Shahrzad Kianidehkordi

https://shkiani.github.io/ | www.linkedin.com/in/shkianid
shkianid@gmail.com | 4162302796 | Toronto, ON | Canadian Citizen

Summary

- Machine Learning Researcher and recent 2025 PhD Graduate with 4+ years of research in **privacy-preserving AI** ★, **statistical ML** ★, and **scalable distributed optimization** ★.
- Proven track record of publications (**9 first-authored**, **340+** citations, in high-impact journals and conferences, e.g., **ICLR** 💎), **mentorship**, and **cross-disciplinary** collaboration.
- Skilled in developing **real-word** algorithms for **privacy-preserving** and **straggler-resilient** distributed AI under *strict privacy budgets*, *response variability*, and *numerical stability constraints*.
- **3+** years of practical implementation experience in **Python** and **PyTorch**, and in training and evaluating **ML** models in **academic** and **applied industry settings**.
- **Math Olympiad Gold medalist** 🏆 with theoretical research in *probability*, *optimization*, *differential privacy*, *approximated polynomial interpolation*, *error-correction codes*, and *floating point arithmetic*.

Selective Research and Work Experiences

- University of Toronto, Toronto, Canada — 2017 - Present
  Graduate Research and Teaching Assistant | Supervisor: Prof. Stark C. Draper
  - Ph.D. Research Contribution:
    - **Designed and implemented novel** methods for **differentially private federated learning** that support **heterogeneity** in both **privacy and data distributions**, boosting model performance by about 10% improved accuracy while satisfying privacy constraints.
    - **Pioneered** the extension of differentially private federated learning to **overlapping grouped** structures, **controlling and analyzing** clients' **privacy leakage propagation** to out-of-group nodes (e.g., business data to external companies or personal genomic data outside family groups).
    - Engineered novel **error-correction-coded redundancy** in **large-scale** distributed computing. Addressed **variability in responsiveness**, and **accelerated matrix multiplication** by 66%. Designed **approximated** and **randomized successive recovery** strategies, inspired by rate-distortion theory.
  - MASc. Research Contribution:
    - Developed a **unified geometric model** for coded matrix multiplication as a **cuboid partitioning** problem. **Designed** and **tested** novel hierarchical coded computing methods on **cloud** platforms, mitigating **stragglers** through **sequential computation recovery** and **enhanced load balancing**.
  - Collaborated with **interdisciplinary** research teams (privacy, ML, information theory, optimization), **mentoring** junior researchers, and coordinated **cross-functional**, **deadline-driven** research projects.
  - Scientific communication skills in **grant proposal writing** (securing **15+** scholarships/grants), **reviewing** for **6+** journals/Confs, **publishing 9 first**-author articles, and **presenting** at **9+** workshops/Confs.

- CISPA Helmholtz Center for Information Security, Germany — Apr-Sep 2024
  Research Scientist, Intern | Advisors: Prof. Franziska Boenisch, Prof. Adam Dziedzic
  - **First-authored** a paper accepted at **ICLR 2025**, a top-tier machine learning conference. **Mentored** a MASc student, guiding the completion of a **deadline-driven**, **collaborative** research project.
  - Proposed a novel **time-adaptive privacy expenditure** algorithm for trust dynamics in federated learning, improving overall utility without compromising privacy in heterogeneous settings.

- Accelerated Neural Technology Team, Huawei Noah's Ark Lab, Montreal, Canada — Summer 2021
  Machine Learning Researcher, Intern | Advisor: Prof. Vahid Partovi Nia
  - Developed and analyzed **quantization error bounds** in deep learning training pipelines (e.g., ResNet18), addressing numerical stability and floating-point vulnerabilities.
  - Collaborated with hardware teams to guide theoretically-motivated design practices for **deployment and reliable** ML model training. Contributed to **coding implementations** that improved overall efficiency.
  - Delivered a **60+ page technical report** summarizing findings for cross-team communication/integration.

