Co-designing Neuromorphic Systems from Materials to Algorithms

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Abstract: Deploying trusted artificial intelligence at the point-of-sensing or at the edge in our nation’s mobile, airborne and satellite systems would enable revolutionary capabilities including persistent and ubiquitous monitoring for emerging threats, enhanced climate monitoring, and autonomous vehicles. To accomplish this, intelligent algorithms need to be co-designed with tailored analog in-memory computing to achieve 100X more compute (performance/watt) than possible with state-of-the-art technology in size, weight and power constrained extreme environments. This talk will give an overview of Sandia’s work towards co-designing the entire information processing chain from materials and devices to systems, architectures, and algorithms to accelerate neural network inference, Fourier transforms, solving linear systems and real-time uncertainty quantification.

Bio: Dr. Sapan Agarwal is a Principal Member of Technical Staff at Sandia National Laboratories. He received the Ph.D. degree in electrical engineering from the University of California at Berkeley, in 2012. He is leading projects to develop analog in-memory computing architectures to accelerate a variety of embedded applications at the point-of-sensing. His research interests include the co-design of computing systems from materials to algorithms, novel computing technologies, multiscale modeling of radiation effects, and explainable machine learning.