

SAKSHI SHARMA

<https://scholar.google.co.in/sakshi.sharma>
☎ (+91) 8826234701 • ✉ sakshisharma.iitd@gmail.com
🌐 <https://www.linkedin.com/in/sakshisharma1012/>

Profile Statement

Skilled researcher with expertise in microgrids, DER integration, and e-mobility, utilizing AI/ML-driven solutions for cyber-physical systems, state estimation, and grid modeling. Proficient in developing and advancing smart inverter control functionalities, grid-forming and grid-following inverter control strategies, and analytical tools for stability analysis. Experienced in large-scale power grid system decomposition, HIL testing, real-time simulators, and data analytics. Demonstrates strong mathematical skills, knowledge of graph theory, and a proven ability to address complex power system challenges through cutting-edge methodologies and innovative algorithms.

Education

- **Indian Institute of Technology Delhi** **New Delhi, India**
Doctor of Philosophy, Electrical Engineering, [Sept 2020 - July 2025 (expected)]
Specialization: Advancing Energy Infrastructure Modeling and Cyber Security: An AI Perspective.
CGPA: 8.33
- **Y.M.C.A. University of Science & Technology** **Faridabad, India**
Master of Technology in Electrical Engineering, [Aug 2015 - Jul 2017]
Specialization: Power Systems
CGPA: 8.943
- **Dr. A.P.J. Abdul Kalam Technical University** **Lucknow, India**
Bachelor of Technology in Electrical and Electronics Engineering , [Aug 2009 - Jul 2013]
Percentage: 71.38 %

Research Work

Design of 800 V DC Microgrid Power Hardware-in-Loop (PHIL) Setup for Detection and Mitigation of Injected False Data Cyber-Attacks.

- Indian Institute of Technology, Delhi** **[Jun 2023 - Present]**
Smart Infrastructure for an Electric Vehicle Ecosystem Lab, *Prof. B K Panigrahi*
- Conducted a comprehensive analysis of potential false data injection based cyber threats targeting Hierarchical Droop-Controlled DC microgrids system.
 - Designed a privacy -preserving AI-driven anomaly detection algorithm to identify and respond to cyber-attacks in real-time, ensuring the secure operation of battery systems under various conditions.
 - Implementating and validating the proposed cyber-resilient framework on a large-scale lithium-ion battery ecosystem, integrating it with existing energy management systems for enhanced security.

Development of Power Hardware-in-Loop (PHIL) platform with 15 kVA Four-quadrant Power Amplifier and Battery Emulator Integrated with Opal-RT for Validation of Battery State Estimation Algorithm.

- Indian Institute of Technology, Delhi** **[Dec 2020 - Aug 2024]**
Smart Infrastructure for an Electric Vehicle Ecosystem Lab, *Prof. B K Panigrahi*
- Validated an So[X] estimation algorithm for a 2800 mAh, 15 V Li-ion battery pack using AI-based techniques through extensive experimental studies.
 - Developed a sparse Quasi-Recurrent Neural Network model combining CNN and LSTM advantages, with reduced computational complexity via enhanced regularization.
 - Demonstrated the effectiveness of the state estimation framework through dynamic simulation testing and real-time PHIL validation on an Opal-RT platform, assessing a lithium-ion battery pack under various loading conditions.

Design of a Hardware-in-Loop (HIL) platform with Speedgoat Framework for Real-Time Validation of Battery Health Estimation Algorithm.

- Indian Institute of Technology, Delhi** **[Sept 2020 - Dec 2023]**
Battery Testing Lab / Power System Core lab, *Prof. B K Panigrahi*
- Designed an algorithm that facilitates a time-ahead health prediction of the battery using an attention-mechanism-based neural network, which is capable of using the data of just the first few cycles of the battery to predict the capacity.
 - Additionally, the effect of aging on the different battery states is studied. It is observed through this study that the reliability of the state estimation scheme increases manifolds with the inclusion of battery age information.

- The algorithm was validated on the Speedgoat platform, demonstrating real-time performance on par with existing BMS standards while achieving improved accuracy.

Design of a T-I-D based SVC Controller for Improving Power System Stability.

Y.M.C.A. Univ. of Sc. & Tech., Faridabad

[Sept 2016 - Jun 2017]

Power Systems Lab, Dept. of EE,

Prof. Poonam Singhal

- Conducted literature review on controllers and the various techniques to perform tuning.
- Designed and Simulated the T-I-D SVC controller, showing improved stability and robustness under fault conditions.

Implementing Enhanced Power System Stability through Genetic Algorithm-Optimized SVC Controller.

