

Education

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

Research Experience

- Jun–Oct 2020 **Research Intern**, *King Abdullah University of Science and Technology*, Saudi Arabia.
Remote research intern in the group of Professor [Peter Richtárik](#). Worked on federated learning and convex composite optimization.
- Jun–Sep 2019 **Research Intern**, *King Abdullah University of Science and Technology*, Saudi Arabia.
Worked in the group of Professor [Peter Richtárik](#) on stochastic optimization. Analyzed algorithms for federated learning and non-convex optimization.
- Aug–Sep 2018 **Undergraduate Research Assistant**, *Cairo University*, Egypt.
Worked with Professor [Amir Atiya](#) and Professor [Ahmed Abdel-Gawad](#) on speeding up the training of neural networks using fast matrix multiplication algorithms. Wrote code in CUDA C.

Work Experience

- Oct 2020 – Present **Egyptian Military**, *Conscript Soldier*.
Serving mandatory conscription for one year as a soldier in the Egyptian Armed Forces.
- Jun–Aug 2016 **Nafham**, *Intern*.
Wrote web pages in HTML, JavaScript, & CSS, and PHP with Bootstrap and Laravel. Recorded more than 40 educational videos on high school mathematics.
- Aug–Sep 2017

Awards

- 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 at the 2020 INFORMS annual meeting.
- Oct 2020 **Top 10% of Reviewers**, *NeurIPS 2020*.
Awarded one free registration to NeurIPS 2020 for being one of the top 10% of high-scoring reviewers for the year.
- Sep 2019 **Mentor Achievement Award**, *Learn IT, Girl 4th Edition*.
Awarded for successfully mentoring Natalia Grzywalska over March–June 2019 in programming.

Mathematics Self-Study

Self-studied to develop my mathematical maturity beyond class.

- Worked through a textbook on real analysis (Bloch, *The Real Numbers and Real Analysis*) and wrote a solutions manual for it ([solutions link](#)).
- Also worked through chapters of various other mathematical textbooks:
 - Hrbáček and Jech's *Set Theory* Ch.1-4 ([solutions link](#)).
 - Axler's *Linear Algebra Done Right* Ch. 1-3 ([solutions link](#)).
 - Bartle's *Elements of Integration* Ch. 1-4.

Course Projects

These projects involved implementing research papers from scratch.

- Image Processing: Implemented Elad and Milanfar's Style-Transfer via Texture-Synthesis (2016) in Python using OpenCV, scikit-learn and NumPy. [Code](#), [Report](#).
- Multimedia: Implemented a gated neural nets algorithm (PAQ7) for compression in C++. Won 1st place out of 15 teams over the department for the best compression ratio on an Arabic text dataset. [Report](#).
- Pattern Recognition: 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](#).

Talks

May 2020 **On the Convergence of Local SGD on Identical and Heterogeneous Data**, *Federated Learning One World Seminar*.

Gave an hour-long seminar talk on using local stochastic gradient descent for federated learning.

Papers

Conference Publications

- (1) Konstantin Mishchenko, **A. Khaled**, and Peter Richtárik - **Random Reshuffling: Simple Analysis with Vast Improvements** - To appear in Neural Information Processing Systems (NeurIPS) 2020.
- (2) **A. Khaled**, Konstantin Mishchenko, and Peter Richtárik - **Tighter Theory for Local SGD on Identical and Heterogeneous Data** - Artificial Intelligence and Statistics (AISTATS) 2020.
- (3) **A. Khaled**, Amir Atiya, and Ahmed Abdel-Gawad - **Applying Fast Matrix Multiplication to Neural Networks** - 35th ACM/SIGAPP Symposium on Applied Computing (ACM SAC) 2020.

Preprints / In preparation

- (4) Konstantin Mishchenko, **A. Khaled**, and Peter Richtárik - **Proximal and Federated Random Reshuffling** - preprint (2021).
- (5) **A. Khaled**, Othmane Sebbouh, Nicolas Loizou, Robert M. Gower, and Peter Richtárik - **Unified Analysis of Stochastic Gradient Methods for Composite Convex and Smooth Optimization** - preprint (2020).
- (6) **A. Khaled** and Peter Richtárik - **Better Theory for SGD in the Nonconvex World** - preprint (2020).
- (7) Sélim Chraïbi, **A. Khaled**, Dmitry Kovalev, Peter Richtárik, Adil Salim, and Matrin Takáč - **Distributed Fixed Points Methods with Compressed Iterates** - preprint (2019).

Workshop Papers

- (8) **A. Khaled**, Konstantin Mishchenko, and Peter Richtárik - **Better Communication Complexity for Local SGD** - *Oral presentation* at the NeurIPS 2019 Federated Learning Workshop.
- (9) **A. Khaled** and Peter Richtárik - **Gradient descent with Compressed Iterates** - Poster at the NeurIPS 2019 Federated Learning Workshop.
- (10) **A. Khaled**, Konstantin Mishchenko, and Peter Richtárik - **First Analysis of Local GD on Heterogeneous Data** - Poster at the NeurIPS 2019 Federated Learning Workshop.