Dr. Sohail Khan

Age: 37

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Ph.D. in Electric Engineering (Power Systems)

Career Statement

Open to a progressive, stable, and vibrant team in a highly dynamic organization where I can utilize my acquired skills and develop new skills to make maximum impact socially and professionally.

Profile

Motivated professional with international field experience working in Power and Energy projects with an emphasis on applying Artificial Intelligence in making the solutions resilient and flexible to diverse operating conditions. Possesses a successful 14-year track record of professional experience spanning from the power and energy sector, higher education sector, training, establishing a world-class center of excellence, and having executed diversified projects of international and national importance.

Skills & Personal Traits

- Project management & monitoring, report writing (technical/business), teaching and training.
- Strategic vision, planning and implementation, team building, and nurturing leadership.

Awards

- Chancellor Gold Medal from Comsats Islamabad, Pakistan [2008]
- Campus Gold Medal from Comsats Abbottabad, Pakistan [2008]
- Graduate Fellowship Award during MS Electrical Engineering, National University of Sciences and Technology, Pakistan [2008-10]
- Ph.D. Scholarship Award from the Austrian Institute of Technology, Austria [2013-16]
- Ph.D. with Distinction Award from the Technical University of Vienna, Austria [2016]
- Higher Education Commission of Pakistan approved PhD Supervisor [2023]

Membership and Technical Affiliations

- Member & Reviewer, Institute of Electrical and Electronics Engineers (IEEE), since 2013
- Member, Pakistan Engineering Council since 2008
- Member, IEEE power and energy society since 2014
- Member, IEEE industrial electronics society since 2014
- Reviewer, electric power systems research, Elsevier, since 2016.

International Projects and Research Initiatives

- **Batterie Stable, 2016-2018, Austria:** The project aimed to explore the provision of synthetic inertia from the battery as an ancillary service towards system stabilization. The role was the

impact analysis of frequency measurement delay on the synthetic inertia provision from the battery to support a high proportion of renewable energy input in the system.

- **LEAFS - LV Loads and Storage Integration, 2015-2018, Austria:** LEAFS project evaluated the effects of the energy storage system and load flexibility on the power distribution grids. The role was to design strategies to control the charging process of the energy storage to reduce the reverse power infeed from the customers and maximize the utilization of locally produced renewable energy from PV systems.

- **DeCAS - Demonstration of Coordinated Ancillary Services, 2015-2019, Pan-European:** The project aimed to research and analyze system services such as demand response and coordination of individual Volt-Var control concepts crossing traditional boundaries from high voltage, medium voltage to low voltage. The role was of the preparation network equivalents for testing the Volt/Var control strategies that cover low-medium-high voltage levels with an emphasis on scalability and replicability.

- **INTERPLAN- 2017-2020, Pan-European:** Interplan aimed to provide an integrated operation planning tool for the pan-European network to support the EU in reaching the expected low-carbon targets while maintaining network security. The role was to develop a planning tool for the frequency and voltage stability assessment in future grids with less inertia.

- **Erigenia 2018-2020, Pan-European** – Erigeneia target was developing a python-based optimization module for a battery energy storage system coupled with a photovoltaic generation integrated with a central system to achieve system-wide targets. The role was to develop an energy management system for homes in Cyprus and Turkey, with use cases focused on providing distribution grid support services.

National Projects and Research Initiatives

SPCAI: Sino-Pak Center for Artificial Intelligence

- **Establishment of SPCAI, Pakistan (2020-2023):** SPCAI is a Centre of excellence in Artificial Intelligence (AI) that is sponsored by the Ministry of Information Technology and Telecommunication (MoITT) under the Public Sector Development Program (PSDP). SPCAI is being executed, maintained, and operated by PAF-IAST. Responsible for meeting the results-based monitoring indicators necessary for successful project completion.

- **INTERACT, 2021-2022, SPCAI, Pakistan:** This project aims to develop and test a prototype energy management system for buildings that minimize energy costs and ensure the energy supply's availability.

Consultant on Artificial Intelligence & Allied Technologies at GlowBug Technologies

- Principal Author of **"Feasibility Study of National Centers for Research Innovation and Entrepreneurship in AI and Allied Technologies (NCRIE-AI)" (2020-21):** This feasibility study sets identified the sectoral challenges in Pakistan regarding AI adoption and how a research organization (NCRIE-AI) can establish an AI enabling ecosystem in the country.

