

Kaushik Mukherjee

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Current Affiliation:

Associate Professor, Department of Electrical Engineering, Indian Institute of Engineering Science and Technology, (formerly Bengal Engineering and Science University, abbreviated as BESU), Shibpur, Howrah, INDIA – 711103.

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Research Interests:

Electrical Machines, Power Electronics Applications - Electrical Machine Drives, Active front end converters, Flexible AC transmission devices, Distributed Generation, Electrified Vehicles.

Education:

- Bachelor of Electrical Engineering – Jadavpur University, Calcutta, India, 1993.
- Master of Electrical Engineering – Bengal Engineering College (Deemed University), Howrah, India, 1998.
Specialization – Power Electronics
- Doctor of Philosophy (Electrical Engineering) – Indian Institute of Technology, Kharagpur, India, 2003.
Thesis title - Development of a Commutatorless Series Motor Drive for High Power Applications

List of Awards & Honours:

- Merit certificates for excellence in Secondary and Higher Secondary Examinations, 1987 & 1989.
- Secured 6th position in the University among a class of around 100 students in the Bachelor of Electrical Engineering, 1993.
- Secured 1st position in the University at the Master of Electrical Engineering, 1998.
- ‘Visiting Professor’ to the Centre for Hybrid Automotive Research and Green Energy, University of Windsor, Canada, July 2011-June 2012, May-July 2014, May-July 2015, May-July 2016, June-July 2017.

Work Experience:

➤ **Industrial:**

- In the field of design, production and testing of transformer-based stepless voltage regulators (up to 33kV, 5 MVA class), on-load tap-changer based step voltage regulators (up to 2 MVA, 11kV class), distribution transformers and flameproof transformers – more than 1 year (1993 – 1994) under Brentford Unit, M/S Andrew Yule & Co. Ltd., Calcutta, India.
- In the execution of hot strip mill modernization project in Rourkela Steel Plant, India – 1 year (1994 – 1995) under M/S SIEMENS Ltd., Projects Division, India.

➤ **Research:**

- Worked as research scholar leading to PhD in the field of DC Commutatorless Series Motor Drives in IIT Kharagpur, India – 4.5 years (1998 – 2002)

- As a Visiting Professor to the Center for Hybrid Automotive Research and Green Energy (CHARGE), University of Windsor, Canada – 1 year (July 2011- June2012), 2 months (May 2014-July 2014), 2 months (May 2015-July 2015), 2 months (May 2016-July 2016), 2 months (June 2017-July 2017)

➤ Teaching:

- As *Lecturer* in the Department of Electrical Engineering, Jadavpur University, Kolkata, India from June 2002- February 2006.
- As *Lecturer* in the Department of Electrical Engineering, Bengal Engineering and Science University (BESU), Howrah, India from February 2006- June 2006.
- As *Assistant Professor* in the Department of Electrical Engineering, Bengal Engineering and Science University (BESU), Howrah, India from June 2006-March 2014.
- As *Assistant Professor* in the Department of Electrical Engineering, Indian Institute of Engineering Science and Technology, Shibpur, India from April 2014-February 2019.
- Currently continuing as *Associate Professor* in the Department of Electrical Engineering, Indian Institute of Engineering Science and Technology, Shibpur, India

Publications:

International Journals/transactions:

1. S. Sengupta, **Kaushik Mukherjee**, T. K. Bhattacharya and A. K. Chattopadhyay, “Performance of an SCR-Inverter-Based Commutatorless Series Motor with Load Commutation and Unaided Startup Capability”, **IEEE Transactions on Industry Applications**, vol. 36, No. 4, July-August 2000, pp. 1151-1157.
2. **Kaushik Mukherjee**, S. Sengupta, T. K. Bhattacharya and A. K. Chattopadhyay, “Simplified Steady-State Model of an SCR-Inverter-Based Load-Commutated Commutatorless Series Motor”, **IEEE Transactions on Energy Conversion**, vol. 17, No. 2, June 2002, pp. 197-202.
3. **Kaushik Mukherjee**, S. Sengupta, T. K. Bhattacharya, A. K. Chattopadhyay and S. N. Bhadra, “A Simplified Analytical Averaged model of a Thyristorized Commutatorless Series Motor”, **IEEE Transactions on Industry Applications**, vol. 42, No. 6, Nov.-Dec. 2006”, pp. 1508-1515.
4. K. L. V. Iyer, X. Lu, **Kaushik Mukherjee**, and N. C. Kar, “A Novel Two-Axis Theory based Approach towards Parameter Determination of Line-Start Permanent Magnet Synchronous Machines”, **IEEE Transactions on Magnetics**, vol. 48, no. 11, November 2012 pp. 4208-4211.
5. X. Lu, K. L. V. Iyer, **Kaushik Mukherjee**, and N. C. Kar, “A Wavelet/Particle Swarm Optimization based Voltage Regulation Scheme and Suitability Analysis of Copper- and Aluminum-rotor Induction Machines for Distributed Wind Power Generation”, **IEEE Transactions on Smart Grid**, vol. 3, no. 4, December 2012, pp. 1923-1934.
6. X. Lu, K. L. V. Iyer, **Kaushik Mukherjee**, and N. C. Kar, “A Dual Purpose Triangular Neural Network Based Module for Monitoring and Protection in Bi-directional Off-board Level-3 Charging of EV/PHEV”, **IEEE Transactions on Smart Grid**, vol. 3, no. 4, December 2012, pp. 1670-1678.
7. S. B. Chaudhury, M. Sengupta and **Kaushik Mukherjee**, “Experimental study of induction motor misalignment and its online detection through data fusion”, **IET Journal Elect. Power Appl.**, vol.7, no.1, Jan. 2013, pp. 58-67.
8. Xiaomin Lu, K.L.V. Iyer, **Kaushik Mukherjee**, N. C. Kar, “A Novel Two-Axis Theory-Based Experimental Approach Towards Determination of Magnetization Characteristics of Line-Start Permanent Magnet Synchronous Machines”, **IEEE Transactions on Magnetics**, vol. 49, no. 8 Part I, August 2013 (Digital Object Identifier: 10.1109/TMAG.2013.2259152), pp. 4733-4737.
9. Xiaomin Lu, K.L.V. Iyer, **Kaushik Mukherjee**, N. C. Kar, “Development of a Novel Magnetic Circuit Model for Design of Premium Efficiency Three-Phase Line Start Permanent Magnet Machines With Improved Starting Performance ,” **IEEE Transactions on Magnetics**, vol. 49, no. 7, July 2013 (Digital Object Identifier: 10.1109/TMAG.2013.2242869), pp. 3965-3968.

