Title: - Future Power Electronics: Opportunities and Challenges

Abstract: The popularity of electric transportation and the development of smart grid technologies have led the requirement for better performance from power electronic converters and components. In particular, these power electronic devices may operate under high stress, various environmental scenarios, and in overload conditions. Nevertheless, due to their central roles in electrical systems, the necessity to consider the reliability and availability of the devices has become fundamental; this can be assessed both from a technical and economical point of view considering the final scope of the device. Traditional approaches usually consider historical failure data and/or past observed scenarios; however, considering the rapid evolution of the technologies and the high reliability values attained by such components, these data are quite scarce, thus complicating the reliability of our estimations.

The proposed talk will focus on the following topics:

- Scope of high band gap devices
- Risk analysis of power electronic devices
- Design of Power reliable power Electronics converter
- Statistical methods for power electronics reliability evaluation (Bayesian inference, statistical modelling, nonparametric approaches, etc.);
- Dielectric and thermal stress strength models of power electronics devices;
- High reliability power electronics architecture for electric powertrain;
- Risk analysis of battery storage system under critical condition;
- Reliability challenges in smart grid installations.
- Power Quality issues

About the speaker:

Dr. Avik Bhattacharya is working as Assistant Professor in the Dept. of Electrical Engineering of IIT Roorkee from February 2014. He completed his B. Tech from Sikkim Manipal Institute of Technology in 2002 and M. Tech and PhD from IIT Khragpur in the year 2005 and 2010 respectively.

He became student member, member and senior member of IEEE in 2006, 2013 and 2018 respectively. Prior to joining IIT Roorkee he has worked for R&D division of Solar Semiconductor and Samtel Avionics during his short stay in industry he filed two international patents on solar pump and power quality.

At present he owns two international patents and one national patent. He has also published fifteen SCI index journals and thirty conference papers. Among the fifteen SCI-index journals, ten among them in IEEE/IET. He is also Principal investigator of three research project supported by DST-SERB, CSIR, CPRI and two industrial projects (sponsored research project) supported by companies like Statcon Energia and Tata Power. He has also authored as he has already guided two PhD students and more than fifteen M. Tech students. He has also offered four NPTEL video courses and conducted two short term courses in QIP as PI and collaborator of GIAN courses with foreign faculty. His field of interest is power converter topology, electric vehicle, micro-grid, power quality, converters for the renewable energy.