheer Chunduri**: Software Engineer, Google
  Email: sudheerc.atwork@gmail.com; Phone: +1-630-666-8767
  Address: Google, Kirkland, WA
  (Mentor during Argonne National Laboratory)

Publications

1. **Chaulagain RS**, Mondol T, Bhowmik S, Yuan X. *"Exploiting Software-Defined Networking Technology for Improving UGAL Routing in Dragonfly Networks"* The 25th IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGRID 2025)). 2025 (Accepted)
2. **Chaulagain RS**, Yuan X. *"Enhanced UGAL Routing Schemes for Dragonfly Networks."* ACM International Conference on Supercomputing. 2024 May.
3. **Chaulagain RS**, Yuan X. *"Exploring Software-Defined Networking for Routing in Dragonfly Topology"* ACM/IEEE SC tech poster. 2024 Nov.
4. **Chaulagain RS**, Liza FT, Chunduri S, Yuan X, Lang M. *"Achieving the Performance of Global Adaptive Routing using Local Information on Dragonfly through Deep Learning."* ACM/IEEE SC tech poster. 2020 Nov.
5. West L, Ke F, Dai CP, Kim BJ, **Chaulagain RS**, Mondol TC, Xu J, Kuba R, Jung S. *Effects of level trajectory on mathematical gameplay."* In Proceedings of the 16th International Conference of the Learning Sciences (ICLS) 2022 2022 Jan.
6. Ke F, Dai Z, Dai CP, Pachman M, **Chaulagain RS**, Yuan X. *"Designing Virtual Agents for Simulation-Based Learning in Virtual Reality."* In Cognitive and Affective Perspectives on Immersive Technology in Education 2020 (pp. 151-170). IGI Global.
7. **Chaulagain RS**, Pandey S, Basnet SR, Shakya S. *"Cloud based web scraping for big data applications."* In 2017 IEEE International Conference on Smart Cloud (SmartCloud) 2017 Nov 3 (pp. 138-143). IEEE.

8. Basnet SR, **Chaulagain RS**, Pandey S, Shakya S. *"Distributed high performance computing in OpenStack cloud over SDN infrastructure."* 2017 IEEE International Conference on Smart Cloud (SmartCloud) 2017 Nov 3 (pp. 144-148). IEEE.
9. Shakya S, **Chaulagain RS**, Pandey S, Gyawali P. *"Distributed high performance computing using JAVA."* 2017 International Conference on Computing, Communication and Automation (ICCCA) 2017 May 5 (pp. 742-747). IEEE.

Publications Under Review

10. **Chaulagain RS**, Yuan X. *"Improve latency estimation for UGAL routing in Dragonfly Networks"* IEEE Transactions on Parallel and Distributed Systems, Submitted June 2025.

Poster and Presentations

1. **Chaulagain RS** (Advisor: X. Yuan) *"Exploiting Software-Defined Networking Technology for Improving UGAL Routing in Dragonfly Networks"* Research Presentation at the annual CS Expo, Florida State University, Tallahassee, FL, April 2025.
2. **Chaulagain RS** (Advisor: X Yuan) *"Enhanced UGAL Routing Schemes for Dragonfly Networks"* CS-FSU Department of Computer Science Student Seminar series. Nov 2024
3. **Chaulagain RS** (Advisor: X Yuan) *"Exploring Software-Defined Networking for Routing in Dragonfly Topology"* ACM/IEEE SC tech poster. 2024 Nov.
4. **Chaulagain RS** (Advisor: Sudheer Chunduri) *"Achieving the Performance of Global Adaptive Routing using Local Information on Dragonfly through Deep Learning."* ACM/IEEE SC tech poster. 2020 Nov.
5. **Chaulagain RS** (Advisor: Sudheer Chunduri) *"Simulation Studies to Categorize Interconnect Congestion Signatures on Dragonfly Topologies"* CODES call: Technical Presentation at the Argonne Leadership and Computing Facility, July 2019