The Life Cycle of Electronics Research Topics

By Franco Maloberti

Abstract:

The life cycle reflects the universal evolution of everything in nature, and this principle also applies to science. Scientific principles guide the development of new theories and models, promote innovative ideas, and determine potential endpoints for research studies. The evolution is supported by essential factors, with funding being the most crucial. Modern research requires specialized equipment and "manpower" consisting of PhD and postdoctoral researchers. Another key element is the career development of researchers, which reaches its peak in the prestige they achieve at the height of their careers.

The situation with electronics topics is more complicated because they are now strategically vital to many aspects of human activity. It is not only about activities that enhance quality of life, but also those that are strategically or militarily important. Some factors often lead to significant deviations from the normal path of life, like the injection of funding or the initiation of research programs that focus attention on specific areas.

Initially, the presentation explains the meaning of an electronic research topic that lies between pure research and pure development. Then, it describes different stages of the life cycle of key electronic topics. The "natural" life cycle follows a path from the initial idea to "nothing more to study" or to "development." The presentation also highlights the factors that influence the "natural" flow, either extending or shortening the life cycle.

The provided information can help the researcher select an investigation topic and determine its potential for producing scientific results.

Biography：

Franco Maloberti graduated in Physics with Honors in 1968. After a year at the University of L'Aquila, he moved to the University of Pavia in 1969, where he is now a Professor Emeritus. He received two Honorary Doctorates, the first from the Instituto Nacional de Astrofisica Optica y Electronica, Puebla, Mexico, in 1996, and the second in Science from the University of Macau in 2023. He was the first Professor awarded the chair dedicated to Jack Kilby (Nobel Prize winner in 2000 for the invention of integrated circuits) at Texas A&M University, College Station, and the Microelectronics Chair Professor at the University of Dallas. He has been a visiting professor at the Zurich Polytechnic (ETH) and the Lausanne Polytechnic (EPFL). At the University of Pavia, Prof. Maloberti has supervised over 260 master's theses and 28 PhDs in circuits, systems, and analog microelectronics. Furthermore, he has co-supervised four PhDs from EPFL Lausanne, one PhD from ITU Istanbul, and another PhD from the University of Macau. As a professor at Texas A&M University, he supervised 11 doctoral and five master's students. As a professor at UTD Dallas, he supervised eight PhD and seven master's students.

His scientific interests span from switched capacitors to data converters, sensor interfaces, and portable power management. He has written over 620 publications, ten books, and holds 41 patents. Of the 620 publications, 139 describe microelectronic circuits fabricated and measured with innovative features. In 1992, he received the XII Pedriali Prize for his technical and scientific contributions to national industrial production. He received the IEEE CAS Society Meritorious Service Award in 1999, the CAS Society Jubilee Gold Medal in 2000, and the IEEE Millennium Medal. He received the 1996 IEE Fleming Premium, the 2007 ESSIRC Best Paper Award, and the 2007 and 2010 IEEJ Workshop Best Paper Awards. He received the 2013 IEEE CAS Society Mac Van Valkenburg Prize. He was president of the IEEE Sensor Council and the IEEE CAS Society. He was the Division I director of IEEE (2022-2023). He is an IEEE Life Fellow.