Muhammad Farhan Hanif

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INTRODUCTION

A dedicated and innovative researcher with a robust academic foundation and over a decade of experience in teaching and supervising at a prestigious university. Skilled in the application of machine learning techniques to solar forecasting, my research integrates advanced computational models and extensive datasets to enhance the accuracy of solar irradiance predictions. With a PhD in Energy and Resource Engineering from Peking University, I have successfully led and collaborated on multiple international research projects that test models geographically across diverse global environments. My expertise includes the adept use of Python for programming complex simulation and forecasting models, ensuring robust and scalable solutions. I possess strong analytical skills, with a proven track record of publishing influential research and contributing to the scientific community's understanding of renewable energy resources.

EDUCATION

18/09/2018 -- 30/06/2024	**PhD** in **Energy and Resource Engineering** (Machine Learning Applications in Solar Energy) Peking University, Beijing, China. (QS Ranked-17) Advisor: Jianchun Mi, Ph.D. Thesis title: "Advancing Accuracy in Solar Energy Forecasting: A Fusion of Machine Learning, Deep Learning, and Hybrid Modelling Techniques"
25/01/2013 -- 10/11/2016	**MSc** in **Thermal Power Engineering** University of Engineering & Technology, Lahore Pakistan. Advisor: Nasir Hayat, Ph.D. Thesis title: "Optimizing the Power Output of Supercritical Organic Rankine Cycle"
15/11/2005 -- 26/10/2010	**B.Sc.** in **Mechanical Engineering** Bahauddin Zakariya University, Multan, Pakistan.

RESEARCH FOCI

Solar Irradiance Forecasting; Advanced Machine Learning Techniques; Enhanced Data Analytics and Feature Selection; Comprehensive Predictive Model Development; Extensive Scientific Review and Synthesis; Interdisciplinary Approaches in Renewable Energy; Global Validation of Predictive Models; Hybrid Modeling Techniques; Time Series Analysis; Neural Networks and Deep Learning Applications; Gradient Boosting and Random Forests in Energy Forecasting; Systematic Meta-Analysis of Transformer Models.

RESEARCH EXPERIENCE

18/09/2018 – Present	**Doctoral Research Assistant** Center of Efficient Energy & Power Engineering, College of Engineering, Peking University, Beijing 100871, China.
31/08/2013 – Present	**Lecturer, Mechanical Engineering** Department of Mechanical Engineering, Faculty of Engineering & Technology, Bahauddin Zakariya University, Multan 60000, Pakistan. Pakistan.
01/08/2010 – 31/05/2013	**Lecturer, Bachelor in Technology Mechanical** Department of Mechanical, City College of Technology, Multan 60000, Pakistan.

