Muhammad Farooq Siddique

Graduate Research Assistant

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1995-06-08

PROFILE

A highly motivated and research-focused final-semester Ph.D. candidate with a strong foundation in artificial intelligence, machine learning, and signal processing. Doctoral research is centered on the development of advanced deep learning frameworks for intelligent fault diagnosis in industrial systems, integrating time-frequency analysis with hybrid neural architectures. Proficient in Python, PyTorch, and MATLAB, with practical experience in implementing AI models for real-world applications involving vibration and acoustic emission signals. Published work has been presented at international conferences, demonstrating a commitment to high-impact, interdisciplinary research. Currently seeking a postdoctoral opportunity to contribute to innovative AI-driven solutions across diverse domains, including engineering, healthcare, manufacturing, and other sectors where intelligent data-driven systems can address complex and meaningful challenges.

EDUCATION

Ph.D in AI and Computer Engineering, *University of Ulsan, South Korea.* 09/2022 – 02/2026
Thesis: “Condition Monitoring and Fault Diagnosis of Mechanical and Flow-Based Industrial Equipment Using Advanced Signal Processing and Deep Learning” under the advisor Prof. Jongmyon Kim.

M.S in Mechanical Engineering, 04/2018 – 12/2020
University of Engineering and Technology, Peshawar.
Thesis: “Analysis of dual booster mirrors box type solar cooker integrated with thermal storage,” supervised by Prof. Dr. Khurshid Ahmad.

Bachelor in Mechanical Engineering, 09/2013 – 10/2017
National University of Science and Technology (NUST), Islamabad.

F.Sc Pre-Engineering, *Islamia College and University Peshawar.* 06/2011 – 07/2013

RESEARCH INTEREST

Advanced Signal Processing for Health Monitoring
Applying time-domain, frequency-domain, and time-frequency transforms to extract meaningful diagnostic features from vibration and acoustic signals for precise condition assessment in applications such as mechanical fault diagnosis, pipeline leak detection, and biomedical signal analysis.

Real-Time Condition Monitoring Using Vibration and Acoustic Emissions
Designing robust monitoring frameworks using AE and vibration signals for continuous performance evaluation of industrial equipment, enabling early fault detection and reducing unplanned downtimes in systems like pumps, motors, pipelines, and rotating machinery.

Deep Learning Architectures for Anomaly and Pattern Recognition
Developing and optimizing CNNs, LSTMs, ViTs, and hybrid deep learning models with transfer learning and attention mechanisms to detect anomalies and patterns in sensor data for predictive maintenance in manufacturing, structural health monitoring, and early-stage disease detection.

Smart Sensing and Data Fusion in Predictive Maintenance
Utilizing sensor fusion and intelligent signal preprocessing to enhance fault prediction and estimate remaining useful life (RUL) in critical systems such as industrial machinery, batteries, medical devices, and smart infrastructure.

PROFESSIONAL EXPERIENCE

Graduate Research Assistant, *University of Ulsan.* South Korea

MANAGER CAD/CAM AND CONFIGURATION CELL, Pakistan
Aircraft Manufacturing Factory, PAC Kamra.

MANAGER SAFETY & CONFIGURATION, *Aircraft Manufacturing Factory, PAC Kamra.* Pakistan

LECTURER, *New Islamia Public High School and College, Charsadda, (KPK).* Pakistan

SKILLS

Core Expertise
- Fault diagnosis, signal processing, artificial intelligence.
- Machine learning, deep learning, algorithms and data structures.

Model Development & Optimization
- Proficient in designing and optimizing deep learning models.
- Strong background in transfer learning, knowledge distillation, and hybrid architectures for classification and prediction.

Data Analytics & Visualization
- Competent in statistical analysis, dimensionality reduction, and visualization.
- Skilled in handling large-scale sensor datasets for real-time condition monitoring and predictive maintenance.

Signal Acquisition & Processing
- Experienced in acquiring and preprocessing acoustic emission and vibration signals.
- Skilled in extracting diagnostic features using time-domain, frequency-domain, and time-frequency techniques.

Programming & Tools
- Well-versed in Python, MATLAB, TensorFlow, and PyTorch.
- Hands-on experience with OriginPro, NI VISTA, and MS Office for technical analysis and documentation.

Engineering Systems and Soft Skills
- CAD/CAM design, aircraft component documentation, and configuration control.
- Research mentoring, peer reviewing, and collaborative research communication.

