

# CV of the researcher

## Personal details

**Name:** Muhammad Ahsan

**Data and place of birth:** September 19, 1990, Sahiwal, Pakistan

**Age:** 35 years old

**Countr/Nationality:** Pakistan/Pakistani

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**Research unique identifier(s): ORCID:** 0000-0003-2362-3297

**Research Interests:** Vibration analysis, digital signal processing, and machine learning for fault diagnosis and health monitoring, with a current focus on baseline-free ultrasonic guided-wave SHM, nonlinear signal analytics, and neuromorphic edge-AI for resilient infrastructures.

## Academic Background

- 15/07/2025. Doctor of Philosophy in the field of engineering and technical science, and discipline of automation, electronics, electrical engineering and space technologies, Silesian University of Technology, Gliwice, Poland. (Doctoral dissertation defended on 09/07/2025 and resolution on award the degree of Doctor of Philosophy issued on 15/07/2025)
- 19/06/2020. Master of Control Theory and Control Engineering, Nanjing University of Science and Technology, Nanjing, China
- 24/04/2014. Bachelor of Electrical Engineering (Telecom), Air University, Islamabad, Pakistan

## Professional activities

- 01/10/2025 to 30/09/2026. Postdoctoral Researcher (Research Assistant Professor) at Faculty of Mechanical Engineering and Robotics, AGH University of Science and Technology in Krakow, Poland. **Research Topic:** Development of an integrated framework for SCADA-based condition monitoring and fault detection of wind turbines, incorporating image analysis and trend monitoring techniques.
- 01/10/2020 to 30/09/2024. Worked on “Vehicle Diagnostics using Artificial Intelligence and Digital Signal Processing Methods” where I utilized low-cost MEMS accelerometer to capture vibration data from the vehicle engine. The recorded data was analysed using advanced digital signal processing techniques and artificial intelligence models to accurately diagnose engine health conditions. The project was carried out at the Silesian University of Technology
- 01/10/2020 to 30/09/2024. I conducted laboratory sessions for the following courses at the Silesian University of Technology:
  - a) Numerical Methods
  - b) Fundamental of Measurements
  - c) Computer Networks
  - d) System Identification
- 13/12/2024 to 23/12/2024. I visited Department of Networks and Digital Media, Kingston University London, London, UK as a visiting researcher
- 01/07/2022 to 31/10/2022. I visited Dynamics and Vibrations Group, Department of Science and Engineering Methods, University of Modena and Reggio Emilia, Reggio Emilia, Italy as a visiting researcher
- 13/09/2021 to 26/09/2021. I visited Department of Networked Systems and Services, Budapest University of Technology and Economics, Budapest, Hungary for research internship
- 01/10/2017 to 30/05/2020. I worked on distributed control for linear multi-agent systems where the containment control problem was considered, and necessary and sufficient conditions were

developed to achieve the consensus. The project was carried out the School of Automation at the Nanjing University of Science and Technology, China

## Professional Courses

- 19/04/2022 to 21/04/2022. **Approximation of mass and damping matrices in structural dynamics:** Conducted by Prof. Robert Nemeth, Faculty of Structural Mechanics, Budapest University of Technology and Economics, Hungary
- 25/01/2022 to 03/03/2022. **Implementation of Interdisciplinary Project Based Learning (PBL) Projects:** Offered by the European University on Responsible Consumption and Production
- 19/07/2021 to 05/08/2021. **International Virtual Course on Multidisciplinary Optimization and Machine Learning for Engineering Design Applications:** Organized by ITB (Indonesia) – Tohoku University (Japan) – HKUST (Hong Kong)
- 01/04/2021 to 08/04/2021. **Reinforcement Learning Virtual School:** Organized by Artificial and Natural Intelligence Toulouse Institute (ANITI)
- 15/04/2021 to 15/07/2021. **Responsible Production & Consumption:** Organized by the European University on Responsible Consumption and Production
- Attended following continuing professional development (CPD) courses organized by the Pakistan Engineering Council:

- [1] 31/08/2025. Risk Assessment in Engineering Industry
- [2] 16/08/2025. Project Team Building in Engineering Project
- [3] 09/08/2025. Health, Safety, and Environment (HSE) Management in Construction Industry
- [4] 13/05/2025. Service Leadership and Professional Ethics
- [5] 30/04/2025. Mastering Digital Tools for Engineering Works
- [6] 01/03/2025. Potential of Hydrogen as Energy Source for Industry in Pakistan

