Muhammad Farooq Siddique

Ph.D. Researcher (Defense Completed)

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PROFILE

A highly motivated and research-focused Ph.D. researcher who **successfully completed the doctoral defense on 25 November 2025 and is awaiting the official degree award scheduled for 13 February 2026**. Possesses a strong foundation in artificial intelligence, machine learning, and signal processing, with doctoral work centered on developing advanced deep learning frameworks for intelligent fault diagnosis in industrial systems. The research integrates time-frequency analysis with hybrid neural architectures to improve reliability in vibration- and acoustic-emission-based monitoring. Skilled in Python, PyTorch, and MATLAB, with practical experience deploying AI models on real experimental setups. Research contributions have been published and presented at international venues, demonstrating a strong commitment to impactful and interdisciplinary research. In addition to technical expertise, has completed internationally recognized health and safety management system courses, including NEBOSH, IOSH, and OSHA, strengthening the ability to work confidently in laboratory, industrial, and field environments with strict safety compliance. Currently seeking a faculty or postdoctoral position to contribute to innovative AI-driven solutions in engineering, healthcare, manufacturing, and related domains where intelligent data-driven systems can address complex real-world challenges.

EDUCATION

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

M.S in Mechanical Engineering, 04/2018 – 12/2020
University of Engineering and Technology, Peshawar. Peshawar, Pakistan

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

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

Projects (Worked as Research Assistant)

Automobile/Ship Smart Electronics(ICT) Conver gence Education/Research Center, 03/2025 – 02/2026

National Research Foundation of Korea (2025-0236)/ Grant Number: 4199990113964

- Development and validation of advanced condition monitoring and fault diagnosis frameworks for industrial equipment using real-world manufacturing and sensor data
- Advancement of data-driven and intelligent diagnostic algorithms that enhance research capability and foster future-oriented graduate-level researchers in science and engineering fields
- Enhancement of data analysis, interpretation, and visualization techniques to support digital transformation and web-based platforms for industrial condition monitoring and smart manufacturing applications

Development of Flexible Pipe and Connector for Hydrogen gas, *Korea Institute of Energy Technology Evaluation and Planning (2025-0489)/ Grant Number: RS-2024-00449107* 11/2025 – 12/2025

- Development of preprocessing algorithms for acoustic emission and vibration data
- Development of acoustic emission and vibration-based condition monitoring algorithms for hydrogen flexible pipelines and fittings
- Construction of an integrated database for managing acoustic emission and vibration data of non-metallic hydrogen flexible pipelines and fittings

Development and Demonstration of industrial IoT and AI Based Process Facility intelligence Support System in Small and Medium Manufactu ring Sites, *Korea Planning & Evaluation Institute of Industrial Technology (2025-0080)/Grant Number: RS-2023-00259648* 03/2025 – 09/2025

- Construction of an AAS-based data collection system
- Development of data acquisition devices for collecting process equipment condition data and establishment of the operating environment
- Construction of a fault-simulation testbed for rotating machinery

Underground Pipe Safety Management Intelligent System Operation Project, 11/2023 – 12/2023

Ulsan Metropolitan City (2023-0060)/ Grant Number: 24AB1600

- Prediction and visualization of leak source and damage dispersion
- Risk zone monitoring and alerting based on damage prediction

Development of dynamic prediction system for damage spread at chemical accident sites, *National Research Foundation of Korea (2022-1062)/ Grant Number: 2019R1D1A303103840* 01/2023 – 02/2023

- Continuous operation of the intelligent underground pipeline safety management system developed under the National Infrastructure Intelligent Informatization Program
- Maintenance and performance enhancement of the intelligent underground pipeline safety management system

Development of AI Solution Technology for Petrochemical Manufacturing Facilities, *Ulsan Metropolitan City/ Grant Number: 24AB1600* 01/2024 – 12/2024

- Testing and evaluation of manufacturing equipment, condition monitoring, and fault diagnosis systems
- Advancement of equipment condition monitoring and diagnostic algorithms using manufacturing equipment condition data

- Enhancement of data analysis and visualization for web-based condition monitoring and diagnostics

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: 30+, Accumulative IF: 65+, 550+ citations, h-index: 15 and i10 index=16.

LIST OF PUBLICATIONS

MF Siddique, Z Ahmad, JM Kim*, "Pipeline leak diagnosis based on leak-augmented scalograms and deep learning", *Engineering Applications of Computational Fluid Mechanics, SCIE, 2023, Q1, IF=5.40, JCR= 12.90%, Citations=89.*

MF Siddique, Z Ahmad, N Ullah, J Kim*, "A Hybrid Deep Learning Approach: Integrating Short-Time Fourier Transform and Continuous Wavelet Transform for Improved Pipeline Leak Detection",
Sensors, SCIE, Q2, 2023, IF=3.50, JCR= 36.30%, Citations=80.