10. **Kaushik Mukherjee**, K. L. V. Iyer, Xiaomin Lu and N. C. Kar, "A Novel and Fundamental Approach Toward Field and Damper Circuit Parameter Determination of Synchronous Machine", **IEEE Transactions on Industry Applications**, vol. 49, No. 5, Sept-Oct. 2013, pp. 2097-2105.
11. S. B. Chaudhury, M. Sengupta and **Kaushik Mukherjee**, "Vibration Monitoring of Rotating Machines Using MEMS Accelerometer", *International Journal Of Scientific Engineering And Research (IJSER)* Journal (ISSN: 2347-3878), vol. 2, issue 9, September 2014.
12. Xiaomin Lu, K.L.V. Iyer, **Kaushik Mukherjee**, K. Ramkumar and N. C. Kar, "Investigation of Permanent Magnet Motor Drives Incorporating Damper Bars for Electrified Vehicles", **IEEE Transactions on Industrial Electronics**, vol. 62, no. 5, November 4, 2014 (date of publication), issue dated May 2015, pp. 3234-3244 (DOI 10.1109/TIE.2014.2367023).
13. Chunyan Lai, K.L.V. Iyer, **Kaushik Mukherjee** and N.C. Kar, "Analysis of Electromagnetic Torque and Effective Winding Inductance in a Surface-Mounted PMSM during Integrated Battery Charging Operation", **IEEE Transactions on Magnetics**, vol. 51, no. 11, pp. 1-4, November 2015.
14. Xiaomin Lu, K.L.V. Iyer, **Kaushik Mukherjee** and N. C. Kar, "Investigation of Integrated Charging and Discharging Incorporating Interior Permanent Magnet Machine with Damper Bars for Electric Vehicles", **IEEE Transactions on Energy Conversion**, vol. 31, no. 1, pp. 260-269, 2016.
15. Guodong Feng, Chunyan Lai, **Kaushik Mukherjee** and N.C. Kar, "Current Injection-Based Online Parameter and VSI Nonlinearity Estimation for PMSM Drives Using Current and Voltage DC Components", **IEEE Transactions on Transportation Electrification**, 2016, vol. 2, no. 2, pp. 119-128, 2016.
16. Xiaomin Lu, K. L. V. Iyer, Chunyan Lai, Kaushik Mukherjee and N. C. Kar, "Design and Testing of a Multi-port Sustainable DC Fast-charging System for Electric Vehicles", **Journal of Electric Power Components and Systems**, vol. 44, no. 14, pp. 1576 - 1587, August 2016.
17. Chunyan Lai, G. Feng, K. L. V. Iyer, **K. Mukherjee**, and N. C. Kar, "Generic Algorithm-Based Current Optimization for Torque Ripple Reduction of Interior PMSMs," **IEEE Transactions on Industry Applications**, vol. 53, no. 5, pp. 4493-4503, 2017.
18. Guodong Feng, C. Lai, **K. Mukherjee**, N. C. Kar, "Online PMSM Magnet Flux-Linkage Estimation for Rotor Magnet Condition Monitoring Using Measured Speed Harmonics," **IEEE Transactions on Industry Applications**, vol. 53, no. 3, pp. 2786-2794, 2017.
19. Chunyan Lai, G. Feng, **K. Mukherjee**, V. Loukanov, and N. Kar, "Torque Ripple Minimization for Interior PMSM with Consideration of Magnetic Saturation Incorporating Online Parameter Identification," **IEEE Transactions on Magnetics**, vol. 53, no. 6, Article Sequence No. 8105904, 2017.
20. Chunyan Lai, G. Feng, **K. Mukherjee**, and N. C. Kar, "Investigations of the Influence of PMSM Parameter Variations in Optimal Stator Current Design for Torque Ripple Minimization," **IEEE Transactions on Energy Conversion**, vol. 32, no. 3, pp. 1052-1062, 2017.
21. Chunyan Lai, G. Feng, K. L. V. Iyer, **K. Mukherjee**, and N. C. Kar, "Torque ripple Modeling and Minimization for Interior PMSM Considering Magnetic Saturation," **IEEE Transactions on Power Electronics**, vol. 33, no. 3, pp. 2417-2429, 2018.
22. K.L.V. Iyer, C. Lai, S. Mukundan, H. Dhulipati, K. Mukherjee, and N. C. Kar, "Investigation of a Six-phase Interior Permanent Magnet Synchronous Machine for Integrated Charging and Propulsion in EVs," in press, *SAE International Journal of Alternative Powertrains*, 2018.
23. C. Lai, G. Feng, **Kaushik Mukherjee**, Jimi Tjong and N. C. Kar, "Maximum Torque Per Ampere Control for IPMSM Using Gradient Descent Algorithm Based on Measured Speed Harmonics," **IEEE Transactions on Industrial Informatics**, vol. 14, no. 4, pp. 1424-1435, 2018.
24. H. Dhulipati, S. Mukundan, C. Lai, **Kaushik Mukherjee**, Jimi Tjong and Narayan C. Kar, "Multiple Reference Frame-Based Extended Concentrated Wound PMSM Model Considering

PM Flux Linkage and Inductance Harmonics,” **IEEE Transactions on Energy Conversion**, vol. 34, no. 2, pp. 731-740, 2019.