## Grants and Fundings

- 01/10/2025 to 30/09/2026. **Excellence Initiative – Research University (IDUB) Programme of the AGH University of Science and Technology in Krakow:** Funded by the AGH University of Science and Technology in Krakow for postdoctoral research (Contest Number 13961)
- 21/12/2023. **Pro-quality Competition for Rector's Grants for Highly Scored Publications:** Funded by the Rector of the Silesian University of Technology, Gliwice, Poland (Project Code: 32/014/RGJ24/2021)
- 01/06/2023 to 31/12/2023. **Young Scientist Research Grant:** Funded by the Silesian University of Technology, Gliwice, Poland; for research on condition monitoring and fault diagnosis using advanced machine learning methods (Project Code: 02/050/BKM23/0036)
- 26/06/2023. **PCC2023 Conference Grant for Young Authors:** Funded by XXI Polish Control Conference, Poland
- 01/07/2022 to 31/10/2022. **Erasmus+ Mobility Grant:** Co-funded by the European Union; for research on vibration-based condition monitoring of mechatronic systems using AI and DSP (Project Code: 2021-1-PL01-KA131-HED-000005374)
- 13/09/2021 to 26/09/2021. **NAWA PROM Mobility Grant:** Co-funded by the European Social Fund; for research on artificial intelligence algorithms (Project Code: 08/030/FSD20/0078)
- 01/06/2021 to 31/12/2021. **Young Scientist Research Grant:** Funded by the Silesian University of Technology, Gliwice, Poland; for research on filter design using evolutionary algorithm for estimation in application to non-stationary signal analysis (Project Code: 02/050/BKM21/0021)

## Honours and Awards

- 31/12/2023. **Best PhD Student, under the Excellence Initiative – Research University Programme:** Funded by the Rector of the Silesian University of Technology, Gliwice, Poland (Project Code: RJO15.5033.450.2023)
- 01/10/2020 to 30/09/2024. **Polish Government Scholarship:** Funded by the Polish Government for PhD study and research at the Silesian University of Technology, Gliwice, Poland (Student Number: 4949)
- 01/09/2017 to 31/03.2020. **China Scholarship Council (CSC) Scholarship:** Funded by the Chinese Government for master's study in Nanjing University of Science and Technology, Nanjing, China (Project Code: CSC No. 2017SLJ018830)
- 24/04/2014. **Silver Medal** awarded by the Vice Chancellor of Air University, Islamabad, Pakistan on maintaining second highest CGPA in the Department of Electrical Engineering (BETE-Fall-2009)
- 01/03/2010 to 31/08/2013. **Merit Based Scholarship** awarded by the Department of Electrical Engineering of Air University, Islamabad, Pakistan on attaining the CGPA higher than 3.5 out of 4.0 (090636)

## Other relevant information

### A. Languages

- Candidate speaks and writes English fluently (entire education in English as medium of instruction)

### B. Professional Memberships

- Registered Engineer with Pakistan Engineering Council (PEC), Islamabad, Pakistan (Reg. No. ELECT/39269)
- Member of the International Association of Engineers (IAENG) (Member No. 141064)

### C. Peer-Review Activities

- Reviewer for IEEE Access, IEEE Transactions, and MDPI journals

## Publications

### A. Journal Papers

- [J.1] **Muhammad Ahsan**, Jose Rodriguez & Mohamed Abdelrahem. (2025). **Title:** Bearing Fault Diagnosis in Induction Motors using Low-Cost Triaxial ADXL335 Accelerometer and a Hybrid CWT-DCNN-LSTM Model. **Journal:** IEEE Access, Vol. 13, pp. 101037 – 101050. DOI: <https://doi.org/10.1109/ACCESS.2025.3577672>
- [J.2] **Muhammad Ahsan**, Muhammad Waqar Hassan, Jose Rodriguez & Mohamed Abdelrahem. (2025). **Title:** Enhanced Fault Diagnosis in Rotating Machinery using a Hybrid CWT-LeNet-5-LSTM Model: Performance Across Various Load Conditions. **Journal:** IEEE Access, Vol. 13, pp. 1026 – 1045. DOI: <https://doi.org/10.1109/ACCESS.2024.3522948>
- [J.3] **Muhammad Ahsan**, Dariusz Bismor & Pawel Fabis. (2025). **Title:** Application of low-cost ADXL1002 accelerometer for vehicle engine misfire detection using a novel hybrid EMD-based image processing and DCNN-LSTM model. **Journal:** Vibrations in Physical Systems, Vol. 36(1), pp. 1 –7. DOI: <https://doi.org/10.21008/j.0860-6897.2025.1.02>
- [J.4] **Muhammad Ahsan**, Dariusz Bismor, & Pawel Fabis. (2024). **Title:** Analysis of the Vehicle Engine Misfires using Frequency-Domain Approaches at Various RPMs with ADXL1002

