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ACADEMIC PROFILE

Ph.D. candidate and AI researcher specializing in **computer vision**, **deep learning**, **explainable AI**, and applied machine learning for industrial inspection, medical imaging, healthcare intelligence, and environmental forecasting. My research focuses on designing and evaluating CNN, Transformer, CNN–Transformer, and emerging sequence-based architectures for segmentation, classification, forecasting, and decision-support systems. I have authored **15 journal papers**, 3 conference papers, and 1 book chapter, with **800+ Google Scholar citations**, h-index 12, and i10-index 13. My recent work includes first-author publications in *Expert Systems with Applications*, *Engineering Applications of Artificial Intelligence*, *Ecotoxicology and Environmental Safety*, *Information Sciences*, and *Neurocomputing*.

RESEARCH INTERESTS

- Computer vision, industrial surface defect segmentation, and visual inspection systems
- Medical image analysis, healthcare AI, and explainable clinical decision-support models
- CNN, Vision Transformer, Swin Transformer, CNN–Transformer, and Mamba-based architectures
- Explainable AI, model interpretability, feature attribution, and trustworthy machine learning
- Vision-language models, multimodal learning, and agentic AI for automated analysis and decision-support workflows
- Time-series forecasting for air quality, hydrology, environmental intelligence, and decision support

EDUCATION

Ph.D. in Information Management

Expected Sep. 2026

National Yunlin University of Science and Technology

Taiwan

- GPA: 4.00/4.00.
- Dissertation: *A Deep Learning Approach for Surface Defect Segmentation in Industrial Applications*.
- Research focus: computer vision, industrial defect segmentation, CNN–Transformer architectures, explainable AI, and applied healthcare AI.
- Recipient of university scholarship for outstanding doctoral students and NSTC doctoral research award.

M.Sc. in Artificial Intelligence

2013–2016

Shahrood University of Technology

Iran

- GPA: 4.00/4.00.
- Ranked 2nd in Artificial Intelligence cohort.
- Thesis: EEG signal classification using dictionary learning methods for brain-computer interface applications.

B.Sc. in Software Engineering

2008–2012

Shahrood University of Technology

Iran

- GPA: 3.43/4.00.
- Ranked 2nd in Software Engineering cohort.
- Final project: Iris-based human recognition system using image processing and pattern recognition.

RESEARCH EXPERIENCE

Ph.D. Researcher / Research Assistant

2022–Present

Explainable AI Lab, National Yunlin University of Science and Technology

Taiwan

- Designed and implemented **LACTNet**, a dual-encoder CNN–Swin Transformer architecture for industrial surface defect segmentation, integrating Adaptive Feature Fusion and multi-stage Label-Aware supervision for pixel-level defect localization.
- Developed manuscript-stage research on **boundary-aware CNN–Mamba architectures** for wildfire segmentation, with emphasis on irregular boundary preservation, segmentation robustness, and accurate fire-region delineation.
- Developed a **UNet-based segmentation model** for endotracheal tube and carina localization in chest radiographs, supporting automated assessment of airway placement.
- Implemented **XAI-based machine learning models** for interdisciplinary engineering applications, particu-

larly time-series analysis, environmental forecasting, and model interpretability.

- Conducted systematic review research on **Vision Transformers for neurological disorder diagnosis**, covering architectural taxonomies, clinical challenges, methodological limitations, and future research directions.
- Conducted systematic review research on **deep learning methods for industrial surface defect detection**, including CNN, encoder-decoder, GAN, attention-based, Transformer-based, and hybrid architectures.

Researcher / AI Developer

2013–2016

Signal Processing and AI Research Lab, Shahrood University of Technology

Iran

- Developed projective dictionary pair learning methods for EEG signal classification in brain-computer interface applications.
- Achieved average accuracy of **85.7%** on BCI Competition III Dataset IIIa for two-class EEG classification.
- Built pattern recognition systems for handwritten number recognition using HOG features and dictionary learning, achieving **>98% classification accuracy**.

