Centre Nacional de Microelectrònica IMB

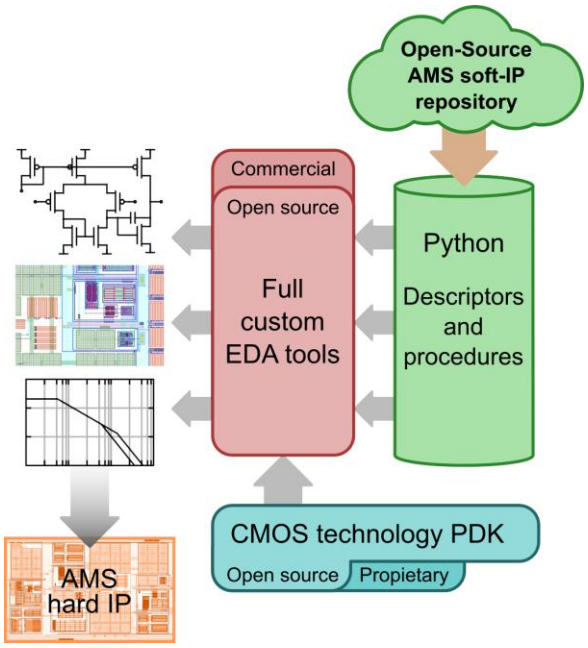
CSIC
Consejo Superior de Investigaciones Científicas

Master Thesis (with possibility of PhD Thesis)
at the Integrated Circuits and Systems (ICAS) research group of IMB-CNM(CSIC)

Open-Source Design Methodology for AMS Integrated Circuits

Description

This work aims to explore new design methodologies of analog and mixed-signal (AMS) CMOS circuits in order to build a truly open-source, license-free and technology-portable repository of IP blocks. The proposed full-custom AMS IC design methodology is based on a common Python frontend, so expert designers can describe in detail the circuit topologies, simulation methodologies, optimization rules at transistor level, as well as the physical design constrains of these soft-IP AMS blocks. The goal is that a third-party designer should be able to use this soft-IP repository to develop an optimum hard-IP implementation in a CMOS technology of choice using either open-source or proprietary EDA tools and process design kits (PDKs).



Background and skills

- Electronic engineering or any similar curriculum covering the following topics: CMOS technology basics, full-custom analog and mixed-signal CMOS circuit design.
- Knowledge of EDA tools and HDLs for full-custom IC design.
- Experience in Python programming language.
- Capability of working as a team.
- Good spoken and written English.

Tasks

The student will setup a Python interface for the description of AMS CMOS IP circuits, both at schematic (topological) and layout (physical) levels, as well as all the associated procedures for scripting its validation and optimization through transistor-level electrical simulations. This Python interface will be tested with three AMS soft-IP case studies in the field of high-resolution A/D data converters (ADCs), clock phase-locked loops (PLLs) and integrate-and-fire (IAF) modulators and their hard-IP implementation in a CMOS technology node ranging from 180 nm to 22 nm. All the above tasks will be performed in the IMB-CNM lab facilities at the UAB Bellaterra Campus.

Contact

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