PUBLICATIONS

Selected articles in peer-reviewed journals

- **Muhammad Farhan Hanif**, Muhammad Umar Siddique, Jicang Si, Muhammad Sabir Naveed, Xiangtao Liu, Jianchun Mi. "Enhancing Solar Forecasting Accuracy with Sequential Deep Artificial Neural Network and Hybrid Random Forest and Gradient Boosting Models across Varied Terrains." *Advanced Theory and Simulation, Wiley*, 2024. (Accepted). https://doi.org/10.1002/adts.202301289
- **Muhammad Farhan Hanif**, Muhammad Sabir Naveed, Mohamed Metwaly, Jicang Si, Xiangtao Liu, and Jianchun Mi. "Advancing solar energy forecasting with modified ANN and light GBM learning algorithms." *AIMS Energy* 12, no. 2 (2024): 350-386. doi: 10.3934/energy.2024017
- Liu, Xiangtao, Guochang Wang, Feifei Wang, Pengfei Li, Jicang Si, **Farhan Hanif**, and Jianchun Mi. "Classification and characteristics of ammonia combustion in well stirred reactor." *International Journal of Hydrogen Energy* 55 (2024): 1-13. https://doi.org/10.1016/j.ijhydene.2023.10.221
- Gul, M., Asad Naeem Shah, Umair Aziz, Naveed Husnain, M. A. Mujtaba, Tasmiya Kousar, Rauf Ahmad, and **Muhammad Farhan Hanif**. "Grey-Taguchi and ANN based optimization of a better performing low-emission diesel engine fueled with biodiesel." *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects* 44, no. 1 (2022): 1019-1032. https://doi.org/10.1080/15567036.2019.1638995
- Mahmood, Awais, Farrukh Arsalan Siddiqui, **Muhammad Farhan Hanif**, Atif Mahmood, and Muhammad Imran Malik. "Design Characterization of Shape Memory Alloy Helical Stent For Endohyperthermia Treatment Of Restenosis." *Journal of Faculty of Engineering & Technology* 24, no. 1 (2017): 11-20.
- Mahmood, Awais, Farrukh Arsalan Siddiqui, **Muhammad Farhan Hanif**, Atif Mahmood, and Muhammad Imran Malik. "Evaluation of LC Resonant Pressure Sensor for Smart Stent Application." Journal of Faculty of Engineering & Technology 23, no. 1 (2016): 13-23.
- Siddiqui, F., A. Chaudhry, M. Farhan, I. Sanaullah, M. Asim, **M. F. Hanif**, and T. Ambreen. "Impact of swept volume ratio in designing a beta type Stirling engine." *University of Engineering and Technology Taxila Technical Journal* 21, no. 2 (2016): 39.

In preparation/Submitted

- **M. F. Hanif**, J. Mi. "Harnessing AI for Solar Energy: Emergence of Transformer Models." *Applied Energy, Elsevier*. (Revision Submitted, Waiting Editors Decision).
- **M. F. Hanif,** U. Hassan, J. Mi. "Precision in GSR/GHI Forecasting: Leveraging XGBOOST enhanced CNN-BiLSTM-Transformers." *Applied Energy, Elsevier*. (Under Review).
- **M. F. Hanif**, J. Mi. "Evaluating the Performance and Efficiency of Standalone Models in Solar Forecasting: Regression, Machine Learning, and Deep Learning Approaches." (In Progress)

ORGANISATIONAL/ MANAGERIAL SKILLS

2017- 2018 **Deputy Director Students Affairs (BZU Multan)**
Managed the disciplinary body for the entire university, overseeing student affairs, functions, seminars, convocations, and orientations.

2017-2018 **Director Students Affairs (Faculty of Engineering & Technology, BZU Multan)**
Led the disciplinary body of the faculty, responsible for comprehensive management of student affairs.

2016-2018 **Director Students Affairs (Department of Mechanical Engineering, BZU Multan)**
Oversaw departmental student affairs, including management of scholarships and student support initiatives.

INDIVIDUAL HONORS, AWARDS AND SCHOLARSHIPS

2018 – 2024 **Chinese Government Scholarship**
Awarded by the Chinese Scholarship Council for PhD Studies at Peking University for the period of 4 years (Covid years excluded) from September 2018 till July 2024.

2018 **HEC Student Travel Award**
Awarded by the Higher Education Commission of Pakistan to travel to China to pursue PhD studies.

2015 **HEC Prime Minister Laptop Award**
Awarded by the Higher Education Commission of Pakistan based on academic excellence in master'sdegree.

2010 **Merit Award**
Attained overall 2nd position in B.Sc. Mechanical Engineering

2010 **Excellent Student Award**
Attained appreciation award from the Head, Department of Mechanical Engineering.

