Dr. SUDIPTA GHOSH

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ACADEMIC CHRONICLE

➢ PhD in Electrical Engineering from *Indian Institute of Technology*, Delhi, India. (2013)

Thesis title: *Application of Model Order Reduction Techniques in Modern Power Systems.* (Received prestigious POSOCO Power System Award (PPSA) for the research excellence in power system by Power Grid, 2014).

➢ Master of Engineering in Industrial Electrical Systems from *National Institute of Technology*, Durgapur, India

Thesis title: *Optimal Sizing and Placement of Distributed Generation in Large Scale Power Systems* (2009).

➢ Bachelor of Engineering in Electrical Engineering from *National Institute of Technology*, Jamshedpur, Jharkhand, India. (2002)

INVITED LECTURES

1. Real-time frequency based reduced order modeling of large power grid Skolkovo Institute of Science and Technology (Skoltech), Russian Federation, Moscow Region, 3rd Oct 2016.
2. Advanced Approaches to Renewable Energy Integrated Power System Modeling and Energy Management IISC Bangalore, 28th Nov 2016.
3. Wind Energy Conversion System IIT Palakkad, 28th Dec 2016.
4. Two sessions Dynamic modelling of Renewable energy resources and Grid operation & control challenges for Weak inertia systems at Central Power Research Institute (CPRI), Bengaluru, India, 9-10th Nov 2017.

AWARDS AND RECOGNITION

1. Developed the **SAVE Tool** (Stability Assessment, Visualization, and Enhancement) for **TRANSCO, UAE** and received the first-place R&D award from the Ministry of Energy and Infrastructure from top 53 projects around the world, 2023 and received a cash price of 20,000 AED from MOEI (Ministry of Energy and Infrastructure in UAE).
2. Awarded the "**POSOCO Power System Award** (PPSA-2014)" for outstanding work in the doctoral thesis, which is presented by Power System Operation Corporation Limited in collaboration with the Foundation for Innovation and Technology Transfer at IIT Delhi. This recognition includes a citation and a cash prize of INR 60,000.
3. Appointed as **Associate Graduate Faculty member (UNC, USA)**.
4. Awarded fellowship from 'COST, E.On Energy research Centre, **RWTH Aachen, Germany**.
5. Received scholarship from **CSIR, INDIA** to present paper in IEEE GM, 2012, San Diego, California, USA.
6. Received MHRD scholarship from **IIT Delhi** during PhD.
7. **National Scholarship holder** from West Bengal Board of Secondary Education.
8. **Elevated to Senior Member of IEEE,** a recognition of significant contributions and professional achievements to the power industry and IEEE Young Professional member.

PROFESSIONAL APPOINTMENTS

1. **Assistant Professor:** Department of Electrical Engineering, NIT Kurukshetra, India. Joined on 20th Feb-2023.
2. **Research Scientist:** Department of Electrical Engineering, Khalifa University, Abu Dhabi, UAE. July 2018 – Feb 2023.

3. **Assistant Professor:** Department of Electrical Engineering, SRM University, India. July 2017- Dec 2017

4. **Assistant Professor:** Department of Electrical Engineering, Shiv Nadar University, India. Oct. 2016 - May 2017

5. **Associate Graduate faculty member:** Department of Computer Science and Electrical Engineering, University of North Carolina, USA. Mar. 2014 – Sep. 2016

6. **Assistant Professor:** Department of Electrical Engineering, Indian Institue of Technology Dhanbad, India. Apr. 2013 – Feb. 2014

7. **Senior Lecturer:** Department of Electrical Engineering, Dr. B.C. Roy Engg college, India. Aug. 2008 – Jun. 2009

8. **Lecturer:** Department of Electrical Engineering, Birbhum Institute of Engineering and Technology, Suri, India. Nov. 2005 – Jul. 2008

9. **Sales Executive:** Havells India Ltd, Bajaj Electricals Ltd, Kolkata, India. Apr. 2004 –Oct. 2005

10. **Graduate Engineer**: Erectile Engineers, India. Sep. 2002-Apr. 2003

   Total years of Experience (Post PhD) : 12 Years

RESEARCH INTERESTS

- ❖ Power system dynamics and control with integrated renewable energy resources and storage
- ❖ Power system transient stability analysis based on energy function and structure preserving based method
- ❖ Integrated modelling of power system for transient stability and small signal stability analysis based on Model Order Reduction (MOR)
- ❖ Real time frequency based reduced order modelling of large power grid
- ❖ Power system inertia estimation and control
- ❖ Bus inertia estimation to enhance the grid dynamic flexibility of hybrid power systems
- ❖ Application of machine learning algorithm in Power Systems dynamics and control studies

TEACHING INTERESTS

- ❖ Power System dynamics
- ❖ Power system operation and control
- ❖ Power system analysis
- ❖ Smart Grid Course
- ❖ Adaptive Control
- ❖ Power System Simulation Lab (PSS/E, Dig-Silent, Hyper-SIM (OPAL RT), PST, PSAT, MAT LAB etc.)

