Shahrooz Pouryousef

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Work authorization: U.S. Permanent Resident (Green Card)
Interests: Distributed training of LLMs | AI × networking co-design | RDMA/DCN transport for ML workloads

Summary

Networking & data-center systems researcher with a Ph.D. in Computer Science (UMass Amherst). Core expertise in **congestion control, load balancing, routing/traffic engineering**, and reproducible DCN evaluation (ns-3/OMNeT/Python). Recent, hands-on **LLM prototypes** (small PyTorch projects) and growing interest in applying networking methods to **distributed training of LLMs**.

Core Skills

- **Data Center Networking:** Congestion control (DCTCP/CUBIC concepts), ECN/AQM (RED/CoDel), load balancing (ECMP/flowlets), routing/TE, Clos/leaf–spine topologies.

- **Experimentation & Telemetry:** ns-3, OMNeT++; Linux traffic control

- **Programming & Tools:** Python (pandas/NumPy/matplotlib), C++ (sim); NetworkX; Git/Linux; config-driven, reproducible scripts.

- **AI/ML (applied prototypes):** PyTorch basics, minimal transformer implementation, offline evaluation for recommender-style tasks.
  Current focus: understanding comm patterns and batching effects in distributed training.

Experience

Research Scientist (Quantum Systems) — Cisco, Quantum Data Centers *San Jose, CA*   2025–Present

- Planned and ran studies to **control and benchmark quantum data-center architectures** for distributed QC, varying ports/communication-qubit budgets, photonic switch latency, and topology choices; analyzed throughput, non-local stall, and EPR consumption.

- Built an **event-driven simulation stack** (Python/SimPy/asyncio + NetworkX) to model end-to-end execution with **orchestration layers** (window-based partitioning, DAG scheduling, entanglement workflows) and reproducible parameter sweeps.

- Performed **performance analysis and profiling** of representative quantum application workloads (circuit kernels) to study critical-path delay, EPR request rates, and sensitivity to fabric contention; produced standardized plots and reports.

Ph.D. Researcher (Networks/Systems) — University of Massachusetts Amherst *Amherst, MA*   2019–2025

- Developed **event-driven simulators** and measurement pipelines; ran congestion-control and TE experiments (ns-3/OMNeT, Python);

- Published in QCE/TQE/QCNC; mentored undergraduate researchers

Selected Projects

Networking / DCN

- **TCP Congestion-Control Study (ns-3/OMNeT):** Logged CWND, throughput, queue occupancy, latency; generated CDFs/time-series; examined ECN/AQM settings and their effect.

- **Topology Generator & Scheduling:** Layered/Clos generator with per-switch capacity; explored path diversity vs. blocking and simple scheduling sensitivities under load.

Applied AI/ML (prototypes)

- **LLM from Scratch (PyTorch):** Minimal transformer (positional encodings, masking, basic generation); quick latency/memory checks; clean modular code.

- **Conversational RecSys (MovieLens-100K):** MF/NCF baselines vs. prompt-based recommendations; offline top-N metrics; small ablations on history/context length.

Education

Ph.D., Computer Science — University of Massachusetts Amherst 2025

Dissertation: *Resource Allocation in Networked/Distributed Systems*

Advisor: Prof. Don Towsley

M.S., Computer Science — University of Massachusetts Amherst 2020

M.S., Computer Engineering — Sharif University of Technology 2015

B.S., Information Technology — University of Tabriz 2013

Publications (selected)

Quantum / Distributed Systems

- S. Pouryousef *et al.*, "Resource Allocation for Rate and Fidelity Maximization in Quantum Networks," *IEEE Transactions on Quantum Engineering*, 2024. arXiv:2308.16264

- S. Pouryousef, N. K. Panigrahy, D. Towsley, "A Quantum Overlay Network for Efficient Entanglement Distribution," *IEEE INFOCOM*, 2023. arXiv:2212.01694

- S. Pouryousef *et al.*, "Analysis of Asynchronous Protocols for Entanglement Distribution in Quantum Networks," 2024 (preprint). arXiv:2405.02406

Classical Networking

- S. Pouryousef, L. Gao, A. Venkataramani, "Towards Logically Centralized Interdomain Routing," *NSDI*, 2020. link

- S. Pouryousef, L. Gao, D. Towsley, "Robust Path Selection in Software-defined WANs using Deep Reinforcement Learning," 2022 (preprint). arXiv:2212.11155

- Shahrooz Pouryousef, Muhammad Daniyal Dar, Suleman Ahmad, Phillipa Gill, Rishab Nithyanand, Extortion or Expansion? An Investigation into the Costs and Consequences of ICANN's gTLD Experiments — Passive and Active Measurement (PAM) (2020)