PROJECTS, GRANTS AND FUNDINGS

2016-2017 **HEC Research Grant (Pakistan)**
Effective financial support during Masters
Principal Investigator: Muhammad Farhan Hanif

TEACHING EXPERIENCE

Graduate courses

01/02/2022–
30/06/2022 **Heating Ventilation and Air Conditioning** (Master's program)
Course Instructor at Department of Mechanical Engineering, FE & T, BZU, Multan.
Duties: Responsible for all aspects of course

Undergraduate courses

31/05/2013 –
30/06/2022 **Control System, Refrigeration and Air Conditioning, Engineering Mechanics, Applied Thermodynamics, and Fluid Mechanics** (Bachelors Program)
Course Instructor at Department of Mechanical Engineering, FE & T, BZU, Multan.
Duties: Responsible for all aspects of course

01/08/2010 –
31/05/2013 **Mechanics of Machines and Strength of Materials** (Bachelors of Technology Program)
Course Instructor at City College of Technology, Multan.
Duties: Responsible for all aspects of course

COURSES STUDIED

PhD New Energy Technology, Thermodynamical Analysis for Renewable Energy, Functional Materials and Devices, Analysis and Characterization of Materials, Energy Materials, Safety knowledge of Laboratory, Lecture Series on Contemporary China, Chinese Language.

MS Advanced Heat Transfer, Mechanical Vibration, Mathematical Methods, Advanced Thermodynamics, Sustainable Energy Systems, Advanced Fluid Dynamics, Experimental Methods, Turbomachinery.

SUPERVISING AND MENTORING

MS Kashaf Shahid, Master's thesis co-supervisor in Sustainable Energy Technology
Topic: Enhancing PV power by optimizing Solar energy forecasting leveraging artificial intelligence modelling techniques.

BS Umer Siddiqui, Sahar Mohsin, Sarfraz, Bachelors' thesis supervisor in Sustainable Energy Technology
Topic: Solar Forecasting in Hyderabad, Sukur and Turbat by Machine Learning Ensemble Modelling i-e Artificial Neural Network- Simulated Annulling Algorithm (ANN-SA).

Usama Iqbal, Usama Bilal, M. Umer, Bachelors' thesis supervisor in Sustainable Energy Technology
Topic: Comparison of Support Vector Machine (SVM) and Artificial Neural Network (ANN) models in Solar Forecasting using Data from NASA for Quetta City

CERTIFICATIONS & MEMBERSHIP

Chinese Government
Participated in 70th Chinese Anniversary Celebrations in 2019 as internationalstudent.

Shanghai Jiaotong University, Shanghai, China
Completed "Zhi-Hong" International Summer School of Advanced Material, SJTU, Shanghai, China

British Council
Active Citizens Training of Facilitators

Pakistan Engineering Council (Continuing Professional Development Programme)
4 Certifications

Pakistan Engineering Council
Registered Engineer of Pakistan Engineering Council under registration no. MECH/23943

EXTRACURRICULAR ACTIVITIES

Peking University Dragon Boat Team Member
Member of PKU Dragon Boat Team since 2018, participated in several international events held in various cities of China.

Peking University Archery Club Member
Member of PKU Archery Club since 2023.

PKU YAFA
Member of Peking University Youth Association of Foreign Affairs.

Cultural Festivals
Actively Participated in Peking University Cultural Festival in 2018, 2019 and 2023.
Actively participated in Shanghai Jiaotong University summer school cultural festival 2019.

TECHNICAL AND COMPUTER SKILLS

Python, TensorFlow, PyTorch, Scikit-Learn, XGBoost, MATLAB, Google Colab, Microsoft Visio, REFPROP, Cycle Tempo, RET Screen, HAP, MS Office, Excel, PowerPoint and OriginPro.

LANGUAGES

Urdu	Native speaker
English	High proficiency(IELTS 7.5)
Arabic	Basic level
Chinese	Basic level

REFERENCES

Jianchun Mi
Professor, PhD,
Department of Energy & Resource Engineering,
College of Engineering, Peking University, Beijing 100871, China
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Khuram Walayat
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Coventry, CV4 7AL, United Kingdom
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Mohsin Hassan Saeed
Post Doc Researcher, PhD,
University of Colorado Boulder, USA.
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