PROFESSIONAL AND ENGINEERING EXPERIENCE

Machine Learning Engineer (1-year contract)

2021–2022

University of Hawaii / CropNet Project, under Prof. Sayed M. Bateni

Remote

- Built an end-to-end evapotranspiration and rainfall forecasting platform for 1-, 3-, and 7-day horizons.
- Integrated online API data extraction, MySQL-based storage, GPR+PSO and LSTM forecasting models, and Flask JSON API serving.
- Automated daily data pipelines from HOBO and CAMPBELL stations using Python and shell scripts, including scheduled data extraction, database updates, and multi-horizon forecast generation.
- Delivered structured JSON forecast endpoints for web-based stakeholder access and reproducible backend deployment.

Signal Processing Developer (3-month project)

Jun.–Aug. 2024

statigen.ai

USA / Remote

- Developed a machine learning pipeline for **multi-level blood concentration classification** from voltage-induced sensor signal patterns.
- Conducted data cleaning, signal preprocessing, feature extraction, visualization, classification, and optimization for experimental biomedical signal data.
- Implemented Python-based models using scikit-learn, XGBoost, LSTM, and Optuna, and prepared analytical reports on model performance and signal characteristics.

AI/ML Developer

2019–2022

Clocklearn / Shahrour University of Medical Sciences

Iran

- Designed and recorded a Persian-language machine learning course covering preprocessing, regression, classification, clustering, dimensionality reduction, neural networks, and applied ML.
- Developed healthcare-oriented AI prototypes, including ultrasound signal classification for finger-motion recognition using signal processing, HOG features, and supervised classifiers.

Independent AI/ML Developer

2016–2019

Research and Commercial Projects

Remote / Freelance

- Developed machine learning and computer vision prototypes for EEG classification, face recognition, object tracking, digit recognition, and time-series forecasting.
- Built CNN-LSTM stock forecasting pipelines for approximately 300 Japanese companies using OHLCV, financial news, and social-media signals.

SELECTED RESEARCH AND TECHNICAL PROJECTS

Industrial Surface Defect Segmentation — LACTNet [\[DOI\]](#) [\[GitHub\]](#)

- Proposed a Label-Aware CNN-Transformer segmentation network combining Adaptive Feature Fusion, Dense Upsampling Convolution, and multi-stage supervision.
- Evaluated the model on SD-saliency-900, NRSD-MN, and DAGM2007 datasets, covering steel surface defects, rail defects, and synthetic industrial defects.
- Demonstrated strong segmentation accuracy and real-time feasibility for industrial inspection scenarios.

Wildfire Segmentation — Boundary-Aware CNN-Mamba

- Designed a hybrid CNN-Mamba architecture with boundary-aware refinement and BCE+Dice loss for irregular fire-contour preservation.
- Achieved IoU/Dice of **0.9025/0.9469** on Corsican and **0.8224/0.9006** on FLAME datasets.

ETT and Carina Segmentation in Chest Radiographs [\[GitHub\]](#)

- Evaluated UNet++-based segmentation on chest X-ray data for automated airway placement assessment.
- Achieved **IoU 0.8683** for endotracheal tube localization.

Public Defect and Crack Segmentation [\[GitHub\]](#)

- Implemented a modified TransUNet-style framework for SD-saliency and Crack500 datasets.
- Integrated CNN features, Transformer layers, attention gates, and multi-stage decoder fusion.

PM2.5 Forecasting — CEEMDAN + SVM + LSTM

- Developed a hybrid air-pollution forecasting model using CEEMDAN decomposition, SVM, and LSTM over 10 monitoring stations in Kaohsiung.
- Achieved 1-day-ahead forecasting performance of MAE 1.858, RMSE 2.668, and R^2 **0.9169**.

Streamflow Forecasting — FEDformer-LSTM

- Developed a hybrid FEDformer-LSTM model for multi-step daily river streamflow forecasting.
- Applied CEEMDAN preprocessing for nonlinear hydrological signal decomposition.

