DR. DUSHYANT SHARMA
Assistant Professor,
Department of Electrical Engineering,
IIT (ISM) Dhanbad

Contact Information

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Research Interests

Automatic load frequency control, renewable energy systems, distributed control in power systems, microgrids, grid forming inverter control, and active power control of interconnected power systems.

Education

Ph.D., Electrical Engineering, October, 2019

Indian Institute of Technology (IIT) Delhi, New Delhi, India

- Thesis Title: Design of Novel Control Schemes for Improved Performance of Automatic Generation Control
- Thesis Advisor: Prof. Sukumar Mishra
- Course Work: Non-conventional Energy Systems & Energy Conservation, Power System Control and Instrumentation, Selective Topics in Advance Control & System Theory-I, Artificial Intelligence for Control Applications, AC Controllers, High Voltage DC Transmission, Power System Dynamics, Selected Topics in Advance Control & System Theory-II
- CGPA: 8.875/10

B.Tech.(Hons.), Electrical Engineering, June, 2012

National Institute of Technology Rourkela, India

- CGPA: 9.19/10

AISSCE (12^{th}), CBSE, 2007

Kendriya Vidyalaya Jhunjhunu, Rajasthan, India

- Percentage: 85.4

AISSE (10^{th}), CBSE, 2005

Kendriya Vidyalaya Jhunjhunu, Rajasthan, India

- Percentage: 88.8

Research and Teaching Experience

Assistant Professor **From November, 2021**

Department of Electrical Engineering, IIT (ISM) Dhanbad, India

- Course Instructor (UG): Basics of Electrical Engineering (EEI101), Utilization of Electrical Energy (EEE202)
- Course Co-instructor (UG): Networks Lab (EEC271)

- Course Instructor (PG): Smart Grid Technology (EEO501)
- Mentoring of PDF (Ongoing) - 1
- Ph.D. Supervision (Ongoing) - 2
- Ph.D. Co-supervision (Ongoing) - 2
- M.Tech. Thesis Supervision (Ongoing) - 1
- M.Tech. Thesis Supervision (Completed) - 2
- B.Tech. Project Supervision (Completed) - 4

Research Associate **From April, 2021 to November, 2021**

Department of Electrical & Computer Engineering, Kansas State University, U.S.A.

Young Faculty Associate **From January, 2020 to January, 2021**

Department of Electrical Engineering, IIT Jodhpur, India

- Course Instructor (UG): Power System (EE223)
- Course Instructor (PG): Selected Topics in Distributed Generation (EEL7640), Hydropower Fractal 2 (MEL7452)
- Course Co-instructor (PG): Solar Energy & Application (MEL7460), Hydropower (MEL7450)
- Ph.D. Co-supervision - 1
- B.Tech Project Co-supervision - 9

Early-Doc Fellowship **November, 2019 to December, 2019**

Department of Electrical Engineering, IIT Delhi, India

Teaching Assistant **January, 2014 to October, 2019**

Department of Electrical Engineering, IIT Delhi, India

- TA for the Courses: Introduction to Electrical Engineering (ELL 100), Power Engineering-1 (ELL303), Power Engineering Lab (ELP303), Power System Dynamics (ELL775), Dynamic Modelling and Control (ELL778), and Power System Lab-2 (ELP871).

Industrial Experience

Graduate Engineer Trainee **June, 2012 to April, 2013**

CEAT Limited, Worli, Mumbai, India

- Job Description: Manufacturing

Administrative Experience

- Faculty-in-Charge, Infrastructure (Electrical), IIT (ISM) Dhanbad, since October 2023.
- Coordinator, Infrastructure (Electrical), IIT (ISM) Dhanbad, from January 2023 to October 2023.
- Warden, Jasper hostel, IIT (ISM) Dhanbad, from July 2022 to June 2024.

Research Projects

As Investigator

- "Investigations of interoperability of grid-forming assets in hybrid power system," funded by SERB for a duration of 2 years. Budget: INR 3130600. Status: ongoing.
- "Virtual synchronous generators and their coordinated control in AC microgrids," funded by IIT (ISM) Dhanbad for a duration of 3 years. Budget: INR 1500000. Status: ongoing.

Journal Publications

1. V. Vaishnav, A. Jain and **D. Sharma**, "Auxiliary network-enabled attack detection and resilient control of islanded AC microgrid," accepted for publication in *IEEE Transactions on Smart Grid*.

2. F. Sadeque, M. Gursoy, **D. Sharma** and B. Mirafzal, "Autonomous control of inverters in microgrid," *IEEE Transactions on Industry Applications*, vol. 60, no. 3, pp. 4313-4323, May-June 2024.

