

Power Electronics Research Group

The Power Electronics Research Group at the School of Electrical Engineering, KIIT Deemed to be University, comprises a dynamic team of faculty members, PhD research scholars, postgraduate research scholars, and undergraduate research students. The group focuses on several major thrust areas including the development of novel topologies for DC-DC converters, the creation of compact and high-efficient power converters, innovative inverter structures, and the advancement of multilevel inverter topologies and their control strategies. Our research extends to switched capacitor converters, matrix converters, and the interfacing of these converters with the grid, advanced filter design for power quality improvement, as well as machine control research. The group has a prolific publication record with several papers published in SCI journals and prestigious conferences. Established over a decade ago, the Power Electronics Research Lab is equipped with state-of-the-art instruments such as dSpace 1104 controller, DC regulated power supplies, Hall sensor current probes, Tektronix TPS 2014B DSOs, and high voltage isolated probes. The lab also features a dedicated testing setup for multilevel inverters, facilitating advanced research and development in power electronics.

Power Electronics Research Lab



Research Thrust Areas are:

- (1) Multilevel Inverters
- (2) DC to DC converters
- (3) Interfacing of power converters with renewable sources
- (4) Matrix converters
- (5) Switched Capacitor Converters
- (6) Z-source Inverters
- (7) Machine control using developed converters
- (8) Advanced PWM techniques for power converters
- (9) Advanced filter design for power quality improvement

Notable Alumni

Dr. Diptish Saha: Postdoctoral Research Fellow at Center for Research on Microgrids (CROM), Aalborg University

Dr. Neha Aarzoo: Senior Engineer at Schneider Electric, Bengaluru, India

Major Publications:

- (1) T. Roy and P. K. Sadhu, "A Step-Up Multilevel Inverter Topology Using Novel Switched Capacitor Converters With Reduced Components," in *IEEE Transactions on Industrial Electronics*, vol. 68, no. 1, pp. 236-247, Jan. 2021.
- (2) T. Roy, P. K. Sadhu and A. Dasgupta, "Cross-Switched Multilevel Inverter Using Novel Switched Capacitor Converters," in *IEEE Transactions on Industrial Electronics*, vol. 66, no. 11, pp. 8521-8532, Nov. 2019
- (3) T. R. Choudhury, B. Nayak and S. B. Santra, "A Novel Switch Current Stress Reduction Technique for Single Switch Boost-Flyback Integrated High Step Up DC-DC Converter," in *IEEE Transactions on Industrial Electronics*, vol. 66, no. 9, pp. 6876-6886, Sept. 2019.
- (4) T. Roy, M. W. Tesfay, B. Nayak and C. K. Panigrahi, "A 7-Level Switched Capacitor Multilevel Inverter With Reduced Switches and Voltage Stresses," in *IEEE Transactions on Circuits and Systems II: Express Briefs*, vol. 68, no. 12, pp. 3587-3591, Dec. 2021.

Research Team members:

Faculty Members:

- (1) Dr. Tapas Roy: research on multilevel inverters and their control
- (2) Dr. Ranjeeta Patel: research on developing novel DC to DC converter structures
- (3) Mr. Subrat Bahera: research on novel DC to DC converters and their control
- (4) Dr. Byamakesh Nayak research on high gain non-isolated DC-DC converters and power quality.
- (5) Dr. Banishree Misra research on Adaptive filter design and power quality improvement
- (6) Dr. Snehalika research on bidirectional DC-DC converters for Electric Vehicle Charging

PhD Research Scholars:

Amruta Abhishek (Research on developing novel DC to DC converter and their control)

**Post Graduate and graduate
Research Scholars**

- (1) Sudip Nandi: Research on
switched capacitor multilevel inverters
- (2) Ravindu Athapaththu:
Working on novel inverter structures
- (3) Abhinaba Choudhury:
working on switched capacitor
multilevel inverters
- (4) Ariha Sahoo: working on
switched capacitor multilevel inverters