

CURRICULUM VITAE

Name: Dr. Dipankar Debnath

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Nationality: Indian

Updated on 31.12.2023

OBJECTIVE:

To work in a challenging atmosphere facilitating ample opportunities for learning and growth

Present Position and Work Experience:

- Assistant Professor (Electrical Engineering, IIT Kharagpur, Oct 2016 to present)
- Assistant Professor (Electrical Engineering, IIT Indore, Jan 2016 to Oct 2016)
- Research Associate (Electrical Engineering, IIT Bombay, July 2015 to Dec 2015)

Current/Completed Projects:

As principal Investigator (PI)

- Solar Photovoltaic Based Uninterruptible Power Supply Scheme for Semi-urban Areas, ISIRD, SRIC, IIT Kharagpur, Status: Completed
- Sustainable energy system for achieving novel carbon neutral energy communities (SUSTENANCE), Indo-EU project funded by DST for Indian Partner, PI from IIT Kharagpur, July 2021-Dec 2025
- Indigenous Development and Commercialization of Advanced Lightweight and Efficient Powertrain for Electric 3-wheelers Ministry of Electronics and Information Technology, April 2022- March 2024

As Co-PI

- Centre of Excellence on Energy Aware Urban Infrastructure, SERB (April 2022-March 2026)
- Development of Indigenous Electrical Sub-Systems for 3-Wheeler E-Rickshaw along with a Smart Vehicle Control Unit, Ministry of Electronics and Information Technology (Sep 2020- Sep 2022)
- Open & Intelligent Plug-in Hybrid Electric Vehicle (PHEV) Technologies for Smart Indian Cities (UAY_I_IITKGP_019) Ministry of Heavy Industries and Public Enterprises, GoI [Industry Partner: Tata Motors Ltd. Pune, India], Status: Ongoing
- Development of a Laboratory on Novel Electronics Control and Software for Transport by EV (NECST-EV) SRIC, IIT KHARAGPUR, Status: Completed
- Testing of Concepts for Detecting Insulation Faults in Vehicle, Eaton India Innovation Center LLP (Consultancy Project, Status: partially completed due to COVID pandemic)

EDUCATIONAL QUALIFICATION:

Degree/Exam	Institute / University	Year of Passing	Awards/Distinction
Ph.D. (EE)	IIT Bombay, Mumbai, Maharashtra	2015	Excellence in PhD thesis award
M. E. (EE)	IEST, Shibpur, West Bengal	2011	First division (topper of his specialization)
B. E. (EEE)	NIT Agartala, Tripura	2009	First division (Highest scorer of 2009 UG batch considering all 8 semester marks)
H.S (+2)	Radha Kishore Institution, Tripura	2005	First division (school topper)
Matriculation	Dalugaon Class XII School, Tripura	2003	First division (school topper)

TECHNICAL PROFICIENCY:

Summary of key works:

1. Involved in development of high power density Motor and Motor Controller for HEV in partnership with Tata Motors Ltd (Details can't be shared due to IP issues)
2. Designed and developed BLDC Motor, motor controller along with smart supervisory controller for Electric 3-wheeler suitable for Indian conditions (details provided as annexure)



Smart controller (e3W)



BLDC motor (e3W)



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3. Developed Vehicle-2-Grid (V2G), G2V, V2H schemes facilitating seam-less transitions for Indian EVs
4. Developed Solar assisted battery charger for e-rickshaw and EVs
5. Developed reduced stage off-grid/stand-alone systems based on solar photovoltaic for rural area deployment having battery as energy storage element
6. Developed Grid-connected inverter for solar photovoltaic systems
7. Developed Distributed Maximum Power point tracking schemes for extracting maximum power from Solar plants subjected to mismatched operating conditions like shading

