# Sarit Khirirat

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https://scholar.google.se/citations?hl=enuser=NSFBRNAAAAAJ

## Qualifications

- Strong research background in **numerical optimization**, **machine learning** and **federated learning**.
- Author of publications at machine learning and signal processing conferences (i.e. **NeurIPS**, **AAAI**, **ICASSP**).
- Proficiency in programming languages such as **Python, Julia, MATLAB/Simulink, CVX, LaTeX** and **Git**.

## Education

**KTH Royal Institute of Technology** — Stockholm, Sweden
**Ph.D.**, Electrical Engineering and Computer Science — 2016 – 2022
Advisor: Prof. Mikael Johansson
Thesis: First-order algorithms for communication efficient distributed learning

**KTH Royal Institute of Technology** — Stockholm, Sweden
**M.Sc.**, Systems, Control, and Robotics, GPA: 3.5/4.0 — 2014 – 2016
Advisor: Prof. Mikael Johansson
Thesis: Randomized first-order methods for convex optimization

**Chulalongkorn University** — Bangkok, Thailand
**B.Eng. (First Class Honors)**, Electrical Engineering, GPA: 3.83/4.0 — 2009 – 2013
Advisor: Assoc. Prof. Watcharapong Khovidhungij
Thesis: Application of adaptive backstepping design for uncertain linear systems with unknown input time-delay

## Research and Industry Experience

**King Abdullah University of Science and Technology** — Thuwal, Saudi Arabia
***Postdoctoral Researcher*** *advised by Prof. Peter Richtárik* — 2024 – present

- Investigated foundational theory for large-scale optimization in machine learning

**Mohamed bin Zayed University of Artificial Intelligence** — Abu Dhabi, UAE
***Postdoctoral Fellow*** *advised by Prof. Peter Richtárik and Prof. Fakhreddine (Fakhri) Karray* — 2022 – 2023

- Developed federated learning algorithms with provable statistical optimality
- Reported to Prof. Fakhreddine Karray (Provost at MBZUAI), as Prof. Peter Richtárik is my scientific supervisor

**KTH Royal Institute of Technology** — Stockholm, Sweden
***PhD Researcher*** *supervised by Prof. Mikael Johansson* — 2016 – 2022

- Developed an adaptive communication-aware framework that optimizes online communication efficiency
- Collaborated with leading scholars from Stockholm University and IST Austria

**Yokogawa, Thailand, Ltd.** — Bangkok, Thailand
***Summer Intern*** — 2012

- Implemented distributed control and automation systems for chemical processes
- Programmed with Centum-VP software, PLC, SCADA and AutoCAD

## Awards

**Rising Star in AI (ranked among top 20%)** 2023
in *the KAUST AI Initiative*
headed by **Prof. Jürgen Schmidhuber**

**Best Student Paper Award** 2019
in *the $44^{th}$ International Conference on Acoustics, Speech and Signal Processing*
sponsored by **Hitachi**

**Academic PhD Position** 2018 – 2022
in the cluster of *Large Scale Optimization and Control*
funded by **the Wallenberg AI, Autonomous Systems and Software program**

## Selected Publications

**[S1] Improved Step-Size Schedules for Proximal Noisy Gradient Methods**
**S. Khirirat**, X. Wang, S. Magnússon, M. Johansson
*IEEE Transactions on Signal Processing*, 2023

**[S2] Eco-Fedsplit: Federated Learning with Error-Compensated Compressions**
**S. Khirirat**, S. Magnússon, M. Johansson
*IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022

**[S3] Zeroth-order Randomized Subspace Newton Methods**
E. Berglund, **S. Khirirat**, X. Wang
*IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022

**[S4] A Flexible Framework for Communication-Efficient Machine Learning**
**S. Khirirat**, S. Magnússon, A. Aytekin, M. Johansson
*Proceedings of the AAAI Conference on Artificial Intelligence*, 2021

**[S5] Compressed Gradient Methods for Hessian-Aided Error Compensation**
**S. Khirirat**, S. Magnússon, M. Johansson
*IEEE Transactions on Signal Processing*, 2020

**[S6] Convergence Bounds for Compressed Gradient Methods with Memory Based Error Compensation (Best Student Paper Award)**
**S. Khirirat**, S. Magnússon, M. Johansson
*IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2019

**[S7] The Convergence of Sparsified Gradient Methods**
D. Alistarh, T. Hoefler, M. Johansson, N. Konstantinov, **S. Khirirat**, C. Renggli
*Advances in Neural Information Processing Systems (NeurIPS)*, 2018

## Teaching Experience

**Teaching Assistant,** in *EL1010: Automatic Control, General Course* 2017-2018, 2020

- Taught weekly recitation and laboratory sessions
- Prepared online lecture videos and notes using Descript, Markdown and Pandoc

**Project Supervisor,** in *EL111X: Degree Project in Electrical Engineering, First Cycle* 2017, 2019-2020

- Supervised projects on portfolio optimization, machine learning-based forecasting, and vehicle path tracking control

## Scientific and outreach activities

**Reviewer** for the following conferences and journals 2019-2022

- *Conference on Neural Information Processing Systems*; *AAAI Conference on Artificial Intelligence*; *International Conference on Learning Representations (ICLR)*; *IMA Journal of Applied Mathematics*; *IEEE Transactions on Signal Processing*; *Automatica*; *Systems & Control Letters*; *IEEE Conference on Decision and Control (CDC); IEEE American Control Conference (ACC)*; *European Control Conference (ECC)*

**Presenter**, Seminar Talk: "A Flexible Framework for Communication-Efficient Machine Learning" 2021

- **Federated Learning One World Seminar (FLOW)**

**Presenter**, Seminar Talk: "First-Order Methods for Communication-Efficient Machine Learning" 2021

- **Harvard University**, School of Engineering and Applied Sciences (SEAS)

**Staff**, Chula Academic Expo, Chulalongkorn University 2012

- Staffed and presented a research poster on Thai dictionary for deaf mutes to the public

**Flood Relief Volunteer**, Chulalongkorn University with Metropolitan Electricity Authority 2011

- Checked household electrical systems
- Provided information on maintenance of electrical components to residents

## References

**Prof. Mikael Johansson**
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