Amin Jalali

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Centre for Neuroscience Studies & Ingenuity Labs Research Institute, Queen's University, Canada

Profile Summary

- Conduct research in medical artificial intelligence, computer vision, foundation models, long-tailed distribution learning, multimodal learning, and time-series prediction, focusing on advancing technical expertise in artificial intelligence and contributing actively to the research community.
- Authored over 38 publications, including journal articles, conferences, and patents, featured in venues like NeurIPS, IEEE Transactions, and Elsevier, accumulating 830+ citations, with an h-index of 16.
- Contributed to securing research funding and grants, supporting the expansion and development of innovative projects.
- Co-supervised 12 researchers (4 PhD and 8 MSc students), providing mentorship to support their academic and professional development.

Employment

- **Postdoctoral Fellow** *April 2025 - October 2026*
  Centre for Neuroscience Studies, Queen's University Kingston, Canada
  - Implementing AI-based arterial spin labeling MRI pipeline for epilepsy detection and presurgical decision-making.
  - Developing foundational AI models for neurological disease detection and prediction for clinical use in hospitals.
  - Collaborating on hippocampal sclerosis asymmetry size calculation in epileptic patients.
- **Postdoctoral Fellow** *April 2023 - April 2025*
  Department of Electrical and Computer Engineering and Ingenuity Labs Research Institute, Queen's University Kingston, Canada
  - Developed a hierarchical uniformity-tolerance latent balancing model for time-series representation learning.
  - Collaborated on a multi-domain EEG representation learning model for cognitive load classification.
  - Analyzed temporal and spatial characteristics of time-series data for prediction and anomaly detection.
  - Conducted bio-signal and medical signal analysis with multimodal fusion.
- **Postdoctoral Fellow** *September 2021 - March 2023*
  KNU-LG Electronics Convergence Research Center, AI Institute of Technology Daegu, South Korea
  - Developed a Transformer-based model for predicting mortality and length of stay using ICU data.
  - Created AI algorithms to predict neurological prognosis in critically ill patients, enhancing critical care outcomes.
  - Established a patient-specific big data infrastructure and developed an AI-based clinical decision support system.
  - Implemented long-tailed data distribution learning model, addressing challenges in low-shot medical data samples.
  - Applied self-supervised model distillation techniques to manage long-tailed imbalanced data distributions.

Education

- **PhD in Electronic and Electrical Engineering** *September 2016 - August 2021*
  Kyungpook National University (KNU) Daegu, South Korea
  - GPA: 97.8/100
  - Served as a research and teaching assistant; recipient of a full graduate scholarship from the School of Engineering.
  - PhD Thesis: "Low-Shot Imbalanced Data Regularizations for Long-Tailed Image Classification and Medical Series Prediction," supervised by Prof. Giljin Jang and Prof. Minho Lee.
  - Awarded Best PhD Thesis.
- **Master's in Electronics Engineering** *April 2014 - August 2016*
  Kyungpook National University (KNU) Daegu, South Korea
  - GPA: 95.2/100
  - Research assistant with a full KINGS graduate scholarship from the School of Engineering.
  - Master's Thesis: "Sensitivity and Robustness Regularizations in Convolutional Neural Networks," supervised by Prof. Minho Lee.
- **Bachelor's in Marine Telecommunication and Electronics Engineering** *February 2008 - March 2012*
  Chabahar University of Maritime and Marine Sciences Iran
  - Received top scholar research honors at the School of Engineering.
  - Top student during the last two years; graduated in the top three of the class (GPA: 3.42/4.5).
  - Completed guest studies at Shiraz University of Technology (SUTech) in 2011.
  - Completed a one-year internship with Sanatkade Sabz Pasargad Co. (SSP Co.).
  - High School Diploma in Math and Physics (Top 5%).

