Ahmed Khaled

✉ ahmed.khaled@princeton.edu
Website
Google Scholar Profile

Education

Jan 2022 - Present **Ph.D. Electrical and Computer Engineering**, *Princeton University*, New Jersey, United States.
Advisor: Professor Chi Jin. GPA: 3.96/4.0.

Oct 2015 – Aug 2020 **B.Sc. Computer Engineering**, *Cairo University*, Egypt.
GPA: Distinction with Honors (91.3%). Rank: 3rd/64.

Work Experience

May–Aug 2024 **Student Researcher**, *Google DeepMind*, New York City, New York, United States.
Worked on adaptive and federated optimization with Manzil Zaheer.

May–Sep 2023 **Research Scientist Intern**, *Meta*, New York City, New York, United States.
Research scientist intern at the Fundamental AI Research Team at Meta working with Aaron Defazio. Worked on adaptive optimization.

Jun–Oct 2020 **Research Intern**, *KAUST*, Saudi Arabia.

Jun–Sep 2019 Research intern in the group of Professor Peter Richtárik. Worked on federated learning and optimization.

Aug–Sep 2018 **Undergraduate Research Assistant**, *Cairo University*, Egypt.
Worked with Professors Amir Atiya and Ahmed Abdel-Gawad on fast matrix multiplication algorithms. Wrote code in CUDA C.

Jun–Aug 2016/2017 **Nafham**, *Intern*.
Recorded more than 40 educational videos on high school mathematics and wrote web pages in HTML, JavaScript, & CSS, and PHP with Bootstrap and Laravel.

Awards

2023/2024 **School of Engineering and Applied Sciences (SEAS) Travel Grant**, *Princeton University*.
Awarded a travel grant worth used towards going to ICLR 2023 / INFORMS Annual Meeting 2024.

2020/2022 **Top reviewer**, *various conferences*.
One of the top 10% of reviewers for ICML 2022 (awarded free registration, July 2022), AISTATS 2022 (awarded Feb. 2022) and NeurIPS 2020 (awarded free registration, Oct. 2020).

Oct 2020 **INFORMS Undergraduate Operations Research Prize Finalist**, *Institute for Operations Research and the Management Sciences (INFORMS)*.
One of ten finalists selected to give a presentation on outstanding research done as an undergraduate.

Jan 2020 **SIGAPP Student Travel Award**, *ACM*, (Declined).
Travel award worth $700 used towards going to the ACM SAC 2020 conference. Declined due to Covid.

Sep 2019 **Mentor Achievement Award**, *Learn IT, Girl 4th Edition*.
Awarded for successfully mentoring for three months in learning IT.

Papers

Conference papers

(1) Aaron Mishkin*, **A. Khaled***, Yuanhao Wang, Aaron Defazio, and Robert M. Gower - Directional Smoothness and Gradient Methods: Convergence and Adaptivity. To appear in NeurIPS 2024.

Note: * *indicates joint first authorship.*

(2) Aaron Defazio, Xinyu (Alice) Yang, Harsh Mehta, Konstantin Mishchenko, **A. Khaled**, Ashok Cutkosky - The Road Less Scheduled - To appear in NeurIPS 2024.

(3) Abdurakhmon Sadiev, Grigory Malinovsky, Eduard Gorbunov, Igor Sokolov, **A. Khaled**, Konstantin Burlachenko and Peter Richtárik - Federated Optimization Algorithms with Random Reshuffling and Gradient Compression. To appear in NeurIPS 2024.

(4) **A. Khaled**, Chi Jin - Tuning-Free Stochastic Optimization - ICML 2024 **Spotlight** (acceptance rate 3.5%).

(5) **A. Khaled**, Konstantin Mishchenko, and Chi Jin - DoWG Unleashed: An Efficient Universal Parameter-Free Gradient Descent Method - NeurIPS 2023.

(6) **A. Khaled** and Chi Jin - Faster federated optimization under second-order similarity - ICLR 2023.

