

Master Thesis:

Automatic Generation of Switched Capacitor Biquad Filters

Infineon Technologies Austria AG is looking for a Master thesis student in Villach, Austria.

Infineon seeks to develop methods to generate analog and mixed-signal circuits automatically. Basic idea is to transfer the design engineer's knowhow into Software code, which allows automatic optimization and dimensioning of the circuit.

During this thesis, we want to push further and realize a program that automatically implements and optimizes a switched capacitor filter according to given constraints. The program should do this in two steps: Firstly, it should optimize the filter structure on an idealized transfer-function level. For this step, we want to develop an optimization algorithm, thus basic knowledge of optimization problems is beneficial for this work. During this first step, the program fixes the overall filter structure, which is in the second step implemented as a mixed-signal circuit on transistor level. At this point, analog simulations must confirm that the circuit meets all requirements. Lastly, the program should generate the corresponding layout automatically. Programs that implement these last two steps for other structures are already available as templates.

Prerequisites

- › Solid knowledge in analog CMOS circuit design: design, verification, layout, optimization
- › Understanding of analog circuit development flow
- › Basic familiarity with signal theory, transfer functions in Laplace- and Z-domain
- › Knowledge in the Python programming language beneficial
- › Familiarity with Cadence tools
- › Good English language skills

The main tasks of this thesis work are:

- › Research and compare the different possible biquad structures.
- › Manually implement such a biquad filter in an Infineon CMOS Technology to get familiar with the technology and the filter's performance measures.
- › Getting familiar with the existing analog generator framework and analog generator development flow.
- › Develop an optimization algorithm for the filter-structure. This algorithm will compare several possible structures and select the one to implement in silicon.
- › Write software code that implements the chosen structure in a mixed-signal circuit and places components in the layout.
- › At this point, several optimizations may or may not be implemented.
- › Concluding the thesis, we want to publish a paper summarizing our results.

Infrastructure: Infineon provides access to the in-house design environment and tools. If applicable, Infineon may produce test chips, cover the production costs and provides access to measurement equipment.

For the duration of the thesis, the student is expected to be located in Villach, Austria (if not agreed otherwise). HR Infineon will give details upon the monthly salary for the student after a technical interview.

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