- Principal Author of **National Artificial Intelligence Policy of Pakistan, 2022:** The National AI policy document provides a wide range of developmental and regulatory guidelines for awareness and adoption, reimagining the transparent and fair use of personal data using AI and stimulating innovation through industry-academia collaborations and investments in AI-led initiatives. It is the blueprint of how a developing nation can harness the true potential of AI in all of its sectors to alleviate poverty, develop value chains and lead to sustainable social development toward a more vibrant and peaceful society.

Professional Experience

Senior Faculty/Associate Professor

Sino-Pak Center for Artificial Intelligence, Pak-Austria Fachhochschule – Institute of Applied Sciences & Technology   *October. 2020 – to date*

Leading the academics at Sino-Pak Center for Artificial Intelligence (SPCAI) under administrative support from the university.

Role & Responsibilities

- Initiating and managing the technological infrastructure development for Sino-Pak Center for Artificial Intelligence (SPCAI).
- Strategic planning and development activities related to the establishment of SPCAI research laboratories
- Establishment of research lab portfolios and development plans for their sustainability
- Establishment of High-Performance Computing laboratory with Lenovo Global solutions
- Industrial and flagship events at SPCAI
- Liaison with international partners for academic program development and forging industrial collaborations.
- Principal Investigator of Smart City and Urban Planning lab at SPCAI
- Academically leading MS in Artificial Intelligence program at SPCAI
- Academically leading MS in Advanced Power System Analysis program at PAF-IAST
- PI of the project: Intelligent Forecasting and Control of Energy Storage For Smart Buildings.
- Organizing specialized and general training in the field of Artificial Intelligence and Power Systems
- Organizing industrial liaison meetings and events
- Managing the SPCAI portfolio and facilitating cross teams interactions

Dr. Sohail has helped to develop the SPCAI portfolio across the following clusters and labs:

No.	Clusters of Excellence and Research Laboratories
Cluster of Intelligent Infrastructure	
1	Smart City, Urban planning Lab
2	Smart Agriculture Lab
Cluster of Intelligent Systems	
3	Intelligent Field Robotics Lab
4	Intelligent Systems Design Lab
Cluster of Machine Learning	
5	Computer Vision lab
6	Deep Learning Lab
Cluster of Safety and Security	
7	Intelligent technologies for Natural Disaster Management & Rescue Operations Lab
8	Internet of Things Lab
Smart Health and Biosciences	
9	Intelligent Biomedical Applications Lab
10	Neuro-Computation Lab

Scientist

Austrian Institute of Technology, GmbH, Vienna, Austria   *Sep. 2016 – Sept. 2020*

Developed algorithms and performed system-wide studies to promote renewable energy integration in the grid at the Austrian and European levels. These contributions were made as part of European projects aiming to develop new concepts and provide solutions to energy utilities.

Role & Responsibilities
- Conduct research and development for Europe-wide international projects with multi-disciplinary technical expertise in renewable energy integration and smart grid applications.
- Develop project collaboration with EU partner institutions.
- Develop software and hardware in-loop solutions to test the designed hypothesis in a library-scale environment.
- Publish results in internationally renowned journals and reports.

PhD Researcher

Austrian Institute of Technology, GmbH, Vienna, Austria   *March. 2013 – Aug. 2016*

Worked on the Ph.D. research in flexibility modeling and optimization in energy networks. Contributed to the research on the co-simulation of energy networks simulated in various software platforms while working at the Complex Energy Systems research group at AIT.

Role & Responsibilities
- Completing doctoral dissertation on "Assessment and Allocation of Operational Flexibility from Distribution System Resources."
- Research work on the cyber-physical aspects of the future energy system with emphasis on the application of Functional Mock-up Interface (FMI) between widely adopted software tools for modeling cyber/physical components of energy systems.
- Collaboration with the AIT Energy and Thermal Systems department in implementing the research work in prospective projects.
- Publish results in internationally renowned journals and reports.

Lecturer

COMSATS Institute of Information Technology, Islamabad, Pakistan   *Feb. 2012 – Feb. 2013*

Taught undergraduate courses in electric machines and micro-controller-based systems. Achieving funding for the project "Design of re-configurable guidance system for autonomous robot" from National ICT R&D Fund, Pakistan.

- Member of board evaluating final year project for Electrical Engineering projects.
- Part of the Board of Studies of the Department of Electrical Engineering.
- Supervised as a department committee member in **administrative matters** of the department.
- Engaged with the **senior faculty-hiring program** of the university

Lecturer

Heavy Industries Taxila Education City University, Pakistan   *Oct. 2010 – Jan. 2012*

Performed structured and team-orientated efforts in the management of departmental tasks. Taught courses in electric machines and microprocessor systems and Interfacing with undergraduate students in the Department of Electrical Engineering.

