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Energy efficient computing and sensing in the Zettabyte era: silicon to the cloud

Abstract— In this talk we present and discuss some of the great research challenges and opportunities related to 21st century energy efficient computing and sensing devices and systems, in the context of the Internet of Things (IoT) revolution. In the future, major innovations will require holistic approaches encompassing silicon and cloud technologies and will be centered on big/abundant data and context. There is still an important role to be played by innovations in energy efficient technologies, devices, and system design, building on the success of silicon CMOS. Overall, the predicted future global amounts of stored, computed, communicated, and sensed information will certainly challenge the world capability to process and make sense of zettabytes of data, requiring orders of magnitude improvements in energy efficiency. We will discuss the challenges of edge, neuromorphic and quantum computing and we will show that they are rather complementary and will co-exist as part of future digital computing platforms.

Short Bio

Adrian M. Ionescu is a Professor at the Swiss Federal Institute of Technology, Lausanne, Switzerland. He received the B.S./M.S. and Ph.D. degrees from the Polytechnic Institute of Bucharest, Romania and the National Polytechnic Institute of Grenoble, France, in 1989 and 1997, respectively. He has held staff and/or visiting positions at LETI-CEA, Grenoble, France, LPCS-ENSERG, Grenoble, France and Stanford University, USA, in 1998 and 1999.

Dr. Ionescu has published more than 400 articles in international journals and conferences. He received many Best Paper Awards in international conferences, the Annual Award of the Technical Section of the Romanian Academy of Sciences in 1994 and the Blondel Medal in 2009 for remarkable contributions to the progress in engineering sciences in the domain of electronics.He is the 2013 recipient of the IBM Faculty Award in Engineering. He served the IEDM and VLSI conference technical committees and was the Technical Program Committee (Co)Chair of ESSDERC in 2006 and 2013.

He is director of the Laboratory of Micro/Nanoelectronic Devices (NANOLAB). He is appointed as national representative of Switzerland for the European Nanoelectronics Initiative Advisory Council (ENIAC) and member of the Scientific Committee of CATRENE. Dr. Ionescu is the European Chapter Chair of the ITRS Emerging Research Devices Working Group