

BIODATA

- Name :** DR. SUSMITA KAR
- Present Position and Organization details:** ASSISTANT PROFESSOR
NIT ROURKELA
- Present office address including email and mobile number:** Room No.-EE124
Departement of Electrical Engineering
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- Date of birth:** 14/07/1987

5. **Academic Qualifications (Bachelor's degree onwards, with University, year, subjects/area**

	Degree	Year	Subject	University/Institution
1.	B.Tech	2009	Electrical Engineering	BPUT Rourkela/ OSME Keonjhar (Presently GCE Keonjhar)
2.	ME	2011	Power Systems	BIT Mesra, Ranchi
3.	PhD	2018	Electrical Engineering	IIT Bhubaneswar, Odisha

6. **Field of specialization:** Power Systems

7. **Positions held earlier:(in reverse chronological order)**

S.No.	Positions held	Name of the Institute	From	To	Pay Scale (INR)
1	Assistant Professor	NIT Rourkela, Odisha, India	27/03/2020	continuing	Grade -II
2	Assistant Professor	C V Raman College of Engineering, Bhubaneswar, Odisha, India	18/03/2019	24/02/2020	15600 (AGP 6000)
3	Assistant Professor	NIST Berhampur, Odisha, India	06/09/2016	16/03/2019	15600 (AGP 6000)
4	JRF	IIT Bhubaneswar	10/04/2012	01/02/2015	Consolidated 18000

8. **Significant engineering contributions:**

Dr Susmita Kar started her research career at IIT Bhubaneswar as a Junior Research Fellow and subsequently PhD research scholar in the year 2012. She carried out research under the external funded project entitled “**Design and development of an anti-islanding protection relay for Distributed Generations**” from Central Power Research Institute, Bangalore. Under this project, she **developed adaptive and intelligent protection schemes for islanding detection and fault protection schemes for microgrids**. The developed islanding detection

schemes are capable of detecting islanding events in microgrid with reduced Non-Detection zones and fault protection schemes capable of performing under wide variations in faults conditions including inverter interfaced distributed generation with enhanced accuracy and speed.

She also developed hierarchical control framework considering intelligent load management to mitigate voltage and frequency abnormalities during both off-peak and peak hours and ensure better energy management in stand-alone microgrids. Further, the interlinking converter control strategy proposed by her enable power sharing between microgrids in dc corridor through forming the networked microgrid. Furthermore, she is working for developing network restructuring algorithm to supply maximum possible loads through formation of new microgrids after a high impact low probability event such as Earth quake, cyclone etc. Furthermore, she is working to detect and distinguish cyber attack from other transient events. She has almost **12 years of research experience** including the **PhD program at IIT Bhubaneswar** and **more than 6 years of teaching and research at NIT Rourkela**. Out of her works, she has **more than 6 years of independent post PhD research work** in the area of microgrid protection, control, planning and cyber security issues.

She has published 18 journal publications of high repute including top notch **IEEE Transactions on Smartgrid, IEEE transaction on Power Delivery, IEEE System Journal IET Generation transmission and Distribution** etc., **16 conference publications** of high repute and **4 book chapters** in CRC Press. Two of her research works got high citation including the paper entitled “**Data-Mining Model Based Intelligent Differential Microgrid Protection Scheme**, IEEE Systems Journal (**Citation of 347**) and “**Time-frequency transform-based differential scheme for microgrid protection**, IET Generation, Transmission and Distribution (**Citation of 286**), which shows the quality of contributions of her research work.

Her research works have brought internationally acclaimed reputation with around 350 citations which has been carried out for providing sustainable solution to the energy crisis and increasing energy demand. Her high grade research work in the PhD thesis brought the prestigious **POSOCO Power System Award in Doctoral Category for the year 2017**.

