

Towards Memory-Centric Autonomous Systems: A Technology and Device Perspective, *Arijit Raychowdhury, Georgia Institute of Technology*

Arijit Raychowdhury is currently a Professor in the School of Electrical and Computer Engineering at the Georgia Institute of Technology where he joined in January 2013. He is the co-director of the Georgia Tech Quantum Alliance. From 2013 to July 2019 he was an Associate Professor and held the ON Semiconductor Junior Professorship in the department. He received his Ph.D. degree in Electrical and Computer Engineering from Purdue University (2007) and his B.E. in Electrical and Telecommunication Engineering from Jadavpur University, India (2001). His industry experience includes five years as a Staff Scientist in the Circuits Research Lab, Intel Corporation, and a year as an Analog Circuit Researcher with Texas Instruments Inc. His research interests include low power digital and mixed-signal circuit design, design of power converters, sensors and exploring interactions of circuits with device technologies. He and his students have won eleven best paper awards and multiple fellowships and awards over the years. Dr. Raychowdhury is a Senior Member of the IEEE.

Abstract: As we look at future computing systems, we realize the need for fundamentally new approaches to sustain the exponential growth in performance beyond the end of the CMOS roadmap. In particular, we observe that new computing models that deal with “data analytics” have compute and storage interleaved in a fine grained manner - not separated as in the Von Neumann world. Such a paradigm shift requires breakthrough innovations in memory technologies, BEOL and FEOL devices, packaging and integration as well as computing architectures that can be married to these technologies. In this talk, I will discuss the latest advances in near-memory and in-memory computing circuits and their potential when integrated in novel memory arrays. In particular, I will discuss the promise of working with various resistive memory technologies and how they can accelerate the pathway towards future autonomous systems. Furthermore, I will show examples of some of the fundamental and engineering limitations in the associated technologies and devices that can be addressed by careful system design. Overall, the focus of the talk will be on devices and technologies that are needed to build end-to-end autonomous systems for example used in micro robots applications and more.