MF Siddique, F Saleem, M Umar, CH Kim, JM Kim*, "A Hybrid Deep Learning Approach for Bearing Fault Diagnosis Using Continuous Wavelet Transform and Attention-Enhanced Spatiotemporal Feature Extraction", *Sensors, SCIE, Q2, 2024, IF=3.50, JCR=36.30%, Citations=30.*

MF Siddique, M Umar, W Ahmad, and JM Kim*, "Advanced Fault Diagnosis in Milling Cutting Tools Using Vision Transformers with Semi-Supervised Learning and Uncertainty Quantification",
Scientific Reports, SCIE, Q1, 2025, IF=3.90, JCR=18.0%, Citations=3.

MF Siddique, W Zaman, S Ullah, M Umar, F Saleem, D Shon, TH Yoon, DS Yoo, JM Kim*, "Advanced Bearing-Fault Diagnosis and Classification Using Mel-Scalograms and FOX-Optimized ANN",
Sensors, SCIE, Q2, 2024, IF=3.50, JCR=36.30%, Citations=25.

MF Siddique, W Zaman, M Umar, JY Kim, JM Kim*, "A Hybrid Deep Learning Framework for Fault Diagnosis in Milling machines", *Sensors, SCIE, Q2, 2025, IF=3.50, JCR=46.30%, Citations=8.*

MF Siddique, Saif Ullah, Jong-Myon Kim*, "A Deep Learning Approach for Fault Diagnosis in Centrifugal Pumps through Wavelet Coherent Analysis and S-Transform Scalograms with CNN-KAN",
Computers, Materials & Continua 84 (2), 3577–3603, Q2, 2025, IF=1.70, Citations=18.

MF Siddique, Z Ahmad, N Ullah, S Ullah, JM Kim*, "Pipeline Leak Detection: A Comprehensive Deep Learning Model Using CWT Image Analysis and an Optimized DBN-GA-LSSVM Framework",
Sensors, SCIE, Q2, 2024, IF=3.50, JCR=36.30%, Citations=31.

W Zaman, MF Siddique, SU Khan, JM Kim*, "A new dual-input CNN for multimodal fault classification using acoustic emission and vibration signals",
Engineering Failure Analysis, SCIE, Q1, 2025, IF=5.70, JCR=10.70%, Citations=28.

M Umar, MF Siddique, JM Kim*, "Burst-Informed Acoustic Emission Framework for Explainable Failure Diagnosis in Milling Machines",
Engineering Failure Analysis, SCIE, Q1, 2026, IF=5.70, JCR=10.70%, Citations=3.

S Ullah, MF Siddique, JM Kim*, "Multi-Sensor Observer-Based Residual Learning with Auto-Permutation Feature Importance for Fault Diagnosis of Multistage Centrifugal Pumps under Variable Pressures",
Scientific Reports, SCIE, 2025, Q1, 3.90, JCR=18.0%, Citations=1.

N Ullah, MF Siddique, S Ullah, Z Ahmad, JM Kim*, "Pipeline Leak Detection System for a Smart City: Leveraging Acoustic Emission Sensing and Sequential Deep Learning",
Smart Cities, ESCIE, Q1, 2025, IF=5.50, JCR= 18.10%, Citations=30.

W Zaman, Z Ahmad, MF Siddique, N Ullah, JM Kim*, "Centrifugal Pump Fault Diagnosis Based on a Novel SobelEdge Scalogram and CNN", *Sensors, SCIE, Q2, 2023, IF=3.50, JCR=36.30%, Citations=38.*

M Umar, Z Ahmad, S Ullah, F Saleem, MF Siddique, JM Kim*, "Advanced Fault Diagnosis in Milling Machines Using Acoustic Emission and Transfer Learning",
IEEE Access, SCIE, Q1, 2025, IF=3.60, JCR=35.90%, Citations=14.

N Ullah, Z Ahmad, MF Siddique, K Im, DK Shon, TH Yoon, DS Yoo, JM Kim*, "An Intelligent Framework for Fault Diagnosis of Centrifugal Pump Leveraging Wavelet Coherence Analysis and Deep Learning",
Sensors, SCIE, Q2, 2024, IF=3.50, JCR=36.30%, Citations=28.

M Umar, MF Siddique, N Ullah, JM Kim*, "Milling Machine Fault Diagnosis Using Acoustic Emission and Hybrid Deep Learning with Feature Optimization",
Applied Sciences, SCIE, Q2, 2024, IF=2.50, JCR=27.70%, Citations=33.

S Ullah, N Ullah, MF Siddique, Z Ahmad, JM Kim*, "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",
Sensors, SCIE, Q2, 2024, IF=3.50, JCR=36.30%, Citations=18.