9. Publications and granted patents details

Reputed Journal publications:

1. Sourav Chakraborty, Susmita Kar, Subhransu Ranjan Samantaray, “Hierarchical voltage unbalance mitigation in networked microgrid: A multi-tier control approach with price-driven energy management”, Electric Power Systems Research, Volume 251, 2026, 112290, <https://doi.org/10.1016/j.epsr.2025.112290>.
2. Kunal Kumar, Prince Kumar, Susmita Kar, “A blockchain-enabled framework for secure synchronization and resilient energy distribution in networked microgrids against false data attacks”, Sustainable Energy, Grids and Networks, Volume 44, 2025, 101880, <https://doi.org/10.1016/j.segan.2025.101880>.
3. K. Kumar and **S. Kar**, "An efficient protection scheme for microgrid using ROC of differential admittance angle", Electric Power Systems Research, vol.227, pp.109969, Elsevier 2024, doi :10.1016/j.epsr.2023.109969.
4. K. Kumar, P. Kumar and **S. Kar**, “A review of microgrid protection for addressing challenges and solutions”, Renewable Energy Focus, Elsevier, Vol. 49, pp. 100572, 2024, doi.org/10.1016/j.ref.2024.100572.

5. K. Kumar, P. Kumar, **S. Kar**, A. K. Bohre, "Anomaly detection technique for securing microgrid against false data attacks", *ISA Transactions*, 2024, doi :10.1016/j.isatra.2024.07.037.
6. K. Kumar and **S. Kar**, "An efficient protection scheme for microgrid using ROC of differential admittance angle", *Electric Power Systems Research*, vol.227, pp.109969, Elsevier 2024, doi :10.1016/j.epsr.2023.109969.
7. S. Chakraborty, S. Bera, S. Kar and S. R. Samantaray, "Ensuring Long Term Sustainability in Networked Microgrids Through Intelligent Load Management and Priority-Based Power Transfer Scheme," in *IEEE Transactions on Power Delivery*, vol. 39, no. 3, pp. 1386-1398, June 2024, doi: 10.1109/TPWRD.2024.3362434
8. S. Chakraborty, **S. Kar**, and S. R. Samantaray, "Hierarchical dual loop voltage and frequency control in stand alone microgrid with priority based intelligent load management", *Electric Power Systems Research*, vol.220, Elsevier 2023, doi :10.1016/j.epsr.2023.109339.
9. K. Kumar, P. Kumar, **S. Kar**, A. K. Bohre, and S. A. Gebereselassie, "A Static State Estimation Scheme in Microgrid Utilizing μ PMU Measurements", *International Transactions on Electrical Energy Systems*, vol.2023, pp.13, Hindawi 2023, doi :10.1155/2023/1916299.
10. S. Chakraborty and **S. Kar**, "Hierarchical control of networked microgrid with intelligent management of TCLs: A case study approach", *EPSR*, vol.224, Elsevier 2023, doi :10.1016/j.epsr.2023.109787.
11. S. Chakraborty and **S. Kar**, "Voltage unbalance and inertia based frequency control framework considering intelligent load management for stand-alone operation of microgrid", *International Journal of Electrical Power & Energy Systems*, vol.155, pp.109485, ELSEVIER, September 2023, doi : 10.1016/j.ijepes.2023.109485
12. S. Bera, S. Chakraborty, S. Kar and S. R. Samantaray, "Hierarchical Control for Voltage Unbalance Mitigation Considering Load Management in Stand-Alone Microgrid," in *IEEE Transactions on Smart Grid*, vol. 14, no. 4, pp. 2521-2533, July 2023, doi: 10.1109/TSG.2022.3222490.
13. **S. Kar** and S. Samantaray, "Impact of Microgrid Operation on the Performance of Overcurrent Relay Coordination and Assessment of Differential Relay Coordination", *Electric Power Components and Systems*, vol.48, no.9-10, pp.1049-1062, Taylor and Francis 2020, doi : 10.1080/15325008.2020.1825550.
14. **S. Kar**, S. R. Samantaray, and M. D. Zadeh, "Data-Mining Model Based Intelligent Differential Microgrid Protection Scheme", *IEEE Systems Journal*, vol.11, no.2, pp.1161-1169, IEEE 2017, doi :10.1109/JSYST.2014.2380432.
15. **S. Kar**, "A comprehensive protection scheme for micro-grid using fuzzy rule base approach", *Energy Systems*, vol.8, no.3, pp.449-464, Springer 2016, doi :10.1007/s12667-016-0204-x.
16. **S. Kar** and S. R. Samantaray, "A Fuzzy Rule Base Approach for Intelligent Protection of Microgrids", *Electric Power Components and Systems*, vol.43, no.18, pp.2082-2093, Taylor and Francis Online 2015, doi :10.1080/15325008.2015.1070384.
17. **S. Kar** and S., "Time-frequency transform-based differential scheme for microgrid protection.", *IET Generation, Transmission & Distribution*, vol.8, no.2, pp.310-320, IET 2014, doi :10.1049/iet-gtd.2013.0180.
18. **S. Kar** and S., "Data-mining-based intelligent anti-islanding protection relay for distributed generations.", *IET Generation, Transmission & Distribution*, vol.8, no.4,

