

Microelectronics training experiment in Tunisia, Case of Monastir University

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Abstract:

In the absence of an industry in micro-electronics, the university plays the role of the technical and economic promoter. The training of various generations of graduates makes it possible to make easy the emergence and the attraction of investors in the discipline. However without the effort of certain precursors it doesn't have possible to achieve this goal. Paper presents the emergence of the experiment of the teaching of micro-electronics in second and third cycle in a country in voice of development like Tunisia.

1. Introduction

Since the end of the Eighties, microelectronic industry popularized its tools towards the universities. Various centers gathering the acquisition of tools of CAD or subcontractor the design were created like CMP, CIMIRLY and CNFM in France or Europractice in the U.K., IMEC in Belgium...

Like other countries, Tunisian university sees its development did not remain in margin of this activity. The industry of micro-electronics being practically non-existent at this time in this kind of countries, the contribution of the national PhDs of return from foreign countries as France, Canada, USA, allowed the establishment of a network of the teaching of micro-electronics.

2. BSc and Master experience

The first teaching experience was established in Tunisia, since 1990, in the Faculty of Sciences of Monastir, with BSc of Physics & Microelectronics, where the first course in micro-electronics was ensured by Professors Besbes (VLSI & CAD) and ElJani (Technology).

At the same time the idea of created a master specialized in micro-electronics emerged. The master of materials and devices for Electronics was created in 1993 by the Dean, Pr Maaref with the assistance of local professors Tourki, Alaya, Besbes, Zaidi, Bouazra, Ben Ouada ... and Pinard, Bosio, Guyot, Torki,... from French universities. Currently it is called: Materials, Nanostructures, Devices and Systems Micro-electronics (MNDSM). At present, training is exclusively made by Tunisian professors with sometimes the contest of foreign professors in the form of seminars or conferences. The first Material and Systems for Micro-electronics research laboratories also were created in this university

and they were confirmed in great structures (LR) within the framework of the application of the reform of Tunisian research organisation of 1999.

In first case, this network developed organization of several conferences specialized in Tunisia as (International Conferences on Microelectronics) ICM 92, 98, 2005 or (Smart System Devices) SSD 2003, 2005, 2007, MADICA...

3. Actual curricula & developments

The development of the teaching of micro-electronics in Tunisia follows the international curricula.

At the beginning the course was based on the characterization of materials, the technological processes like on the design of the devices and basic cells for ASICs and design flow.

Currently it touches the various nano and micro aspects and new electronic devices. It relates to the preceding fundamental aspects in addition to the modern flow of design for reconfigurable supports or not. In this flood of design, the most used tools for description are them: VHDL, VHDL-AMS, System C,...

Currently several promotions of new national university teachers, coming from Monastir University, ensure the activities of formation and research particularly in the universities of Monastir, Sfax, Sousse and Tunis.

Initially the didactic tools were based on tools of CAD in version of demonstration of softwares or on university versions.

Tools for remote formation, films of companies, applet java can enrich various courses with the recent sets of themes. They are often available on the Net.

But new helps with education programs or agreements of companies like Mentor, AMS... or association protocols with CMP, IMEC and Europractice open to our university new opportunity with tools accessibility.

At our days, in the University of Monastir, the graduates in master of micro-electronics are 160. Majority of these students continued in doctorate and 50 already supported there PhD.

4. New industrial environment

This dynamics of teaching and the formation by research allowed the attraction of foreign industrial activity in

engineering in Micro-electronics like ST Microelectronics, ALCATEL, SAGEM,... or national industry like TELNET...

This industrial activity was consolidated by the creation of a new technological poles specialized in Micro-electronics in Sousse (3rd city in Tunisia) after that of the technological pole El Ghazala in Tunis although specialized in telecommunication.

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5. Conclusion

We can conclude that the training level in micro-electronics in Tunisia is close to the international and particularly European standards. The formation by search represents the principal engine of development and follow-up of the evolution of training international in micro-electronics.

Currently Tunisia is ready to take part in the development and research in international microelectronics programs or to accommodate industrial investment in search of cheap but good competences.