PROJECTS

- **Human-Centered AI and Interactive Machines Lab / Ingenuity Labs Research Center** *2025-Present*
  Ongoing Research Projects:
  - Implementing AI algorithms for pre-surgical decision-making for neurological diseases and in particular for epilepsy.
  - Analyzing the pipelines and monitoring systems in the hospital in order to develop programming code to make the processes more efficient.
  - Improving the algorithms designed to precisely detect hippocampal sclerosis measurements and MRI arterial spin labeling asymmetry detection (Kingston General Hospital Project).
- **Human-Centered AI and Interactive Machines Lab / Ingenuity Labs Research Center** *2023-2025*
  Ongoing Research Projects:
  - Developed AI and ML models for time-series forecasting and anomaly detection applications (Bank of Montreal Project).
  - Identified critical research gaps and created multi-domain data systems using self-supervised learning techniques.
  - Authored scientific manuscripts, protocols, and grant applications, collaborating with researchers to ensure clarity, accuracy, and impactful delivery.
- **Artificial Brain Research Lab** *2014 - 2023*
  Research Assistant: Projects Overview
  - Applied self-supervised contrastive learning with label information for low-rank, sparse, and orthogonal data representations using Lagrangian multipliers.
  - Developed an ECG prediction model for arrhythmia detection (including atrial fibrillation and myocardial infarction) using a resampling technique with orthogonality constraints (Kyungpook Hospital project).
  - Built a document translation system for high-cursive ancient documents for the Korean National Library, integrating detection, recognition, and translation modules (Korean National Cultural Project).
  - Implemented a low-shot image recognition model for blurry, noisy environments, focusing on edge-based representations for intra- and inter-features distinction for images at long stand-offs (LG project).
  - Created a contactless, robust palm-print recognition model using a deep convolutional network (Human-Robot Interaction project).
  - Developed a regularized, low-shot attention transfer model with t-normalization for classifying and translating ancient documents.
- **Science and Technology Center, Shiraz University of Technology** *2010 - 2013*
  Research Assistant: Projects Overview
  - Performed clustering on medical datasets, including breast cancer and ECG data, by integrating K-Means with evolutionary optimization algorithms such as the Imperialist Competitive Algorithm (ICA).
  - Implemented evolutionary algorithms (Imperialist Competitive Algorithm and Particle Swarm Optimization) in conjunction with conventional controllers.

PATENTS[WEB-LINK]

[P.1] M. Lee, J. Chang, **A. Jalali**, "Device for predicting length of stay and mortality rate of patients in intensive care unit." Application number: 102600493, filing date: 2023-03-21, publication date: 2023-11-08, patent number: KR20230036401A. Application agency: Kyungpook National University Industry-University Cooperation Foundation, South Korea.

[P.2] M. Lee, **A. Jalali**, J. Chang, J. Hong, J. Kim, "Patient Status Analysis in the Intensive Care Unit Based on Deep Neural Network and Method Thereof." Application number: 102598101, filing date: 2022-06-27, publication date: 2023-11-02, patent number: KR20220078274A, South Korea.

[P.3] M. Lee, J. Seo, **A. Jalali**, "Low-Shot Transfer with Attention for Highly Imbalanced Cursive Character Recognition, Recording Medium, and Device for Performing the Method." Application number: KR20210013300A, filing date: 2021-01-29, publication date: 2022-08-05, patent number: KR20220109821A, South Korea.

[P.4] M. Lee, J. Park, **A. Jalali**, "Atrial Fibrillation Predicting System and Method Thereof." Application number: KR20190155412A, filing date: 2019-11-28, publication date: 2022-05-23, patent number: 102401131, South Korea.

[P.5] M. Lee, **A. Jalali**, J. Park, "Traditional Korean Character Hanja Recognition System and Method Thereof." Application number: 102264988, filing date: 2019-08-12, publication date: 2021-06-16. Application agency: KNU Industry-University Cooperation Foundation, patent number: KR20190098004A, South Korea.

PUBLICATIONS

J=JOURNAL, C=CONFERENCE

[J.1] P. Angkan, **A. Jalali**, P. Hungler, A. Etemad, "Multi-Domain EEG Representation Learning with Orthogonal Mapping and Attention-based Fusion for Cognitive Load Classification," (Submitted).

[J.2] J. Kim, M. Toikkanen, **A. Jalali**, M. Kim, H. Han, H. Kim, W. Shin, J. Ho-Young, K. Kim, "Adaptive Metadata-Guided Supervised Contrastive Learning for Domain Adaptation on Respiratory Sound Classification," *IEEE Journal of Biomedical and Health Informatics*, vol., pp. (2025).

[J.3] M. Bermudez-Gonzalez, **A. Jalali**, and M. Lee, "Dynamically Adaptive Deformable Feature Fusion for multi-scale character detection in ancient documents," *Engineering Applications of Artificial Intelligence*, vol. 139, pp. 109458 (2025).

