

1 Microsystems to Nano-Microsystems

A Technological Breakthrough

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Microsystems are small-dimensional intelligent objects, with sizes ranging from centimeters to micrometers, which present a well-identified function, and are elaborated by different technologies of manufacturing in parallel (batch processing) already well mastered in microelectronics. They arise from the needs of miniaturization of voluminous, expensive systems, in order to apply them to new systems that require a better functional conformity and a better portability (nomadic systems). The concept is based on the top-down way of miniaturization. The main evolution of the functions beyond electronics is the introduction of micromechanics using mobile parts (springs, beams, rotors, etc.), the optics, and the intelligence (software embedded into the microsystems) by using the technologies of microelectronics.

The new tools generally ensure a link with nanotechnology (technology capable of elaborating objects structured on the scale of the nanometer) and the macroscopic real world. Nanotechnologies lead to creating infinitely local functions using either sculpture by manipulating atoms, molecules, or molecular assembly (the bottom-up way). They are approachable to the users through a continuous line as nano-micro-meso-macro systems, ensuring coherent and additional set of useful functions from nano to real world.

1.1 FROM MICROELECTRONICS TO MICROSYSTEMS

The microelectronics developed on the concept of C-MOS transistor and on planar manufacturing technology allow for an automatic realignment of various technological layers implemented during circuit integration.