

EHSAN LARI

PHD CANDIDATE IN ELECTRONIC SYSTEMS AT NTNU

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Profile

Accomplished researcher in signal processing and statistical machine learning from NTNU, with a specialization in distributed and federated machine learning, optimization, and data science. Demonstrates extensive hands-on experience with MATLAB and Python, utilizing libraries such as Scikit-Learn, PyTorch, NumPy, Pandas, and Matplotlib.

Professional Experience

Signal Processing Researcher and Teaching Assistant

January 2020 – Present

Norwegian University of Science and Technology (NTNU)

Trondheim, Norway

- **Developed** robust novel algorithms using Python and MATLAB for federated learning, distributed NMF, and consensus algorithms, enhancing resilience to noise and privacy in large-scale signal processing and machine learning systems.
- Authored **seven** peer-reviewed publications in top-tier venues (**IEEE TSIPN, Elsevier SP, ICASSP, SSP, APSIPA, EUSIPCO**) on distributed optimization and privacy-preserving data systems, advancing efficient and secure technology solutions.
- Served as a teaching assistant for three years, providing valuable support in the courses of Digital Signal Processing (3x), Estimation, Detection and Classification, and Design of Integrated Circuits (3x).
- Mentored students in research projects, leveraging Python, MATLAB, and Docker to bridge data science and engineering through distributed system integration and algorithm development.

Assistant Professor in Electronic Systems

August 2022 – December 2022

Norwegian University of Science and Technology (NTNU)

Trondheim, Norway

- Delivered lectures on advanced signal processing using Python and Verilog, supporting over 200 master's students in understanding engineering technology frameworks and statistical models.
- Supervised graduate projects involving machine learning and electronic systems integration.

Education

Norwegian University of Science and Technology (NTNU)

January 2020 – March 2024

Doctor of Philosophy (PhD) — Signal Processing and Machine Learning

Trondheim, Norway

Amirkabir University of Technology (Tehran Polytechnic)

September 2016 – December 2018

Master of Science (MSc) — Electrical Engineering

Tehran, Iran

Amirkabir University of Technology (Tehran Polytechnic)

September 2012 – September 2016

Bachelor of Science (BSc) — Electrical Engineering (Double-Major)

Tehran, Iran

PhD Thesis

- **Title:** Distributed Learning with Enhanced Efficiency, Robustness and Privacy
- **Supervisors:** Prof. Stefan Werner (NTNU, Norway), Dr. Reza Arablouei (CSIRO, Australia)
- **Opponents:** Prof. Paulo S. R. Diniz (Federal University of Rio de Janeiro, Brazil), Dr. Monica Nicoli (Politecnico di Milano, Italy), Prof. Pierluigi Salvo Rossi (NTNU, Norway)

Major Achievements

- **NTNU, Norway:** Offered an assistant professor position mid-PhD, recognizing exceptional research and teaching integrity in machine learning and signal processing.
- **McGill University, Canada:** PhD offer + McGill Engineering International Tuition Award (MEITA)

Skills

- **Programming Languages:** Python (Scikit-Learn, PyTorch, NumPy, Pandas), MATLAB, SQL
- **Software & Tools:** Cloud Platforms (Microsoft Azure), Docker, Kubernetes, Microsoft Fabric, Git
- **Technologies:** Machine Learning, Generative AI, Machine Vision, Forecasting, Data Analytics
- **Soft Skills:** Problem-Solving, Communication, Cross-Functional Collaboration, Teamwork, Adaptability, Stakeholder Management, Pragmatic Programming

Projects and Outputs

Uncertainty Quantification in Federated Machine Learning June 2025 – Present

- Developed methods for uncertainty quantification in federated online learning, resulting in more robust and trustworthy learning algorithms.
- Plan to submit findings to **IEEE TSP** (Q1 journal), also known as the "bible of signal processing".

Resilience in Online Federated Machine Learning April 2022 – August 2024

- Developed the PSO-Fed algorithm for online federated learning, enabling privacy-preserving model training on distributed streaming data with reduced communication overhead.
- Optimized PSO-Fed's robustness by identifying a non-trivial stepsize, outperforming state-of-the-art federated learning algorithms in resilience to malicious client attacks.
- **Published** findings in **IEEE TSIPN** (Q1 journal) and presented at **IEEE ICASSP**, a leading signal processing conference, demonstrating PSO-Fed's superior performance via extensive simulations.

Noise-Robust and Resource-Efficient Machine Learning April 2023 – February 2025

- Developed a novel federated learning algorithm to enhance robustness to communication noise while minimizing client-server communication load.
- Enhanced performance by eliminating dual variables and enabling continuous local model updates, improving resilience to noisy links.
- **Published** in **Elsevier Signal Processing** (Q1 journal) and presented at **IEEE SSP** and **IEEE APSIPA**, showcasing significant robustness and efficiency gains.

Privacy-Preserving Nonnegative Matrix Factorization January 2024 – September 2024

- Developed a privacy-preserving algorithm for fully-distributed nonnegative matrix factorization (NMF) to decompose large data matrices over ad-hoc networks.
- Implemented a decentralized approach to prevent raw data sharing among agents, ensuring robust privacy in distributed signal processing applications.
- **Presented** findings at **EUSIPCO**, a leading signal processing conference, showcasing the algorithm's applicability to privacy-sensitive machine learning tasks.

Distributed Maximum Consensus

February 2024 – September 2024

- Developed the RD-MC algorithm for distributed maximum consensus, enabling robust estimation of maximum values in multi-agent networks over noisy communication links.
- Enhanced robustness and efficiency by utilizing a single set of noise-corrupted estimates and applying moving averaging to local estimates.
- **Presented** results at **EUSIPCO**, a leading signal processing conference, showcasing the algorithm's effectiveness in noisy distributed environments.

Voluntarily Work

Reviewer

January 2023 – Present

- IEEE Transactions on Signal and Information Processing over Networks (4x)
- IEEE Sensors Journal (3x)

Languages

- **Norwegian, Bokmål:** B2 Proficiency (Ongoing improvement)
- **English:** Fluent, C1/C2 Proficiency
- **Persian (Farsi):** Native Proficiency