SCHOLARSHIPS AND AWARDS

Brain Korea (BK) Scholarship, *University of Ulsan, South Korea*

University of Arizona Funded (USAID project) Scholarship, *Pakistan*

Senior Alumni Scholarship, *National University of Science and Technology, Islamabad*

Best Paper Award in International conference award, *IHCI, South Korea (2023)*

Best Paper Award in International conference award, *FICTA, UK (2025)*

PUBLICATIONS

Total number of publications: 26 publications.

Total number of citations: 300 citations in Google Scholar, Impact Factor: 50 plus, h-index: 11.

The first author (6 publications, 2 are under review/submission): Engineering Applications of Computational Fluid Mechanics (IF: 5.9), IEEE Access (IF: 3.4), Engineering Failure Analysis (IF: 5.7), Sensors (IF: 3.5), Machines (IF: 2.5), Applied Sciences (IF: 2.5), Computers, Materials & Continua (IF: 2.1).

★ LIST OF PUBLICATIONS

Pipeline leak diagnosis based on leak-augmented scalograms and deep learning, *Q1, 2023, IF=5.40.*

A Hybrid Deep Learning Approach: Integrating Short-Time Fourier Transform and Continuous Wavelet Transform for Improved Pipeline Leak Detection, *Q1, 2023, IF=3.50.*

Centrifugal Pump Fault Diagnosis Based on a Novel SobelEdge Scalogram and CNN, *Q1, 2023, IF=3.50.*

A new dual-input CNN for multimodal fault classification using acoustic emission and vibration signals, *Q1, 2025, IF=5.70.*

Advanced Fault Diagnosis in Milling Machines Using Acoustic Emission and Transfer Learning, *Q1, 2025, IF=3.60.*

Pipeline Leak Detection: A Comprehensive Deep Learning Model Using CWT Image Analysis and an Optimized DBN-GA-LSSVM Framework, *Q1, 2024, IF=3.50.*

A Hybrid Deep Learning Approach for Bearing Fault Diagnosis Using Continuous Wavelet Transform and Attention-Enhanced Spatiotemporal Feature Extraction, *Q1, 2024, IF=3.50.*

A Deep Learning Approach for Fault Diagnosis in Centrifugal Pumps through Wavelet Coherent Analysis and S-Transform Scalograms with CNN-KAN, *Q2, 2025, IF=1.70.*

Advanced Bearing-Fault Diagnosis and Classification Using Mel-Scalograms and FOX-Optimized ANN, *Q1, 2024, IF=3.50.*

Pipeline Leak Detection System for a Smart City: Leveraging Acoustic Emission Sensing and Sequential Deep Learning, *Q1, 2025, IF=5.50.*

Application of membrane technology in the treatment of waste liquid containing radioactive materials, *Q2, 2023, IF=1.60.*

Milling Machine Fault Diagnosis Using Acoustic Emission and Hybrid Deep Learning with Feature Optimization, *Q2, 2024, IF=2.50.*

Spatio-Temporal Feature Extraction for Pipeline Leak Detection in Smart Cities Using Acoustic Emission Signals: A One-Dimensional Hybrid Convolutional Neural Network–Long Short-Term Memory Approach, *Q1, 2024, IF=3.50.*

Acoustic Emission-Based Pipeline Leak Detection and Size Identification Using a Customized One-Dimensional DenseNet, *Q1, 2025, IF=3.50.*

Hybrid Deep Learning Model for Fault Diagnosis in Centrifugal Pumps: A Comparative Study of VGG16, ResNet50, and Wavelet Coherence Analysis, *Q2, 2024, IF=2.50.*

Fabrication Challenges in Synthesizing Porous Ceramic Membrane to Effective Flue Gas Treatment, *Q4, 2023.*

★ CONFERENCES

Oral Presentations: International (7) Domestic (4).

Presented International conference papers in Australia, Netherlands, UK, Dubai, Pakistan, South Korea and Saudia Arabia.