Conference publications:

1. S. Chakraborty, K.Kumar and **S. Kar**, "Hierarchical Control Framework in Networked Microgrid," 2024 IEEE International Conference on Smart Power Control and Renewable Energy (ICSPCRE-2024), Rourkela, India (Presented).
2. K. Kumar, S. Chakraborty, P. Kumar and **S. Kar**, " Blockchain-Based Defense Mechanisms for Mitigating Unnecessary Islanding in Microgrids Against Cyber-Attack," 2024 IEEE International Conference on Smart Power Control and Renewable Energy (ICSPCRE-2024), Rourkela, India (Presented).
3. B. Mouleeka, S. Chakraborty and **S. Kar**, "Voltage Unbalance Control in Stand-Alone Microgrid," *2023 International Conference in Advances in Power, Signal, and Information Technology (APSIT)*, Bhubaneswar, India, 2023, pp. 221-225, doi: 10.1109/APSIT58554.2023.10201702.
4. S. Chakraborty, B. Mouleeka and **S. Kar**, "LSTM based Intelligent Load Management in a Stand-Alone Microgrid," *2023 International Conference in Advances in Power, Signal, and Information Technology (APSIT)*, Bhubaneswar, India, 2023, pp. 402-405, doi: 10.1109/APSIT58554.2023.10201770.
5. S. Chakraborty and **S. Kar**, "Hierarchical Control of Stand Alone Microgrid for Peak and off-peak Hours Operation," *2022 IEEE 10th Power India International Conference (PIICON)*, New Delhi, India, 2022, pp. 1-5, doi: 10.1109/PIICON56320.2022.10045215.
6. B. N. Sahoo and **S. Kar**, "High Impedance Fault Detection in Microgrid Using Sum of Difference Method," *2022 IEEE Students Conference on Engineering and Systems (SCES)*, Prayagraj, India, 2022, pp. 01-04, doi: 10.1109/SCES55490.2022.9887665.
7. S. Chakraborty, **S. Kar** and D. Kumar, "Review of Demand Side Management With Thermostatically Controllable Loads," *2021 IEEE 2nd International Conference On Electrical Power and Energy Systems (ICEPES)*, Bhopal, India, 2021, pp. 1-5, doi: 10.1109/ICEPES52894.2021.9699799.
8. R. Pradhan and **S. Kar**, "A Comprehensive Study of Partial Shading Effect on the Performance of PV array with Different Configuration," *2020 International Conference on Renewable Energy Integration into Smart Grids: A Multidisciplinary Approach to Technology Modelling and Simulation (ICREISG)*, Bhubaneswar, India, 2020, pp. 78-83, doi: 10.1109/ICREISG49226.2020.9174548.
9. **S. Kar** and S. R. Samantaray, "High impedance fault detection in microgrid using maximal overlapping discrete wavelet transform and decision tree," *2016 International Conference on Electrical Power and Energy Systems (ICEPES)*, Bhopal, India, 2016, pp. 258-263, doi: 10.1109/ICEPES.2016.7915940.
10. **S. Kar**, D. Jati and S. R. Samantaray, "Overcurrent relay coordination for micro-grid with different operating conditions," *2016 IEEE 6th International Conference on Power Systems (ICPS)*, New Delhi, India, 2016, pp. 1-6, doi: 10.1109/ICPES.2016.7584205.
11. **S. Kar** and S. R. Samantaray, "Data-mining based comprehensive primary and backup protection scheme for micro-grid," *2015 IEEE Power, Communication and Information Technology Conference (PCITC)*, Bhubaneswar, India, 2015, pp. 505-510, doi: 10.1109/PCITC.2015.7438217.

