Muhammad Waqar Akram

CAS-TWAS President's Fellowship PhD Graduate
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ACADEMIC QUALIFICATIONS

Ph.D. Precision Instrument and Machinery	University of Science and Technology of China, China	2020
M.Sc. (Hons.) Agricultural Engineering	University of Agriculture Faisalabad, Pk	2015
B.Sc. Agricultural Engineering	University of Agriculture Faisalabad, Pk	2012

PROFESSIONAL EXPERIENCE

1- **Research Associate** Apr-2024 to Date

School of Renewable Energy, Hohai University, China.

Responsibilities: Research and Teaching

2- **Lecturer** Sep-2014 to Date (Currently on EOL)

Department of Farm Machinery and Power, University of Agriculture Faisalabad, Pakistan

Responsibilities: Research and Teaching

3- **Assistant Executive Engineer/Lab Engineer** Sep-2013 – Sep-2014

Department of Irrigation and Drainage, University of Agriculture, Faisalabad.

Responsibilities: Administration and Teaching

PERSONAL/RESEARCH STATEMENT

I have multiple years of teaching and research experience in Machine/Deep learning and vision, Computer Modeling, and Precision Instruments integration/application to address complex engineering challenges, with applications in Renewable Energy and Agro-Mechanical systems. I worked in collaboration with different national and international research groups and remained involved in different R&D projects of multidisciplinary nature and published more than 30 SCI papers including 18 Q1 and 6 highly cited publications (Total 1900+ citations and h-index of 20). I also contributed open datasets and methods for AI applications. My research activities cover design, modeling/simulation, development, and experiments. Currently, I am engaged in research related to Generative models and Machine learning for power forecasting and monitoring of Photovoltaic systems. Particularly, I aim to explore Deep learning, Generative text-to-image and image-to-image models, and edge AI for enhancing efficiency, performance and reliability of PV energy systems, focusing efficient and trustworthy Machine learning with reduced carbon foot print, cost and explainability. My future goals are to progressively enhance my abilities and effective contribution to addressing sustainable energy and environment challenges through involvement in effective teaching, research and development in a challenging and stimulating environment.

MEMBERSHIPS/AFFILIATIONS (Selective)

1. Academic Editor, PLOS ONE Journal, Public Library of Science, San Francisco, California, USA (Jan 2025-Present)
2. Advisory Board member, Pakistan Journal of Engineering and Technology, The University of Lahore, Pakistan (Jul 2023-Present)
3. Professional Member, International Solar Energy Society (ISES), Germany.
4. Member, International Association of Engineers (IAENG).
5. Member, Asian Council of Science Editors (ACSE).

Ph.D. THESIS / RESEARCH WORK

Akram, M. W. 2020. Thermo-mechanical assessment and defect detection in Photovoltaic modules. Ph.D. Thesis, Department of Precision Machinery and Instrumentation, School of Engineering Science, University of Science and Technology of China, Hefei, China.

RESEARCH PAPERS (Selective)

h-index 20 & Total Citations = 1900 +

1. S. Zheng, J. Bai, M. W. Akram. 2025. An enhanced method for design and simulation of building integrated photovoltaic plants incorporating photovoltaic resource assessment. Building Simulation. https://doi.org/10.1007/s12273-025-1252-8
2. A. Hina, M. Z. Akram, A. Shafa, M. W. Akram. 2025. The Numerical Study of Methane Flame Characteristics in the Ammonia/Air Environment at Sub-Atmospheric Pressure. SAE Technical Paper. https://doi.org/10.4271/2025-01-8450
3. A. Ahmad, I. Javed, C. Zhu, M. B. Rasheed, M. W. Akram, et al. 2024. Prediction of Temperature Variability on Power Transmission Line Parameters using Intelligent Approaches. Pertanika Journal of Science and Technology. https://doi.org/10.47836/pjst.32.6.05
4. Z. Jin, H. Xu, G. Li, X. Zhao, Z. Liu, D. Wu, M. W. Akram. 2024. Performance study of organic photovoltaic/thermal system with synergistic effect of photocatalytic and thermal catalytic technology. Solar Energy, 271 (112456). https://doi.org/10.1016/j.solener.2024.112456
5. Amna, M. W. Akram*, G. Li, M. Z. Akram, M. Faheem, M. M. Omar, M. G. Hassan. 2023. Machine Vision Based Automatic Fruit Quality Detection and Grading. Frontiers of Agricultural Science and Engineering. https://doi.org/10.15302/J-FASE-2023532 (*Supervised)
6. M. Hashaam, M. W. Akram*, M. Ahmad, M. Z. Akram, M. Faheem, M. Maqsood, M. Aleem. 2023. 3D Finite Element Analysis of Tine Cultivator and Soil Deformation. Research in Agricultural Engineering, 69(3):107-117. https://doi.org/10.17221/58/2022-RAE (*Supervised)
7. M. H. Dairath, M. W. Akram*, M. A. Mehmood, H. U. Sarwar, M. Z. Akram, M. M. Omar, M. Faheem. 2023. Computer Vision-Based Prototype Robotic Picking cum Grading System

for Fruits. Smart Agricultural Technology, 4 (100210). https://doi.org/10.1016/j.atech.2023.100210 (*Supervised)

