

Resume

Subhajyoti Mukherjee

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Objective

Pursue research in power electronics and its related fields of applications involving theoretical as well as practical challenges and dedicate myself to solve them. My research interests include (but are not limited to) wide-bandgap devices and their applications to power electronics, soft switching techniques, wireless power transfer techniques, integrated chargers, multiport converters, transportation electrification, medium and high voltage converters, use of power electronics for renewable sources of energy etc.

Specialities

- a. Proficient in power converter design, analysis and modeling, component selection, gate driver design, magnetic design, PCB layout, soldering, converter testing, analog and digital circuit design, DSP programming with TI C2000 series microcontrollers etc.
- b. About 10 years of hands-on experience on hardware design, organization and debugging for power electronic converters for battery chargers, inverters, server power supplies, grid connected utility applications, squirrel cage and doubly fed motor/generator drives.
- c. About 8 years of hands-on experience on digital control for power electronic converters mainly with Texas Instruments C2000 series microcontroller.

Technical Skills

- Software: MATLAB, PLECS, LT Spice, Simplis.
- Assembly level programming for TMS320F2400 series DSP controllers.
- C programming for TMS320F2812, TMS320F28335 and TMS320F28379 DSP controller.
- PCB designing with OrCAD, Altium, Eagle, KiCad.

Education

Missouri University of Science and Technology, Rolla, MO

PhD, Electrical Engineering, Dec '17, **Cumulative GPA – 4.0/4.0**

Thesis: Advanced Control Architectures for Grid-connected and Stand-alone Converter Systems. (Details can be furnished if needed)

Indian Institute of Technology Kharagpur, India

M.Tech, Electrical Engineering, May '10, **Cumulative GPA- 9.5/10**

Thesis: Efficiency improvement of Doubly fed Induction Generator (DFIG) based variable speed constant frequency system. (Details can be furnished if needed)

Jadavpur University, Kolkata, India

B.E (Hons), Electrical Engineering, May '07, **Cumulative GPA- 8.82/10 (83%)**

Major Appointments

1. Indian Institute of Technology Kharagpur, India

Assistant Professor, Nov '21 – till date

Primary research focus is on wide bandgap based integrated onboard chargers for electric vehicles and multi objective optimization of power converters

2. Indian Institute of Technology Bhubaneswar, India

Assistant Professor, Aug '20 – Nov '21

Primary research focus is on wide bandgap based integrated onboard chargers for electric vehicles and multi objective optimization of power converters.

3. Oakridge National Lab, Knoxville, TN

Postdoctoral Research Associate, Mar '19 – June 2020

Primary research focus was on development and optimization of wide-bandgap semiconductor-based power converters for wireless power charging and integrated on-board charger for electric vehicles.

4. Infineon Technologies, Warwick, RI

Senior Engineer, Nov '17 – Feb '19

Job responsibilities included

- a. Definition of multiphase power management dc-dc converters to meet VR specifications from Intel and AMD (Lead Application Engineer for the TDA21520/21540 DC-DC power management ic).
- b. Simplifying and developing simulation models of the existing controllers in Simplis platform.
- c. Developing new power management topologies with reduced noise coupling and exploring potential benefits in the same.

Patents

- Veda Galigekere, Burak Ozpineci, and **Subho Mukherjee**, “Feed forward Control of High Frequency Inverter to Minimize DC Link Capacitor in Wireless Power Transfer,” filed by UT Battelle USA. (filed)

Publications (till 2021)

- 1) A. Basu and **S. Mukherjee**, “Modelling and Control of a Multiport Converter based Integrated On-board Charger for Electric Vehicle Powertrains,” accepted in *proc. 2022 IEEE International conference on Power Electronics, Smart Grid and Renewable Energy (PESGRE2022)*, Jan. 2022, Trivandrum, Kerala, India.
- 2) A. Basu and **S. Mukherjee**, “Analysis and Design of a Multiport Converter based Integrated On-board Charger for Electric Vehicle Powertrains,” in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Oct. 2021, Vancouver Canada.
- 3) **S. Mukherjee** et al., “Control of Output Power in Primary Side LCC and Secondary Series Tuned Wireless Power Transfer System without Secondary Side Sensors,” in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Sept. 2020, Detroit, MI, USA, 2020, pp. 5532-5536.
- 4) T. Saha, **S. Mukherjee**, V. P. Galigekere and O. C. Onar, “Design of Auxiliary Circuit Elements for Achieving Zero Voltage Switching in a Wireless Power Transfer System,” in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Sept. 2020, Detroit, MI, USA, 2020, pp. 5537-5544.