F Saleem, Z Ahmad, MF Siddique, M Umar, JM Kim*, "Acoustic Emission-Based Pipeline Leak Detection and Size Identification Using a Customized One-Dimensional DenseNet",
Sensors, SCIE, Q2, 2025, IF=3.50 JCR=36.30%, Citations=24.

W Zaman, MF Siddique, S Ullah, F Saleem, JM Kim*, "Hybrid Deep Learning Model for Fault Diagnosis in Centrifugal Pumps: A Comparative Study of VGG16, ResNet50, and Wavelet Coherence Analysis",
Machines, SCIE, Q2, 2024, IF=2.50, JCR=40.40%, Citations=17.

★ 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

MF Siddique, W Zaman, N Ullah, S Ullah, JM Kim*, "Pipeline Leak Detection: Leveraging Acoustic Emission Signal Processing and Machine Learning", *IHCI, Netherlands, 2025.*

MF Siddique, N Ullah, JM Kim*, "Comprehensive Pipeline Leak Detection Using Induced-Leak Enhanced Scalogram Analysis and Deep Learning", *IEEE HPCC, Australia, 2023.*

N Ullah, MF Siddique, JM Kim*, "A Hybrid Classification Framework of Centrifugal Pumps Using Wavelet Coherence Visuals and Principal Component Analysis", *IEEE HPCC, Australia, 2023.*

W Zaman, MF Siddique, JM Kim*, "Centrifugal Pump Fault Detection with Hybrid Feature Pool and Deep Learning", *IEEE IBCAST, 2023, Pakistan.*

Z Ahmad, MF Siddique, N Ullah, J Kim, JM Kim*, "Centrifugal Pump Health Condition Identification Based on Novel Multi-filter Processed Scalograms and CNN", *IHCI, South Korea, 2024.*

Z Ahmad, N Ullah, W Zaman, MF Siddique, J Kim, JM Kim*, "A Framework for Centrifugal Pump Diagnosis Using Health Sensitivity Ratio Based Feature Selection and KNN",
Asian Conference on Pattern Recognition (ACPR), 170-179 , South Korea, 2023.

S Ullah, K Zeb, MF Siddique, M Khalid, J Kim, JM Kim*, "Design of Double Integral Sliding Mode Controller for Energy Storage System of a Novel Multisource Hybrid Electric Vehicle",
SMILE, Saudia Arabia, 2025.

N Ullah, MF Siddique, M Umar, F Saleem, J Kim, JM Kim*, "Local and Global Feature Extraction Using Convolutional Autoencoders and Convolution Neural Networks for Diagnosing Milling Machine Faults",
Information System Design: AI and ML Applications, 37, 2026.

★ LIST OF PAPERS (In progress)

"A Multistage Transfer Learning Framework for Fault Diagnosis in Milling Cutting Tools under Varying Operating Conditions", *First Author, Scientific Reports (Under review), SCIE, Q1, IF=3.90, JCR=18.0%.*

"Advanced Transformer Based Bearing Fault Diagnosis with Physics Guided Vision Transformer and Band Aware Attention", *First author, Results in Engineering (With Editor), ESCIE, Q1, IF=7.90, JCR=3.1%.*

"Layer-wise Domain Discrepancy Guided Transfer Learning with ScaloNet for Fault Diagnosis in Rotating Machines", *Co-author, EAAI Elsevier (Under review), SCIE, IF=8.0, Q1, JCR=12.0%.*

"Advanced Fault Diagnosis in Rotary Machines Using Optimized Transfer Learning",
Co-author, IEEE Access (Under Review), SCIE, Q2, IF=3.60, JCR=35.90%.

"From Sensors to Decisions: Edge-Ready CRNN Fault Detection with Calibrated Hybrid Models for Modern Process Industries", *Co-author, Information (Under Review).*

"Smart Predictive Maintenance: A TCN-Based System for Early Fault Detection in Industrial Machinery",
Co-author, Machines (Under Review).

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

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

Stockwell Transform and CNN-Based Pipeline Leak Detection Using Sobel-Filtered Acoustic Emission Signals, *(Co-author, ICCIIOT 2024, Pakistan, Presented)*

★ VOLUNTEER REVIEWER

Guest Editor at Information,
Special Issue: Advanced Fault Diagnosis Using Interpretable, Multimodal and Transfer Learning Techniques

Mechanical Systems and Signal Processing

IEEE Transactions on Instrumentation and Measurement

Measurements

Engineering Applications of Computational Fluid Mechanics

ISPRS Journal of Photogrammetry and Remote Sensing

Engineering Structures

IEEE Access

IEEE Open Journal of Industry Applications

Scientific Reports

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.,
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