Fall-Risk Classification with Explainable AI

- Developed a machine learning and SHAP-based explainability pipeline for fall-risk classification in community-dwelling older adults.
- Reported classification accuracy of 0.72–0.77 and AUC of **0.80–0.90**.

Dictionary Learning for EEG/BCI

- Developed projective dictionary learning methods for EEG signal classification in BCI applications.
- Evaluated models on BCI Competition datasets and published the work in *Neurocomputing*.

PUBLICATION SUMMARY

15 journal papers, 3 conference papers, and 1 book chapter • **800+ citations** • h-index **12** • i10-index **13**

Research areas: computer vision, defect segmentation, medical AI, explainable AI, time-series forecasting, EEG/BCI, and environmental intelligence.

Selected First-Author Publications

1. Ameri, R., and Hsu, C.-C. **LACTNet: A Label-Aware CNN-Transformer Network for Surface Defect Segmentation.** *Expert Systems with Applications*, 2026.
2. Ameri, R., et al. **Vision Transformers for Neurological Disorder Diagnosis: A Systematic Review of Architectural Taxonomies, Challenges, and Future Directions.** *Expert Systems with Applications*, 2026.
3. Ameri, R., et al. **A Systematic Review of Deep Learning Approaches for Surface Defect Detection in Industrial Applications.** *Engineering Applications of Artificial Intelligence*, 2024.
4. Ameri, R., et al. **Forecasting PM2.5 Concentration Based on Integrating CEEMDAN Decomposition Method with SVM and LSTM.** *Ecotoxicology and Environmental Safety*, 2023.
5. Ameri, R., et al. **Labeled Projective Dictionary Pair Learning: Application to Handwritten Numbers Recognition.** *Information Sciences*, 2022.
6. Ameri, R., et al. **Projective Dictionary Pair Learning for EEG Signal Classification in Brain-Computer Interface Applications.** *Neurocomputing*, 2016.
7. Ameri, R., et al. **EEG Signal Classification Based on Sparse Representation in Brain-Computer Interface Applications.** Conference paper.
8. Ameri, R., et al. **Classification of Handwritten Chinese Numbers with Convolutional Neural Networks.** Conference paper.

Selected Co-authored Publications and Manuscripts

9. **A Hybrid FEDformer-LSTM Model for Accurate Multi-Step Ahead River Streamflow Forecasting.** Manuscript under review.
10. **Boundary-Aware Hybrid CNN-Mamba Network for Accurate Wildfire Segmentation.** Manuscript in preparation.
11. **Transformer-Based Deep Learning Models for PM2.5 Forecasting: Architectures, Challenges, and Future Directions.** Manuscript in preparation.
12. **A Deep Reinforcement Learning Approach for Wind Speed Forecasting.** *Engineering Applications of Computational Fluid Mechanics*, 2025.
13. **Explainable Machine Learning Models for Estimating Daily Dissolved Oxygen Concentration of**

the Tualatin River. *Engineering Applications of Computational Fluid Mechanics*, 2024.

14. **Fall Risk Classification with Posturographic Parameters in Community-Dwelling Older Adults: Machine Learning and Explainable AI Approach.** *Journal of NeuroEngineering and Rehabilitation*, 2024.
15. **Energy Consumption of High-Rise Double Skin Facade Buildings: A Machine Learning Analysis.** *Journal of Building Engineering*, 2024.
16. **Application of Explainable Artificial Intelligence in Medical Health: A Systematic Review of Interpretability Methods.** *Informatics in Medicine Unlocked*, 2023.
17. **Performance Improvement of Machine Learning Models via Wavelet Theory in Estimating Monthly River Streamflow.** *Engineering Applications of Computational Fluid Mechanics*, 2022.

TEACHING, INSTRUCTION, AND MENTORING

Instructor — AI Programming Using Python

Mar.–May 2023

National Yunlin University of Science and Technology

Taiwan

- Taught 30 master’s students Python fundamentals, data preprocessing, machine learning workflows, model training, and explainable AI concepts.
- Received an official appreciation letter from the International Graduate School of Artificial Intelligence, College of Management.

