Dr. Deepak Reddy Pullaguram

Contact Information

202, Electrical Engineering Department
Indian Institute of Technology Kharagpur
Kharagpur, West Bengal, 721302, India

Mob:+91 99891 79093
E-mail1:drpullaguram@iitkgp.ac.in
E-mail2:deepak.pullaguram@gmail.com

Research Interests

Microgrid systems, renewable integration, power system dynamics, power system optimization.

Education

Indian Institute of Technology Delhi, New Delhi, India.

Ph.D., Electrical Engineering, Power systems. Oct, 2018. CGPA: 9.25/10,

- Thesis Topic: Distributed control strategies for AC and DC microgrids
- Advisors: Prof. Sukumar Mishra and Prof. Nilanjan Senroy

National Institute of Technology Warangal, Telangana, India.

M.Tech., Electrical Engineering, Power systems, May, 2014. CGPA: 8.62/10

- Topic: Meta-Heuristic Based Tuning of Gains for HVDC Supplementary Controller to Improve Transient Stability
- Advisor: Dr. B. Nagu

CVR college of Engineering, Telangana, India.

B.Tech., Electrical and Electronics Engineering , May 2012. Percentage: 81.96%

Teaching Experience

Indian Institute of Technology Kharagpur, West Bengal, India.

Assistant Professor Grade I Sept 2022 to Present

- Course taught,
  - EE60023-Power System Analysis And Operation.
  - EE60005- Renewable And Distributed Energy Systems.

National Institute of Technology Warangal, Warangal, Telangan, India.

Assistant Professor Grade II Dec 2019 to Aug 2022

- Framed syllabus for Microgrid dynamics and control and Smart grid resiliency and cyber security for M.Tech Smart Electric Grid Program.
- Developed Microgrid dynamics and control lab and smart electric grid simulation lab.

Indian Institute of Technology Delhi, New Delhi, India.
PhD student Teaching Assistant June 2014 to Sept 2018

National Institute of Technology Warangal, Warangal, Telangan, India.
Graduate student Teaching Assistant June 2012 to May 2014

Research Experience

University of Texas Arlington, Arlington, TX, USA.

Assistant Professor of Research June 2019 to Nov 2019

- High-performance of optimization and distributed control of microgrids
  PI: Dr. Ramtin Madani, Co-PI: Dr. Ali Davoudi

Faculty Research Associate Nov 2018 to May 2019

- High-performance of optimization and distributed control of microgrids
  PI: Dr. Ramtin Madani, Co-PI: Dr. Ali Davoudi

Indian Institute of Technology Delhi, New Delhi, India.

Research Assistant June 2014 to Oct 2018

- High Energy and Power Density (HEAPD) Solutions to Large Energy Deficits
  Sponsored by DST-EPSRC
  PI: Prof. Sukumar Mishra

Publications

Journals:

1. Rishi Kant Sharma, **D. Pullaguram**, S. Mishra, "Robust Decentralized Auxiliary Damping Controller for Inverter-dominant Autonomous AC Microgrid," in *IEEE Transactions on Smartgrids*. (under review)
2. Ramesh Gugulothu, Nagu Bhookya, and **Deepak Pullaguram**, "Optimal Coordinated Energy Management Strategy for standalone Solar Photovoltaic System withHybrid Energy Storage", *Journal of Energy Storage- Elsevier*. (minor revision)
3. Shan Zuo, **Deepak Pullaguram**, Frank L. Lewis, and Ali Davoudi, "Resilient AC Microgrids against Correlated Attacks," *IEEE access*. vol. 11, pp. 1603-1612, 2023.
4. Ramesh Gugulothu, Nagu Bhookya, and **Deepak Pullaguram**, "Energy Management Strategy for Standalone DC Microgrid with PV, Fuel Cell, and BESS", *Journal of Energy Storage- Elsevier*,Vol. 57, 2023.
5. T. Phani Swecha, **Deepak Pullaguram**, "Distributed Control Microgrids: Cyber Attack Models, Impacts and Remedial Strategies," *IEEE Transactions on Signal and Information Processing Over Networks* vol. 8, pp. 1008-1023, 2022.
6. Ramesh Gugulothu, Bhookya Nagu and **Deepak Pullaguram**, "A computationally efficient jaya optimization for fuel cell maximum power tracking", Energy Sources, Part A: Recovery, Utilization, and Environmental Effects, vol.44 No.1, pp. 1541-1565, 2022
7. **Deepak Pullaguram**, R. Madani, T. Altun and A. Davoudi,"Optimal Power Flow in AC/DC Microgrids with Enhanced Interlinking Converter Modeling," in *IEEE Journal of Emerging and Selected Topics in Industrial Electronics*, *early access*.
8. **Deepak Pullaguram**, Ramtin Madani, Tuncay Altun, and Ali Davoudi, "Small Signal Stability Constrained Optimal Power Flow for Inverter Dominant Autonomous Microgrid", in *IEEE Transactions on Industrial Electronics*, vol. 69, no. 7, pp. 7318-7328, July 2022.
9. **Deepak Pullaguram**, Rubi Rana, S. Mishra, and N. Senroy, "A fully distributed hierarchical control strategy for multi-inverter based AC microgrids," in *IET Renewable Power Generation*vol. 14, no. 13, pp. 2468-2476, Oct. 2020.
10. Rishi Kant Sharma, S. Mishra, Senior Member **D. Pullaguram**, "A robust H_∞ multivariable stabilizer design for droop based autonomous AC microgrid," in *IEEE Transactions on Power Systems* vol. 35, no. 6, pp. 4369-4382, Nov. 2020.
11. S. Madichetty, **D. Pullaguram** and S. Mishra, "A standalone BLDC based solar air cooler with MPP tracking for improved efficiency," in CSEE Journal of Power and Energy Systems, vol. 5, no. 1, pp. 111-119, March 2019.
12. Subham Sahoo, **D. Pullaguram**, Sukumar Mishra, Jianzhong Wu, Nilanjan Senroy,"A containment based distributed finite-time controller for bounded voltage regulation & proportionate current sharing in DC microgrids, Applied Energy, Vol. 228, 2018,Pages 2526-2538, ISSN 0306-2619.
13. **D. Pullaguram**, S. Mishra and N. Senroy, "Event-Triggered Communication Based Distributed Control Scheme for DC Microgrid," *IEEE Transactions on Power Systems*, vol. 33, no. 5, pp. 5583-5593, Sept. 2018.
14. **D. Pullaguram**, S. Mishra, N. Senroy and M. Mukherjee, "Design and Tuning of Robust Fractional Order Controller for Autonomous Microgrid VSC System," in *IEEE Transactions on Industry Applications*, vol. 54, no. 1, pp. 91-101, Jan.-Feb. 2018.
15. **D. Pullaguram**, Sukumar Mishra, Nilanjan Senroy, "Coordinated single-phase control scheme for voltage unbalance reduction in low voltage network," *Philosophical. Trans. Royal Society A*; DOI: 10.1098/rsta.2016.0308. Published 10 July 2017.
16. S. Mishra, **D. Pullaguram**, S. Achary Buragappu and D. Ramasubramanian, "Single-phase synchronverter for a grid-connected roof top photovoltaic system," in *IET Renewable Power Generation*, vol. 10, no. 8, pp. 1187-1194, 9 2016.

Conferences:

1. P. S. V. Prabhakar, R. Krishan and **D. R. Pullaguram**, "Static Security Assessment of Large Power Systems Under N-1-1 Contingency," 2022 22nd National Power Systems Conference (NPSC), New Delhi, India, pp. 35-40, 2022.

