TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Homi Bhabha Road, Mumbai-400 005

January 29, 2019

ASET Colloquium

Speaker : Dr. Nihal Kularatna ***(University of Waikato, New Zealand)***

Title : Benefits of million-times larger capacitance in EDLCs: Supercapacitor-assisted novel circuit topologies

Date &Time : Monday 04 February 2019 at 11:00 hrs.

Venue : Lecture Theater (AG-66)

Abstract :

Supercapacitor technology has matured well during the last fifteen years, and today they are in a myriad of applications, including the automotive. Practical devices in general have almost one million times larger capacitance compared to electrolytic or film capacitors, for the same can size. Compared to conventional capacitors with large DC voltage ratings, supercapacitors offer one to two order greater energy density and twice the power density. Traditional applications are to use them instead of batteries or to complement battery packs with them for high power capability. If we consider them helping us build large time constant circuits in a creative angle, supercapacitors can be the basis for unique and novel circuit topologies to achieve: significantly high energy efficiency in DC-DC converters; surge protection; rapid energy transfer; high density inverters and renewable energy converters with DC-UPS capability. Presentation will be a discussion on how to develop unique solutions to well-known issues in power electronics with the examples of developing many patented or patent pending SC assisted (SCA) techniques useful in high efficiency linear DC-DC converters, surge absorbers, rapid water heaters, high density inverters and renewable energy appliances. About the Speaker: Nihal Kularatna is an electronics engineer with over 43 years of contribution to profession and research. He has authored nine reference books for practicing electronic engineers including two IET Electrical Measurement Series books and four Elsevier (USA) titles. His recent research monograph titled Design of transient protection Systems – Including supercapacitor based designs for surge protectors, was just published by Elsevier (Dec 2018) He was the winner of New Zealand Innovator of the Year 2013 Award. After graduation in 1976, he worked as an aviation ground electronics engineer and in digital telephone exchange systems. In 1985 he joined the Arthur C Clarke Institute for Modern Technologies as an R & D Engineer, and was

appointed the Director/CEO in 2000. From 2002 to 2005 he was a Senior Lecturer at the Department of Electrical and Computer Engineering, University of Auckland. In 2014, he was appointed the vice chair of the DC Energy Efficiency Committee of IEEE. Nihal is a Fellow of the IET, Fellow of IPENZ and a Senior Member of IEEE and a graduate from the University of Ceylon (1976). He is presently employed as an Associate Professor in the School of Engineering, the University of Waikato, New Zealand.

Dr. Satyanarayana Bheesette

(Coordinator, ASET Forum)