- 5) S. Anwar, **S. Mukherjee**, D. Costinett, and S. Chowdhury, "Control of SiC Based Integrated DC-DC Powertrain Charger for Electric Vehicles," in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Sept. 2020, Detroit, MI, USA, 2020, pp. 4104-4111.
- 6) **S. Mukherjee**, V. P. Galigekere and O. Onar, "Methods to Synchronize and Control the Secondary Side Active Rectifier in Wireless Power Transfer Systems," in *proc. IEEE Transportation Electrification Conference & Expo (ITEC)*, June 2020, pp. 955-960, Chicago, IL, USA.
- 7) **S. Mukherjee**, V. Galigekere, S. Anwar, O. Onar, and B. Ozpineci, "DC Link Capacitor Reduction with Feedforward Control in Series-Series Compensated Wireless Power Transfer Systems", in *proc. IEEE Applied Power Electronics Conference (APEC)*, Mar. 2020, New Orleans, LA, USA.
- 8) E. Asa, **S. Mukherjee**, V. Galigekere, O. Onar, G. J. Su, and B. Ozpineci, "A Novel AC to AC Wireless Power Transfer System for On-board PEV/EV Chargers", in *proc. IEEE Applied Power Electronics Conference (APEC)*, Mar. 2020, New Orleans, LA, USA
- 9) **S. Mukherjee**, and J. W Kimball, "Indirect Grid Current Control of LCL Filter Based Grid-Connected Converter", in *proc. IEEE Applied Power Electronics Conference (APEC)*, March. 2018, Anaheim, CA, USA.
- 10) **S. Mukherjee**, V. Roy Chowdhury and J. W Kimball, "Control of a three-phase boost rectifier under unbalanced grid conditions without grid voltage sensors", in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Sept. 2018, Portland, OR, USA, pp. 1521-1527.
- 11) V. Roy Chowdhury, **S. Mukherjee**, and J. W Kimball, "Sensor less Control of a three-phase grid connected inverter under unbalanced grid voltage conditions based on Lyapunov energy function", in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Sept. 2018, Portland, OR, USA, pp. 4884-4888.
- 12) **S. Mukherjee**, P. Shamsi and M. Ferdowsi, "Control of a single-phase standalone inverter without an output voltage sensor," *IEEE Trans. Power Electron.*, vol. 32, no. 7, pp. 5601–5612, July. 2017.
- 13) **S. Mukherjee**, V. Roy Chowdhury, P. Shamsi and M. Ferdowsi, "Grid voltage estimation and current control of single-phase grid-connected converter without grid voltage sensor," *IEEE Trans. Power Electron.*, vol. 33, no. 5, pp. 4407 - 4418, May. 2018.
- 14) **S. Mukherjee**, P. Shamsi and M. Ferdowsi, "Power-angle Synchronization with Fault Ride-through Capability for Low Voltage Grids," *IEEE Trans. Energy Conv.*, vol. 33, no.3, pp. 970 - 979, Sept. 2018.
- 15) **S. Mukherjee**, V. Roy Chowdhury, P. Shamsi and M. Ferdowsi, "Model Reference Adaptive Control Based Estimation of Equivalent Resistance and Reactance in Grid-Connected Inverters," *IEEE Trans. Energy Conv.*, vol. 32, no. 4, pp. 1407–1417, Dec. 2017.
- 16) **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, "Estimation of parameters in single phase grid connected and stand-alone inverter system", in *proc. IEEE Applied Power Electronics Conference (APEC)*, Mar. 2017, pp. 448–453.
- 17) **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, "Resonant controller based power-angle synchronization control in low voltage grids", in *proc. IEEE Applied Power Electronics Conference (APEC)*, Mar. 2017, pp. 454–458.
- 18) **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, "Indirect voltage control of a stand-alone inverter", in *proc. IEEE Applied Power Electronics Conference (APEC)*, Mar. 2017, pp. 3451–3455.
- 19) **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, "Small signal modeling and control of a grid tied converter without a synchronization unit", in *proc. Appl. Power Electron. Conf. Expo.*, Mar. 2016, pp. 2687–2692.
- 20) **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, "Impedance shaping for improved load sharing among inverters in ac microgrids", in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Sept. 2015, pp.738-744.