- Accelerometer. **Journal:** Archives of Acoustics, Vol. 49(4), pp. 507 – 516. DOI: <https://doi.org/10.24425/aoa.2024.148813>
- [J.5] **Muhammad Ahsan** & Mostafa M. Salah. (2024). **Title:** Improved nonlinear model predictive control with inequality constraints using particle filtering for nonlinear and highly coupled dynamical systems. **Journal:** Nonlinear Engineering, Vol. 13(1), pp. 20220351. DOI: <https://doi.org/10.1515/nleng-2022-0351>
- [J.6] **Muhammad Ahsan**, J. Rodriguez, & M. Abdelrahem. (2023). **Title:** Distributed Control Algorithm for DC Microgrid using Higher-Order Multi-Agent System. **Journal:** Sustainability, Vol. 15(10), pp: 1 – 20. DOI: <https://doi.org/10.3390/su15108336>
- [J.7] **Muhammad Ahsan** & Theyab R. Alsenani. (2023). **Title:** Distributed Consensus Control for Voltage Tracking and Current Distribution in DC Microgrid. **Journal:** Ain Shams Engineering Journal, Vol. 14(12), pp: 1 – 9. DOI: <https://doi.org/10.1016/j.asej.2023.102363>
- [J.8] **Muhammad Ahsan**, Mostafa M. Salah, & Ahmed Saeed (2023). **Title:** Adaptive Fast-Terminal Neuro-Sliding Mode Control for Robot Manipulators with Unknown Dynamics and Disturbances. **Journal:** Electronics, Vol. 12(18), pp: 3856. DOI: <https://doi.org/10.3390/electronics12183856>
- [J.9] **Muhammad Ahsan**, & Mostafa M. Salah. (2023). **Title:** Similarity index of the STFT-based health diagnosis of variable speed rotating machines. **Journal:** Intelligent Systems with Applications, Vol. 20, pp: 1 – 9. DOI: <https://doi.org/10.1016/j.iswa.2023.200270>
- [J.10] **Muhammad Ahsan**, & Mostafa M. Salah. (2023). **Title:** Efficient DCNN-LSTM Model for Fault Diagnosis of Raw Vibration Signals: Applications to Variable Speed Rotating Machines and Diverse Fault Depths Datasets. **Journal:** Symmetry, Vol. 15(7), pp: 1 – 22. DOI: <https://doi.org/10.3390/sym15071413>
- [J.11] **Muhammad Ahsan**, Dariusz Bismor, & Muhammad Arslan Manzoor. (2023). **Title:** ARL-Wavelet-BPF Optimization using PSO Algorithm for Bearing Fault Diagnosis. **Journal:** Archives of Control Sciences, Vol. 33(LXIX), pp: 589 – 606. DOI: [10.24425/acs.2023.146961](https://doi.org/10.24425/acs.2023.146961)
- [J.12] **Muhammad Ahsan**, & Dariusz Bismor. (2022). **Title:** Early-Stage Fault Diagnosis for Rotating Element Bearing using Improved Harmony Search Algorithm with Different Fitness Functions. **Journal:** IEEE Transactions on Instrumentation and Measurement, Vol. 71, pp: 1 – 9. DOI: [10.1109/TIM.2022.3192254](https://doi.org/10.1109/TIM.2022.3192254)

## B. Conference Papers

- [C.1] Mohamed Abdelrahem, **Muhammad Ahsan** & Jose Rodriguez. (September 2025). **Title:** Enhanced LeNet-5-LSTM-Based Diagnosis of PMSM Stator Faults using Vibration Signals Across Different Fault Severities. **Conference:** IEEE CPERE 2025, Pyramisa Island Aswan, Egypt, (Accepted)
- [C.2] **Muhammad Ahsan**, Dariusz Bismor & Pawel Fabis. (September 2024). **Title:** Comparison of ANN and CNN models for misfire detection in vehicle engine at different RPMs with low-cost ADXL1002 accelerometer. **Conference:** IEEE 2024 Signal Processing: Algorithms, Architectures, Arrangements, and Applications (SPA), Poznan, Poland, pp: 60 – 65. DOI: <https://doi.org/10.23919/SPA61993.2024.10715607>
- [C.3] **Muhammad Ahsan** & Dariusz Bismor. (September 2023). **Title:** Advanced Fault Diagnosis in Rotating Machines using 2D Grayscale Images with Improved Deep Convolutional Neural Networks. **Conference:** IEEE 2023 Signal Processing: Algorithms, Architectures, Arrangements, and Applications (SPA), Poznan, Poland, pp: 77 – 82. DOI: <https://doi.org/10.23919/SPA59660.2023.10274428>

- [C.4] **Muhammad Ahsan** & Dariusz Bismor. (June 2023). **Title:** Calibration of a High Sampling Frequency MEMS-Based Vibration Measurement System. **Conference:** XXI Polish Control Conference (PCC2023), Gliwice, Poland, Vol. 708, pp: 294 – 302. DOI: [https://doi.org/10.1007/978-3-031-35170-9\\_28](https://doi.org/10.1007/978-3-031-35170-9_28)
- [C.5] **Muhammad Ahsan** & Dariusz Bismor. (April 2022). **Title:** Early-Stage Faults Detection Using Harmony Search Algorithm and STFT-Based Spectral Kurtosis. **Conference:** Automation 2022: New Solutions and Technologies for Automation, Robotics and Measurement Techniques, Warsaw, Poland, Vol. 1427, pp. 75 – 84. DOI: [https://doi.org/10.1007/978-3-031-03502-9\\_8](https://doi.org/10.1007/978-3-031-03502-9_8)