Conferences:

1. S. Sengupta, **Kaushik Mukherjee**, T. K. Bhattacharya and A. K. Chattopadhyay, “Performance of an SCR-Inverter-Based Commutatorless Series Motor with Load Commutation and Unaided Startup Capability”, The 34th Annual Industry Applications Annual Meeting and International Conference, 1999, at USA, pp. 1956-1963.
2. **Kaushik Mukherjee**, S. Sengupta, T. K. Bhattacharya, S. N. Bhadra and A. K. Chattopadhyay, “Sensorless implementation of an SCR-based commutatorless series motor drive”, The Annual International Conference of IEEE Industrial Electronics Society, IECON 2001 at Denver, USA, 2001, pp. 1494-1497.
3. **Kaushik Mukherjee**, S. Sengupta, T. K. Bhattacharya, S. N. Bhadra and A. K. Chattopadhyay, “A Simplified Analytical Model of a Thyristorized Commutatorless Series Motor Drive”, The International Conference on Energy, Automation and Information Technology, EAIT-2001, at IIT Kharagpur, India, 2001, pp. 54-59.
4. **Kaushik Mukherjee**, S. Sengupta, T. K. Bhattacharya and A. K. Chattopadhyay, “Constant Power Operation of a Thyristorized Commutatorless Series Motor”, The International Conference on Electrical Machines & Systems, ICEMS 2005, at Nanjing, China, vol. 1, 2005, pp. 38-42.
5. **Kaushik Mukherjee**, S. Sengupta, T. K. Bhattacharya and A. K. Chattopadhyay, “Development of Closed Loop Control Schemes for Constant Speed Operation of a Thyristorized Commutatorless Series Motor Drive”, The 6th International Conference on Power Electronics and Drive Systems, PEDS 2005, at Kuala Lumpur, Malaysia, 2005, pp. 1112-1117.
6. **Kaushik Mukherjee**, S. Sengupta, T. K. Bhattacharya, A. K. Chattopadhyay and S. N. Bhadra, “A Simplified Analytical Averaged model of a Thyristorized Commutatorless Series Motor”, The 6th International Conference on Power Electronics and Drive Systems, PEDS 2005, at Kuala Lumpur, Malaysia, 2005, pp. 715-720.
7. **Kaushik Mukherjee**, S. Sengupta, T. K. Bhattacharya and A. K. Chattopadhyay, “A Torque-Controlled Thyristorized Commutatorless Series Motor Drive For High Power Industrial Applications”, The 2nd National Power Electronics Conference, NPEC 2005, at IIT Kharagpur, India, 2005, pp. 59-62.
8. Soumya Ray, **Kaushik Mukherjee**, Nikhil Mondal and Sujit K. Biswas, “Simulation of an Adjustable Speed Synchronous Motor fed from Sinusoidal Currents”, The International Conference on Modeling and Simulation, MS’07, organized by University of Calcutta, Dept. of Applied Physics, December 3-5, 2007, Kolkata, India (Proceedings vol. II), pp. 736-740.
9. Sudhin Roy, Mainak Sengupta, **Kaushik Mukherjee**, “Design of a 2 kW, 10 kHz induction heating unit”, The 3rd National Power Electronics Conference (NPEC) 2007, organized by Indian Institute of Science, Bangalore, December 16-19, 2007, Session I-B, file no. 176.pdf of proceedings CD.
10. Sudhin Roy, Mainak Sengupta, **Kaushik Mukherjee**, “Simulation and testing of a Power Converter for a 2 kW induction heating unit with real heating load”, The 3rd National Power Electronics Conference (NPEC) 2007, organized by Indian Institute of Science, Bangalore, December 16-19, 2007, pp. Session I-B, file no. 177.pdf of proceedings CD.
11. Pabitra Biswas, **Kaushik Mukherjee**, Debjani Ganguly, “A SEQUEL-software based model of a Permanent Magnet Synchronous Motor Drive – Part I. Fed from a Voltage Source Inverter operating under 180^o conduction”, The 3rd National Power Electronics Conference (NPEC) 2007, organized by Indian Institute of Science, Bangalore, December 16-19, 2007, Session II-B, file no. 169.pdf of proceedings CD.
12. Pabitra Biswas, **Kaushik Mukherjee**, Debjani Ganguly, “A SEQUEL-software based model of a Permanent Magnet Synchronous Motor Drive – Part II. An adjustable-speed one incorporating an SPWM inverter”, The 3rd National Power Electronics Conference (NPEC) 2007, organized by

Indian Institute of Science, Bangalore, December 16-19, 2007, pp. Session II-B, file no. 170.pdf of proceedings CD.

