

**Title: TECHNOLOGY ADVANCES AND TRENDS IN
POWER ELECTRONICS**

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Lecturer Program

Date: **03 December 2009, Thursday**
Time: **10:00AM – 11:30AM**
Venue: Nanyang Technological University,
Block S1-B1c-111, Meeting Room S1-C (S1-B1c-111)

ABSTRACT

The technology of power electronics and motor drives has gone through dynamic evolution during the last three decades due to many inventions in power semiconductor devices, converter circuits, PWM techniques, analytical and simulation methods, motor drives, advanced control techniques, digital signal processors and ASIC chips. It has now grown as a vast, complex and multi-disciplinary area in electrical engineering. Very recently, the advent of large bandgap power semiconductor devices and artificial intelligence (AI) techniques has opened a new frontier in power electronics. The cost and size reduction along with performance improvement and reliability are now promoting extensive application of power electronics in industrial, commercial, residential, aerospace, military, transportation and utility systems. Power electronics is destined to play a significant role in the global industrialization of the 21st century. Power electronics has the important role of energy saving by efficient utilization of electricity. In addition, it is an indispensable element in modern

environmentally clean renewable energy systems and electric/hybrid vehicles. The role of power electronics in solving our future energy shortage and global warming problems appear to be significant. It appears that power electronics in future will be as important as information technology of today.

The presentation will start by explaining why power electronics is so important today, and its important role in energy saving by illustrating specific examples. Then, it will briefly give modern perspective of wind energy, photovoltaic energy, fuel cells and electric/hybrid vehicles which are intensive in power electronics. Then, the technology status of power electronics and motor drives will be briefly reviewed with example applications. The advances and technology trends of power semiconductor devices, converter circuits, machines and motor drives will be discussed. Finally, a conclusion and future perspective of the technology will be outlined before the floor opens for discussion.

Short Biography:

Dr. Bose held the Condra Chair of Excellence (Endowed Chair) in Power Electronics at the University of Tennessee, Knoxville, since 1987, where he was responsible for teaching and the research program in power electronics and motor drives. Concurrently, he was the Distinguished Scientist (1989-2000) and the Chief Scientist (1987-1989) of EPRI-Power Electronics Applications Center, Knoxville, TN. Prior to this, he was a Research Engineer in the General Electric Corporate Research and Development Center (now GE Global Research Center), Schenectady, NY, for 11 years (1976-1987), an Associate Professor of Electrical Engineering, Rensselaer Polytechnic Institute, Troy, NY for five years (1971-1976), and a faculty member at Bengal Engineering and Science University (BESU) for 11 years (1960-1971). He is specialized in power electronics and motor drives area, and has given extensive contributions in power converters, PWM techniques, electric/hybrid vehicle drives, microprocessor/DSP control, system simulation, renewable energy systems, and application of artificial intelligence techniques (expert system, fuzzy logic and neural network) in power electronic systems. He served as a visiting professor in Aalborg University, Denmark; Padova University, Italy; Federal University of Mato Grosso Sul, Brazil, and Sevilla University, Spain. He has been power electronics consultant in a large number of industries. Dr. Bose has authored more than 200 papers and holds 21 U.S. patents. He has authored/edited seven books in power electronics: *Power Electronics and Motor Drives – Advances and Trends* (Elsevier/Academic Press, 2006), *Modern Power Electronics and AC Drives* (Prentice-Hall, 2001), *Power Electronics and AC Drives* (Prentice-Hall, 1986), *Power Electronics and Variable Frequency Drives* (Wiley/IEEE Press, 1997), *Modern Power Electronics* (IEEE Press, 1992), *Microcomputer Control of Power Electronics and Drives* (IEEE Press, 1987), and *Adjustable Speed AC Drive Systems* (IEEE Press, 1981). He has given invited seminars, tutorials and keynote addresses extensively

throughout the world, particularly in IEEE sponsored programs and conferences. “Bimal Bose Award in Power Electronics” was established by the Institute of Electronic and Telecommunication Engineers (IETE), India to recognize his contribution in the field.

Dr. Bose has served the IEEE in various capacities, including Chairman of the IEEE Industrial Electronics Society (IES) Power Electronics Council, Associate Editor of the IEEE Transactions on Industrial Electronics, IEEE IECON Power Electronics Chairman, Chairman of the IEEE Industry Applications Society (IAS) Industrial Power Converter Committee, IAS Member of the Neural Network Council, Vice-Chair of the IEEE Medals Council, Vice-Chair of the IAS Distinguished Lecture Program, Member of IEEE-USA Energy Policy Committee, Member of the IEEE Fellow Committee, Member of IEEE Lamme Medal Committee, Member of the IEEE Medal in Power Engineering Committee, Member of the Editorial Board of the Proceedings of the IEEE, and Member of IEEE Spectrum Advisory Board. He was the Guest Editor of the Proceedings of the IEEE (Special Issue of Power Electronics and Motion Control, August 1994), and Special Section Editor of IEEE Transactions of Industrial Electronics (Neural Network Applications in Power Electronics and Motor Drives, February 2006). Dr. Bose has B.E. degree in 1956 from Bengal Engineering and Science University (BESU), India, M.S. degree in 1960 from University of Wisconsin, Madison,, and Ph.D. degree in 1966 from Calcutta University.

Dr. Bose is a nine-time winner of professional Awards of which seven are IEEE Awards.

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