Y.M.C.A. Univ. of Sc. & Tech., Faridabad

[Aug 2015 - Jun 2017]

M.Tech Thesis,

Prof. Poonam Singhal

- Applied Genetic Algorithm to enhance the gain parameters of a T-I-D Based SVC Controller in a Single Machine Infinite Bus system, using generator speed deviation as the auxiliary signal.
- Demonstrated through computational results that the GA-Based T-I-D SVC Controller is found to perform decently.

Technical Skills

- **Software:** MATLAB/Simulink, Python, PyTorch, Siemens GT-Suite (Battery), EC Lab, ZMAN software, LabView.
- **Battery-Testing, Modelling, and Analysis:** Real-time cycling and Accelerated Aging Tests, EIS testing, BMS Testing.
- **Real-time Simulators:** Skilled in real-time simulation, hardware-in-loop testing, and rapid control prototyping using the following devices: Opal-RT, and Speedgoat.
- **Hardware Experience:** 4-quadrant Power amplifier, Battery emulator.

Other Work Experiences:

- **Indian Inst. of Tech. Delhi, India/Ctr for Automotive Res. & Tribology:** Teaching Assistant [2020 - Present]
- **Manipal Academy of Higher Education, Dubai, UAE/Sch. of Engg. & IT:** Adjunct Faculty [2018 - 2019]
- **Al-Dar University College, Dubai, UAE/Sch. of Engineering :** Lecturer/Lab Co-ordinator. [2018 - 2019]
- **Bluestar Ltd., Gurugram, Haryana/MEP Designing Divison :** Assistant Manager [2017]
- **Y.M.C.A. Univ. of Sc. & Tech., Faridabad, India /Dept. of EE:** Teaching Assistant [2015 - 2017]
- **Shri Siddhi Vinayak Institute of Technology, U.P./Dept. of EEE:** Lecturer [2013 - 2015]

Publications

Citations: 120, h-index: 3 (Source: Google Scholar)

Journal Papers

1. **Sakshi Sharma** and B. K. Panigrahi, "Lithium-Ion Battery State-of-Charge and State-of-Energy Simultaneous Estimation via Sparse- Quasi Recurrent Neural Networks(S-QRNN)," in *IEEE Transactions on Industry Applications*, vol. 61, no. 1, pp. 774-783, Jan.-Feb. 2025, doi: 10.1109/TIA.2024.3522506.
2. **Sakshi Sharma** and B. K. Panigrahi, "Aging Responsive State of Charge Prediction of Lithium-Ion Battery Using Attention Mechanism Based Convolutional Neural Networks," in *IEEE Transactions on Industry Applications*, vol. 60, no. 5, pp. 7342-7354, Sep 2024, doi: 10.1109/TIA.2024.3405431.
3. **Sakshi Sharma**, A. Garg and B. K. Panigrahi, "Predicting State-of-Charge Using Gradient-Boosted SVR Ensemble Technique for Lithium Ion Battery Used in EVs," in *IEEE Transactions on Transportation Electrification*, vol. 10, no. 2, pp. 4441-4454, June 2023, doi: 10.1109/TTE.2023.3310159.
4. P. Shrivastava, P. A. Naidu, **Sakshi Sharma**, B. K. Panigrahi, A. Garg, "Review on technological advancement of lithium-ion battery states estimation methods for electric vehicle applications," in *Elsevier, Journal of Energy Storage.*, vol. 64, 2023, doi.org/10.1016/j.est.2023.107159.
5. Poonam Singhal, **Sakshi Sharma**, "Hybrid T-I-D and Fuzzy Logic Based SVC Controller for Transient Stability Enhancement," in *Int. Journal of Engineering Research and Application* ISSN : 2248-9622, vol. 7, Issue 6, (Part -1) June 2017, pp.31-36.
6. **Sakshi Sharma**, Suman Rath, B. K. Panigrahi, "A Privacy-Preserving Learning Framework for Cyber-Resilient DC Microgrids against FDI Attacks" in *IEEE Transactions on Circuits and Systems —II: Express Briefs*. [Under Review]
7. **Sakshi Sharma**, B. K. Panigrahi, "Detecting the Undetectable: A Federated Learning Paradigm for Securing DC Microgrids against Stealthy FDIAs" in *IEEE Transactions on Smart Grids*. [Under Review]

Conference Papers

1. **Sakshi Sharma** and B. K. Panigrahi, "Stealth Attacks on Droop-Controlled DC Microgrids: A Stability and Performance Analysis" at *IEEE Energy Conversion Conference and Expo*, Philadelphia, US [under review]
2. **Sakshi Sharma** P. D. Achlerkar, P. Shrivastava, A. Garg and B. K. Panigrahi, "Combined SoC and SoE Estimation of