13. Souvik Dasgupta, **Kaushik Mukherjee**, Mainak Sengupta, “A Simplified Averaged Dynamic Model of a Permanent Magnet Synchronous Motor Driven By a Two-level, Three-phase, Self-Controlled Transistorized Voltage Source Inverter Under 120° Conduction Mode”, The 4th IET International Conference on Power Electronics, Machines and Drives (PEMD) 2008, York, U.K., April 2 – 4, 2008, pp. 727-731.
14. S. B. Chaudhury, M. Sengupta and **K. Mukherjee**, “Time stepping Finite Element analysis based simulation study of air gap flux distribution for misaligned rotor cage induction motor”, Proceedings of the 6th National Power Electronics Conference (NPEC), Howrah, India, 2011, pp. 64-69.
15. Subhendu Banerjee, **K. Mukherjee** and Gautam Bandyopadhyay, “Hardware implementation of A Field Programmable Gate Array based Commutatorless DC Motor Drive with Shunt Characteristics”, Proceedings of the 6th National Power Electronics Conference (NPEC), Howrah, India, 2011, pp. 58-63.
16. K. L. V. Iyer, X. Lu, **K. Mukherjee**, and N. C. Kar, “Online Stator and Rotor Resistance Estimation Scheme Using Swarm Intelligence for Induction Motor Drive in EV/HEV”, Proceedings of the 1st IEEE International Electric Drives Production Conference (EDPC), Erlangen-Nuremberg, Germany, 2011. (Digital Object Identifier: 10.1109/EDPC.2011.6085571), pp. 202-207.
17. D. Biswas, **Kaushik Mukherjee** and N. C. Kar, “A novel approach towards electrical loss minimization in vector controlled induction machine drive for EV/HEV”, IEEE Transportation Electrification Conference and Expo, June 17-20, 2012, Dearborn, MI, USA. (Digital Object Identifier:10.1109/ITEC.2012.6243462), pp. 1-5.
18. X. Lu, K. L. V. Iyer, **Kaushik Mukherjee** and N. C. Kar, “Development of a Bi-directional Off-board Level-3 Quick Charging Station for Electric Bus”, IEEE Transportation Electrification Conference and Expo, June 17-20, 2012, Dearborn, MI, USA. (Digital Object Identifier:10.1109/ITEC.2012.6243500), pp. 1-6.
19. S. M. M. Sangdehi, K. L. V. Iyer, **Kaushik Mukherjee** and N. C. Kar, “Short Term Power Demand Forecasting in Light and Heavy Duty Electric Vehicles Through Linear Prediction Method”, IEEE Transportation Electrification Conference and Expo, June 17-20, 2012, Dearborn, MI, USA. (Digital Object Identifier: 10.1109/ITEC.2012.6243480), pp. 1-6.
20. X. Lu, K. L. V. Iyer, **Kaushik Mukherjee** and N. C. Kar, “Study and detection of demagnetization in line start permanent magnet synchronous machines using artificial neural network”, Proceedings of the 15th IEEE International Conference on Electric Machines & Systems (ICEMS), 2012, held in Sapporo, Japan, 21st – 24th October 2012, pp. 1-6.
21. **Kaushik Mukherjee**, K. L. V. Iyer, X. Lu, and N. C. Kar, “A Novel and Fundamental Approach towards Field and Damper Circuit Parameter Determination of Synchronous Machine”, IEEE International Conference on Electric Machines (ICEM), September 2 – 5, 2012, Marseille, France, (Digital Object Identifier: 10.1109 / ICE|Mach.2012.6349836), pp. 41-46.
22. K. L. V. Iyer, X. Lu, **Kaushik Mukherjee** and N. C. Kar, “Fault Detection in Copper-rotor SEIG System Using Artificial Neural Network for Distributed Wind Power Generation”, IEEE International Conference on Electric Machines (ICEM), September 2 – 5, 2012, Marseille, France. (Digital Object Identifier: 10.1109/ICE|Mach.2012.6350109), pp. 1700-1705.
23. Xiaomin Lu, K.L.V. Iyer; **K. Mukherjee**, N. C. Kar, “Study of permanent magnet machine based flywheel energy storage system for peaking power series hybrid vehicle control strategy”, IEEE Transportation Electrification Conference and Expo (ITEC), 2013 (Digital Object Identifier: 10.1109/ITEC.2013.6573470), pp. 1-7.
24. K. L. V. Iyer, X. Lu, **K. Mukherjee**, and N. C. Kar, “Design of a Novel Copper-rotor Line Start Permanent Magnet Machine Tailoring Skin and Proximity Effects for Improved Starting Performance”, Proc. of the 12th Joint MMM/Intermag-IEEE Conference, Chicago, USA, 2013.

