

Energy System Research Group

The Energy System Research Group at the School of Electrical Engineering, KIIT Deemed to be University, consists of an active team of faculty members, PhD candidates, postgraduate researchers, and undergraduate students. The group concentrates on

- ❖ Investigating the different domains of research work in distributed generation (DG) and smart grid.
- ❖ Building of different intelligent control techniques applied to grid integrated solar PV system.
- ❖ Intelligent control technique for PV tied BLDC Motor drive water pumping system.
- ❖ Hybridization of solar PV and wind system using PMSG with battery support.
- ❖ Explore the possibilities and applications of PV panel for isolated system.
- ❖ Establishing the control technique and requirements of DC microgrids.
- ❖ Explore the innovative ideas of Ph. D Scholars, faculties, students in the field of smart grid.

The group boasts an impressive publication history, with numerous papers published in SCI journals and esteemed conferences. To enhance hands-on experience and practical deployment for students, KIIT DU has signed a MoU with National Instruments. Established over a decade ago, the Energy system Research Lab is equipped with state-of-the-art instruments such as NI-cRIO 9082, Spartan-6 Lab-View based board. NI-9401 (Digital input output module), NI 9402(High Speed digital input output module), NI 9225, NI 9227, NI 9795, NI WSN 3230, 2 power supply, NI 9263, NI 9205, NI 9375, NI 9467,MSO6012A,24 Volt, 100Ahr Lead acid Battery, Solar Panel of 500 Watt, Relay Box, Single Phase VSI, Single phase Rectifier, Buck-Boost Converter,250 W PMSG wind system, PV Emulator (4 channel 1kW),Grid Tied solar PV system.

Energy System Research Lab



Research Thrust Areas are

- [1] Energy Management Scheme in PV Powered Greenhouse
- [2] Intelligent control Techniques of Grid-Connected Photovoltaic System
- [3] Solar Power forecasting with Machine Learning Techniques
- [4] Control technique and requirements of DC microgrids
- [5] Partial shading mitigation techniques of PV Array
- [6] Charging Infrastructure and Renewable Energy

Research Collaboration with national and International Level:

National level:

Prof (Dr.) Debashis Chatterjee, Department of Electrical Engineering, Jadavpur University, W.B, India.

International Level:

Prof (Dr.) Frede Baabjerg, Fellow IEEE, Aalborg University, Denmark.

Prof (Dr.) Yam P Siwakoti, SMIEEE, University of Technology Sydney, Australia.

Prof. (Dr.) T.J (peter).Liang, FIEEE, National Chen Kung University, Taiwan.

Publications:

- [1] S. B. Santra, D. Chatterjee and T. -J. Liang, "High Gain and High-Efficiency Bidirectional DC-DC Converter With Current Sharing Characteristics Using Coupled Inductor," in IEEE Transactions on Power Electronics, vol. 36, no. 11, pp. 12819-12833, Nov. 2021, doi: 10.1109/TPEL.2021.3077584.
- [2] S. B. Santra, M. Ramana and D. Chatterjee, "Performance Analysis of Novel Bidirectional DC-DC Converter With L-D Based Modified GaN-FET Driver," in IEEE Transactions on Industry

Research Team

Faculty Members: (Research Field)

- (1) Dr. Byamakesh Nayak : Renewable energy and application of PIC Microcontrollers in special drive applications.
- (2) Dr. Babita Panda :Solar Power forecasting with Machine Learning Techniques
- (3) Dr. Pradeep Kumar Sahu : Current Control Structures for Grid-Connected Photovoltaic System
- (4) Dr. Sriparna Roy Ghatak: Planning and automation of distribution system
- (5) Dr. Alivarani Mohapatra :Partial shading mitigation techniques of PV Array
- (6) Dr. Arjyadhara Pradhan : Renewable energy system and Energy audit and management
- (7) Dr. Sarita Samal :Power Quality

PhD Research Scholars:

Applications, vol. 57, no. 5, pp. 5199-5214, Sept.-Oct. 2021, doi: 10.1109/TIA.2021.3097016.

[3] S. R. Biswal, T. R. Choudhury, S. B. Santra, B. Panda, S. Mishra and S. Padmanaban, "Simplified Prediction Based AI-IoT Model for Energy Management Scheme in Standalone PV Powered Greenhouse," in IEEE Journal of Emerging and Selected Topics in Industrial Electronics, doi: 10.1109/JESTIE.2024.3425670.

[4] "Selection of capacitor in PV system suitable for maximum power point tracking", Subhendu Bikash Santra, Debashis Chatterjee, Kundan Kumar, Manuele Bertoluzzo, Ariya Sangwongwanich, Frede Blaabjerg. IEEE Journal of Emerging and Selected Topics in Power Electronics vol. 9, no. 2, pp. 2136-2146, April 2021, doi:10.1109/JESTPE.2020.2986858

- Nivedita Pati (Robust performance analysis of linear & non-linear controllers for a doublestage stand-alone PV system)

- Anup Kumar Nanda (Performance Enhancement of Partially Shaded Photovoltaic Array Connected to a Microgrid by Optimal Reconfiguration Scheme)

Post Graduate and graduate Research Scholars

- Debu Ghatak (Wind Energy System),
- Gloria Dhal (Solar and wind integration with grid),
- Rajesh Kumar Sahoo (Unified power flow controller in distributed system)
- Sameer Kumar Behera (MPPT Technique for PV),
- Mukesh Kumar Sahu (Quadratic Boost Converter Design)
- Theophilus A T Kambo (Reconfiguration Approach To Reduce Power Loss In Photovoltaic Array)