Joakim Nilsson

Curriculum Vitae Last updated January 24, 2025



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Objective

I am currently employed as a senior lecturer at Luleå University of Technology, where I will probably stay for the foreseeable future. My goals are to continue to develop my skills within electronic design as well as to further improve my teaching skills.

Summary

Interests	Semiconductor physics, integrated-circuit design, high-temperature bandgap sensors, electromagnetic power transfer, pedagogy within electronics
Publications	First author: 3 journal articles and 3 conference proceedings
	Non-first author: 1 journal article and 3 conference proceedings
	To read all my first-author publications in full, see nijoakim.com/research.

Introduction

My first exposure to engineering was probably when I became an ignorant, self-taught programmer who wanted to learn how to make computer games at the age of 13. I continued my programming hobby throughout high school, but it wasn't until I enrolled in the Engineering Physics and Electronics MSc program at Luleå University of Technology (LTU) that my true love for science became apparent. On top of my excitement for computers, I had always been curious about how the universe works and found my studies of the natural sciences tremendously exciting. From then on, I have been overwhelmed with how many thrilling aspects there are about pretty much every field, and how small the fraction of that is that I will have time to learn, be fascinated by, and play with during the course of a lifetime.

Having graduated from LTU, I pursued a PhD at the very same place which provided me with the exiting opportunity to teach what I learn to both colleagues and students, as well as to learn from many very talented colleagues. After my PhD, I have stayed with LTU, first as senior research engineer, later as lecturer, and now as senior lecturer. My focus has been on teaching and find it very rewarding to see that many of my students become inspired, which sometimes leads them to ask questions I wish I would have been smart enough to ask at the time I studied the same subjects. Teaching is my favorite thing at my workplace and my intention is to continue to dedicate a large part of my working time to teaching.

However, I have also been involved in various research projects at LTU and I intend to continue getting involved in such projects. Some of the electronics I have designed are integrated circuit (IC) high-temperature senors intended to be powered by small coils printed directly on-chip. I have also been involved in the design of an IC charge amplifier for use with a radiation detector for mine prospecting, and most recently I am designing a miniaturized ultrasound transducer intended to be placed at the fingertip of a surgeon in order to enable easier diagnosis of certain medical conditions by providing simultaneous feedback by both touch and by observing an ultrasound image.

Skills

Electronics	I have designed and evaluated a sub-15 μ W, non-SOI IC bandgap temperature sensor operating up to 230 °C [8], a sensor made possible through a thorough understanding of semiconductor physics at elevated temperatures. I have experience with integrated and discrete circuits up to 500 MHz, in particular IC coil design for inductive links between PCB coils and chip coils [9]. I have designed two IC chips with Cadence Virtuoso in 350 and 180 nm. I have experience with electromagnetic simulations using FEKO. For SPICE simulations I have been using OrCAD PSpice, Cadence Spectre, LTspice, Qucs, and Gnucap. I also have limited hobby-experience using GNU Archimedes for semiconductor device simulations. I have reviewed 2 articles for the IEEE Sensors journal.
Computer skills	I have been a hobbyist programmer since the age of 13. I maintain and develop the Python electronics library and utility, EPPP (github.com/nijoakim/eppp). Python is my go-to language. I am a GNU/Linux enthusiast and a fanatic Vim user. I have experience programming embedded microcontrollers and FPGAs. I have experience with Microsoft's Office suite.
Teaching	I have been involved with several university courses both as examiner, lecturer and as laboratory tutor. Course evaluations for all courses I have been involved are available upon request.
General skills	I have strong analytical and mathematical skills [12]. I have an IQ of 135 or more according to an IQ test organized by Mensa (FRT form A). I have broad knowledge of physics and various aspects of engineering, and I have basic skills in chemistry. I am used to working in a lab environment and I have a curiosity to understand the instruments I am working with. I am cooperative and often willing to discuss compromises when I disagree.
Languages	I am fluent in Swedish (mother tongue) and English and I speak a little French. I write well and prefer IAT_EX for both writing and presentations.
Misc.	European driver's license (category B)