25. X. Lu, K. L. V. Iyer, **K. Mukherjee**, and N. C. Kar, "Development of a Novel Magnetic Circuit Model for Design of Premium Efficiency Three-Phase Line Start Permanent Magnet Machines with Improved Starting Performance", Proc. of the 12th Joint MMM/Intermag-IEEE Conference, Chicago, USA, 2013.
26. X. Lu, K. L. V. Iyer, **K. Mukherjee**, and N. C. Kar, "A Novel Two-axis Theory based Approach towards Determination of Magnetizing Characteristics of Line Start Permanent Magnet Machine and its Effects on Stability and Starting Performance", Proc. of the 10th Latin American IEEE Workshop on Magnetism, Magnetic Materials, and Their Applications, in Buenos Aires, Argentina, 2013.
27. Subimal Bikash Chaudhury, M. Sengupta and **K. Mukherjee**, "Air-gap flux analysis of misaligned induction motor under different load conditions", Paper ID 39 (Technical Session II: Motor Drives I), National Power Electronics Conference (NPEC), Indian Institute of Technology, Kanpur, 2013.
28. K. L. V. Iyer, S. Mukundan, H. Dhulipati, **K. Mukherjee**, H. Minaker and N. C. Kar, "Design Considerations for Permanent Magnet Machine Drives for Direct-Drive Electric Vehicles", Proceedings of IEEE International Electric Machines and Drives Conference, IEMDC 2015, Idaho, USA, pp. 1170-1176, 2015.
29. Abhisek Maiti, **Kaushik Mukherjee** and Prasad Syam, "Design, Modeling and Software Implementation of a Current-Perturbed Maximum Power Point Tracking Control in a DC-DC Boost Converter for Grid-Connected Solar Photovoltaic Applications", paper ID 30, in CD ROM-based proceedings of the 2016 IEEE First International Conference on Control, Measurement and Instrumentation, held during Jan. 8-10, 2016, Kolkata, India (IEEE Conference ID: 36494, IEEE Xplore Compliant ISBN No.: 978-1-4799-1769-3, IEEE Xplore Compliant Part No.: CFP16C90-ART).
30. Abhinandan Basak, **Kaushik Mukherjee** and Prasad Syam, "Speed Control of A Grid Connected Doubly-Fed Induction Generator System for Maximum Power Point Tracking with Improved Input Power Factor Employing Matrix Converter as a Slip Power Exchanger", paper ID 31, in CD ROM-based proceedings of the 2016 IEEE First International Conference on Control, Measurement and Instrumentation, held during Jan. 8-10, 2016, Kolkata, India (IEEE Conference ID: 36494, IEEE Xplore Compliant ISBN No.: 978-1-4799-1769-3, IEEE Xplore Compliant Part No.: CFP16C90-ART).
31. Abhisek Maiti, **Kaushik Mukherjee** and Prasad Syam, "Design Methodology, Control and Performance of a Three-Phase Grid-Tie PV Inverter under Maximum Power Point Tracking", paper ID 73, in CD ROM-based proceedings of the Second International Conference on Control, Instrumentation, Energy & Communication (CIEC-2016) held during Jan. 28-30, 2016, Kolkata, India (IEEE Conference ID: 36757, IEEE Xplore Compliant ISBN No.: 978-1-5090-0035-7/IEEE Xplore Compliant Part No.: CFP1697V-ART).
32. Tanmoy Dey, **Kaushik Mukherjee** and Prasad Syam, "Dynamic Adjustments of the D-Q axes Reference Voltage Limits during Flux Weakening and Maximum Torque Per Ampere Control of an IPMSM Drive for an EV Application", paper ID 74, in CD ROM-based proceedings of the Second International Conference on Control, Instrumentation, Energy & Communication (CIEC-2016) held during Jan. 28-30, 2016, Kolkata, India (IEEE Conference ID: 36757, IEEE Xplore Compliant ISBN No.: 978-1-5090-0035-7/IEEE Xplore Compliant Part No.: CFP1697V-ART).
33. Abhinandan Basak, **Kaushik Mukherjee** and Prasad Syam, "Effect of Matrix Converter on the Speed Control Scheme of a Grid Connected Doubly-Fed Induction Generator System", paper ID 59, in CD ROM-based proceedings of the Second International Conference on Control, Instrumentation, Energy & Communication (CIEC-2016) held during Jan. 28-30, 2016, Kolkata, India (IEEE Conference ID: 36757, IEEE Xplore Compliant ISBN No.: 978-1-5090-0035-7/IEEE Xplore Compliant Part No.: CFP1697V-ART).
34. H. Dhulipati, K. L. V. Iyer, S. Mukundan, **K. Mukherjee**, J. Tjong, and N. C. Kar, "Investigation of 6-Phase Surface PM Machines with Concentrated Windings for

- Reduction in Space Harmonics, Leakage Inductance and Magnet Loss in Direct-Drive EV,” in Proceedings of the 22nd *IEEE International Conference on Electrical Machines*, ICEM 2016 Switzerland, pp. 811-817, 2016.
35. S. Mukundan, K. L. V. Iyer, H. Dhulipati, **K. Mukherjee**, J. Tjong, and N. C. Kar, “Response Surface Methodology based optimization of surface PM Machine Incorporating Stator Slotting and PM Sizing Effects to Extend the Operating Limits for Direct-drive EV Application,” in Proceedings of the 22nd *IEEE International Conference on Electrical Machines*, ICEM 2016 Switzerland, pp. 2045-2051, 2016.
 36. K. L. V. Iyer, H. Dhulipati, S. Mukundan, **K. Mukherjee**, J. Tjong, and N. C. Kar, “Design Approach Incorporating MTPA and Winding Function Theories for On-board Direct-Drive Surface PM Machines with Concentrated Windings in EVs,” in Proceedings of the 22nd *IEEE International Conference on Electrical Machines*, ICEM 2016 Switzerland, pp. 1499-1505, 2016.
 37. C. Lai, G. Feng, K. L. V. Iyer, **K. Mukherjee**, and N. C. Kar, “Genetic algorithm based current optimization for torque ripple reduction of interior PMSMs,” in Proceedings of the 22nd *IEEE International Conference on Electrical Machines*, ICEM 2016 Switzerland, pp. 1050-1056, 2016.
 38. K. L. V. Iyer, B. Minaker, **K. Mukherjee**, J. Tjong, and N. C. Kar, “On-board Direct-Drive Surface Permanent Magnet Synchronous Machine with Fractional-Slot Concentrated Windings for Electric Vehicles,” in Proceedings of the IEEE Canadian Conference on Electrical & Computer Engineering, Vancouver, Canada, pp. 1-6, 2016.
 39. S. Mukherjee, A. Basak, **K. Mukherjee**, P. Syam, “Effect of Supply Frequency and Magnitude Variation on Generation of SVPWM Switching Pulses for Three Phase Matrix Converter,” in Proc. 2016 IEEE India International Conference on Power Electronics (IICPE 2016), pp. 1-6 (DOI: 10.1109/IICPE.2016.8079348), Nov. 2016.
 40. S. Mukundan, H. Dhulipati, K. L. V. Iyer, C. Lai, **K. Mukherjee**, and N. C. Kar, “Comparative Performance Analysis of 3-phase IPMSM Rotor Configurations with Dampers for Integrated Charging Application in EV,” in proceedings of the 43rd *IEEE Annual Conference of Industrial Electronics Society*, IECON 2017, Beijing, China, pp. 1856-1861, November 2017.
 41. C. Lai, G. Feng, K. L. V. Iyer, **K. Mukherjee**, and N. C. Kar, “Accurate inductances and magnet flux linkage estimation in interior PMSM employing speed harmonic measurements,” in proceedings of the 43rd *IEEE Annual Conference of Industrial Electronics Society*, IECON 2017, Beijing, China, pp. 1771-1776, November 2017.
 42. P. Korta, K. L. V. Iyer, C. Lai, **K. Mukherjee**, J. Tjong, and N. C. Kar, “A novel hybrid approach towards drive-cycle based design and optimization of a fractional slot concentrated winding SPMSM for BEVs,” in proceedings of the *IEEE Energy Conversion Congress and Exposition*, Ohio, United States, pp. 2086-2092, October 2017.
 43. S. Mukundan, H. Dhulipati, K. L. V. Iyer, N. C. Kar and **K. Mukherjee**, “Comparison of Inductance Determination Methods of PMSMs for EV Application,” in proceedings of the 30th *IEEE Canadian Conference on Electrical and Computer Engineering*, Windsor, Canada, pp. 1-4 (DOI: 10.1109/CCECE.2017.7946835), May 2017.
 44. D. Das, A. Basak, **K. Mukherjee**, P. Syam, “Degradation of input displacement power factor by Input Current Filter and its compensation for a Matrix Converter,” in proceedings of IEEE International Conference on Power Electronics, Drives and Energy Systems 2018, Chennai, India, pp. 1-6 (DOI: 10.1109/PEDES.2018.8707869), Dec. 2018.