LIST OF INTERNATIONAL CONFERENCE PAPERS

Pipeline Leak Detection: Leveraging Acoustic Emission Signal Processing and Machine Learning, *IHCI, Netherlands, 2025.*

Comprehensive Pipeline Leak Detection Using Induced-Leak Enhanced Scalogram Analysis and Deep Learning, *IEEE HPCC, Australia, 2023.*

A Hybrid Classification Framework of Centrifugal Pumps Using Wavelet Coherence Visuals and Principal Component Analysis, *IEEE HPCC, Australia, 2023.*

Centrifugal Pump Fault Detection with Hybrid Feature Pool and Deep Learning, *IEEE IBCAST, 2023, Pakistan.*

Centrifugal Pump Health Condition Identification Based on Novel Multi-filter Processed Scalograms and CNN, *IHCI, South Korea, 2024.*

A Framework for Centrifugal Pump Diagnosis Using Health Sensitivity Ratio Based Feature Selection and KNN, *ACPR, South Korea, 2023.*

Design of Double Integral Sliding Mode Controller for Energy Storage System of a Novel Multisource Hybrid Electric Vehicle, *SMILE, Saudia Arabia, 2025.*

Analysis of dual booster mirrors box type solar cooker integrated with thermal storage, *SPI-2020, Pakistan.*

Solar Thermal Water and Space Heating: Comparative Analysis of Charging and Discharging Behavior of Phase Change Materials, *SPI-2020, Pakistan.*

LIST OF PAPERS (In progress)

Advanced Fault Diagnosis in Milling Cutting Tools Using Vision Transformers with Semi-Supervised Learning and Uncertainty Quantification (Journal Paper-Submitted).

A Hybrid Deep Learning Framework for Fault Diagnosis in Milling machines (Journal Paper- Submitted).

Advanced Fault Diagnosis in Milling Machines Using CQ-NSGT and Deep Learning (FICTA 2025, International Conference, UK-Accepted).

An Interpretable Lightweight CNN Framework for Fault Diagnosis in Centrifugal Pumps Using Time-Frequency Scalograms (FICTA 2025, International Conference, UK-Accepted).

Local and Global Feature Extraction Using Convolution-al Autoencoders and Convolution Neural Networks for Diagnosing Milling Machine Faults (ISDIA 2025 International Conference, DUBAI- Accepted).

CERTIFICATES

Health and Safety Management System (NEBOSH IGC UK)
Level 3

Responsible Conduct of Research (Research Ethics)
UNIVERSITY OF ULSAN

Institution of Occopational Safety and Heallth (IOSH)
Level 2

Occopational Safety and Health Administration (OSHA)
Level 2

ARTIFICIAL INTELLIGENCE: Implications for Technologies & Business Strategy
Pakistan Engineering Council.

Digital Transformation and Impact of IOT on Education, Industry, Health Sector, and Society Towards Creating Job Opportunities
Pakistan Engineering Council.

VOLUNTEER REVIEWS

Engineering Applications of Computational Fluid Mechanics

ISPRS Journal of Photogrammetry and Remote Sensing

Engineering Structures

Urban Water Journal

IEEE Access

Scientific Reports

Journal of Nondestructive Evaluation

Structural Durability & Health Monitoring

Sensors

International Journal of Computational Intelligence Systems

Discover Applied Sciences

Sensing and Imaging

Machines

REFERENCES

Professor Jong-Myon Kim,
Vice-President, Foundation for Industry Cooperation, University of Ulsan Chair of UOU Converging Campus Projects for Industry and University Cooperation Director of Embedded System Lab, Professor, IT Convergence Department.,
Department of Electrical Electronics and Computer Engineering, University of Ulsan.
jmkim07@ulsan.ac.kr or jongmyon.kim@gmail.com, (+82) 52-259-2217

Professor Dr. Aurangzeb Khan,
Former Vice Chanceller of University of Laki Marwat, KPK. Currently, Dean of Physical and Numerical Sciences,
Abdul Wali Khan University, Mardan, KPK, Pakistan.
akhan@awkum.edu.pk

Professor Dr. Saeed Islam, *Professor,*
Department of Mechanical Engineering, Prince Mohammad Bin Fahd University (PMU), P.O. Box 1624, 31952 Al Khobar, Saudi Arabia.
sislam@pmu.edu.sa

Dr. Khurshid Ahmad, *Assistant Professor and Director of CIBEA Pakistan,*
University of Engineeering and Technology (UET), Peshawawr, KPK, Pakistan.
khurshid@uetpeshawar.edu.pk

Professor Dr. Yasin Khan, *Professor,*
Department of Electrical Engineering College of Engineering King Saud University, Riyadh 11421.
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