PUBLICATIONS

Synopsis: Total Citations: 1641, h- index: 18, i10- index:23 (Google Scholar)

1. **Sudipta Ghosh**, " An Estimation of COI Frequency using Minimal Measurements in Renewable Power Grid," *IEEE trans. on Industry app.,* July 2024 (Accepted).

2. **Sudipta Ghosh**, Younes J. Isbeih, Mohamed Moursi and Ehab El-Saadany, " An Efficient Method for Estimating Inertia of a PV-Integrated Power Grid for Enhanced Security," *IEEE trans. on smart grid*, vol. 15, no. 6, pp. 5885-5898, Nov. 2024.

3. Faisal Sattar, **Sudipta Ghosh**, et al. "A Predictive Tool for Power System Operators to Ensure Frequency Stability for Power Grids with Renewable Energy Integration" in Applied Energy, vol 353, Part B, 2024.

4. **Sudipta Ghosh**, Younes J. Isbeih, and Mohamed Moursi, "Assessment of Bus Inertia to Enhance Dynamic Flexibility of Hybrid Power Systems with Renewable Energy Integration," in *IEEE trans. on Power Del.*, vol. 38, no. 4, pp. 2372-2386, Aug. 2023.

5. **Sudipta Ghosh** and Mohamed Moursi, "An Analytical Approach for Frequency Estimation of Modern Power Grid," in *IEEE trans. on Power Syst.,* vol. 37, no. 5, pp. 4094-4097, Sept. 2022.

6. **Sudipta Ghosh**, Younes J. Isbeih, Syafiq. Azman, Mohamed Moursi and Ehab El-Saadany, "Optimal PMU Allocation Strategy for Completely Observable Networks with Enhanced Transient Stability Characteristics," in *IEEE trans. on Power Del.*, vol. 37, no. 5, pp. 4086-4102, Oct. 2022.

7. Younes J. Isbeih, **Sudipta Ghosh,** Mohamed Moursi, Ehab El-Saadany,"Online DMDc Based Model Identification Approach for Transient Stability Enhancement Using Wide Area Measurements", in *IEEE trans. on power syst.,* vol. 36, no. 5, pp. 4884-4887, Jul. 2021.

8. Abilash Thakallapelli, **Sudipta Ghosh** and Sukumar Kamalasadan, "Sensorless real-time reduced order model-based adaptive maximum power tracking pitch controller for grid connected wind turbines", *Electric Power System Research*, vol. 194, pp. 107-115, 2021.

9. **Sudipta Ghosh**, Younes J. Isbeih, Mohamed Moursi, Ehab El-Saadany and S Kamalasadan, "Dynamic Coordination Control Architecture for Reactive Power Capability Enhancement of the DFIG-based Wind Power Generation", *IEEE trans. on power syst.*, vol. 35, no. 4, pp. 3051-3064, 2020.

10. **Sudipta Ghosh**, Mohamed Moursi, Ehab El-Saadany and Khalifa Al Hosani, "Online Coherency Based Adaptive Wide Area Damping Controller for Transient Stability Enhancement", *IEEE trans. on power syst.*, vol. 35, no. 4, pp. 3100-3113, 2020.

11. **Sudipta Ghosh**, Younes J. Isbeih, Mohamed Moursi, and Ehab El-Saadany, "Cross-Gramian Model Reduction Approach for Tuning Power System Stabilizers in Large Power Networks", *IEEE trans. on power syst.*, vol. 35, no. 3, pp. 1911-1922, 2020.

12. Abilash Thakallapelli, **Sudipta Ghosh** and Sukumar Kamalasadan, "Development and Applicability of Online Passivity Enforced Wide-Band Multi-Port Equivalents For Hybrid Transient Simulation", *IEEE trans. on power syst.*, vol. 34, no. 3, pp. 2302-2311, May 2019.