Junior Engineer

Nautica Group, Pakistan   *Mar. 2008 – Aug. 2008*

Developed an RFID-based door lock system integrated with enterprise software for an international hotel chain. A complete embedded solution was developed that was integrated with the web services and could write to the RFID cards complying with the safety protocols and organizational requirements.

Education

Ph.D. in Electrical Engineering   Mar. 2013 – Sept. 2016

Technical University of Vienna – Austria

Thesis: Assessment and Allocation of Operational Flexibility in Power Systems with Distributed Resources
Advisors:
Prof. Wolfgang Gawlik (Professor, Vienna University of Technology, Austria)
Prof. Peter Palensky (Professor for intelligent electric power grids at TU Delft)

M.Sc. Electrical Engineering   Sept. 2008 – Aug. 2010

National University of Sciences and Technology (NUST), Islamabad – Pakistan

Thesis: Nonlinear Adaptive Flight Control System for Unmanned Aerial Vehicle
Advisors: Prof. Khalid Munawar

B.Sc. Electronics Engineering   Mar. 2004 – Mar. 2008

COMSATS Institute of Information Technology (CIIT), Abbottabad – Pakistan

Technical Skills

Power System Simulation Platforms	DIgSILENT PowerFactory -- Power system studies Siemens Sincal -- Power system studies Neplan -- Power system studies Combined simulation of Matlab, Python, and PowerFactory. Matlab -- Optimization toolboxes and power system toolbox simulation.
Simulation Platforms for Programming	Pycharm IDE for Python -- Object-oriented programming in Python. Microsoft Visual Studio -- C++ programming. Pyomo -- Constraint programming and optimization.
Programming Languages	C/C++, Python – The primary tool used for algorithm and systems development. Matlab scripting – Algorithm design, combined simulation DSL for DIgSILENT PowerFactory – power systems simulation Modelica for dynamical systems modeling
Hardware Platforms	ATMEL, PIC, and ST micro-controllers. Beagleboard-based robotic systems. Digital Signal Controllers like dsPIC33F programming Micro-controller training boards like EasyPIC v5 and v7 training boards
AI Related Skills	**Supervised Learning: Algorithms and case-studies experience** • Support vector machine: Predict how likely an event in the energy system will occur.

	- Random Forest: Predict the power usage in the electric distribution grid. - Naïve Bayes: Create classifiers to filter the data based on requirements. - Linear/Quadratic Discriminant analysis: Predicting the profile in the energy market analytics. - Logistic regression: Classify the customers based on energy consumption. - Linear regression: Optimize the price points of energy delivery. - Decision tree: Understand the product attributes that can make a solution more likely as successful. **Unsupervised learning: Algorithms and case studies experience** K-means and hierarchical clustering: clustering the distribution networks based on the common properties for generating representative networks from extensive data **Re-enforcement learning:** Balance a load of electricity grids in varying demand cycles **Convolution Neural Network and Recurrent Neural Network in Deep Learning:** Creating a machine learning model that can be used to forecast environmental parameters like solar irradiance.

International Talks and Keynotes

Conference presentations	- CES presentation at IST, Vienna, Austria, 2015 - Energie Informatik Zürich, Switzerland 2014 - MSCPES Berlin, Germany 2014 - IECON Vienna, Austria 2013 - AIT poster presentation at a Ph.D. workshop in Hirschegg, Austria, 2013 - UF Seminar by EES, Vienna, Austria 2015 - AIT Poster Award Presentation, Vienna, Austria 2014, 2015
Public lectures	- Opensource Tools in Power Systems Research at UET Taxila and HITEC University, Pakistan. 2015 - Power system stability challenges at NUST, Pakistan 2018 - DigSilent PowerFactory workshop, US Pakistan Center for Advanced Studies in Energy USPCASE – NUST, 2019 - Speaker at Industrial Event by Medical Imaging and Diagnostic Lab at Comsats, October 26, 2021 - Tutorial Panel Member at 24th International IEEE Multi Topic Conference (INMIC), 2022 - Speaker at PropTech Convention 2022 Smart, Safe, and Sustainable Building Technologies Convention 2022, organized by Landtrack.pk, Build Asia - Panel member of "AI Ecosystem" at Artificial Summit 2023 organized by atomcamp, Jazz, and Ministry of IT and Telecom Pakistan 18-Jan-23