- ICASSP - IEEE Signal Processing Cup (SPC) 2015 2015-2017
  Undergraduate Research Assistant | Advisor: Prof. Farokh Marvasti
  - Developed a novel signal processing algorithm for **motion artifact removal** in biomedical PPG data, contributing to trust in health-AI applications and heart rate tracking.
  - Competed in the Signal Processing Cup 2015 as part of a 5-member team. Achieved **1st** place nationally and **8th** place internationally among **60** teams. Co-authored an **IEEE letter** and a **journal** article.

- Chinese University of Hong Kong, Hong Kong Jul-Sep 2015
  Undergraduate Research Intern | Advisor: Prof. Chandra Nair
  - Explored foundational problems in **network information theory**, studying groundwork for understanding and modeling achievable capacity regions and reliability trade-offs in communication channels.

Selective Technical Skills and Certifications

- **Languages:** Python, Matlab, C++, Java, Julia, Verilog. **VCS:** Git, Mercurial. **Docs:** LaTeX, MS Office.
- **Libraries and Deep Learning Frameworks:** PyTorch, Opacus (differential privacy-enabled PyTorch Lib.), mpi4py (Python interface to MPI for parallel prog.), TensorFlow, Scikit-learn, NumPy, Matplotlib.
- **HPC clusters (supercomputer, cloud computing):** Compute Canada, AWS EC2, Google Cloud.
- Certified in **Generative AI with LLMs** & **Deep Learning** (Coursera, 2025), at the International **High-Performance Computing** Summer School (RIKEN Center for Computational Science, Kobe University, Japan, 2019)., and at the North American School of **Information Theory** (UPenn, USA, 2023).
- *Graduate Courses:* **System Modeling and Analysis** (A+). **Statistical Methods for Machine Learning and Data Mining** (A+). **Learning to Search: Current Machine Learning Algorithms** (A+). **Introduction to Statistical Learning** (A). **Convex Optimization** (A-). **Algorithm and Data Structure** (A-). **Detection and Estimation** (A). **Random Processes** (A+). **Error Control Codes** (A).

Selective Publications and Presentations

- Google scholar. ≥**340** citations, **9 first-authored peer-reviewed** articles in ML, Inf. Theory, Signal Proc.

1 **Kiani**,Kulkarni,Dziedzic,Draper,Boenisch. *Differentially private federated learning with time-adaptive privacy spending.* Accepted to ICLR 2025 (**A* Conference**).
2 **Kiani**,Boenisch,Draper. *Controlled privacy leakage propagation throughout differentially private overlapping grouped learning.* IEEE J. Sel. Areas Inf. Theory 2024 (**Journal**).
3 **Kiani**,Draper. *Successive approximated coded matrix multiplication.* IEEE J. Sel. Areas Inf. Theory 2022 (**Journal**).
4 **Kiani**,Ferdinand,Draper. *Hierarchical coded matrix multiplication.* IEEE Trans. Inf. Theory 2020 (**Journal**).
5 **Kiani**,Ferdinand,Draper. *Cuboid partitioning for hierarchical coded matrix multiplication.* ICML-WS 2019 (**A* WS**).

Education

- University of Toronto, Toronto, Canada 2017-2025
  Ph.D. and MASc. in Electrical and Computer Engineering (GPA: 3.94/4)
  - Ph.D. Thesis: *"Distributed optimization algorithms with improved efficiency, reliability, and privacy preservation"*
  - MASc. Thesis: *"Exploitation of stragglers in hierarchical coded matrix multiplication"*
- Sharif University of Technology, Tehran 2012-2017
  B.Sc. in Electrical Engineering and **Minor** in Economics (GPA: 17.4/20)
  - B.Sc. Thesis: *"Developed Android App for hand motion classification using accelerometer data"*

Selective Honors and Awards

- **Gold** medalist, National **Mathematical Olympiad**, Iran 2011
- **Ontario Graduate Scholarship** (2×, $15K/year) 2019-2021
- **DiDi Graduate Award** (4×, $10K/year) 2020-2024
- **NSERC** Alexander Graham Bell Graduate Scholarship-Doctoral **(CGS D3)** ($105K) 2021-2024
- **Mitacs Globalink Research Award**, Funded research internship in Germany Apr 2024
- **UofT Student and Research Fellowships** and **Doctoral Completion Awards** 2017-2025