Alireza Keshavarzian

University of Toronto - Department of Electrical and Computer Engineering

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Education

Ph.D.:	*University of Toronto - Electrical and Computer Engineering*	2020–Present
M.Sc.:	*Amirkabir University of Technology - Electrical Engineering*	2016–2019
B.Sc. (double major):	*Amirkabir University of Technology - Computer Engineering and Information Tech.*	2014–2019
B.Sc.:	*Amirkabir University of Technology - Electrical Engineering*	2012–2016

Research Interest

- Machine Learning in Healthcare
- Time series analysis
- High-Dimensional Data Integration
- Contrastive and few shot learning

Work and Teaching Experiences

Data Scientist intern at DraftAid (DraftAid) June–Sept 2025

Developed a conditional autoregressive GNN that predicts annotation edges sequentially, conditioning each step on previously accepted graph states.

Data Scientist at University Health Network (UHN) Dec 2020–Now

Design deep learning models for respiratory disease analysis, including the OscilloFusion Attention architecture for multi-channel oscillometry fusion and phenotype classification. Developed an interface enabling clinicians to explore oscillometry signals, attention maps, and predicted mechanical parameters.

Data Scientist at Snappfood May 2020–Oct 2020

Developed a recommendation system for food and restaurants, leveraging a model to generate dynamic meta-tags for foods and restaurant listings, increasing click-through rates. Conducted in-depth analysis of conversion rates across application pages, identifying key areas for optimization and improving user engagement.

Machine Learning Engineer at RISE Jan 2020–Aug 2020

Researching uncertainty measurement and conformal prediction.

Chief Technical Officer (CTO) at Atrovan Nov 2016–Apr 2020

Team leader and software architect of Smart Home Gateway based on Zigbee protocol. Developer of Atrovan edge layer. Worked on Modbus and MQTT gateways deployed on the fog layer of smart solutions. Led engineering teams for the Atrovan IoT platform.

Teaching Assistant at University of Toronto Jan 2021–Mar 2023

Probabilistic Machine Learning (CSC412), Computer Networks I (ECE361), Programming Fundamentals (ECE244), Design and Analysis of Data Structures (CSCB63).

Publications

- **A. Keshavarzian, S. Valaee**, "CoMIND: A Contrastive Multi-metric Approach to INformative and Discriminative Feature Selection"
  Submitted in: International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2026)

- **A. Keshavarzian, S. Valaee**, "CURVE: Contrastive Unsupervised Representation-based Variable Elimination"
  Submitted in: IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)

- **A. Keshavarzian, S. Valaee**, "Random Representation Learning based on Segmented Pooling Layer and Information Spread Detector"
  Submitted in: IEEE Transactions on Artificial Intelligence (TAI)

- **A. Keshavarzian, S. Valaee**, *"HIERVAR: A Hierarchical Feature Selection Method for Time Series Analysis."*
  Published in: International Workshop on Machine Learning for Signal Processing (MLSP 2024)

- **A. Keshavarzian, S. Valaee**, *"RASTER: Representation Learning for Time Series Classification using Scatter Score and Randomized Threshold Exceedance Rate."*
  Published in: International Workshop on Machine Learning for Signal Processing (MLSP 2023)

- **A. Keshavarzian, H. Salehinejad, S. Valaee**, *"Representation Learning of Clinical Multivariate Time Series with Random Filter Banks."*
  Published in: International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2023)

- **A. Keshavarzian, J. Wue, C. Chow, S. Valaee**, *"Time Series Classification Using Convolutional Kernel and Adaptive Dynamic Thresholding."*
  Published in: IEEE International Conference on Communication (ICC 2024)

- **A. Keshavarzian, S. Sharifian, S. Seyedin**, *"Modified Deep Residual Network Architecture Deployed on Serverless Framework of IoT Platform Based on Human Activity Recognition Application."*
  Published in: Future Generation Computer Systems Journal

Skills and Expertise

- **Programming:** C, C++, Python, Golang, Java
- **Frameworks & Libraries:** Spark, Hadoop, PyTorch, TensorFlow, Keras, OpenCV, Numba, OpenAI SDK, CrewAI
- **Data:** Pandas, Seaborn, Plotly, Power BI, PySpark
- **LLMs:** CrewAI, OpenAI SDK, LangChain, LLM fine tuning
- **Hardware:** Xilinx, Verilog, VHDL, Microprocessors, Raspberry Pi
- **Web:** HTML, CSS, JavaScript, Bootstrap, React.js, MongoDB, CassandraDB, RDBMS

Academic Projects

- **PhD Project: Random Representation Learning for Time Series**
  Supervised by Dr. S. Valaee. Develops random representation learning and segmentation-based deep learning methods for time-series data, including RASTER, ISD, HIERVAR, and T-ROCKET, to identify informative regions and enhance feature discriminability. Extends these models to unsupervised and contrastive learning frameworks for scalable feature selection in high-dimensional settings. Focuses on theoretical analysis of segment-wise informativeness and contrastive objectives to build robust, ML-ready representations.

- **M.Sc. Thesis: Human Action Recognition on Distributed Big Data Infrastructure**
  Supervised by Dr. S. Sharifian and Dr. S. Seyedin. Built and optimized deep neural models for smartphone sensor–driven action recognition, integrating distributed training and inference on Apache Spark.
  Python, Keras, TensorFlow, Spark

- **B.Sc. Capstone: Real-time Static Logo Detection and Inpainting in Sports Videos**
  Supervised by Prof. S.A. Motamedi. Designed and implemented GPU-accelerated algorithms for logo detection and inpainting using CUDA.
  C/C++, CUDA, Matlab 2017

- **IoT Platform: Data Aggregation and Real-time Analytics**
  Architected a distributed microservices IoT platform for high-throughput data ingestion, dashboarding, and low-latency analytics. Implemented a FaaS-based rule engine using OpenWhisk for scalable event processing.
  Golang, OpenWhisk, Cassandra, Postgres 2019