2. Kodanda Ram Nagamalli, Phani Swecha Tadepalli, **Deepak Pullaguram**, "Effect of CPL on the Stability of DC Microgrid", *IEEE 2nd International Conference on Sustainable Energy and Future Electric Transportation (SeFeT)*, Hyderabad, India, pp. 1-6, 2022.
3. Maneesh Kumar, Ram krishan, **Deepak Pullaguram**, "Observer based paradigm for resilient secondary control of AC microgrids", *IEEE Conference on electronics, computing and communication technologies (CONECCT)*, Bangalore, India, pp. 1-6, 2022.
4. S.R. Mudaliyar, **D. Pullaguram**, S. Mishra and N. Senroy, "Cascaded Fractional Order and Sliding Mode Control for an Autonomous Voltage Source Inverter," *2018 IEEE Power & Energy Society General Meeting (PESGM)*, Portland, OR, 2018, pp. 1-5.
5. **D. Pullaguram**, S. Mishra and N. Senroy, "Modeling and design of virtual inertia based rooftop PV," 2018 *IEEMA Engineer Infinite Conference (eTechNxT)*, New Delhi, 2018, pp. 1-6.
6. **D. Pullaguram**, S. R. Mudaliyar, S. Mishra and N. Senroy,"Isolated PV battery management system to power home appliances," 2017 *7th International Conference on Power Systems (ICPS)*, Pune, India, 2017, pp. 755-760.
7. M. Kumar, Y. N. Babu, **D. Pullaguram** and S. Mishra, "A high voltage gain non-isolated modified three-port DC/DC converter based on integrated Boost-Cuk topology," 2017 *IEEE PES Asia-Pacific Power and Energy Engineering Conference (APPEEC)*, Bangalore, India, 2017, pp. 1-6.
8. Subham Sahoo, Chenghua Zhang, **Deepak Pullaguram**, Sukumar Mishra and Nilanjan Senroy, "Investigation of Distributed Cooperative Control for DC Microgrids in Different Communication Medium," presented in *9th International Conference on Applied Energy, ICAE 2017*
9. **D. Pullaguram**, Somesh Bhattacharya, Sukumar Mishra and Nilanjan Senroy, "A Fuzzy Assisted Enhanced Control for Utility Connected Rooftop PV," *IFAC World Congress Meeting 2017*, France, Vol. 50, Issue. 1, July 2017, Pages 7693-7698
10. S. Sahoo, **D. Pullaguram**, S. Mishra and N. Senroy, "An adaptive droop based cooperative control framework in DC microgrids," *2017 IEEE Power & Energy Society General Meeting*, Chicago, IL, 2017, pp. 1-5.
11. S. Sahoo, **D. Pullaguram** and S. Mishra, "A consensus priority algorithm based V2G charging framework for frequency response," *2016 IEEE 7th Power India International Conference (PIICON)*, Bikaner, 2016, pp. 1-6.
12. S. Mishra, D. Sharma, Y. Kumar and **D. Pullaguram**, "Lyapunov based frequency independent current controller for grid connected single phase PV systems," *2016 7th India International Conference on Power Electronics (IICPE)*, Patiala, 2016, pp. 1-6.
13. **D. Pullaguram**, S. Mishra and S. Banerjee, "Standalone BLDC based solar air cooler with MPPT tracking for improved efficiency," *2016 IEEE 7th Power India International Conference (PIICON)*, Bikaner, 2016, pp. 1-5.
14. **D. Pullaguram**, M. Mukherjee, S. Mishra and N. Senroy, "Non-linear fractional order controllers for autonomous microgrid system," *IEEE 6th International Conference on Power Systems (ICPS)*, New Delhi, 2016, pp. 1-6.
15. M. Mukherjee, **D. Pullaguram** and S. Mishra, "Dynamic droop based inverter control for autonomous microgrid," *Biennial International Conference on Power and Energy Systems: Towards Sustainable Energy (PESTSE)*, Bangalore, 2016, pp. 1-6.
16. Sukumar Mishra, Subham Sahoo, **Deepak Reddy Pullaguram**, "A Systematic State of Charge based V2G Charging Framework for Frequency Response," *IFAC-PapersOnLine*, Volume 48, Issue 30, 2015, Pages 31-36.
17. T. Murali Krishna, B. Subrahamanyam, **D. Reddy**, N. V. Ramana and S. Kamakshaiah, "Power flow algorithm for radial distribution system with voltage sensitive loads," *Annual IEEE India Conference (INDICON)*, Kochi, 2012, pp. 1069-1071.

Patents

1. Sukumar Mishra, **Deepak Pullaguram** and Dhiman Das, "A Back to Back DC-DC-PV Battery Isolated System to Mimic Inverter to Drive Daily Appliances," Indian Provisional Patent Application No. 201711005776, filed on February 17, 2017.
2. Sukumar Mishra, **Deepak Pullaguram** and Dhiman Das, "Low Disruption Current Estimated Boost Converter For PV Maximum Power Extraction," Indian Provisional Patent Application No. 201611044660, filed on December 28, 2016.

Book Chapter

1. **Deepak Pullaguram**, Subham Sahoo, "Cyber security threats in multi-agent microgrids", 6^{th} Chapter of Cyber Security for Microgrids, IET Digital Library(Energy Engineering) pp. 105-125, 2022.
2. S. Mishra, **Deepak Pullaguram**, "Photovoltaic controller Design," in 6^{th} chapter of *Application of modern heuristic optimization methods in power and energy systems*, IEEE Press John Wiley and Sons Ltd., Hoboken, United States, 2020.