[J.4] **A. Jalali**, S. Lee, and M. Lee, "Learnable Feature Alignment with Attention-Based Data Augmentation for Handling Data Issue in Traditional Scripts," *Applied Soft Computing*, vol. 167, pp. 112394 (2024).

[J.5] S. A. M. Mohamud, **A. Jalali**, and M. Lee, "Hierarchical Reasoning Based on Perception Action Cycle for Visual Question Answering," *Expert Systems with Applications*, vol. 241, pp. 122698 (2024).

[J.6] K. Keisham, **A. Jalali**, J. Kim, M. Lee, "Multi-Level Alignment for Few-Shot Temporal Action Localization," *Information Sciences*, vol. 650, pp. 119618 (2023).

[J.7] S. A. M. Mohamud, **A. Jalali**, and M. Lee, "Encoder-Decoder Cycle for Visual Question Answering Based on Perception-Action Cycle," *Pattern Recognition*, vol. 144, pp. 109848 (2023).

[J.8] K. Hwang, J. Lee, **A. Jalali**, and M. Lee, "Predicting the Refrigerant Amounts across Air Conditioners with a Domain Adaptive Lightweight Transformer," *IEEE Transactions on Consumer Electronics*, vol. 69 (2023).

[J.9] **A. Jalali** and M. Lee, "Adversarial Lagrangian Integrated Contrastive Embedding for Limited Size Datasets," *Neural Networks*, vol. 160, pp. 122–131 (2023).

[J.10] E. Assareh, S. S. Mousavi Asl, N. Agarwal, M. Ahmadinejad, **A. Jalali**, and M. Lee, "A Cogeneration-Coupled Energy Storage System Utilizing Hydrogen and Methane-Fueled CAES and ORC with Ambient Temperature Consideration Enhanced by Artificial Neural Network, and Multi-Objective Optimization," *Thermal Science and Engineering Progress*, vol. 46, pp. 102161 (2023).

[J.11] K. Keisham, **A. Jalali**, and M. Lee, "Online Action Proposal Generation Using Spatio-Temporal Attention Network," *Neural Networks*, vol. 153, pp. 518–529 (2022).

[J.12] **A. Jalali**, S. Kavuri, and M. Lee, "Low-Shot Transfer with Attention for Highly Imbalanced Cursive Character Recognition," *Neural Networks*, vol. 143, pp. 489–499 (2021).

[J.13] **A. Jalali** and M. Lee, "High Cursive Traditional Asian Character Recognition Using Integrated Adaptive Constraints in Ensemble of DenseNet and Inception Models," *Pattern Recognition Letters*, vol. 131, pp. 172–177 (2020).

[J.14] **A. Jalali** and M. Lee, "Atrial Fibrillation Prediction with Residual Networks Using Sensitivity and Orthogonality Constraints," *IEEE Journal of Biomedical and Health Informatics*, vol. 24, pp. 407–413 (2019).

[J.15] **A. Jalali**, R. Mallipeddi, and M. Lee, "Sensitive Deep Convolutional Neural Network for Face Recognition at Large Standoffs with Small Dataset," *Expert Systems with Applications*, vol. 87, pp. 304–315 (2017).

[J.16] **A. Jalali**, F. Piltan, A. Gavahian, M. Jalali, and M. Adibi, "Model-Free Adaptive Fuzzy Sliding Mode Controller Optimized by Particle Swarm for Robot Manipulator," *International Journal of Information Engineering and Electronic Business*, vol. 5, pp. 68 (2013).

[J.17] **A. Jalali**, F. Piltan, M. Hashemzadeh, F. Bibak, and H. Hashemzadeh, "Design Parallel Linear PD Compensation by Fuzzy Sliding Compensator for Continuum Robot," *International Journal of Information Technology and Computer Science*, vol. 5, pp. 97–112 (2013).

[J.18] **A. Jalali**, F. Piltan, M. Keshtgar, and M. Jalali, "Colonial Competitive Optimization Sliding Mode Controller with Application to Robot Manipulator," *International Journal of Intelligent Systems and Applications*, Vol. 5, pp. 50 (2013).

[J.19] **A. Jalali**, F. Piltan, H. Hashemzadeh, A. Hasiri, and MR. Hashemzadeh, "Design Novel Soft Computing Backstepping Controller with Application to Nonlinear Dynamic Uncertain System," *International Journal of Intelligent Systems and Applications*, vol. 5, pp. 93–105 (2013).