3. V. Vaishnav, **D. Sharma** and A. Jain, "Quadratic-droop-based distributed secondary control of microgrid with detail-balanced communication topology," *IEEE Systems Journal*, vol. 17, no. 3, pp. 3401-3412, 2023.

4. S. Singh, V. Vaishnav, A. Jain and **D. Sharma**, "Bounded voltage regulation in a direct current microgrid using barrier lyapunov function with uncertain load current," *IEEE Control Systems Letters*, vol. 7, pp. 991-996, 2023.

5. V. Vaishnav, **D. Sharma** and A. Jain, "Control of heterogeneous battery energy storage systems-based microgrid connected via detail-balanced communication topology," *IEEE Control Systems Letters*, vol. 7, pp. 733-738, 2023.

6. M. S. Pilehvar, **D. Sharma** and B. Mirafzal, "Forming interphase micro-grids in distribution systems using cooperative inverters," *CPSS Transactions on Power Electronics and Applications*, vol. 7, no. 2, 2022, pp. 186-195.

7. **D. Sharma**, F. Sadeque and B. Mirafzal, "Synchronization of inverters in grid forming mode," *IEEE Access*, vol. 10, 2022, pp. 41341-41351.

8. A. Firdaus, **D. Sharma** and S. Mishra, "Dynamic Power Flow Based Simplified Transfer Function Model to Study Instability of Low Frequency Modes in Inverter Based Microgrids," *IET Generation, Transmission & Distribution*, vol. 14, no. 23, 2020, pp. 5634-5645.

9. **D. Sharma** and S. Mishra, "Disturbance-observer based frequency regula-tion scheme for low-inertia microgrid systems," *IEEE Systems Journal*, vol. 14, no. 1, 2020, pp. 782-792.

10. **D. Sharma** and S. Mishra, "Non-linear disturbance observer-based impr-oved frequency and tie-line power control of modern interconnected power systems," *IET Generation, Transmission & Distribution*, vol. 13, no.16, 2019, pp. 3564-3573.

11. **D. Sharma**, A. Dubey, S. Mishra and R. K. Mallik, "A frequency control strategy using power line communication in a smart microgrid," *IEEE Access*, vol. 7, 2019, pp. 21712-21721.

12. N. Nayak, S. Mishra, **D. Sharma** and B. K. Sahu, "Application of modified sine cosine algorithm to optimally design PID/fuzzy-PID controllers to deal with AGC issues in deregulated power system," *IET Generation, Transmission & Distribution*, vol. 13, no. 12, 2019, pp. 2474-2487.

13. **D. Sharma** and S. Mishra, "Power system frequency stabiliser for modern power systems," *IET Generation, Transmission & Distribution*, vol. 12, no. 9, 2018, pp. 1961-1969.

14. J. Nanda, **D. Sharma** and S. Mishra, "Performance analysis of automatic generation control of interconnected power systems with delayed mode operation of area control error," *IET The Journal of Engineering*, vol. 2015, no. 4, 2015, pp. 164-173.

Conference Publications

1. F. Sadeque, **D. Sharma** and B. Mirafzal, "Seamless grid-following to grid-forming transition of inverters supplying a microgrid," *2023 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Orlando, FL, USA, 2023, pp. 594-599.

2. V. Vaishnav, **D. Sharma** and A. Jain, "Network-based finite-time secondary level control for critical bus voltage restoration and accurate reactive power-sharing," *2022 22nd National Power Systems Conference (NPSC)*, New Delhi, India, 2022, pp. 584-589.

3. V. Vaishnav, A. Jain and **D. Sharma**, "Finite-time stability analysis of a distributed microgrid connected via detail-balanced graph," *2021 Seventh Indian Control Conference (ICC)*, Mumbai, India, 2021, pp. 365-370.

4. T. Hossen, **D. Sharma** and B. Mirafzal, "Smart inverter twin model for anomaly detection," *2021 IEEE 22nd Workshop on Control and Modelling of Power Electronics (COMPEL)*, Cartagena, Colombia, 2021, pp. 1-6.

5. F. Sadeque, **D. Sharma** and B. Mirafzal, "Power-sharing between grid-forming and grid-following inverters," *2021 IEEE 22nd Workshop on Control and Modelling of Power Electronics (COMPEL)*, Cartagena, Colombia, 2021, pp. 1-5.

6. F. Sadeque, **D. Sharma** and B. Mirafzal, "Multiple grid-forming inverters in black-start: The challenges," *2021 IEEE 22nd Workshop on Control and Modelling of Power Electronics (COMPEL)*, Cartagena, Colombia, 2021, pp. 1-6.