45. Debalina Nanda, Prasad Syam, **Kaushik Mukherjee**, "Selection procedure of Z-network parameters for a SVPWM Voltage-fed ZSI under varying input voltage conditions with simulated performance," 2019 IEEE Region 10 Symposium (TENSymp), 07-09 June 2019, Kolkata, India, pp. 361-366.
46. Sayani Chatterjee, Ashesh Mandal, Suvarun Dalapati, Pabitra Halder, **Kaushik Mukherjee**, "Design, Simulation & Thermal Analysis of an Interior Permanent Magnet Synchronous Motor for a Fork-lift Truck Application," 2020 IEEE Calcutta Conference (CALCON 2020), Kolkata, India, Feb. 2020, pp. 206-211.

Book published:

Kaushik Mukherjee, S. Sengupta and T. K. Bhattacharya, "Commutatorless Series Motor Drive for High Power Applications: Development, Design, Analysis, Simulation Models and Hardware Implementation", Publisher - VDM Verlag Mueller, ISBN-10: 3639284941, ISBN-13: 978-3639284942, September 2010.

Projects handled:

Industrial:

- As executing engineer (in a team of 10) of the project entitled, "Hot Strip Mill modernization project in Rourkela Steel Plant, India", worth Rs. 75 million, 1995 (Work experience under SIEMENS Ltd., India).
- Worked in the indigenous development of a 1 MVA, 11 kV class step voltage regulator with on-load tap changer in a technology transfer project of Brentford Unit, M/S Andrew Yule & Co. Ltd., Calcutta, India, 1994 (Work experience under M/S Andrew Yule & Co. Ltd., India).

Research:

- As Principal Investigator of the AICTE-funded (under Govt. of India) research project, "A Field Programmable Gate Array (FPGA) controller based real-time implementation of a commutatorless motor drive with selectable hard or soft characteristics", worth Rs. 4.2 Lakhs, 2008- 2010, completed.
- As co-principal investigator of the project, "National Mission on Power Electronic Technology (NaMPET)", under Department of Information Technology, Govt. of India, worth about Rs. 99 Lakhs, 2005 – 2010, completed.
- As co-principal investigator of the project, "Development and validation of SEQUEL and real time models of various drives and testing and validation of the above 'Application Models' in Full Spectrum Simulator", under Department of Information Technology, Govt. of India, worth about Rs. 15 Lakhs, 2005 – 2010, completed.
- As co-investigator of the project, "Design, development and testing of 3-phase permanent magnet machines and their converters", under National Mission on Power Electronic Technology (NaMPET), phase-II", under Department of Electronics and Information Technology (DEITY), Govt. of India, worth about Rs. 1 crore, completed.
- As co-principal-investigator of the project, "Development of motor eccentricity and vibration monitoring systems and control strategies for switched reluctance motor-based drives", under SPARC scheme, MHRD, Govt. of India, worth about Rs. 97 lakhs, ongoing.
- As co-principal-investigator of the project, "MEMS for Electric Machines and Drives", NaMPET phase III Consortium project with IISc-Bangalore, IIT-B, IIT-D, IEST-S and NIT-Trichy, India, under "New Horizons in Power Electronics" funded by DeitY, MeitY, GoI, MHRD, Govt. of India, total budget worth about Rs. 335 lakhs (IEST share Rs. 42 lakhs approximately), ongoing.

Research proposals written/executed during “Visiting Professor” assignment, University of Windsor, 2011-12:

- “Development of a Mechanism for Seamless Power Transfer between Marcom System’s PV Source, End Users and Power Grid” – NSERC ENGAGE grant, Canada – \$25,000 (sanctioned)
- “Driver Alcohol Detection: Collaborative Development of Passive, Unobtrusive Technology and Systems to Prevent Drunk Driving” – AUTO 21 grant - about \$77,800 (sanctioned)
- “Development of a Mechanism for Seamless Power Transfer between SunSource Grids’ PV Source, End Users and Power Grid” – FEDDEV grant – \$50,000 (sanctioned)
- “Stand-alone Sustainable LED Lighting System: Development and Implementation of System Components and Verification of Performance” – FEDDEV grant, Canada –\$50,000 (sanctioned)
- “Energy Efficient Solutions for Electric Vehicles” – NRCAN grant, Canada – (sanctioned till LOI stage) – \$5,000,000
- “Development of a Power Consumption Measurement and Instrumentation System for Tesla Digital Lighting Products” – NSERC ENGAGE grant, Canada – \$25,000
- “Development of Innovative and Sustainable Electric Vehicle Charging Solutions” – NSERC RTI (Equipment) grant, Canada – \$145,000 approx.
- “Cost and Fuel Economy Optimized Flywheel Based Solutions for Hybrid Buses” – APC grant, Canada – \$1,000,000 estimated.