Education

2014 - 2019	PhD in Industrial Electronics, Luleå University of Technology
2014-2016	Licentiate of Engineering in Industrial Electronics, Luleå University of Technology
2008-2013	MSc in Engineering Physics and Electrical Engineering, Luleå University of Technology
2005-2008	Science Program, Strömbackaskolan, Piteå

Educational Experience

LTU, E7009E	Electronic Design (2016–2017, 2021–2024): Examiner, course responsible, lecturer, laboratory tutor, redesign of course
LTU, E7015E	Integrated Circuits (2021, 2023–2024): Examiner, Course responsible, lecturer, laboratory tutor, seminar organizer
LTU, E0007E	Electronics (2013–2016, 2020–2025): Examiner, course responsible, lecturer, laboratory tutor
LTU, E0003E	Circuit Theory (2013, 2020–2024): Examiner, course responsible, lecturer, laboratory tutor
LTU, E0015E	Electric Drive Systems (2022–2024): Lecturer, laboratory tutor
LTU, S7013E	Measurement Systems: Design, Modeling and Computational Meth- ods (2024): Laboratory supervisor
LTU, E7001R	Space Electronics (2023): Lecturer
LTU, E7003R	Space Electronics (2023): Lecturer
LTU, E7027E	Project in Electrical Engineering (2023): Supervisor
LTU, E7024E	Special Studies in Electrical Engineering (2022): Course responsible, laboratory tutor, seminar organizer
LTU, D0003E	Real Time Systems (2020–2023): Laboratory tutor
LTU, D7012E	Declarative Languages (2020–2022): Laboratory tutor
LTU, D0015E	Computer and Engineering Science (2020–2021): Laboratory tutor, seminar organizer, pandemic adaptation
LTU, E7030E	Electronic Systems (2019): Lecturer
LTU, E0013E	Fundamentals of Electrical Engineering (2019): Laboratory tutor
LTU, E7014E	Electronics II (2016): Lecturer, laboratory tutor
LTU, D0011E	Digital Design (2013): Laboratory tutor
LTU, D0010E	Object-Oriented Programming and Design (2013): Laboratory tutor
LTU, D0013E	Microcomputer Engineering (2012): Laboratory tutor

Work Experience

2024–present	Senior lecturer at Luleå University of Technology Teaching; See "Educational Experience". Research within the 'DUS' project in ultrasound sensors aimed at being put on a surgeon's finger in order to en- able simultaneous haptic and ultrasound-generated visual feedback. The work includes design of an electronic front-end for an ultrasound driver/receiver array.
2021-2024	Lecturer at Luleå University of Technology Teaching; See "Educational Experience". Research within the 'DUS' project; See previous paragraph.
2019–2020	Senior research engineer at Luleå University of Technology Teaching; See "Educational Experience". Research in IC design for radiation detectors for mine prospecting in the Vinnova-funded 'SMuL' project. The work includes design, evaluation, and testing of an IC charge amplifier in simulation and in the lab.
2014-2019	PhD student at Luleå University of Technology Teaching; See "Educational Experience". Research in wireless, low-power, high-temperature sensors for monitoring of power semiconductors. The main research outcomes are:
	• IC coil geometries optimized for light loads and high power transfer effiency [13] with measurements on manufactured ICs;
	• Design methodology for maximal Q factor for IC fuse-trimmable capacitors [12]; and
	• A low-power, high-temperature IC temperature sensor [8].
	Responsible for the microelectronics lab, making sure that equipment and components are available and that tools work.
2013	Research engineer at Luleå University of Technology Teaching; See "Educational Experience". Code optimization and data visual- ization for the 'EISCAT' EU project, with the goal of developing antenna arrays for stratosphere radar applications. The main part of the code op- timization was rewriting MATLAB code into C code in order to speed it up.
2013	Summer intern at Luleå University of Technology Programming Internet-enabled wireless sensor nodes for the 'I ² Mine' EU project. The sensor nodes are placed onto rock bolts in mines to issue warning signals of when a cavity may be about to collapse.