[J.20] F. Piltan, S. T. Haghighi, M. Zare, **A. Jalali**, A. Roshanzamir, A. R. Zare, and F. Golshan, "Artificial Control of Nonlinear Second Order Systems Based on AFGSMC," *World Applied Sciences Journal*, vol. 16, pp. 1593–603 (2012).

[J.21] F. Piltan, **A. Jalali**, N. Sulaiman, A. Gavahian, and S. Sobhan, "Novel Artificial Control of Nonlinear Uncertain System: Design a Novel Modified PSO SISO Lyapunov Based Fuzzy Sliding Mode Algorithm," *International Journal of Robotics and Automation*, vol. 2, pp. 298–316 (2011).

[J.22] F. Piltan, N. Sulaiman, **A. Jalali**, and F. D. Narouei, "Design of Model Free Adaptive Fuzzy Computed Torque Controller: Applied to Nonlinear Second Order System," *International Journal of Robotics and Automation*, vol. 2, pp. 232–244 (2011).

[J.23] F. Piltan, N. Sulaiman, **A. Jalali**, and K. Aslansefat, "Evolutionary Design of Mathematical Tunable FPGA Based MIMO Fuzzy Estimator Sliding Mode Based Lyapunov Algorithm: Applied to Robot Manipulator," *International Journal of Robotics and Automation*, vol. 2, pp. 317–343 (2011).

[J.24] F. Piltan, N. Sulaiman, **A. Jalali**, S. Siamak, and I. Nazari, "Control of Robot Manipulator: Design a Novel Tuning MIMO Fuzzy Backstepping Adaptive Based Fuzzy Estimator Variable Structure Control," *International Journal of Control and Automation*, vol. 4, pp. 91–110 (2011).

[J.25] F. Piltan, A. Salehi, **A. Jalali**, A. R. Zare, M. Zare, A. Roshanzamir, F. Golshan, "Sliding Mode Controller Design for Robot Manipulators with Tunable Gains," *Canadian Journal of Pure and Applied Science*, vol. 5, pp. 1573–1579 (2011).

[C.1] **A. Jalali**, M. Soltani, M. Greenspan, and A. Etemad, "Learning Time-Series Representations by Hierarchical Uniformity-Tolerance Latent Balancing," (Submitted).

[C.2] S. Grover, **A. Jalali**, and A. Etemad, "Segment, Shuffle, and Stitch: A Simple Network Layer for Improving Time-Series Representations," In *Conference on Neural Information Processing Systems* (NeurIPS) (2024) (Top Tier).

[C.3] **A. Jalali** and M. Lee, "Imbalanced Data Distribution Norm Adjustment Using Attentive Constraints," In *Brain and Artificial Intelligence Symposium* (2023).

[C.4] **A. Jalali** and M. Lee, "Deep Convolutional Structure to Identify Cardiac Arrhythmia," In *Brain and Artificial Intelligence Symposium* (2019).

[C.5] **A. Jalali** and M. Lee, "DNN Combinations with Adjusted Features Applied in Language Translation," In *Neurobiology and Neuroinformatics Conference* (2019).

[C.6] **A. Jalali**, G. Jang, J. Kang, and M. Lee, "Convolutional Neural Networks Considering Robustness Improvement and Its Application to Face Recognition," In *International Conference on Neural Information Processing*, Proceedings, Part IV 22, pp. 240–245 (2015).

[C.7] **A. Jalali** and M. Lee, "Night Time Face Recognition Considering Slight Changes of Output Vector in the Cost Function of Deep Structure," In *Brain and Artificial Intelligence Symposium* (2015).

[C.8] **A. Jalali** and M. Lee, "Face Recognition Using Robust Convolutional Neural Network," In *Korean Institute of Electronics Engineering Summer Conference* (2015).

[C.9] **A. Jalali**, R. Mallipeddi, and M. Lee, "Deformation Invariant and Contactless Palmprint Recognition Using Convolutional Neural Network," In *International Conference on Human-Agent Interaction*, pp. 209–212 (2015).