Industrial Patent during “Visiting Professor” assignment, University of Windsor, 2011-12:

- Member of the team of inventors with the following details: M. Hurst, K.L.V. Iyer, N. C. Kar, M. Kazerooni, X. Lu, **K. Mukherjee**, “Method and apparatus for seamless power transfer”, **US patent publication no. US20130285453 A1, publication date October 31, 2013, application number US201313869141**, filing date April 24, 2013, priority date April 26, 2012, also published as WO2013160753 (A1).

Research supervision and guidance

A.

Doctoral:

1. Mr. Subimal Bikash Chaudhury, IEST Shibpur, India, “Multi-sensor and multi-algorithm approach for in-process Induction Motor misalignment fault detection under harsh industrial environment”, PhD thesis awarded, 2014 (Jointly supervised with Dr. Mainak Sengupta, IEST Shibpur, India).
2. Ms. Xiaomin Lu, University of Windsor, Canada, “Dual Benefits of adding damper bars in PMSMs for Electrified Vehicles: Improved Machine Dynamics and Simplified Integrated Charging”, PhD thesis, awarded October 2014 (Jointly supervised with Dr. Narayan Kar, University of Windsor, Canada).
3. Mr. K. L. V. Iyer, University of Windsor, Canada, “Investigation of Permanent Magnet Synchronous Machines for Direct-drive and Integrated Charging Applications in Electric Vehicles”, PhD thesis, awarded October 2016 (Jointly supervised with Dr. Narayan Kar, University of Windsor, Canada).
4. Ms. Chunyan Lai, University of Windsor, Canada, “Novel Techniques for Torque Ripple Modeling and Minimization in Permanent magnet Machines”, PhD thesis defended

successfully in February 2017 (Jointly supervised with Dr. Narayan Kar, University of Windsor, Canada).

B.

Masters:

1. Mr. Suvajit Mukherjee, “Studies and development of Sinusoidal Pulse Width Modulated rectifiers” (2004), Masters’ thesis.
2. Mr. Banerwar Das, “PSPICE-based modeling and simulation of a single phase sinusoidal pulse width modulated rectifier and its control strategy” (2005), Masters’ thesis.
3. Mr. Pradip K. Koley, “Development of a State-space model and a PSPICE-based model of a buck chopper and their comparative studies” (2005), Masters’ thesis.
4. Mr. Saibal Samaddar, “Modelling, simulation & experimental implementation of a 4 quadrant DC-DC converter fed armature controlled DC servomotor” (2006), Masters’ thesis.
5. Mr. Pushpendu Kanjilal, “Design of a forward converter and development of its state-space model & PSPICE-based model with their comparative studies” (2006), Masters’ thesis.
6. Mr. Pabitra Biswas, “Development of SEQUEL based models of Permanent Magnet Synchronous Motor Drives and validation through simulation in MATLAB-SIMULINK environment” (2007), Masters’ thesis.
7. Mr. N. Mohana Krishna, “Analysis, simulation of D-STATCOM and PWM Rectifier & Partial Implementation on EP1C12Q240C8 FPGA platform” (2007), Masters’ thesis.
8. Mr. Sudhin Roy, “Finite Element based Design, Fabrication and Testing of a 2kW, 20A, 10kHz CSI-fed Single Phase Induction Furnace for Application in Bar/Billet Heating” (2007), Masters’ thesis.
9. Mr. Souvik Dasgupta, “A Field Programmable Gates Array Controller Based Real Time Implementation of a Permanent Magnet Synchronous Motor Drive” (2008), Masters’ thesis.
10. Mr. Asish Mondal, “Simulation of a Vector-controlled Permanent Magnet Synchronous Motor Drive” (2011), Masters’ thesis.
11. Mr. Subhendu Banerjee, “Development of a Commutatorless DC Motor drive with Selectable Hard and Soft Characteristics” (2011), Masters’ thesis.
12. Mr. Rakesh Roy, “Modern High-Performance Torque-control Strategies of Induction Motor Drives” (2011), Master’s thesis.
13. Mr. Dipankar Debnath, “Modeling, Control, Simulation and Partial Implementation of a Grid-Interactive Inverter for Renewable Energy Applications” (2011), Master’s thesis.
14. Ms. Amrita Pal, “Performance of a Wound Field Synchronous Machine Operated as a Series Drive and a Vector Controlled Drive” (2012), Master’s thesis.
15. Mr. Nisith Bhowmik, “Three phase PWM Rectifiers - Design, Simulation study in MATLAB/SIMULINK and Real time Simulation in FPGA” (2012), Master’s thesis.
16. Mr. Devraj Roy, “Level Three Battery Charger for an Electrified Vehicle” (2014), Master’s thesis.
17. Mr. Sayantan Bhattacharjee, “Maximum Torque per Ampere Controlled Interior Permanent Magnet Synchronous Motor Drives” (2014), Master’s thesis.
18. Mr. Tanmoy Dey, “Analysis and Maximum Torque per Ampere Control of Interior Permanent Magnet Synchronous Motor Drives” (2015), Master’s thesis.
19. Ms. Sayani Chatterjee, “Design & Simulation of an Interior Permanent Magnet Synchronous Motor for Fork-lift Application with Real-time Simulation of its drive” (2018), Master’s thesis.
20. Mr. Subhojit Das, “A Study On The Effects Of C.T. Saturation And Harmonics On The Performance Of A Numerical Overcurrent Relay” (2018), Master’s thesis.
21. Mr. Ashesh Mandal, “Design and Studies on Fractional Slot Concentrated Winding Interior Permanent Magnet Synchronous Motor for Electric Traction Applications” (2019), Master’s thesis.