2012-2013	Laboratory tutor at Luleå University of Technology Laboratory tutor in the courses Digital Design, Object-Oriented Programming and Design, and Microcomputer engineering; See "Educational Experience".
2010-2012	Summer intern at SCA Packaging, Munksund Testing and maintenance of the fire protection and ventilation systems in a paper production factory.
2007–2009	Summer intern at Kappa Kraftliner, Piteå Conducting analyses of liquids in a paper production process in order to determine concentrations of various substances; Various maintenance jobs in a paper production factory.
2005-2006	Summer intern at Hifton, Hemmingsmark Various maintenance jobs as caretaker of the Hifton premises.

Publications and Theses

2021	[13]	Joakim Nilsson, Johan Borg, and Jonny Johansson. Load- dependent power transfer efficiency for on-chip coils. Ana- log Integrated Circuits and Signal Processing, Jul 2021
2020	[10]	Niklas Karvonen, Joakim Nilsson, Denis Kleyko, and Lara Lorna Jiménez. Low-power classification using FPGA—an approach based on cellular automata, neural networks, and hyperdimensional computing. In 2019 18th IEEE International Conference On Machine Learning And Applications (ICMLA), pages 370–375, 2019
2019	[11]	Joakim Nilsson. Wireless High-Temperature Monitoring of Power Semiconductors—A Single-Chip Approach. Doctoral thesis, Luleå University of Technology, 2019
2019	[12]	Joakim Nilsson, Johan Borg, and Jonny Johansson. Maximal Q factor for an on-chip, fuse-based trimmable capacitor. $Electronics, 8(1), 2019$
2018	[9]	Joakim Nilsson, Johan Borg, and Jonny Johansson. Chip-coil design for wireless power transfer in power semiconductor modules. In 2018 2nd Conference on PhD Research in Microelectronics and Electronics Latin America (PRIME-LA), pages 1–4, Feb 2018
2017	[6]	Niklas Karvonen, Lara Lorna Jimenez, Miguel Gomez Simon, Joakim Nilsson, Basel Kikhia, and Josef Hallberg. Classifier optimized for resource-constrained pervasive systems and energy-efficiency. <i>International Journal of Computational Intelligence Systems</i> , 10:1272–1279, 2017
2017	[7]	Joakim Nilsson. Wireless Condition Monitoring of Power Semicon- ductors. Licentiate thesis, Luleå University of Technology, 2017
2017	[8]	Joakim Nilsson, Johan Borg, and Jonny Johans- son. High-temperature characterisation and analysis of leakage-current-compensated, low-power bandgap temper- ature sensors. <i>Analog Integrated Circuits and Signal Pro-</i> cessing, Jun 2017
2015	[5]	Joakim Nilsson, Johan Borg, and Jonny Johansson. Single chip wireless condition monitoring of power semiconductor modules. In Nordic Circuits and Systems Conference (NORCAS): NORCHIP International Symposium on System-on-Chip (SoC), 2015, pages 1–4, Oct 2015

2015	[4]	Joakim Nilsson, Johan Borg, and Jonny Johansson. Leakage current
		compensation for a 450 nW, high-temperature, bandgap temperature
		sensor. In Mixed Design of Integrated Circuits Systems (MIXDES),
		2015 22nd International Conference, pages 343–347, June 2015

- [3] J. Eliasson, P. P. Pereira, H. Mäkitaavola, J. Delsing, J. Nilsson, and J. Gebart. A feasibility study of SOA-enabled networked rock bolts. In *Proceedings of the 2014 IEEE Emerging Technology and Factory Automation (ETFA)*, pages 1–8, Sep. 2014
- 2013 [2] Joakim Nilsson. Towards self-learning sensors: FPGA-based ADC front end. Master's thesis, Luleå University of Technology, 2013
- [1] S. M. del Campo, K. Albertsson, J. Nilsson, J. Eliasson, and F. Sandin. FPGA prototype of machine learning analog-to-feature converter for event-based succinct representation of signals. In 2013 IEEE International Workshop on Machine Learning for Signal Processing (MLSP), pages 1–6, Sep. 2013