Prabhat Ranjan Bana

Research Profiles   : Google Scholar, Research Gate
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Date of Birth   : 21/04/1994

ACADEMIC QUALIFICATION

June 2020 – *May* 2023   : **PhD**, Norwegian University of Science & Technology, Norway
(Research Area- Advanced Control Design for Grid-Connected Converters in Renewable Energy Applications)

July 2017 – *June* 2019   : **Master's** (CGPA- 9.7/10), National Institute of Technology Meghalaya, India
Power and Energy System specialization, (Thesis Title- Design and Performance Analysis of Reduced Switch Multilevel Inverter for Solar PV Integration)

June 2012 – *May* 2016   : **Bachelor's** (CGPA- 8.1/10), Biju Patnaik University of Technology, Odisha, India
(Project Title- Fault analysis on transmission line by using MATLAB/Simulink)

PROFESSIONAL EXPERIENCE

July 2019 – *Feb* 2020   : Research Fellow, National Institute of Technology Meghalaya, India
(Research and duty- To design multilevel converters and assist master's students)

Jan 2019 – *March* 2019 : Visiting Researcher, Cardiff University, U.K.
(Funded under the Joint UK-India Clean Energy (JUICE) two months exchange program scheme. The outcome was published in an IEEE journal)

SUMMARY & RESEARCH STATEMENT

Prabhat has been actively involved in research for the last **5 years**. His research mainly focused on designing multilevel inverters, AI-based advanced closed-loop control, and integrating renewable energy (PV) systems. He has authored/co-authored over **25 research papers**. He has also filed two Indian patents in the field of power converters. The impact of his publications at the early stage of his research career is evident from various citation figures; over **500 Google scholar citations** with an h-index of 12 and i10-index of 13.

During these years, he has guided several master's students and collaborated with PhD students and Professors from International Universities to design, control and real-time testing power converters for research work. With time, he has developed the skills and techniques required to achieve targets, meet deadlines and improve his skills in conveying ideas.

RESEARCH INTERESTS

- Power electronic converters design (multilevel inverter, DC-DC converter, etc.)
- Close-loop control of grid-connected power electronic systems
- Artificial intelligence (AI)-based control design

AWARDS & SCHOLARSHIPS

- IEEE SYPA at IECON 2022 from IEEE Industrial Electronics Society
- Awarded with the silver medal in Master's for scoring the highest CGPA in the Electrical Engineering department (2019)
- Received fellowship for Master's studies from Ministry of Science and Technology, Government of India (2017-2019)
- Received stipend for Bachelor's studies from DHE, Government of Odisha, India (2012-2016)

HARDWARE AND SOFTWARE SKILLS

- Inverters → Novel multilevel converters using Semikron IGBTs and TLP250 driver circuits
- HIL Real-Time Simulator → OPAL-RT 5700 series
- Microcontroller → Texas Instruments F28335 DSP, Arduino-Mega 2560
- Modelling and Simulation → MATLAB / Simulink
- Programming → MATLAB, PLC, Python (working knowledge on programming AI techniques)

LANGUAGE PROFICIENCY

- English, Hindi → Full professional proficiency
- Norwegian → Elementary proficiency (completed A1-A2 level course from NTNU)

KEY PUBLICATIONS (Google Scholar)

Patents:

1. **P. R. Bana**, K. P. Panda, G. Panda, and S. Mishra, "High-Gain dc-dc Converter For Solar-Assisted Electric Vehicle," Indian Patent Application, August 2019, Patent Application No. 202031004840, dated 23/03/2020, Grant is awaited
2. G. Panda, K. P. Panda, and **P. R. Bana,** "Double Stage Voltage Level Boost Reduced Switch Count Multilevel Inverter," Indian Patent Application, August 2019, Patent Application No. 201931030343, dated 26/07/2019, Grant is awaited

Journals:

1. **P. R. Bana**, S. Vanti, S. D'Arco and M. Amin, "An Artificial Neural Network-based Control for Single-stage Grid-Connected PV Systems," *IEEE Transactions on Sustainable Energy*, 2022 (**under review**)
2. **P. R. Bana**, and M. Amin, "Intelligent Damping Control of Grid-tied VSC System Synthesized by Artificial Neural Network," *IEEE Transactions on Industrial Informatics*., 2022 (**under review**)
3. **P. R. Bana**, K. P. Panda, and G. Panda, "Power Quality Performance Evaluation of Multilevel Inverter with Reduced Switching devices and Minimum standing voltage," *IEEE Transactions on Industrial Informatics*, 2019
4. **P. R. Bana**, K. P. Panda, S. Padmanaban and G. Panda, "Extendable Switched-Capacitor Multilevel Inverter with Reduced Number of Components and Self-Balancing Capacitors," *IEEE Transactions on Industry Applications*, 2020
5. **P. R. Bana**, K. P. Panda, and G. Panda, "Performance evaluation of a reduced components count single-phase asymmetric multilevel inverter with low standing voltage," *International Transactions on Electrical Energy Systems* (Wiley), 2020

6. **P. R. Bana**, K. P. Panda, R. T. Naayagi, P. Siano and G. Panda, "Recently Developed Reduced Switch Multilevel Inverter for Renewable Energy Integration and Drives Application: Topologies, Comprehensive Analysis and Comparative Evaluation," *IEEE Access*, vol. 7, pp. 54888-54909, 2019

7. **P. R. Bana** et al, "Closed-loop control and performance evaluation of reduced part count multilevel inverter interfacing grid-connected PV system," *IEEE Access*, 2020

8. S. Vanti, **P. R. Bana**, S. D'Arco and M. Amin, "Single-stage Grid-Connected PV System with Finite Control Set Model Predictive Control and an Improved Maximum Power Point Tracking," *IEEE Transactions on Sustainable Energy*, vol. 13, no. 2, pp. 791-802, April 2022

9. K. P. Panda, **P. R. Bana**, and G. Panda, "FPA Optimized Selective Harmonic Elimination in Symmetric-Asymmetric Reduced Switch Cascaded Multilevel Inverter," *IEEE Transactions on Industry Applications*, 2020

10. P. Panda, **P. R. Bana** and G. Panda, "A Switched-Capacitor Self-Balanced High-Gain Multilevel Inverter Employing a Single DC Source," *IEEE Transactions on Circuits and Systems II: Express Briefs*, 2020

Conferences:

1. **P. R. Bana**, S. Vanti and M. Amin, "Single-stage Grid-connected PV System with Artificial Neural Network Controller," *2021 IEEE 22nd Workshop on Control and Modelling of Power Electronics (COMPEL)*, 2021, pp. 1-7

2. **P. R. Bana** and M. Amin, "Adaptive Vector Control of Grid-tied VSC using Multilayer Perceptron-Recurrent Neural Network," *IECON 2021 – 47th Annual Conference of the IEEE Industrial Electronics Society*, 2021, pp. 1-6

3. **P. R. Bana** and M. Amin, " Comparative Assessment of Supervised Learning ANN Controllers for Grid-Connected VSC System," *IECON 2022 – 48th Annual Conference of the IEEE Industrial Electronics Society*, 2022

4. **P. R. Bana**, K. P. Panda, and G. Panda, "Novel Reduced Source Switched-Capacitor Boost Multilevel Inverter for Photovoltaic Application," *IEEE Conf. PESGRE., 2019*

5. **P. R. Bana**, K. P. Panda, and G. Panda, "Novel Reduced Switch Multilevel Inverter Suitable for Photovoltaic Application with Selective Harmonic Elimination Control," *IEEE Conf. INDICON.*, 2018

6. S. Vanti, **P. R. Bana** and M. Amin, "Single-stage PV System With Multi-Objective Predictive Control Approach," *IECON 2021 – 47th Annual Conference of the IEEE Industrial Electronics Society*, 2021

VOLUNTEER ACTIVITIES

- Student coordinator in IEEE international conference ICEPE-2018, 1-3 June, held at the National Institute of Technology Meghalaya, India.
- Supervised and Mentored 4 master's students with their Thesis work
- Active reviewer for various IEEE Transactions and other reputed journals (reviewed over 150 papers)

PROFESSIONAL MEMBERSHIP

2018 (continuing)   : IEEE Student Member, IEEE Young Professional Member

REFEREES

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