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Paper

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Sensors as Alternative Way for Teaching Microelectronics in Latin American Region

This paper discusses an alternative way to implement a suitable education program for teaching microelectronics using the different possibilities available in local facilities to fabricate sensors. The aim of this program is to provide the necessary condition to develop solid state sensors, optoelectronics devices and microelectromechanisms. To guarantee a viability of this proposal, it is structures with low capital investment in interdisciplinary projects in fields like bio-medical engineering, electronics engineering, instrumentation and computer science.

The South-American experience, to incorporate industrially the Microelectronics (ME) in their economies, contributed to formation of human, resources in areas related to semiconductor technology. Engineers were formed in fabrication processes, electrical characterization and circuits design by using silicon conventional technologies. In these countries the conditions to get technological advances were only possible until the beginning of the 80s. Since then there has been growing a technological gap, with industrialized countries. Today with the standardization of fabrication and integrated circuits design is possible to involve, again, the participation of professionals, in specific fields.

The new concept of design and integrated circuits fabrication, offered by silicon foundries, represents a more concrete option to enlarge most of technical advances to regions with low investment in emerging technologies. Standard foundries also make silicon micromachining possible for universities that do not have an in-house custom integrated circuit fabrication facility. The possibility to make a post-processing step on the final chip, allows to compatibilize the fabrication of the sensor element with electronics circuits.

As described, the development of sensors system is an interdisciplinary task, which requires the detailed knowledge of experts from completely different fields. In general, computer scientists, electrical and electronic engineers, physicists, biochemists, biologists, or medical engineers may be involved. This program intends to explore the interdisciplinary characteristic of Microelectronics to review the potential that it has to fabricate mechanical, thermal radiation, pressure and gas sensors. The methodology to be used includes the revision of design rules of devices related to materials and fabrication processes normally available in semiconductor technologies.