12. **S. Kar** and S. R. Samantaray, "Multiple features based anti-islanding protection relay for distributed generations," *2014 International Conference on Smart Electric Grid (ISEG)*, Guntur, India, 2014, pp. 1-6, doi: 10.1109/ISEG.2014.7005602.
13. **S. Kar** and S. R. Samantaray, "Combined S-transform and data-mining based intelligent micro-grid protection scheme," *2014 Students Conference on Engineering and Systems*, Allahabad, India, 2014, pp. 1-5, doi: 10.1109/SCES.2014.6880053.
14. **S. Kar** and S. R. Samantaray, "Intelligent anti-islanding protection scheme for distributed generations," *2013 Annual IEEE India Conference (INDICON)*, Mumbai, India, 2013, pp. 1-5, doi: 10.1109/INDCON.2013.6725933.
15. S. Chandra, **S. Kar**, A. Srinivasulu and D. K. Mohanta, "Distribution system automation based on GSM using Programmable System on Chip (PSOC)," 2011 International Conference on Sustainable Energy and Intelligent Systems (SEISCON 2011), Chennai, India, 2011, pp. 440-443, doi: 10.1049/cp.2011.0403
16. C. Murthy, **S. Kar**, R. C. Jha and D. K. Mohanta, "Distribution Automation Using Wireless Communications for Improving Reliability," *2011 International Conference on Devices and Communications (ICDeCom)*, Mesra, India, 2011, pp. 1-5, doi: 10.1109/ICDECOM.2011.5738544.

Book Chapter

1. Mouleeka, B., Sourav Chakraborty, and **Susmita Kar**. "Review of Control Strategy with Different Loading Conditions Considering Demand Side Management." In *Distributed Energy Resources and Electric Vehicle*, pp. 121-136. CRC Press, 2024.
2. Kunal Kumar, Prince Kumar and **Susmita Kar**. "A Non-Iterative Robust Scheme for Static State Estimation Based on S-Estimator Using Complex PMU Measurements" In *Renewable Resources and Energy Management*, CRC Press, 2023.
3. Kunal Kumar, Sourav Chakraborty, **Susmita Kar**. "Blockchain-Based Approach for Mitigating Malicious Load Shedding in Microgrids" In the book *Microgrid 4.0: Sustainable Energy for Resilient Infrastructure*, CRC Press, pp 104-125. <https://doi.org/10.1201/9781003513452>
4. Sourav Chakraborty, Kunal Kumar, and **Susmita Kar**. "Resilience Enhancement in Networked Microgrid with Multi Stage Control Mechanism" In the book *Microgrid 4.0: Sustainable Energy for Resilient Infrastructure*, CRC Press, pp 126-142. <https://doi.org/10.1201/9781003513452>

Patent

1. K. Kumar, P. Kumar, **S. Kar**, N. Adhikary and A. K. Bohre "System and method for FDIA detection in microgrids using blockchain technology" Indian Patent, Application no.- 202431073378, (Granted).

