Tiago Oliveira Weber

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About

I am currently a professor at the Federal University of Santa Catarina (UFSC), Araranguá, Brazil. I

Research Interests

My main research interests are:

- CAD tools for analog integrated circuits

- optimization and metaheuristics

- analog integrated circuit design

- artificial intelligence techniques

- analog computing.

Contact

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Education

Doctorate in Microelectronics - June 2015

University of São Paulo - São Paulo, Brazil

- Dissertation Title (translated from Portuguese): Synthesis of analog integrated circuits in system-level and circuit-level using modern optimization methods

- Research Synopsis: analog integrated circuits are very important in modern electronic systems, performing tasks such as analog to digital conversion, digital to analog conversion, radio frequency communication, filtering and others. The design of this type of circuit requires attending to several performance specifications, being usually performed only by experienced designers. We developed techniques for the design of circuit-level and system-level analog circuits. As the optimization core, we proposed an algorithm based on Simulated Annealing while considering multiobjective information through the use of a crossover operator. An hybrid algorithm combining the proposed algorithm with Particle Swarm Optimization was created to properly explore the Pareto front. Tests indicated the algorithms are efficient for the design of analog circuits as well as outperform many other derivative-free algorithms when applied to purely mathematical problems.

B.S. in Electrical Engineering - Jan. 2010

Federal University of Santa Maria - Santa Maria, Brazil

- Undergraduate Thesis Title (translated from Portuguese): Tool for integrated circuit synthesis with an educational approach

- – Modules included:

- Analog Integrated Circuits Design

- Special Topics in Microelectronics

- Programmable Logic Systems

- Conception of Integrated Circuits

- Data Communication

- Signal Processing

Publications

Journal publications

- BARBOZA, S.H.I. ; BREGANT, M. ; CHAMBERT, V. ; ESPAGNON, B. ; HERRERA, H.D. HERNANDEZ ; MAHMOOD, S.M. ; MORAES, D. ; MUNHOZ, M.G. ; NOËL, G. ; PILYAR, A. ; RUSSO, P. ; SANCHES, B.C.S ; TAMBAVE, G.J. ; TUN-LANOË, K.M.M. ; NOIJE, W. VAN ; VELURE, A. ; VERESCHAGIN, S. ; WEBER, T.O. ; ZAPOROZHETS, S. . SAMPA chip: a new ASIC for the ALICE TPC and MCH upgrades. *Journal of Instrumentation*, v. 11, p. C02088-C02088, 2016; Link

- WEBER, T.O.; NOIJE, W.A.M.V. Analog Circuit Synthesis Performing Fast Pareto Frontier Exploration and Analysis Through 3D Graphs. *Analog Integrated Circuits and Signal Processing*, Springer US, v. 73, n. 3, p. 861-871, ISSN 0925-1030, 2012; Link

- WEBER, T.O.; NOIJE, W.A.M.V. Multi-Objective Design of Analog Integrated Circuits using Simulated Annealing with Crossover Operator and Weight Adjusting. *JICS. Journal of Integrated Circuits and Systems*, v. 7, n. 1, p. 1-9, ISSN 1807-1953, 2012. Link

Book chapter

- WEBER, T.O.; NOIJE, W.A.M.V. Design of Analog Integrated Circuits using Simulated Annealing/Quenching with Crossovers and Particle Swarm Optimization. *Simulated Annealing - Advances, Applications and Hybridizations*, v. 1, p. 219-244, Ed. InTech, ISBN 978-953-51-0710-1, 2012. Link

Conference publications

- WEBER, T.O.; CHAPARRO, S.; NOIJE, W.A.M.V. Synthesis of a Narrow-band Low Noise Amplifier in a 180 nm CMOS Technology using Simulated Annealing with Crossover Operator. *In: Proceedings of the 26th Symposium on Integrated Circuits and Systems* p. 1-5, Curitiba, Brasil, 2013; Link

- WEBER, T.O.; NOIJE, W.A.M.V. Analog Design Synthesis Performing Fast Pareto Frontier Exploration. *In: Proceedings of the 2nd IEEE Latin American Symposium on Circuits and Systems*, p. 62-66, ISBN 978-1-4244-9484-2, Bogotá, Colômbia, 2011; Link

- WEBER, T.O.; NOIJE, W.A.M.V. Analog Design Synthesis Method Using Simulated Annealing and Particle Swarm Optimization. *In: Proceedings of the 24th Symposium on Integrated Circuits and Systems*, p. 85-90, ISBN 978-1-4503-0828-1, João Pessoa, Brasil, 2011. Link

- WEBER, T.O.; RODRIGUES, C. R. Automatic LC Oscillator Systematic Design using Matlab and SPICE Interaction *Iberchip Workshop, XV*, Buenos Aires - Argentina, March 2009 Link

- HAYASAKA, H.; WEBER, T. O.; RODRIGUES, C. R. Oscilador LC à 2,4GHz Controlado por Tensão em Tecnologia AMI 05 *Jornadas de Jóvenes Investigadores*, XVI, Montevideo - Uruguay, October 2008

