

Neuromorphic Engineering 2.0: AI for Edge Computing

by

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Abstract

In this talk, I will introduce the concept of “Neuromorphic” Engineering (NE) that aims to develop neuro-inspired circuits and systems for efficient intelligence in edge computing. I will then describe how the original concept has been broadened to include algorithms and architectural aspects. Next, I will show three concrete examples of NE research done in our group. The first deals with developing intelligent cortical implants for brain-machine interfaces by integrating a low-power machine learner in the implant for decoding subject’s intention—this opens up the option of getting the next 10X increase in number of accessible neurons. I will show the first such demonstration of a micropower neural network in decoding spikes from the primate brain in real-time closed loop experiments. In the second example, I will demonstrate the opportunity of creating a scalable Internet of Video Things (IoVT) by using a neuromorphic camera as the front-end sensor. By being sensitive to only changes in temporal contrast like the human retina, such imager systems allow ultra-efficient sensing and processing compared to conventional frame-based cameras. Third, I will show examples of how non-CMOS devices may be used to design deep recurrent neural networks or extend NE applications to printed, large area systems for ambient intelligence. Finally, I will close the talk with some examples of future directions and how NE can impact other areas such as hardware security, large-area electronics etc.

Biography



Arindam Basu received the B.Tech. and the M.Tech. degrees in electronics and electrical communication engineering from IIT Kharagpur in 2005, and the MS degree in mathematics and the Ph.D. degree in electrical engineering from the Georgia Institute of Technology, Atlanta, in 2009 and 2010, respectively. He joined Nanyang Technological University, Singapore in 2010, where he currently holds a tenured Associate Professor position. His research interests include bio-inspired neuromorphic circuits, non-linear dynamics in neural systems, low-power analog IC design, and programmable circuits and devices.

Dr. Basu received the Prime Minister of India Gold Medal in 2005 from IIT Kharagpur. He was a Distinguished Lecturer of the IEEE Circuits and Systems Society for the 2016–2017 term. He received the Best Student Paper Award from the Ultrasonics symposium in 2006, the best live demonstration at ISCAS 2010 and a finalist position in the best student paper contest at ISCAS 2008. He also received the MIT Technology Reviews inaugural TR35@Singapore Award in 2012 for being among the top 12 innovators under the age of 35 in Southeast Asia, Australia, and New Zealand. He has served as Guest Editor in several IEEE journals and is currently an Associate Editor of the IEEE Sensors Journal, the IEEE Transactions on Biomedical Circuits and Systems, and the Frontiers in Neuroscience.

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Please register for the Zoom session [HERE](#)
Online Registration : (*Please register with [EID]@cityu.edu.hk for email address.)

**** ALL ARE WELCOME ****