- 21) **S. Mukherjee**, V. Roy Chowdhury, P. Shamsi, and M. Ferdowsi, “A voltage sensorless phase locked loop structure for single-phase grid connected converter system”, in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Oct. 2017, Cincinnati, OH, USA, pp. 5720-5725.
- 22) **S. Mukherjee**, V. Roy Chowdhury, P. Shamsi, and M. Ferdowsi, “Filter capacitor current estimation and grid current control in LCL based grid connected inverter”, in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Oct. 2017, Cincinnati, OH, USA, pp.3885-3889.
- 23) V. Roy Chowdhury, **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, “Control of a three-phase inverter under unbalanced grid conditions”, in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Oct. 2017, Cincinnati, OH, USA, pp.2909-2913.
- 24) **S. Mukherjee**, V. Roy Chowdhury, P. Shamsi, and M. Ferdowsi, “An improved control scheme for stand-alone inverters in the stationary frame of reference with a zero-sequence controller”, in *proc. IEEE. Power and Energy Conference at Illinois (PECI)*, 2017.
- 25) V. Roy Chowdhury, **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, “State feedback control to damp output LC filter resonance for field oriented control of VSI fed induction motor drives” in *proc. IEEE Greentech*, 2017 Denver, CO, pp. 370–375.
- 26) V. Roy Chowdhury, **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, “Control of a three-phase inverter mimicking synchronous machine with fault ride-through capability”, in *proc. IEEE Greentech*, 2017 Denver, CO, pp. 1–6.
- 27) V. Roy Chowdhury, **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, “Analysis and design of a three-phase photovoltaic system with battery backup”, in *proc. IEEE Greentech*, 2017 Denver, CO, pp. 157–162.
- 28) **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, “Improved virtual inertia based control of a grid connected voltage source converter with fault ride-through ability”, in *proc. IEEE. North American Power Symposium*, 2016, Denver, CO.
- 29) **S. Mukherjee**, P. Shamsi, and M. Ferdowsi, “An improved control scheme for a standalone DFIG with unbalanced and nonlinear loads using proportional-resonant controllers”, in *proc. IEEE. North American Power Symposium*, 2016, Denver, CO.
- 30) **S. Mukherjee**, S. Saxena, and T. Saha, “A novel ac-ac converter with minimum snubber requirement”, in *proc. IEEE Aerospace Conference*, March. 2014, Big Sky, Montana, pp.1-7.
- 31) **S. Mukherjee**, D. Kastha, “Flux programmed hybrid mode operation of a doubly fed induction generator for wind power application”, in *proc. IEEE International Conference on Power Electronics Drives and Energy Systems*, Dec. 2012, Bengaluru, India, pp.1-6.

Teaching Experience

- Instructor for **EE60027** (Wind Energy), IIT Kharagpur, Spring 2022
- Instructor for **EE6L055** (Advanced Electric Drives), IIT Bhubaneswar, Spring 2021.
- Instructor for **EE6P053** (Power Converters and Drives Laboratory), IIT Bhubaneswar, Spring 2021.
- Instructor for **EE6L002** (Electric Power Quality), IIT Bhubaneswar, Autumn 2020, 2021.
- Instructor for **EE5520** (Power Electronics), Missouri University of Science and Technology, Summer 2016.
- Instructor for **ECE4284** (Power Electronics Laboratory), Virginia Tech, Spring 2014.

Research Grants

- **Wide bandgap semiconductor based integrated on-board charger for electric vehicle power train.**
Funding : INR 32 Lakhs. Funded by Science and Engineering Research Board, India.
- **Compact, efficient, and optimized wide bandgap semiconductor-based power converter solutions for power quality improvements.**

Funding: INR 8.5 Lakhs, Funded by Seed Grant Project at IIT Bhubaneswar India (project code SP 108)

Student Supervision

Masters Thesis : 4 completed, 2 ongoing.

Service Activities

- Publicity chair and Session chair for Symposium on Power Electronic and Renewable Energy Systems Control 2020 held at IIT Bhubaneswar, India. 4-5 December 2020.
- Reviewer for several IEEE journals and conferences.

Awards and Academic Achievements

- Awarded the prize paper award (third position) from IEEE Industrial Application Society's Transportation Systems Committee for the paper: "Control of SiC Based Integrated DC-DC Powertrain Charger for Electric Vehicles," in *proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Sept. 2020, Detroit, MI, USA, 2020, pp. 4104-4111.
- Secured the first position among all postgraduate students in all specialization in the department of electrical engineering, IIT Kharagpur in 2010.
- Awarded Barindra Memorial Medal from Jadavpur University, India in 2007.
- Ranked 11th in GATE (Graduate Aptitude Test in Engineering, India), 2008.
- Ranked 3rd among 120 students in Electrical Engineering Department, Jadavpur University, India in 2007.
- Ranked 176 among roughly 48000 students in WBJEE (West Bengal Joint Entrance Examination, India) in engineering, 2003.