13. Rojan Bhattarai, Niroj Gurung, **Sudipta Ghosh**, Sukumar Kamalasadan, "Parametrically Robust Dynamic Speed Estimation Based Control for Doubly Fed Induction Generator ", *IEEE trans. on Industry app.*, vol. 54, no. 6, pp. 6529-6542, 2018.

14. Tim Paul, Sheikh J. Hossain, **Sudipta Ghosh**, Pranab Mandal, Sukumar Kamalasadan, "A Quadratic Programming Based Optimal Power and Battery Dispatch for Grid-Connected Microgrid", *IEEE trans. on Industry app.*, vol. 54, no. 2, pp.1793-1805, 2018.

15. **Sudipta Ghosh**, and Sukumar Kamalasadan, "An Integrated Dynamic Modeling and Adaptive Controller Approach for Flywheel Augmented DFIG Based Wind System", *IEEE trans. on power syst.*, vol. 32, no. 3, pp. 2161-2171, 2017.

16. **Sudipta Ghosh**, and Sukumar Kamalasadan, "An Energy Function based Optimal Control Strategy for output stabilization of Integrated DFIG-Flywheel Energy storage System", *IEEE*

trans. on smart grid, vol. 8, no. 4, pp. 1922-1931, 2017.

17. **Sudipta Ghosh**, Sukumar Kamalasadan, Nilanjan Senroy and Johan Enslin, "Doubly Fed Induction Generator (DFIG)-based Wind Farm Control Framework for Primary Frequency and Inertial Response Application", *IEEE trans. on power syst.*, vol. 31, no. 03, pp.1861-1871, 2016.

18. Nikhil Kulkarni, Sukumar Kamalasadan, **Sudipta Ghosh**, "An Integrated Method for Optimal Placement and Tuning of Power System Stabilizer Based on Full Controllability Index and Generator Participation", *IEEE trans. on Industry app.*, vol. 51, no. 5, pp. 4201-4211, 2015.

19. **Sudipta Ghosh**, and Nilanjan Senroy, "Electromechanical Dynamics of Controlled Variable Speed Wind Turbines", *IEEE syst. Journal.*, vol. 9, no. 2, pp. 639-646, 2015.

20. **Sudipta Ghosh**, and Nilanjan Senroy, "Balanced Truncation based Reduced Order Modeling of Wind Farm", *Int. J. Elect. Power Energy Syst.*, vol. 53, pp. 649-655. 2013.

21. **Sudipta Ghosh**, and Nilanjan Senroy, "Balanced Truncation Approach to Power System Model Order Reduction", *Electric Power Components and Syst.*, vol. 41, no. 8, pp. 747-764, 2013.

22. **Sudipta Ghosh**, and Nilanjan Senroy, "The Localness of Electromechanical Oscillations in Power Systems", *Int. J. Elect. Power Energy. Syst.*, vol. 42, no. 1, pp. 306-313, 2012.

23. **Sudipta Ghosh**, S. P. Ghoshal and Saradindu Ghosh "Optimal Sizing and Placement of Distributed Generation in a Network System", *Int. J. Elect. Power Energy. Syst.*, vol. 32, no. 8, pp. 849-856, 2010.

PROCEEDINGS IN THE CONFERENCES

1. **Sudipta Ghosh**, Rojan Bhattarai ,Sukumar Kamalasadan, "Reactive Power Estimation based Adaptive Voltage Control for Improved Grid Voltage Restoration using Doubly Fed Induction Generators" *IEEE ITEC India* , Pune, India, 13-15th Dec 2017.

2. Abilash Thakallapelli**, Sudipta Ghosh** and Sukumar Kamalasadan, "Real-Time Reduced Order Model Based Adaptive Pitch Controller for Grid Connected Wind Turbines*", Proc. of IEEE Industrial Applications Society Annual Meeting,* Portland, Oregon, USA, Oct 2016.

3. Abilash Thakallapelli, **Sudipta Ghosh** and Sukumar Kamalasadan, "Real-time Frequency Based Reduced Order Modelling of Large Power Grid**",** in *Proc.* of *IEEE PES General Meeting,* Boston, Massachusetts, USA, July 2016.

4. T.Paul, **Sudipta Ghosh**, Sukumar Kamalasadan and P. Mondal, "A Quadratic Programming Based Optimal Power and Battery Dispatch for Grid Connected Microgrid*", Proc. of IEEE Industrial Applications Society Annual Meeting,* Portland, Oregon, USA, Oct 2016.