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|-----|---|---|
| 10. | Major Sponsored/Consultancy Projects completed as principal investigator : | Co-PI in ANRF-SERB (PAIR) funded project title 'Consortium of Technologies for Sustainable Agriculture, Health , Energy and Environment'. |
| 11. | National/International Fellowship, Awards, Prizes received | POSOCO Power System Award-2017 for PhD Thesis, GATE-2011 |
| 12. | Other Information: | Fair knowledge of MATLAB, Simulink, |

Data- mining Software, RTDS etc.

13. **Subject Taught:**

Sl. No.	Subject	Degree
i.	Network Theory {Theory}	B.Tech
ii.	Electrical Power Transmission and Distribution{Theory}	B.Tech
iii.	Power System Protection{Theory}	B.Tech
iv.	Smart Electrical Energy System{Theory}	M.Tech
v.	Basic Electrical Engineering{Theory}	B.Tech
vi.	High Voltage Engineering and HVDC Transmission{Theory}	B.Tech
vii.	Power System Protection{Theory}	M.Tech
viii.	Basic Electrical Engineering Laboratory {Practical}	B.Tech
ix.	Power Systems Laboratory {Practical}	B.Tech
x.	Power System Simulation Laboratory {Practical}	B.Tech

14. **Project Guided :**

B.Tech Project Guided

	Project Title	Year
i.	Modelling and Simulation of Electric Vehicle's Chargers	2021
ii.	Power System Fault Analysis & Design of Overcurrent Protection Scheme	2023
iii.	Design of PWM Based EV Charger With In-house Microgrid Charging	2023
iv.	G2V and V2G operations in EV charger	2023
v.	Intelligent management of schedulable loads at NIT Rourkela academic area	2023
vi.	Protection of Microgrid	2024
vii.	Inrush detection in transformer using negative sequence current	2024

M.Tech Project Guided

	Project Title	Year
i.	Modeling and Simulation of PV System with MPPT	2016
ii.	High Impedance Fault Detection in Microgrid Based on Non-	2022

	Linearity and Asymmetry Properties of Current Waveform	
iii.	Positive Sequence Impedance Angle Based Microgrid Protection Scheme	2022
iv.	Intelligent Load Management in Microgrid	2023
v.	Design of Hybrid Islanding Detection Technique Considering Modified SFS & Q/f Ratio for Microgrid.	2023
vi.	Design of controller for voltage unbalance and zero sequence component mitigation in Stand-alone microgrid	2023
vii.	Resiliency Enhancement in Microgrid through critical load restoration	2024
viii.	An Adaptive Droop Scheme for improving Transient and Steady-State Power Sharing Among Distributed Generator in Islanded Microgrids	2024

PhD Supervision

Thesis Title		Status
i.	Development of Hierarchical Control Framework for Stand-alone Microgrid with Networking Capabiity to Ensure Long Term Sustainability	Graduated (Nov 2024)
ii.	Development of a Multi-Layer Protection Framework for Cyber-Physical Microgrids.	Graduated (Mar 2026)

15. **National/International Fellowship, Awards, Prizes received** POSOCO Power System Award-2017 for PhD Thesis, GATE-2011
16. **Professional Body Membership Reviewer** IEEE Senior Member (IEEE Young Professional, IEEE PES Societymember, Women in Engineering etc.)
IET Generation Transmission and Distribution
IEEE System Journal
IEEE Transaction on Power Delivery
Sustainable Grid and Networks, Elsevier
Applied Energy, Elsevier
Electrical Power Components and

System, Taylor & Francis
Scientific Reports etc.

Declaration

I declare that the foregoing information is correct to the best of my knowledge and belief and nothing has been concealed / distorted. If any time, I am found to have concealed / distorted any material information, my candidature shall be liable to termination without notice.