Prof. Bipin Rajendran
Department of Electrical Engineering,
IIT Bombay.

TOPIC:

New algorithms and devices for neuromorphic computing

ABSTRACT:

The computing hardware employed by biological systems are drastically di_erent from man- made Silicon based machines { they operate at one-tenth of a Volt, and have the ability to adapt and extract higher level information content in data streams in a fault-tolerant, fuzzy manner. In this talk, I will discuss some recent advances in building such novel algorithms and devices. We have developed an adaptive spiking neural circuit for navigation inspired by the thermot axis network of the nematode C. elegans. This network comprising of only 10 neurons and 2 adaptive synapses could be used to forage and detect contour lines of various physical environmental variables such as temperature, chemical concentration, radiation etc. I will also discuss new nanoscale devices that have been programmed using very simple voltage waveform to mimic the plasticity properties of synapses in the brain. These devices and algorithms lay the stepping stones towards building truly intelligent information processing systems for the `beyond-Moore' era.

PROFILE:

Dr. Bipin Rajendran is an Associate Professor in the Department of Electrical Engineering at Indian Institute of Technology Bombay and a DST Ramanujan Fellow. He was a Master Inventor and Research Staff Member at IBM T. J. Watson Research Center in New York during 2006-'12, engaged in exploratory research on non-volatile memory and neuromorphic computation. He has co-authored a book on phase change memory, published more than 40 papers in peer reviewed journals and conferences, and has been issued 45 US patents. In Spring 2012, he was an Adjunct Associate Professor in the Engineering school at Columbia University, during which he taught a graduate course on Neuromorphic Engineering. He received a B.Tech (2000) from Indian Institute of Technology, Kharagpur and M.S (2003) and Ph.D (2006) in Electrical Engineering from Stanford University.