

75th Anniversary of the Transistor Semiconductor Industry Perspective

Fernando Guarín PhD, IEEE Fellow
Senior Past President Electron Devices Society EDS
fernando.guarin@ieee.org

The invention of the transistor in 1947, coupled along with advances in materials, device layout and process integration of semiconductor devices over the last seven decades has enabled the exponential growth of the necessary products and technological innovations that have transformed the world. Our society depends on semiconductors for most facets of everyday life. The near future will bring a level of instrumentation that grows daily with ever increasing amounts of data along with the intelligence and ability to communicate and automate many processes and industries in what is now known as the Internet of Things (IoT), an area that will be progressing at much higher speeds thanks to the incremental deployment of 5G. As a result of all these advances the world is already smaller and flatter. The reality of living in a globally integrated world is upon us and is presenting us with many opportunities and challenges. This increased information content gives us a unique path to alleviate and find solutions to the very serious problems that pose some of the most important challenges facing the world today. In this talk we will provide a brief historical perspective of the most relevant milestones in the development of semiconductor technology and will provide an overview of the economics and supply chain currently producing the chips that are widely employed throughout the world. We will describe the role and interactions of Pure Play Foundries, Integrated Device Manufacturers and Fabless companies. We will spend some time addressing the implications for our planet, from geopolitical to our ability to survive the impending climate and ecological crisis. To close we will look at the semiconductor industry and opportunities from the Latin American perspective. Throughout this talk I will provide a personal perspective from my 42 years actively working in the semiconductor Industry.



Dr. Fernando Guarín retired in July 2022 as a Distinguished Member of Technical Staff at Global Foundries in East Fishkill New York where he led the reliability team responsible for the qualification of 5G technologies. In 2015 he retired from IBM's Semiconductor Division after 27 years as Senior Member of Technical Staff. He earned his BSEE from the "Pontificia Universidad Javeriana", in Bogotá, Colombia, the M.S.E.E. degree from the University of Arizona, and the Ph.D. in Electrical Engineering from Columbia University, NY. He has worked in microelectronic reliability for over 35 years.

From 1980 until 1988 he worked in the Military and Aerospace Operations division of National Semiconductor Corporation. In 1988 he joined IBM's microelectronics division where he worked in the reliability physics and modeling of Advanced Bipolar, CMOS and Silicon Germanium BiCMOS technologies. Most recently he was the leader of the team qualifying GlobalFoundries RF 5G technology offerings.

Dr. Guarín is an IEEE Fellow, Distinguished Lecturer for the IEEE Electron Device Society EDS, where he has served in many capacities including; member of the IEEE's EDS Board of governors, chair of the EDS Education Committee, Secretary for EDS. He was the EDS President 2018-2019.