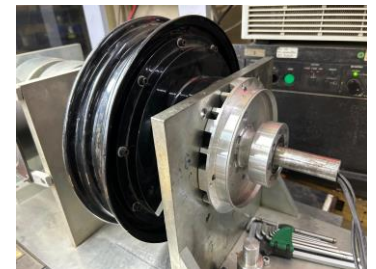
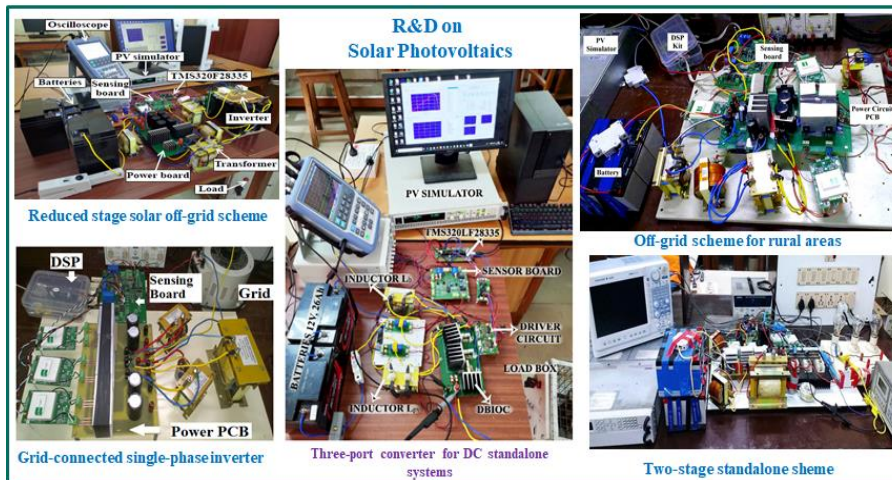


Fig. BLDC Hub Motor (500 W)

Fig. Hardware set-ups for various works done on solar photovoltaics

8. Designed and fabricated magnet-free Synchronous Reluctance Motor for light duty EVs



Fig: Fabricated prototype of Synchronous Reluctance Motor (3 kW peak power, 17.5 Nm peak Torque)

PERSONAL INFORMATION:

Name	: Dipankar Debnath	Nationality	: Indian
Father's Name	: Sri Khagendra Kumar Debnath;	Mother's Name	: Smt. Malina Debnath
Sex	: Male	Marital Status	: Married
Hobbies: Playing guitar & drums, reading story books, listening music & singing, playing TT, Football, carom			
Language known: Bengali, English, Hindi			

LIST OF PUBLICATIONS:

Journal Publications:

1. N. Surulivel, A. C. Sunny, D. Debnath and C. Chakraborty, " Derivation Methodology of TPCs with all Bi-directional Inductively Interfaced Ports suitable for Solar Photo-Voltaic Applications," in *IEEE Transactions on Industrial Electronics*, in press, doi: 10.1109/TIE.2023.3340183.
2. N. Surulivel, D. Debnath and C. Chakraborty, "Novel Bidirectional Four-Port DC–DC Converter Suitable for Bipolar DC Solar Household Integration," in *IEEE Transactions on Power Electronics*, vol. 38, no. 7, pp. 9033-9045, July 2023, doi: 10.1109/TPEL.2023.3249339.
3. A. C. Sunny and D. Debnath, "A Novel Low Device Count Four-Port Converter Based Solar-Fed Off-Grid System for Catering Household Hybrid AC/DC Loads," in *IEEE Transactions on Power Electronics*, vol. 38, no. 2, pp. 2658-2667, Feb. 2023, doi: 10.1109/TPEL.2022.3213991.
4. N. Surulivel, D. Debnath and C. Chakraborty, "A Novel Single Coupled-Inductor Boost TPC with Two Inductively Interfaced Ports suitable for Renewable Energy Integration," in *IEEE Transactions on Industrial Electronics*, vol. 70, no. 5, pp. 4705-4715, May 2023, doi: 10.1109/TIE.2022.3187576.
5. A. C. Sunny, N. Surulivel and D. Debnath, "Solar-Battery Integrated Hybrid ac/dc Off-Grid System for Rural Households based on a Novel Multi-Output Converter," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 10, no. 5, pp. 6208-6217, Oct. 2022, doi: 10.1109/JESTPE.2022.3186104.
6. N. Surulivel and D. Debnath, "A New Switching Strategy for Improving Efficiency and Thermal Distribution of a Three-Port Converter for Solar DC Stand-Alone System," in *IEEE Transactions on Circuits and Systems II: Express Briefs*, vol. 69, no. 3, pp. 1527-1531, March 2022.
7. A. C. Sunny, and D. Debnath, "Two Stage solar Off-Grid System for Catering Household AC Appliances with Reduced Switches" *IET Power Electronics*, Vol. 13, Issue 16, pp. 3807 – 3817, December 2020
8. S. Dutta, D. Debnath and K. Chatterjee, "A Grid-Connected Single-Phase Transformerless Inverter Controlling Two Solar PV Arrays Operating Under Different Atmospheric Conditions," in *IEEE Transactions on Industrial Electronics*, vol. 65, no. 1, pp. 374-385, Jan. 2018.
9. D. Debnath and K. Chatterjee, "A Two Stage Solar Photovoltaic based Stand Alone Scheme having Battery as Energy Storage Element for Rural Deployment," *IEEE transactions on Industrial Electronics*, vol. 62, no. 7, pp. 4148- 4157, July 2015
10. D. Debnath and K. Chatterjee, "Neutral Point Clamped Transformer-less Grid Connected Inverter having Voltage Buck-boost Capability for Solar Photovoltaic Systems," *IET Power Electronics*, vol. 9, no. 2, pp. 385-392, Feb 2016
11. D. Debnath, P. De, and K. Chatterjee, "Simple Scheme to Extract Maximum Power from Series Connected PV Modules Experiencing Mismatched Operating Conditions," *IET Power Electronics*, vol. 9, no. 3, pp. 408-416, March 2016
12. D. Debnath and K. Chatterjee, "Solar Photovoltaic Based Stand Alone Scheme Incorporating a New Boost Inverter," *IET Power Electronics*, vol. 9, no. 4, pp. 621-630, March 2016
13. D. Debnath and K. Chatterjee, "Maximizing Power Yield in a Transformerless Single Phase Grid Connected Inverter Servicing Two Separate PV Panels," *IET Renewable Power Generation*, vol. 10, no. 8, pp. 1087-1095, Sep 2016.

Patents

1. D. Debnath and K. Chatterjee, "Transformer-less grid connected inverter with two separate PV arrays while minimizing leakage current," 464446, *Indian patent, 2023 (Granted)*, available: <https://iprsearch.ipindia.gov.in/PublicSearch/PublicationSearch/Search>
2. S. Sengupta, D. Debnath, and D. Vanjani, "Integrated motor control unit and vehicle control unit for low speed electric vehicle", Provisional (Indian) patent filed on 23rd August 2021, application number: 202131038017.

Conference Publications:

1. D. Dev, N. Surulivel, A. C. Sunny and D. Debnath, "Integrating Second Life EV Batteries to a PV based DC System using a Novel Bidirectional Four-Port Converter," 2022 IEEE 1st Industrial Electronics Society Annual On-Line Conference (ONCON), Kharagpur, India, 2022, pp. 1-6,
2. J. Kumar, D. Debnath and S. Sashidhar, "Comparison of Magnet-less and PM Assisted Synchronous Reluctance Motors for Hybrid Electric Vehicle Application," 2022 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES), Jaipur, India, 2022, pp. 1-6,
3. A. Singh, D. Verma, T. Bhattacharya and D. Debnath, "Synchronous Space Vector PWM Method for Field Oriented Vector Controlled Induction Motor Drive for Railway Traction Application," 2022 IEEE Int. Conf. on Power Electronics, Drives and Energy Systems (PEDES), Jaipur, India, 2022, pp. 1-6,
4. L. Parihar, A. Madhu, D. Debnath, R. Roy and T. R. Choudhury, "Least Component Count Off-Grid Solar Photovoltaic Scheme for Rural Household Application," 2021 National Power Electronics Conference (NPEC), Bhubaneswar, India, 2021, pp. 1-6, doi: 10.1109/NPEC52100.2021.9672501.
5. G. C. Mahato, T. R. Choudhury, B. Nayak, D. Debnath, S. B. Santra and B. Misra, "A Review on High PV Penetration on Smart Grid: Challenges and its Mitigation using FPPT," 2021 1st International Conference on Power Electronics and Energy (ICPEE), Bhubaneswar, India, 2021, pp. 1-6,
6. I. Halder, and D. Debnath, "Design and Development of Two Solar PV panel based Battery Charger for Solar Assisted E-rickshaw" accepted for publication in IEEE International Conference on Power Electronics and Energy(ICPEE) to be held during 2-3 January 2021 at KIIT Bhubaneswar, India
7. S. Nagarjun, D. Debnath and C. Chakraborty, "Synthesis of Three-Port Converter from existing dc-dc converters for PV based dc stand-alone system," IEEE International Conference on Power Electronics, Smart Grid and Renewable Energy (PESGRE2020), pp. 1-6, Cochin, India, 2020,
8. D. Debnath and K. Chatterjee, "A buck-boost integrated full bridge inverter for solar photovoltaic based stand alone system," in Proc. IEEE Photovoltaic Specialists conf. (PVSC), pp: 2867- 2872, June 2013.
9. D. Debnath and K. Chatterjee, "Transformer coupled multi-input two stage stand alone solar photovoltaic scheme for rural areas," in Proc. IEEE Indus. Electron. Society Conf. (IECON), pp. 7028- 7033, Nov. 2013.
10. D. Debnath and K. Chatterjee, "A Transformerless Grid Connected Inverter for Solar Photovoltaic Systems Having Capability to Negotiate DC Loads," in Proc. IEEE Int. Conf. on Indus. Tech, pp. 2835- 2840, 2015.
11. S. Nagarjun and D. Debnath, "Buck-boost buck ccm-dcm converter for pv based dc standalone system", IEEE International Conference on Power Electronics, Drives and Energy Systems, Chennai, India, pp. 1-6, 2018.
12. A. Mitra, and D. Debnath, "A Transformerless Doubly Boost DC-DC Converter for grid connected solar photovoltaic systems", 8th IEEE India Int. Conf. on Power Electronics (IICPE), JAIPUR, India, pp. 1-6, 2018.
13. S. N. Gosh and D. Debnath, "An Approach to Reduce the Number of Sensors for MPPT of Series Connected Solar PV Modules Facing Mismatched Operating Conditions", 8th IEEE India International Conference on Power Electronics (IICPE), JAIPUR, India, pp. 1-6, 2018.

Courses offered at IIT Kharagpur and IIT Indore [As an Assistant Professor]

Electrical Technology (3 times), Electric Vehicle (4 times), Power Electronics (2 times), Electric Drives (4 times), Networks and systems (1 time), Electrical Machines Lab (3 times), Electrical Technology lab (6 times), Power Electronics Lab (3 times), DIY Lab (2 times)

ADDITIONAL INFORMATION

Award and achievements:

- G S Sanyal Award for Faculty Excellence 2023, IIT Kharagpur USA Foundation
- Faculty Excellence Award 2022, IIT Kharagpur
- Excellence in PhD thesis work, IIT Bombay, August, 2016
- Five consecutive inclusions in 'Top Teaching Feedback' list of IIT Kharagpur.
- Selected as Best TA (teaching Assistant) during PhD (awarded by EE dept, IIT Bombay)

