

Faculty exchange period carried-out in the framework of Carnegie Mellon | Portugal Program

Report

Participant : José A. P. Machado da Silva; Associate Professor, Faculdade de Engenharia da Universidade do Porto

Host : Shawn Blanton; Professor, Centre for Silicon Systems Implementation, Department of Electrical and Computer Engineering, CMU

Period : February 12, 2012 to May 12, 2012

The objectives foreseen for this visiting period were stated as follows:

- *participate in the teaching of courses on design and testing of analog and mixed-signal microelectronic circuits.*
- *carry-on research on testing and diagnosis of integrated circuits and systems aiming at identifying the fundamental quantities and measurements which should be used to develop embedded test instruments and the respective interconnection infrastructure*

The outcomes of this experience are expected to contribute for the evaluation of the curricular contents of the courses Test and Design for Testability and Instrumentation and Systems Testing of the Doctoral Program on Electrical and Computer Engineering, as well as to establish new research activities at FEUP in collaboration with the CSSI.

The activity developed during this faculty exchange period was then accordingly organized in teaching and research activities, in both cases addressing the domain of design and testing of analog and mixed-signal microelectronic circuits.

Regarding teaching José Machado da Silva had the opportunity of following the S12-18723 course on RF IC Design and Implementation lectured by Prof. Jeyanandh Paramesh. Specifically he had the opportunity of collaborating on the supervision of students' design project assignments as well as of lecturing the classes on Radio-Frequency Power Amplifiers and RF IC Testing.

As the main outcomes of this experience it can be mentioned the identification of new contents, namely on the domain of submicron MOS transistors modelling, to be included in the course Analog Microelectronics of the Integrated Masters on Electrical and Computer Engineering at FEUP, as well as the introduction of CMU students to issues related to RF testing, a subject that was not initially foreseen in the course syllabus.

Concerning also teaching, the contents of the course “Test and Design for Testability” taught in the Doctoral Programme in Electrical and Computer Engineering at FEUP were presented and this course approved for inclusion in the ICTI joint curricular programmes.

As far as research is concerned, the developed activity can be divided in:

- immersion in the activity of the Advanced Test Chip Laboratory research group with the attendance in presentations dedicated to on-going work on the application of statistics and machine learning methods to testing operations, namely:

- “Physically-Aware Analysis of Systematic Defects in Integrated Circuits” PhD thesis submitted by student Wing Chiu Tam.
- “Hardware Implementation of Decision Tree Algorithm”, work being developed by student Meng Ni,
- “Adaptive Machine Learning for Hardware Applications”, work being developed student Mitchell Martin.

- presentation of the seminar "Test and Design for Testability of AMS Circuits -- Critical Steps towards Reliable Products", an overview of the activity and main achievements on design for testability and built-in self-test at FEUP/INESC Porto

- establishment of future collaborative research between the two universities on the development and testing of systems for capturing human biological signals, namely within a project submitted to the FCT call for projects on all scientific domains 2012, as well as in the PhD projects proposed to students recently admitted in the CMU | Portugal PhD programme.

José Machado da Silva had also the opportunity of participating in the activities organized by the CMU | Portugal office:

- presentations of Project Research Doctoral Students Ryan Turner, EPP and Rui Correia, LTI
- social meeting of the CMU | Portugal community in the Waterfront Center

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