Teaching Assistant — Machine Learning, Expert Systems, Data Structures, Operating Systems 2015–2023

Shahrood University of Technology / YunTech

Iran / Taiwan

- TA for Machine Learning in 2015, 2016, 2022, and 2023, covering supervised learning, regression, classification, clustering, dimensionality reduction, neural networks, and model evaluation.
- TA for Expert Systems, Data Structures, and Operating Systems.
- Mentored students in coding, experiment design, model evaluation, and academic writing.

TECHNICAL SKILLS

Programming	Python (<i>Expert</i>), MATLAB (<i>Advanced</i>), SQL (<i>Intermediate</i>), C/C++ (<i>Intermediate</i>), JavaScript (<i>Basic</i>)
Computer Vision	OpenCV, mmsegmentation, TorchVision; image segmentation, medical image analysis, industrial defect inspection, crack segmentation, wildfire segmentation, object detection, object tracking
Deep Learning	PyTorch (<i>Expert</i>), TensorFlow, Keras, scikit-learn, HuggingFace Transformers
Architectures	CNNs, UNet, UNet++, DeepLabV3+, SegFormer, TransUNet, Swin Transformer, Vision Transformer, CNN-Transformer hybrids, Mamba, LSTM, GRU, FEDformer, Informer
Explainable AI	SHAP, Grad-CAM, LIME, LRP, ANCHOR, UMAP, t-SNE, feature importance analysis, model interpretation
Data Science	NumPy, pandas, SciPy, matplotlib, Jupyter, Conda, experiment tracking, model evaluation
Backend and Deployment	Flask, FastAPI, MySQL, JSON API design, shell scripting, scheduled automation, Docker
Systems	Linux, Git, CUDA, GPU-based deep learning workflows
Languages	Persian: Native English: Professional working proficiency

GRANT AND PROPOSAL EXPERIENCE

- Contributed to a 2-year research grant proposal: *Innovative Approaches for Air Pollution Forecasting: Hybrid Transfer and Deep Learning Models*.
- Supported technical framing, AI methodology design, literature synthesis, and research rationale for hybrid transfer learning and deep learning models in air pollution forecasting.

AWARDS AND HONORS

- University scholarship for outstanding doctoral students — National Yunlin University of Science and Technology.
- NSTC scholarship/award for doctoral research performance.
- Ranked 2nd in Artificial Intelligence cohort — M.Sc., Shahrood University of Technology.
- Ranked 2nd in Software Engineering cohort — B.Sc., Shahrood University of Technology.

ACADEMIC SERVICE

- Peer reviewer: *IEEE Transactions on Neural Networks and Learning Systems* and *Intelligent Systems with Applications*.
- Completed 4 peer reviews for international AI/ML journals.
- Mentored junior students and collaborators in machine learning coding, experiment design, model evaluation, and manuscript preparation.

CERTIFICATES

Optimize TensorFlow Models for Deployment with TensorRT — Coursera	2025
Generative AI Engineering with LLMs Specialization	2025
Computer Vision Specialization	2025
Transformer Models and BERT Model — Google Cloud	2024
Introduction to Large Language Models — Google Cloud	2024
Prompt Design in Vertex AI — Google Cloud	2024
Introduction to Responsible AI — Google Cloud	2024
Developing AI Applications with Python and Flask — IBM / Coursera	2023
Getting Started with Git and GitHub — IBM / Coursera	2023
Python for Data Science, AI & Development — IBM / Coursera	2023
Introduction to Python Programming — University of Pennsylvania / Coursera	2023
Machine Learning — Stanford University & DeepLearning.AI / Coursera	2023
Deep Learning with PyTorch: Image Segmentation — Coursera	2023
Version Control; Programming in Python; Introduction to Back-End Development — Meta / Coursera	2023
Introduction to SQL — University of Michigan / Coursera	2023