- A product development focused work entitled ‘Integrated Motor Control Unit and Vehicle Control Unit for Low Speed Electric Vehicle’ got selected for pan-IIT R&D showcase Fair.
- Elevated to ‘Senior Member’ grade of IEEE (world's largest technical professional organization) in 2021
- MHRD Scholarship, Govt. of India, (during MTech and PhD)
- Completed one ‘Transfer of Technology’ to an Industry (2022)
- Graduate Student Assistant, 39th IEEE Photovoltaic specialist conference (PVSC) Tampa, Florida, USA, 2013

Other Professional Contributions:

- **Vice-Chair**, Ex-Secretary, Ex-Treasurer, and Ex-Chair for the Student Activities **for IEEE Kharagpur Section**
- Organized special session at IEEE ICPEE conference held during 2-3 January 2021 at KIIT, Bhubaneswar, India
- **Served as Meta-Reviewer in** IEEE ICPEE conference held during 2-3 January 2021 at KIIT, Bhubaneswar, India
- **Served as** Session Chair, International Conference on Smart and Intelligent Systems (SIS-2021), Feb 25-26, 2021.
- **Served as Track chair at IEEE ICPS 2021, Co-chair for IEEE ICIIS 2021**
- **Technical Program Committee** Member for: (a) TENSYP-The IEEE Region 10 Symposium, 7-9 June 2019, Kolkata, India, (b) 14th IEEE Int. Conf. on Industrial and Information Systems (ICIIS), 18-20 Dec 2019, Peradeniya, Sri Lanka, (c) IEEE, ICEPE 2024, and few more
- Served/serving as **reviewer** in following journals and conferences:
 - **Journals:** IEEE transaction on Industrial Electronics, IEEE Trans. on Power Elec., IEEE Trans. on Circuits and Systems, IET Power Elec., IEEE Trans. on Sustainable Energy, Electric Power Components and Systems
 - **IEEE Conferences:** ICIT, APEC, PEDES, IECON, INDICON, ISIE, IICPE
 - **National Conferences:** National Power System Conference, National Power Electronics Conference

Membership of Professional Bodies:

- Senior Member, IEEE
- Member in following societies of IEEE: IES, IAS, PES, PELS

Other Departmental/Institute roles and responsibilities:

- Prof. In Charge, Student Welfare Committee, EE Dept, IIT Kharagpur
- Faculty adviser, Electrical Engineering Society, IIT Kharagpur
- CTO, NCC Air Wing, IIT Kharagpur
- Coordinator, M.Tech. in Electric Transportation, IIT Kharagpur
- Member of Pradhan Mantri Kaushal Vikas Yojna (PMKVY 4.0)
- Project supervisor of several students (BTech, Dual Degree, MTech, MS, PhD)
- Member of BROAD (Branding, Ranking, Outreach, and Dissemination), EE, IIT Kharagpur

Invited talks (More than 80 talks on various topics relevant to EVs and solar photovoltaics/renewables)

- Uni. of Exeter, UK., Hong Kong University, NIT Silchar, NIT Meghalaya, KIIT, Bhubaneswar, Assam Engineering College, Mizoram University, KIIT Bhubaneswar, BIT Mesra, VRSE College AP, LNJPIT Chapra, Manipal University, IFET College of Engineering, BVRIT Telangana, BCE Bihar, SIT Bhubaneswar, RVCE, Bangalore, SRMIST, Kattankulathur, Fr. C. RIT, Navi Mumbai, BIT Durg, TCE, Madurai, SCET, Surat, LNCT, Bhopal, B V C I T & SCIENCE, KLEF Deemed to be University, AKGEC, Ghaziabad, GMIT Baraipur, BITM Ballari, NITK, Surathkal, MNNIT Alahabad, IITDM Kanchipuram, NIT Trichy, NIT Warangal, NIT Rourkela, etc.

DECLARATION:

I hereby declare that all information furnished above are true, complete and correct to the best of my knowledge and belief.

Date: 31/12/2023

Place: IIT Kharagpur

Dr. Dipankar Debnath