Teaching

Federal University of Santa Catarina (UFSC): I lecture to classes of the Computer Engineering course

- First semester of 2017 (planned):
    - Special Topics in Analog Microelectronics (in portuguese: "Tópicos Especiais em Microeletrônica Analógica")

- – Electric Circuits for Computer Engineering (in portuguese: "Circuitos Elétricos para Computação")
- – Signal Acquisition (in portuguese: "Aquisição de Sinais")

- Second semester of 2016:
  - – Electric Circuits for Computer Engineering (in portuguese: "Circuitos Elétricos para Computação")
  - – Data Communication (in portuguese: "Comunicação de Dados")
  - – Signal Acquisition (in portuguese: "Aquisição de Sinais")

- First semester of 2016:
  - – Electric Circuits for Computer Engineering (in portuguese: "Circuitos Elétricos para Computação")
  - – Fundamentals of Mathematics to Computer Science (in portuguese: "Fundamentos Matemáticos para Computação")

Curriculum

- Lattes

Professional Social Networks

- ResearchGate
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Blog

Integrate your Circuit Design Flow and Reports: Demonstration of Ngspice and Octave/Matlab Interaction within Emacs

by Tiago Oliveira Weber *<2016-08-04 Thu>*

Can you imagine being able to explore new design ideas, perform calculations, run circuit simulations, calculate some more based on the results and generate reports, all in the same place? Well, you can stop imagining and start developing your next electric/electronic project on Emacs.

Recently, I've made a blog post introducing ob-spice, which is a simple language extension to ob-babel to be able to simulate Ngspice within Emacs.

In the present post I will show how we can use ob-spice to perform interaction between Ngspice, Octave (or Matlab) and any other language of our interest. While the experienced org-mode user would already assume this interaction possible from ob-babel features, it is the first demonstration of ob-spice receiving vector inputs (a new feature to ob-spice) and producing outputs back to other languages.

In our example we will design a simple opamp inverting topology. For that purpose, we will calculate the resistor values in Octave/Matlab, pass the values to Ngspice and measure the results so they can be used back in Octave/Matlab to calculate the error between the ideal response and the simulated one. The error will be due to the opamp characteristics and limitations (for th ... Read more

Design Automation Conferece (DAC) Video About Moving EDA Tools to Open Source

by Tiago Oliveira Weber *<2016-07-06 Wen>*

The 53rd Design Automation Conference had a great discussion about opportunities for open source tools on the Electronic Design Automation world and market models for existing companies. Luckily for all of us, the panel video is available online on YouTube's DAC TV channel with the title "Lanza's Tech Vision Challenge: Daring to Move to Open Source". The moderator was Lucio Lanza (from Lanza TechVentures) and the panelists were Warran Savage (from IP Extreme), Mark Templeton (from Scientific Ventures) and Michael Wishart (from eFabless).

In my opinion all participants were very rational on their statements although having different points of view. I, as an open source advocate, felt very glad this type of discussion is taking place in such a relevant conference and with people that know from the inside out how the current EDA business works. ... Read more

Software/Hardware Integration Lab

by Tiago Oliveira Weber *<2016-06-27 Mon>*

I am now a member of the **Software/Hardware Integration Lab** (LISHA) at the Federal University of Santa Catarina. According to the official site:

The Software/Hardware Integration Lab (LISHA) was founded in 1985 to promote research in the frontiers between hardware and software. Since then, it has dedicated considerable efforts to research in areas such as com-

puter architecture, operating systems, computer networks and the related applications. Currently, the laboratory focuses on innovative techniques and tools to support the development of embedded systems.

My webpage at LISHA is `https://lisha.ufsc.br/Weber` and the announcement (in portuguese) of the start of LISHA at UFSC Araranguá is here. ... Read more

Simulating Circuits with Emacs, Org-mode, Babel and Ngspice

by Tiago Oliveira Weber *<2016-06-26 Sun>*

Picture this. You are creating a report, studying or preparing a class. While you write your text, you suddenly feel that it is time to show in a circuit how your project works. Now the adventure begins: to add the results of a given simulation to your document, you will have to open your simulation software in another window, describe the circuit using a schematic editor, simulate it and then copy and paste the results to your text file. You might as well copy the image of some waveforms. Additionaly, you will also have to describe the circuit elements in such a way that the reader of your report knows what you have simulated.

In this process a lot can be lost: the quality of your schematic screenshots may or may not be a delight to the eyes, but even if the quality is great, there is still a lot of information that is not accessible through an image of the schematic. These can be the various component properties, simulation parameters and component models. In top of that, if you are like me, you will probably spend a lot of time editing and working with the waveforms to make them fit well in the report. And this is usually made either with an image editor (such as Gimp or Inkscape) or with gnuplot (if you're performing the additional step of exporting the data out of the simulator). After you are done ... Read more

Upcoming Conferences

A list of upcoming conferences related to microelectronics can be seen in here.