5. T.Paul, **Sudipta Ghosh** and Sukumar Kamalasadan, "A Hybrid Battery Optimal Power Dispatch for Grid Connected Micro Grid*" , Proc. of IEEE PEDES*, Trivandrum, India, Dec-2016.

6. **Sudipta Ghosh**, Nilanjan Senroy, Sukumar Kamalasadan and Sukumar Mishra, "Fast PSS Tuning in Large Power Systems", in *Proc.* of *IEEE PES General meeting*, Denver, CO, USA, July 2015.

7. **Sudipta Ghosh**, Nilanjan Senroy and Sukumar Kamalasadan, "Reduced Order Modeling of Wind Farms for Inclusion in Large Power System Simulations for Primary Frequency Response", *North American Power Symposium (NAPS)*, Pullman,WA, USA, Sept. 2014.

8. **Sudipta Ghosh**, "Closed loop Control of a DFIG based Wind Power System", in *Proc.* of *IEEE ISGT ASIA* 2013, Bangalore, India, Nov 2013.

9. **Sudipta Ghosh**, and Nilanjan Senroy, "A Comparative Study of Two Model Order Reduction Approaches for Application in Power Systems", in *Proc.* of *IEEE PES General Meeting*, San Diego, California, USA, pp. 1-8, July 2012.

10. **Sudipta Ghosh**, and Nilanjan Senroy, "Effect of generator type on the participation of

adjacent synchronous machines in electromechanical oscillations", *Proc. IEEE PEDES*, pp. 1-3, New Delhi, India, Dec 2010.

11. **Sudipta Ghosh**, S. P. Ghoshal and Saradindu Ghosh, "Two Analytical Approaches for Optimal Placement of Distributed Generation Unit in Power Systems", *Proc. IEEE ICPS*, pp-1-4, Kharagpur, India, Dec 2009.

PATENTS GRANTED:

- **Sudipta Ghosh,** *A Method and System for Online Tracking of Inertia of A Power Source* (Patent Number : 546753, 31st July 2024) in the name of National Institute of Technology, Kurukshetra, India.

PATENTS PUBLISHED:

- **Sudipta Ghosh** and El Moursi, *Bus Inertia For Enhancing Dynamic Flexibility Of Hybrid Power Systems,* US Patent. Aug, 2022. U.S. Application No 63/402,012.

BOOK CHAPTER:

1. Ramanjot Singh, **Sudipta Ghosh** & Rajesh Kumar, "A Review on Different Voltage Source Converter based Multi-Terminal Direct Current System Control Schemes" accepted in International Conference on Recent Advancement in Smart Energy Systems & Intelligent Automation (2024). (accepted for publications in **"Lecture Notes in Electrical Engineering" series (https://www.springer.com/series/7818).**

2. Ramanjot Singh, **Sudipta Ghosh** & Rajesh Kumar, " A Comparative Study Between Fixed Droop Control & Adaptive Droop Control in Voltage Source Converter Based MTDC system" accepted in International Conference on Recent Advancement in Smart Energy Systems & Intelligent Automation (2024). (accepted for publications in **"Lecture Notes in Electrical Engineering" series (https://www.springer.com/series/7818).**

CO-MENTER IN PROJECTS

1. A. Thakkalapelli, "Approaches for Real time frequency based Reduced Order Modelling and Wide area Control of Modern Power Grid", Sept 2018 (PhD), UNC, USA.
2. R. Bhattarai, "Adaptive Control of Renewable Energy Resources for Improving the Dispatchability and Operation Stability of Renewable Energy Integrated Power System", August 2018 (PhD), UNC, USA.
3. R. Buyyanapragada, "Structure Preserving Energy Function Based Analysis of the power grid", March 2015, (MS), UNC, USA.
4. Faisal Sattar, "Design and Control of Transmission Level Interconnected PV System Augmented with ESS for Grid Support Functions", Dec 2021 (MS), KU, UAE.
5. Abdula Fawzy Saleem, "Enhancement of power system transient stability using machine learning and MPC", July 2021 (MS), KU, UAE.

CURRENT PG STUDENTS

Student Name	Topic
Ashok Kumar (PhD)	Wide Area Damping Controller for Hybrid Power Systems
Ramonjot Singh (M. Tech) (Completed)	Improved Dc Voltage Transient And Frequency Support Control Of Voltage Source Converter Based Multi terminal Direct Current System .
Ashish Singh (M. Tech)	Small-signal Stability and Grid Flexibility Constrained OPF with Solar Photovoltaic (PV) Power Generation

REFERENCES

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