Report of Thomas Alva Edison Memorial Lecture (24th in the series) held on 10th Oct 2020

Thomas Alva Edison Memorial Lecture (24th in the series) was organized by PES-IAS Delhi Chapter on 10th October, 2020, 9:00 am to 10.30 am via Google meet link. This year's speaker Dr. Brij N. Singh is a renowned Technical Fellow of Power Electronics Engineering, John Deere Inc., USA. He delivered talk on the topic: "Wide Bandgap (WBG) Power Electronics for Heavy-Duty Vehicles".

His talk related to John Deere project funded by the US DOE-Power America. The speaker emphasized that through PowerAmerica, John Deere has formed a collaboration with researchers from the US Department of Energy National Renewable Energy Laboratory (DOE NREL) to develop a 200 kW 1050 VDC silicon carbide (SiC) dual inverter. The SiC inverter converts vehicle engine power into electrical power needed for the permanent-magnet-motor based powertrain used in heavy-duty construction and mining vehicles.

His presentation covered development and test verification of various technologies deployed in the successful realization of a power-dense (43kW/Liter) high-temperature (suitable for 115 deg C water-ethylene-glycol coolant) high-efficiency (>98% over entre range of coolant) SiC dual inverter. Test results from various generations of the SiC inverter were presented. He discussed that in April 2017, the Fargo, North Dakota-based John Deere Electronic Solutions (JDES) successfully demonstrated the SiC inverter in a John Deere 644K hybrid front loader vehicle, using the engine radiator fluid to cool the SiC power electronics. Since then this SiC inverter has been operating on a prototype vehicle and 100s of continuous operation of the drive train didn't show any field issue. In addition to in-vehicle testing of the SiC inverter,~3,500 hours experience from real-world application experience resulted from the extensive testing in a back-to-back motor dynamometer in JDES's power electronics lab. The students and faculty members discussed a number of issues related to the development of SiC inverter technology including realization of key commercialization objectives in the question-answer session afterwards. The talk was attended by more than 60 researchers and faculty members.