7. **D. Sharma**, S. Mishra and A. Firdaus, "Computation of delay margin in a power system having open channel communication based automatic generation control using Padé approximation," *2019 IEEE International Conference on Envir-onment and Electrical Engineering and 2019 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe)*, Genova, Italy, 2019, pp. 1-6.

8. A. Firdaus, S. Mishra and **D. Sharma**, "Stability enhancement of inverter based autonomous microgrid using electric spring," *2019 IEEE International Conf-erence on Environment and Electrical Engineering and 2019 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe)*, Genova, Italy, 2019, pp. 1-5.

9. **D. Sharma** and S. Mishra, "Impacts of system non-linearities on commu-nication delay margin for power systems having open channel communication based automatic generation control," *2018 IEEMA Engineer Infinite Conference (eTechNxT)*, New Delhi, 2018, pp. 1-5.

10. A. Firdaus, S. Mishra and **D. Sharma**, "Quadratic regulator based opti-mal state feedback controller for stability improvement of inverter based micro-grids," *TENCON 2017 - 2017 IEEE Region 10 Conference*, Penang, 2017, pp. 2165-2170.

11. **D. Sharma**, S. Mishra and A. Firdaus, "Multi objective gain tuning approach for time delayed automatic generation control," *TENCON 2017 - 2017 IEEE Region 10 Conference*, Penang, 2017, pp. 2896-2900.

12. A. Tomar, **D. Sharma** and S. Mishra, "An active power management strategy in a microgrid having static and rotating generators considering generation limits using water pumping loads," *2017 International Conference on Computer, Communications and Electronics (Comptelix)*, Jaipur, 2017, pp. 484-488.

13. S. Mishra, **D. Sharma**, Y. Kumar and D. Pullaguram, "Lyapunov based frequency independent current controller for grid connected single phase PV sys-tems," *2016 7^{th} India International Conference on Power Electronics (IICPE)*, Patiala, 2016, pp. 1-6.

14. **D. Sharma**, S. Mishra and J. Nanda, "Micro-grid operation and control of Photo-Voltaic power with canal based small hydro power plant," *2016 IEEE Region 10 Conference (TENCON)*, Singapore, 2016, pp. 1289-1293.

15. **D. Sharma**, R. K. Mallik, S. Mishra, A. Dubey and V. Ranjan, "Voltage control of a DC microgrid with double-input converter in a multi-PV scenario using PLC," *2016 IEEE Power and Energy Society General Meeting*, Boston, MA, 2016, pp. 1-5.

16. S. Mishra, R. Sharma and **D. Sharma**, "Coordinated active power control of wind, solar and diesel generator in a microgrid," *IFAC-PapersOnLine*, vol. 48, no. 30, 2015, pp.7-12.

17. A. Dubey, **D. Sharma**, R. K. Mallik and S. Mishra, "Modeling and performance analysis of a PLC system in presence of impulsive noise," *2015 IEEE Power & Energy Society General Meeting*, Denver, CO, 2015, pp. 1-5.

18. B. Sen, **D. Sharma** and B. C. Babu, "DSRF and SOGI based PLL-two viable scheme for grid synchronization of DG systems during grid abnormalities," *2012 Students Conference on Engineering and Systems*, Allahabad, Uttar Pradesh, 2012, pp. 1-6.

19. **D. Sharma**, B. Sen and B. C. Babu, "Improved grid synchronization algorithm for DG system using DSRF PLL under grid disturbances," *2012 Students Conference on Engineering and Systems*, Allahabad, Uttar Pradesh, 2012, pp. 1-6.

Book Chapters

1. S. Mishra, **D. Sharma**, S. N. Singh, K. Y. Lee, M. M. Farsangi, H. Nezamabadipour, EM Voumvoulakis, N. D. Hatziargyriou, X. Wu, and L. Ma, "Power System and Power Plant Control," Chapter 4 of Applications of Modern Heuristic Optimization Methods in Power and Energy Systems, John Wiley & Sons, 2020.

2. S. Mishra and **D. Sharma**, "Control of Photovoltaic Technology," Chapter 19 of Electric Renewable Energy Systems, Academic Press publications, 2016.