Research Projects

1. "Convex optimization based economic and stable operation of microgrid system" Start-up Research Grant (SRG) Sponsored by *SERB-DST*, Dec 2020 - Dec 2022, **(INR 32,04,860)**.
2. "Dynamic and Static Security Analysis of Large Power System using High-Performance Computing" HPC Applications, Sponsored by *National Supercomputing Mission (NSM)-DST*, Mar 2021 - Mar 2023, **(INR 45,58,160) (Co-PI)**.
3. "Stability Improvement of Microgrid System with Uncertain Generation and Loads" Research Seed (RSM) sponsored by National Institute of Technology Warangal June 2020 - June 2022, **(INR 19,99,500)**.

Awards/ Recognition/ Scholarships

- Received CSEE JPES Excellent Paper Award for Paper entitled "A standalone BLDC based solar air cooler with MPP tracking for improved efficiency".
- Received POSOCO Power System Award (PPSA-2018) for best thesis
- Received A P J Abdul Kalam Memorial International Travel Award for IFAC world congress 2017 conference
- Received PhD scholarship from grants funded by Department of Science and Technology, July 2014 Oct 2018.
- Received Ministry of Human Resources Development (MHRD) scholarship, M. Tech., July 2012 June 2014.

Administrative Roles/Activities

- Faculty Advisor for B.tech 2022-26, Electrical Engineering at IIT Kharagpur.
- Course Coordinator at National Institute of Technology Warangal, M.Tech Smart Electric Grid(SEG) from May-2021 to Aug-2022.
- LMS Moodle Electrical Engineering Dempartment Coordinator, From May, 2020 to May, 2021.
- Nodal Faculty Assistant for MoU between NIT Warangal, Electrical Engineering Department and ABB From Feb, 2020 to till date.

Professional/ Extension Activities

- Program Committee member for '2nd Electric Power and Renewable Energy Conference (EPREC-2021)'
- Organised 5- Days Online Student Training Program Teaching and Learning of 'Open-source simulation software-SCILA,' 10 15 March 2021.
- Organised 6-Day Online Faculty Development Program on 'Design, Development, and Control of Renewable Energy Resource,' dated 21 26 September 2020.
- 5-Day Online Faculty Development Program on 'Operation and control of Various Sources in Microgrids' dated 20-24, July 2020. (co-coordinator).

- Volunteered in the workshop entitled 'Workshop on Grid Integration Of Renewable Energy Sources- GIRES 2015' organised by Prof. Sukumar Mishra at IIT Delhi, New Delhi, India.
- Volunteered in 'Control of Power and Energy Systems - 9th CPES 2015' international conference at IIT Delhi, New Delhi, India.
- Volunteered in '6^{th} IEEE International Conference on Power Systems, 2016 (ICPS 2016)' at India Habitat Centre, Lodi road, New Delhi, India
- Volunteered in the workshop entitled ' Stability and Control of Renewable Energy based Systems- SCRES 2017' organised by Prof. Sukumar Mishra at IIT Delhi, New Delhi, India.

Computer Skills

- Simulation software: Simulink, RT-LAB, PSCAD, DIgSILENT, PSS®E, LABVIEW.
- OPAL-RT eMegasim (real time simulation, Hardware-in-loop (HIL), Power Hardware-in-loop (PHIL)), Typhoon based Hardware in loop, dSPACE Microlab-box, NI sbRIO 9606.
- Languages: Matlab, CVX toolbox, C, Python.

Interests

- Photography
- Travelling
- Playing Badminton
- Reading novels and magazines

references

1. Dr. Ali Davoudi
   Professor
   Department of Electrical Engineering
   The University of Texas Arlington
   Arlington, Texas-76019, USA
   Email: davoudi@uta.edu
   Mobile:(+1)-817-272-1374
2. Dr. Sukumar Mishra
   Professor
   Department of Electrical Engineering
   Indian Institute of Technology Delhi
   Hauz Khas, New Delhi-110016, India.
   Email: sukumariitdelhi@gmail.com, sukumar@ee.iitd.ac.in
   Tel: (+91)-11-2659-1074; Mobile: (+91)-9810429715
3. Dr. Nilanjan Senroy
   Professor
   Department of Electrical Engineering
   Indian Institute of Technology Delhi
   Hauz Khas, New Delhi 110016, India.
   Email: nsenroy@ee.iitd.ac.in
   Tel: (+91)-11-2659-7016