8. G. Li, J. Li, Z. Dai, M. W. Akram. 2022. Modelling and analysis of a novel hydrogen production approach by full spectrum solar energy. Energy Conversion and Management, 263 (115694). https://doi.org/10.1016/j.enconman.2022.115694
9. M. W. Akram, G. Li, Y. Jin, X. Chen. 2022. Failures of Photovoltaic modules and their Detection: A Review. Applied Energy, 313 (118822). https://doi.org/10.1016/j.apenergy.2022.118822
10. M. W. Akram, G. Li, Y. Jin, X. Chen, C. Zhu, I. Shauket, A. Ahmad. 2020. Defect detection and degradation analysis in Photovoltaic modules using thermography, spectroscopy and current-voltage measurements, and quantitative assessment of their impact. Energy technology, 8 (7), 2000100. https://doi.org/10.1002/ente.202000100
11. M. W. Akram, G. Li, Y. Jin, C. Zhu, A. Javaid, M. Z. Akram, M. U. Khan. 2020. Study of manufacturing and hotspot formation in cut cell and full cell PV modules. Solar Energy, 203, 247-259. https://doi.org/10.1016/j.solener.2020.04.052
12. M. W. Akram, G. Li, Y. Jin, X. Chen, C. Zhu, A. Ahmad. 2020. Automatic detection of photovoltaic module defects in infrared images with isolated and develop-model transfer deep learning. Solar Energy, 198, 175-186. https://doi.org/10.1016/j.solener.2020.01.055
13. M. W. Akram, L. Guiqiang, Y. Jin, X. Chen, C. Zhu, X. Zhao, A. Khaliq, M. Faheem, A. Ahmad. 2019. CNN based automatic detection of photovoltaic cell defects in electroluminescence images. Energy, 189, 116319. https://doi.org/10.1016/j.energy.2019.116319
14. M. W. Akram, L. Guiqiang, Y. Jin, X. Chen, C. Zhu, X. Zhao, M. Aleem, A. Ahmad. 2019. Improved outdoor thermography and processing of infrared images for defect detection in PV modules. Solar Energy, 190, 549–560. https://doi.org/10.1016/j.solener.2019.08.061

Complete list can be accessed from: https://scholar.google.com/citations?user=m9Lvzb4AAAAJ&hl=en

DATASETS

1. Solar PVELM-Synthetic Solar PV Module EL images (2025). Synthetic (Image-to-image generated) electroluminescence images dataset of Photovoltaic (PV) modules for AI applications in Photovoltaic monitoring and inspection. Publicly available at https://www.kaggle.com/datasets/waqarakram/solar-pvelm-synthetic-solar-pv-module-el-images

2. Text-to-image generated PV module EL images (2025). Synthetic (Text-to-image generated) electroluminescence images dataset of Photovoltaic (PV) modules for AI applications in Photovoltaic monitoring and inspection. Publicly available at https://www.kaggle.com/datasets/waqarakram/text-to-image-generated-pv-module-el-images/data

OPEN METHODS/MODELS

1. Text-to-image model "mwaqarakram/PVEL-Text-to-image-Generator" for generating electroluminescence (EL) images of normal and defective Photovoltaic modules (2025), available at Hugging Face platform on following link: https://huggingface.co/mwaqarakram/PVEL-Text-to-image-Generator

RESEARCH PROJECTS (Selective)

1. "A Research Study on Synergistic Integration of Generative Image Models and Deep Learning for Photovoltaic Modules Inspection" under The Fundamental Research Funds for the Central Universities, China Program, Project Number B250201205, 2025-26 (Working as PI)

STUDENTS SUPERVISION

1. Degree completed: 03 Master thesis (Supervised) and 05 (Co-Supervised), 09 Bachelor Final Year Projects (FYPs) supervised
2. Degree in progress: 01 PhD student (Under Supervision) and 03 Master's Students (Under Supervision/Co-Supervision)