(7) Konstantin Mishchenko, **A. Khaled**, and Peter Richtárik - Proximal and Federated Random Reshuffling - ICML 2022.

(8) Elnur Gasanov, **A. Khaled**, Samuel Horváth, and Peter Richtárik - FLIX: A Simple and Communication-Efficient Alternative to Local Methods in Federated Learning - AISTATS 2022.

(9) Konstantin Mishchenko, **A. Khaled**, and Peter Richtárik - Random Reshuffling: Simple Analysis with Vast Improvements - NeurIPS 2020.

(10) **A. Khaled**, Konstantin Mishchenko, and Peter Richtárik - Tighter Theory for Local SGD on Identical and Heterogeneous Data - AISTATS 2020.

(11) **A. Khaled**, Amir F. Atiya, Ahmed H. Abdelgawad - Applying Fast Matrix Multiplication to Neural Networks - ACM SAC 2020.

Journal papers

(12) **A. Khaled**, Othmane Sebbouh, Nicolas Loizou, Robert M. Gower, and Peter Richtárik - Unified Analysis of Stochastic Gradient Methods for Composite Convex and Smooth Optimization - Journal of Optimization Theory and Applications (JOTA) 2023.

(13) **A. Khaled** and Peter Richtárik - Better Theory for SGD in the Nonconvex World - Transactions of Machine Learning Research (TMLR) 2023.

Preprints

(14) Sélim Chraibi, **A. Khaled**, Dmitry Kovalev, Peter Richtárik, Adil Salim, and Matrin Takáč - Distributed Fixed Points Methods with Compressed Iterates - arXiv:1912.09925 (2019).

Workshop papers

(15) Aaron Mishkin*, **A. Khaled***, Aaron Defazio, and Robert M. Gower - A novel analysis of gradient descent under directional smoothness - Poster at the NeurIPS 2023 Optimization for ML workshop.

(16) **A. Khaled**, Konstantin Mishchenko, and Peter Richtárik - Better Communication Complexity for Local SGD - **Oral presentation** at the NeurIPS 2019 Federated Learning workshop.

(17) **A. Khaled** and Peter Richtárik - Gradient descent with Compressed Iterates - Poster at the NeurIPS 2019 Federated Learning workshop.

(18) **A. Khaled**, Konstantin Mishchenko, and Peter Richtárik - First Analysis of Local GD on Heterogeneous Data - Poster at the NeurIPS 2019 Federated Learning workshop.

Skills

Technical Python, C/C++, LaTeX, Git.

Languages English (fluent) and Arabic (native).

Programming projects

- Style Transfer (Image Processing course project): Implemented Elad and Milanfar's Style-Transfer via Texture-Synthesis paper in Python using OpenCV, scikit-learn and NumPy. Code, Report.
- Gated Neural Networks (Multimedia course project): Implemented a gated neural nets algorithm (PAQ7) for compression in C++. Won 1st place out of 15 teams in a department-wide text compression contest. Report.
- GoSlayer (Machine Intelligence course project): Led a team of sixteen people in implementing an AI agent that plays Go based on Monte-Carlo Tree Search and various heuristics. Code, Report.
- Arabic OCR (Pattern Recognition course project): Implemented Nashwan et al.'s A Holistic Technique for an Arabic OCR System paper in Python using OpenCV, scikit-learn, and NumPy, in addition to multiple other papers. Code, Report.

- PacMan (Microprocessors course project): Wrote a multiplayer PacMan-like game in pure x86 assembly with search-based AI. Code.

Teaching

May 2024 **Optimization Short Course**, *MLx Fundamentals*, Oxford Machine Learning Summer School (OxML).
Teaching assistant for a lecture on optimization at the MLx Fundamentals Oxford Machine Learning Summer School.

Springs 2023/2024 **ECE539/COS512**, *Princeton University*.
Teaching assistant for ECE539: Optimization for Machine Learning. Graduate course on optimization.