

Sepehr Abbasi Zadeh

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Homepage
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- Education
- ◇ **Doctor of Philosophy: Computer Science** Jan 2018 - Sept 2023
[Computer Science Department](#), University of Toronto, Toronto, Canada.
 - Relevant courses: Software-Defined Networking, Topics in ML: Learning to Search, Proof Complexity and Algorithms, Advanced Data Structures.
 - ◇ **Master of Science: Computer Science** Sept 2016 - Jan 2018
[Computer Science Department](#), University of Toronto, Toronto, Canada.
 - **Thesis:** Rounding Semidefinite Programming Solution Using Stochastic Processes
 - Relevant courses: Machine Learning, Distributed Computing, Differential Privacy, Computational Neuroscience.
 - ◇ **Bachelor of Science: Computer Engineering** Sept 2011 - Apr 2016
[Computer Engineering Department](#), Sharif University of Technology, Tehran, Iran.
 - Relevant courses: Data Structures and Algorithms, Designing Algorithms, Discrete Structures, Operating Systems, Networks, Network Security, Theory of Machines and Languages, Database, Advanced Programming.
 - **Thesis:** Maximin Share Guarantees on Indivisible Items with Externality Constraints.
 - ◇ **Minor: Mathematics** Sept 2012 - Apr 2016
[Department of Mathematical Sciences](#), Sharif University of Technology, Tehran, Iran.
 - Relevant courses: Data Analysis, Probability and its Applications, Graph Theory, Cryptography, Mathematical Analysis, Computational Geometry.
- Research Experience
- ◇ **Associate Researcher** at the Data Center Lab of Huawei Research, Canada May 2020 - *present*
TCP Congestion Control Project.
 - Played a key role in the design and simulation of an innovative congestion control signal for **ultra-low-latency** data centers.
 - The idea is patented and a series of papers are in submission.
 - Architecting Linux-based transport solutions without touching the kernel.
 - Automated the CI/CD pipeline for our unit tests, streamlining the testing process and ensuring code quality.
 - Curated code versions via experiment tracking tools, enhancing the project's traceability and reproducibility.
 - Deployed a low-overhead custom tool over our bare-metal servers, enabling real-time performance tracking and analysis.
 - Achieved a remarkable 99.6% network utilization while **reducing latency by 2.5x** (from 250 us to below 100 us).
 - Designed and implemented a product version of the prototype using eBPF, enabling hot plugging of the module for scale and maintenance purposes. Currently undergoing test deployment in internal storage units.**Head of the Data Center Transport Augmenting Group.**
 - Established and led the eBPF development team.
 - My team created an enhancement shim-layer over Linux's TCP/IP stack to set the initial sending rate of traffic.
 - This innovation slashed the task completion time for our in-house **AI training models by 2.3x**.
 - Our initial results are published at the SIGCOMM23 workshop on eBPF.
 - Developing software in Python, C, Rust, and Go.**AI HPC Load-Balancing Project (Product Manager).**
 - Contributed to the load-balancing research team, reforming Huawei's next-generation products with hardware-level load-balancing for specific AI/ML workloads in large Ethernet HPC fleets.
 - Collaborated closely with business stakeholders to translate their requirements into product features.
 - Oversaw project timelines, resource allocation, and deliverables to ensure successful development and deployment.
 - Proficient with MPI techniques used for data-distributed and model-distributed training methods.
 - Designed and implemented an agile eBPF-based routing solution, ensuring **theoretical guarantees** on task completion time for multi-tenant deep learning training fleets.
 - Optimized architecture-specific C implementation of our codebase, achieving a significant reduction in route deduction time from 24 us to 640 ns (**38x latency improvement**).