- Lithium-ion Battery using Multi-layer Feedforward Neural Network,” at *IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES)*, Jaipur, India, 2022, pp. 1-6, doi: 10.1109/PEDES56012.2022.10080110.
3. **Sakshi Sharma** P. D. Achlerkar, P. Shrivastava, A. Garg and B. K. Panigrahi, “Neural Network based State of Charge Prediction of Lithium-ion Battery,” at *IEEE International Conference on Sustainable Energy and Future Electric Transportation (SeFeT)*, Hyderabad, India, 2022, pp. 1-6, doi: 10.1109/SeFeT55524.2022.9909368.
4. **Sakshi Sharma** and B. K. Panigrahi, “A Machine Learning Approach to Capacity Estimation of Lithium-Ion Batteries using Electrochemical Impedance Spectroscopy,” at *50th IEEE Annual Industrial Electronics Conference (IECON)*, Chicago, US, 2024.

Other Academic Projects

Delhi Cluster Project for E-Mobility-Sustainable Mobility Theme.

[Dec, 2020 - Dec, 2023]

- Contributed to sustainable mobility research and innovation within the Delhi Cluster Project, focusing on electric vehicle solutions.

Research and development of smart, secure, scalable, resilient, and adaptive cyber-physical power system.

[Oct 2018 - April 2022]

- Led research on developing smart, secure, scalable, resilient, and adaptive cyber-physical of EV infrastructure.

Collaborative work with Alt. Mobility, JBM BAT-X (through FITT) on Development of Real-Time Battery State Estimation Algorithm for Performance Analysis of EV Batteries.

[Jan 2023 - Mar 2024]

- Developed AI models to estimate battery health and states using real-time, noisy data from EVs, rather than relying on uniform and controlled lab data.

Activities and Achievements

- Received **Best Presentation Award** for the work titled “A Machine Learning Approach to Capacity Estimation of LiBs using Electrochemical Impedance Spectroscopy,” at 50th IEEE Annual Industrial Electronics Conference (IECON) Chicago, Nov’2024.
- Recognized with the **Research Excellence Travel Award (RETA)** (Top 20% researchers) and the **Research Scholar Travel Award (RSTA)** by the Indian Institute of Technology, Delhi.
- Awarded **Silver Medal** [2nd Topper in final academic result] and **Merit Scholarship** for two consecutive academic semesters during Masters at Y.M.C.A. University for Sc. & Tech. for exceptional academic performance.
- Delivered a lecture on ‘Batteries in EV Applications’ as part of the Managerial Training Program at Hyundai, Gurugram, and IIT-Delhi, under the Foundation for Innovation and Technology Transfer (FITT).
- Reviewer of the following Journal Articles and Conference Proceedings: IEEE Transactions on Transportation Electrification, IEEE Journal of Emerging and Selected Topics in Industrial Electronics, IEEE Access, IET, Springer-Nature, and International Journal of Electrical Power & Energy Systems.
- Graduate Teaching Assistant at IIT Delhi: Introduction to Electric Vehicles (Autumn 2023), Batteries for Electric Vehicles (Spring 2024), Electric Vehicle Laboratory-I (Autumn 2023), at IIT-Delhi And Power Electronics Lab (Autumn 2016), Power Systems-II Lab (Autumn 2016), Control Systems (Spring 2017) Power System Lab (Spring 2017) at Y.M.C.A University of Science & Technology Faridabad, India.
- Conducted experimentation and analysis on various batteries and Battery Management Systems (BMS) as part of a FITT collaboration with multiple organizations and start-ups.

References

Prof. B. K. Panigrahi

Professor EE, Founder Head CART,
IIT Delhi,

Address: Department of EE, IIT Delhi,
Hauz Khas, New Delhi, India-110016.

✉ bkpanigrahi@ee.iitd.ac.in

Prof. Pankaj D. Achlerkar

Astt. Prof.

IIT Bhubaneswar,

Address: Sch of Electrical & Computer Sciences,
Khordha, Odisha, India-752050.

✉ pankaj@iitbbs.ac.in

Prof. R. Dudhe

Professor, Head,

Sch. of Engg. & IT (SoEIT),

Address: Manipal Acad. of Higher Edu.(MAHE),
Dubai, UAE-345050.

✉ ravishankar.dudhe@manipaldubai.com

Prof. P. Singhal

Retd. Professor EE,

Y.M.C.A.U.S.T - Faridabad,

Address: Department of EE, Y.M.C.A.U.S.T,
Faridabad, India-121006.

✉ ymcapoonamsinghal@gmail.com

Declaration

I hereby declare that the above statements are true to the best of my knowledge.

Place: IIT Delhi

Sakshi Sharma