International Research Collaboration:

1. With Dr. Narayan Kar, Professor, Department of Electrical and Computer Engineering, University of Windsor, Canada; in the field of power-train components and systems of Electrified Vehicles.
 - Ms. Xiaomin Lu, doctoral student at the Centre for Hybrid Automotive Research and Green Energy, University of Windsor visited BESU, Shibpur, EE Dept. and performed collaborative research for one and half months (December 2013-January 2014).
 - Mr. K. L. V. Iyer, doctoral candidate at Centre for Hybrid Automotive Research and Green Energy, University of Windsor is currently visiting IEST Shibpur, EE Dept. (December 2014 – February 2015) to perform collaborative research.

Important Seminars Delivered:

- “A DC commutatorless series motor viewed in the light of a conventional DC series motor”, hosted by the IEEE Industry Applications Calcutta Chapter, at Bengal Engineering College (D.U.), Howrah, India, 2002.
- “Power Electronics: Fundamentals and Some Applications in Electrical Power Systems”, hosted by the IEEE IEEE Power Engineering Calcutta Chapter, at Future Institute of Engineering & Management, Kolkata, India, 2006.
- “A decoupled linear control technique for controlling the performance of a Distribution STATCOM”, hosted by Imperial College, London, UK at the **Department of Electrical and Electronic Engineering, Imperial College, London, UK, 2008.**
- “Power Electronics based R&D related to EV and Green Energy Applications in B.E.S.U India”, hosted by University of Windsor, at the **University of Windsor, Canada, September 2, 2011.**
- “A series synchronous motor drive for large power and normal speed applications”, hosted by University of Victoria at the **University of Victoria, Canada, 14th May 2012.**
- “Research in Centre for Hybrid Automotive Research & Green Energy, University of Windsor, Canada”, hosted by University of Victoria, at the **University of Victoria, Canada, 14th May 2012.**

Subjects taught:

- At Undergraduate level – Theoretical courses of Basic Electrical Engineering, Circuit theory, DC Machines, BLDC machines, Stepper motors, Switched Reluctance Motors, Power Electronics, Electrical Drives, Electrical Energy Utilization and Grid-Interactive Control, Laboratory-based courses on Basic Electrical Engineering, Control Systems, Electrical Machines, Power Electronics and Electrical Drives
- At Graduate level – Theoretical courses of DC-DC Converters, Power Quality Conditioners, Analysis of Synchronous and Asynchronous Machines and laboratory-based courses on Electrical Machines and Power Electronics

Departmental Administrative Activities in IEST Shibpur:

- Member, Postgraduate (Masters) Academic Committee, Department of Electrical Engineering, Indian Institute of Engineering Science and Technology (formerly BESU) Shibpur, India
- In-charge, Power Electronics Laboratory, Department of Electrical Engineering, IEST, Shibpur, India
- Convener, Departmental Space Committee, Department of Electrical Engineering, IEST, Shibpur, India

Infrastructural Development Activities:

- Worked in a team of 5 teaching faculties in developing a 100 kVA Advanced Power Electronics Laboratory in the Department of Electrical Engineering, Indian Institute of Engineering Science and Technology, Shibpur, India
- Indigenously developed laboratory setups and trainer kits on thyristor drivers, IGBT drivers, phase controlled rectifiers and voltage controllers for undergraduate and postgraduate experiments in the Power Electronics Laboratory, Department of Electrical Engineering, Indian Institute of Engineering Science and Technology, Shibpur, India
- Designed and developed two Insulated Gate Bipolar Transistors (IGBT)-diode based flexible power converter stack for CHARGE laboratory, University of Windsor and Indian Institute of Engineering Science and Technology, Shibpur, India; keeping in view the requirements of majority of the students' research areas. The stacks can handle a three phase throughput of 30 kVA and 85 kVA respectively at the DC link voltage of 750V DC.
- Evaluated the requirement of total space required for the Department of Electrical Engineering, IEST Shibpur according to new integrated dual degree and existing Masters degree course curriculum with increased intake of students, 2014 onwards.

External examination of theses and Paper Review:

- External examiner of 5 Masters theses of students of 'Machine Drives and Power Electronics' specialization of Indian Institute of Technology, Kharagpur for the batch of 2015
- External examiner of 6 Masters/dual degree theses of students of 'Machine Drives and Power Electronics' specialization of Indian Institute of Technology, Kharagpur for the batch of 2017
- Reviewer of manuscripts of IET Generation, Transmission and Distribution journal, UK, IET Electric Power Applications journal, UK
- Reviewer of manuscripts of IEEE Industrial Electronics Magazine, IEEE Transactions on Energy Conversion, IEEE Transactions on Industry Applications, IEEE Transactions on Power Electronics, IEEE Transactions on Industrial Electronics, USA

Organizing Activities:

- Organized more than 10 technical lecture programmes as Secretary of IEEE-IAS Kolkata Chapter
- Co-organizer of 4 short term training courses on Power Electronics Applications during 2009-2015
- Co-organizer of a symposium on 'Green Energy and Technology' in University of Windsor, 2011
- Looked after Programme Committee activities of the International Conference on Advanced Materials and Energy (ICAMET 2014) arranged jointly by IEST Shibpur and Southern University, Baton Rouge, Louisiana, USA in my institute during December 17-19, 2014.

Professional Activities:

- Senior Member, IEEE USA; member of the IEEE Industry Applications (IAS) Society
- Secretary of IEEE Industry Applications (IAS) Calcutta Chapter in 2010, 2011, 2013 and 2014 (*The IAS Calcutta Chapter has bagged outstanding small chapter award from IEEE IAS headquarter for 2010 and 2011*)
- Member of the executive committee of the IEEE Calcutta Section in 2011.