Honors and Awards

- **Best Ph.D. Thesis Award** *February 2022*
  Electronics Department, Kyungpook National University
- **Great Postdoctoral Incentive Award Recipient** *February 2022*
  KNU-LG Electronics Convergence Research Center, Kyungpook National University
- **Great Publications Incentive Award** *February 2021*
  Electronic and Electrical Department, Kyungpook National University
  ◦ Awarded for journal publications in IEEE and Elsevier.
- **BK21 Scholarship for the Ph.D. Degree** *October 2016*
  Electronic and Electrical Department, Kyungpook National University
  ◦ Recipient of the research assistance scholarship for Ph.D. studies.
- **KNU International Graduate Scholarship (KINGS)** *February 2014*
  Electronics Department, Kyungpook National University
  ◦ Recipient of a full scholarship for graduate studies.
- **Work certificate award** *August 2013*
  SSP. Co. Research Center (Register No. 230531)
- **Best Scholar of the Year Award and Incentives in Engineering Department** *February 2011*
  Chabahar University, recipient for the best bachelor final project in the Engineering Department.

Grants

Resource Allocation Competition (RAC) Grants – Digital Research Alliance of Canada (Compute Canada)

- 2025-2026: Secured a Compute Canada Resource Allocation Grant with Prof. Ali Etemad, valued at 55k$, receiving 45.0 RGU-years on the rorqual-gpu system and 45 TB of /project storage on the rorqual-storage system to support multimodal AI research.
- 2024-2025: Led and secured a RAC grant with Prof. Ali Etemad, valued at 78K$, providing 132 RGU-years of GPU, 176 core years of CPU, and 50TB of storage to support high-memory GPU applications integrating video, text, speech, and other human-centric modalities.

Teaching Assistant (TA)

Department of Electrical and Electronics Engineering (2017-2021)

- Teaching Assistant for the *Neural Networks* course.
- Instructor in the Artificial Brain Research Lab's graduate education program, presenting topics on computer vision models for new graduate students.

Professional Development and Talks

- **Certificate in University Teaching and Learning**, Queen's University: A foundational program in teaching and learning for educators in higher education.
- **Certificate in Professional Development for Postdocs**, Queen's University, 2024: Completed 10 workshops covering Indigenization, communication skills, professionalism, teaching development, leadership, grant writing, and management.

Talks:

- "AI Applications for Epilepsy Detection," presented at Centre for Teaching and Learning, Canada, 2025.
- "Document Translation Challenges," presented at the Brain and AI Symposium, South Korea, 2023.
- "Atrial Fibrillation Prediction and Cardiac Disease Detection," South Korea, 2019.
- "The Impact of Regularization Constraints on Computer Vision and Neural Structures," South Korea, 2018.

Reviews | Skills

Member of Reviewers Board

- Peer-reviewed over 75 manuscripts for high-ranking journals, including *Neural Networks*, *IEEE Journal of Biomedical and Health Informatics*, *IEEE TAI*, *Expert Systems with Applications*, *Pattern Recognition*, *Knowledge-Based Systems*, *Engineering Applications of AI*, *Neurocomputing*, and *Neural Processing Letters*.
- Peer-reviewed for conferences such as *AISTATS*, *AAAI*, *ICONIP*, *IJFS*, *IJCNN*, *ESANN*, *ICANN*, and *NEPL*.
- Review history available at: Web of Science

Skills:
Programming Languages (Python, MATLAB), Platforms (PyTorch, Ubuntu, LaTeX), Languages (English, Persian (Native), Korean and French (Basic))

Membership:
Institute of Electrical and Electronics Engineers (IEEE) Young Professionals: review for IEEE journals, attend their talks, and network within the global IEEE community.

Completed Courses in Graduate School

Advanced Digital Image Processing, Artificial Intelligence Applications, Advanced Probability and Random Processes, Applied Agent Systems, Advanced Programming Languages, Design and Analysis of Computer Networks, Digital Image Processing, Digital Signal Processing, Intelligent Systems Design, Data Mining, Soft Computing, Linear System Theory, Neural Networks, Pattern Recognition, Probability and Applied Statistics, Speech Signal Processing, Visual Communications.

References

- Gavin Winston, Professor of Medicine Department and Centre for Neuroscience Studies, Queen's University, Canada
  (Email: gavin.winston@queensu.ca)
- Ali Etemad, Mitchell Professor and Associate Professor of Electrical and Computer Engineering Department, Queen's University, Canada
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- Minho Lee, Professor of Graduate School of Artificial Intelligence, Dean of the Department, Kyungpook National University, South Korea
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