- ◇ **Researcher** at University of Toronto, Canada
PhD in CS (Systems & Networks).
 - My thesis is on the **agile protocols and schedulers** for migrating software units in data centers and cloud environments.
 - This line of work covers a range of migrations in the control plane and data plane that effectively allows us to move an entire cloud tenant/application between the physical zones of a data center in a live and stateful manner.
 - Proficient in tools for distributed application management in **AWS and Azure**.
 - Tutorial TA in **data structures and algorithm design** for more than 10 semesters.
 - MSc in CS** (Theoretical CS).
 - Designed randomized algorithms based on Brownian motion for solving combinatorial-constrained graph instances.
 - The paper on this project was **invited for the special issue** of the ACM Transactions on Algorithms journal.
 - Proficient in graph modeling for solving scheduling problems.

Sept 2016 - Sept 2023
 - ◇ **Undergraduate Researcher** in [Sharif Algorithms' Lab](#) at Sharif University of Technology, Iran
Under the supervision of [Prof. Mohammad Ghodsi](#)

June 2015 - July 2016
 - ◇ **Summer Intern** at [Cafebazaar](#), Iran
Worked on a theoretical automatic approach for fraud detection in online ad networks.

Summer 2015
 - ◇ **Summer Intern** in System Security and Cryptography Lab at National University of Singapore (NUS), Singapore
Did research on compressed and secure publishing of data sets of POSETs and Unit Disk Graphs.

Summer 2014
 - ◇ University of Toronto Fellowship, Faculty of Arts And Science.

Fall 2016 - *present*
 - ◇ Won **Acres Productive Technologies Inc. Award** at University of Toronto, awarded to graduate students with academic excellence.

Fall 2018
 - ◇ **Ranked 1st** in Canada's Data Open (a data science competition) among more than 530 participants; our team won the grand prize of \$15000.

Fall 2016
 - ◇ Recipient of the grant for **Summer Research Internship** from National University of Singapore (**NUS**).

Summer 2014
 - ◇ Recipient of the grant for researching on a voting system for academic elections from the Sharif University of Technology.

2015
 - ◇ Ranked among the top 0.3% of students who participated in the Konkoor (the nationwide university entrance exam in Iran with more than 350000 participants).

2011
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- Awards and Honors

- ◇ Sepehr Abbasi Zadeh, Ali Munir, Mahmoud Bahnasy, Shiva Ketabi, Yashar Ganjali. On Augmenting TCP/IP Stack via eBPF. **ACM SIGCOMM Workshop on eBPF** 2023.
 - ◇ Sepehr Abbasi Zadeh, Farid Zandi, Matthew Buckley, Yashar Ganjali. Meta Protocols: Cutting the Tail Latency of Migration Protocols. **IFIP Networking** 2023.
 - ◇ Sepehr Abbasi Zadeh, Shiva Ketabi, Ali Munir, Mahmoud Bahnasy, Yashar Ganjali. DWTCP: Ultra Low Latency Congestion Control Protocol for Data Centers. *In Submission*. ([link](#))
 - ◇ Farid Zandi, Sepehr Abbasi Zadeh, Soheil Abbasloo, Yashar Ganjali, Zhenhua Hu. Live Stateful Migration of a Virtual Sub-Network. **NOMS** 2023. ([link](#))
 - ◇ Sepehr Abbasi Zadeh, Farid Zandi, Mohammad Amin Beiruti, Yashar Ganjali. Load Migration in Distributed Softwarized Network Controllers. **IJNM** 2022. ([link](#))
 - ◇ Matthew Buckley, Sepehr Abbasi Zadeh, Mohammad Amin Beiruti, Soheil Abbasloo, Yashar Ganjali. Switch Migration Scheduling in Distributed SDN Controllers. **NetSoft** 2022. ([link](#))
 - ◇ Sepehr Abbasi Zadeh, Allan Borodin, Aleksandar Nikolov. Sublinear-Time Estimation of the Matching Size in Bipartite Graphs. *In Submission*.
 - ◇ Sepehr Abbasi Zadeh, MohammadAmin Beiruti, Yashar Ganjali, Zhenhua Hu. Poster: Application-Aware Load Migration Protocols for Network Controllers. **ICNP** 2020. ([link](#))
 - ◇ Sepehr Abbasi Zadeh, MohammadAmin Beiruti, Yashar Ganjali, Zhenhua Hu. Poster: Fast Scheduling for Load Migration in Distributed Network Controllers. **ICNP** 2020. ([link](#))

