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Title : Sensor Scaling for Intelligent Heterogeneous Systems

Abstract :

With transistor scaling becoming increasingly difficult, the heterogeneous system integration would become a norm for future intelligent systems. I believe that the stage is now set for a new wave of electronic systems to be equipped with massive sensory functions, specifically with biological and chemical sensors, going beyond conventional compute and storage paradigm. However, not much attention is given to develop a holistic approach to manage the diversity and scaling issues of sensor blocks, akin to what was done in digital, analog and mixed signal electronics. I will present two case studies from our research:

- (i) Biosensor systems for point of care diagnostics : the story of managing the sensing of multiple analytes in blood and urine with an eventual goal to realize "Lab on Palm"
- (ii) Gas sensor systems for environmental monitoring, breath analysis and hazardous gas leakage detection, with an eventual goal to realize the "Electronic Nose"

With this backdrop, I will end my talk with some thoughts on future challenges in achieving highly complex and intelligent electronic sensory systems.

Bio : Navakanta Bhat received his Ph.D. in Electrical Engineering from Stanford University, in 1996. Then he worked at APRDL, Motorola in Austin, TX until 1999 on advanced CMOS technology development. He is currently the Dean of the Division of Interdisciplinary Sciences at the Indian Institute of Science, Bangalore. His research is focussed on nanoelectronic devices, electrochemical biosensors and chemiresistive gas sensors. He is the recipient of several awards including IBM Faculty award, Dr Abdul Kalam Technology Innovation National Fellowship and Outstanding Research Investigator award (Govt. of India) and the prestigious Infosys Prize in Engineering and Computer Science. He is the Fellow of INAE, and Fellow of IEEE. He was the Editor of IEEE Transactions on Electron Devices (2013-2016). He is EDS BoG member since 2015, and is currently Co-Chair, Nanotechnology technical committee and Vice President IEEE EDS Educational Activities. He is a Distinguished Lecturer of IEEE EDS.

He is also the cofounder of the start-up "PathShodh Healthcare Pvt Ltd", which has commercialized first of its kind lab-on-palm device, for point of care diagnosis of multiple chronic diseases.