Conferences and Workshops Attended

- 2024 International Conference on Sustainable Power and Energy Research (ICSPER-2024), NIT Waranagl, 1-3 March, 2024.
- 2023 American Control Conference (ACC), San Diego, CA, USA, 31 May-2 June, 2023.
- 2019 IEEE International Conference on Environment and Electrical Engineering and 2019 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe), Genova, Italy, 11-14 June, 2019.
- 2018 IEEMA Engineer Infinite Conference (eTechNxT), New Delhi, 13-14 March, 2018.
- 2016 IEEE Region 10 Conference (TENCON), Singapore, 22-25 November, 2016.
- 2016 IEEE Power and Energy Society General Meeting, Boston, MA, 26-30 July, 2016.
- 9^{th} IFAC Symposium on Control of Power and Energy Systems (CPES) - 2015, New Delhi, India, 9-11 December, 2015.
- 9^{th} Workshop on Power Line Communications (WSPLC 15), Klagenfurt, Austria, 21-22 September, 2015.
- 2012 Students Conference on Engineering and Systems, Allahabad, Uttar Pradesh, 16-18 March, 2012.

Invited Talks & Guest Lectures

- Lecture on 14 September 2023 on the topic, "Developing simulation skills for design and analysis of dynamical engineering systems", in the one-week short term training programme on "Challenges, applications, and technologies in engineering research and designs" held at Arka Jain University from 12 September 2023 to 16 September 2023.
- Invited talk on 26 July 2023 on the topic, "Advanced control techniques for inverters in autonomous power systems", at Netaji Subhas University of Technology, Delhi.
- National webinar on 20 August 2022 on the topic, "Understanding control and operation of autonomous inverters", organized by Kalinga University.
- Invited talk on 24 July 2022 on the topic, "Control aspects of grid forming inverters", during the one-week high-end workshop on "Power electronics interface for green energy sources and e-mobility" organized by Birla Institute of Technology Mesra held from 18 July 2022 to 24 July 2022.
- Invited talk on 6 September 2021 on the topic, "Understanding real-time simulations: Applications for Power Engineering", during the one-week faculty development programme on "Innovative research & development trends in electronics & communication engineering," organized by G.L. Bajaj Institute of Technology & Management, Greater Noida, held from 6 September 2021 to 12 September 2021.

Professional Experience

- Technical Reviewer for:
  IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, IEEE Transactions on Sustainable Energy, IEEE Systems Journal, IEEE Access, IET Generation, Transmission & Distribution, IET Power Electronics, The International Journal of Power and Energy Systems, International Transactions on Electrical Energy Systems, INAE Letters, Current Science, Scientific Reports.
- TPC Member/Organizing Committee Member/Track Chair/Topic Chair/Advisory Committee Member for:
  22^{nd} National Power System Conference 2022, IEEE Energy Conversion Congress & Expo (ECCE) 2022, ICSPER-2024.
- Membership:
  Member of IEEE, The Institution of Engineers (India)

Professional Accomplishments

- Recipient of **Best paper award** in 2024 ICSPER-2024, NIT Waranagl, 2024
- Recipient of **POSOCO power system awards (PPSA)-2019** under the Doctoral Category
- Recipient of **Research excellence travel award** of Indian Institute of Technology Delhi in the year 2019
- Recipient of **Best Ph.D. student poster award** in IEEE EEEIC 2019, Genoa, Italy
- Recipient of **Best paper award** in IEEE TENCON 2017, Penang, Malaysia

Leadership and Management Skills

- Served as a lead volunteer for the IEEE 20^{th} International Conference on Intelligent Systems Applications to Power Systems (ISAP) 2019, held during 10-14 December, 2019 at the Indian Institute of Technology Delhi, Hauz Khas, New Delhi, India.
- Served as a lead volunteer for the IEEE 6^{th} International Conference on Power Systems, 2016 (ICPS 2016) held during 4-6 March, 2016 at the Indian Institute of Technology Delhi and India Habitat Centre, New Delhi, India.
- Served as a lead volunteer for the 9^{th} IFAC Symposium on Control of Power and Energy Systems (CPES)-2015 held during 9-11 December, 2015 at the Indian Institute of Technology Delhi, Hauz Khas, New Delhi, India.

Software Skills Matlab, DIgSILENT, RT-LAB, PSpice, LaTeX

Important Links

- *Google Scholar*: https://scholar.google.com/citations?user=aWtCveAAAAAJ&hl=en&oi=ao
- *Scopus*: https://www.scopus.com/authid/detail.uri?authorId=57092450400
- *Web of Science ResearcherID*: https://www.webofscience.com/wos/author/record/2341701

Personal Information

- Date of birth: 29 October, 1989
- Gender: Male
- Father's name: Mahesh Kumar Sharma
- Mother's name: Rachana Sharma
- Marital status: Married
- Nationality: Indian
- Languages known: English, Hindi

References

Dr. Behrooz Mirafzal
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Dr. Anil Pahwa
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