Publications

- ◇ Sepehr Abbasi Zadeh, Nikhil Bansal, Guru Guruganesh, Aleksandar Nikolov, Mohit Singh, Roy Schwartz. Sticky Brownian Rounding and its Applications to Constraint Satisfaction Problems. **SODA 2020**. ([link](#))
Invited to Special Journal Issue.
- ◇ Sepehr Abbasi Zadeh, Mehrdad Ghadiri, Vahab Mirrokni, Morteza Zadimoghaddam. Scalable Feature Selection via Distributed Diversity Maximization. **AAAI 2017**. ([link](#))
- ◇ Sepehr Abbasi Zadeh, Mehrdad Ghadiri. Max-Sum Diversification, Monotone Submodular Functions and Semi-metric Spaces. *arXiv:1511.02402, 2015*. ([link](#))

Teaching Experience

- ◇ **Teaching Assistant**
University of Toronto
 - Advanced Algorithms, Winter '18, Winter '17; Instructor: [A. Nikolov](#)
 - Algorithm Design, Analysis and Complexity, Fall '17; Instructor: [A. Borodin](#)
 - Data Structures and Analysis, Fall '19, Winter '18, Winter '17, Summer '17; Instructor: [S. Toueg](#)
 - Mathematical Expression and Reasoning for CS, Fall '19, Fall '18, Fall '16; Instructor: [T. Fairgrieve](#)
- Sharif University of Technology
 - Data Structures and Algorithms, Fall 2015, Spring 2015, Fall 2014; Instructor: [M. Ghodsi](#)
 - Design and Analysis of Algorithms, Spring 2015; Instructor: [M. Ghodsi](#)
 - Introduction to Cryptography, Fall 2014, Spring 2014; Instructor: [S. Khazaei](#)
 - Data Structures and Algorithms, Spring 2014; Instructor: [M. Abam](#)
 - Probability and its Applications, Spring 2014; Instructor: [S. Khazaei](#)
 - Fundamentals of Programming, Fall 2012; Instructor: [Y. Tabesh](#)
- ◇ **Teacher of Special Topics in Mathematics**
 - Teaching Euclidean Geometry to high school students for mathematical olympiad preparation.

Work Experience

- ◇ **Data Scientist** at [Cafebazaar](#), Tehran, Iran. July 2015 - June 2016
Developed unsupervised fraud-detection techniques over spatiotemporal datasets of 30M users.
- ◇ **Volunteer Server Admin** Sept 2014 - Sept 2015
The administrator of [Sharif code judging system](#) for universities' programming courses.
- ◇ **Software Developer** at [Congenial Mobile Co.](#), Tehran, Iran. June 2012 - Dec 2013
Participated in the [Cafebazaar](#) project.

Skills

- ◇ **Programming/Scripting:** Python, C/C++, Java, Matlab, Mathematica, R, Unix Bash Script.
- ◇ **System Engineering:** Linux kernel module and eBPF application development, iptables, ansible, P4, DPDK, KVM, Ceph and Lustre distributed storage cluster development experience, Redis, Kafka, ZMQ, RabbitMQ, MPI, research on RDMA (RoCE v2).
- ◇ **Data visualization tools:** Grafana, R, Graphviz, and Gephi.
- ◇ **Optimization tools:** CVXOPT (and other extensions: CVXPY, PICOS), GLPK.

Language

- ◇ Persian (native), English (fluent).

References

- ◇ References and Projects Are Available Upon Request.