

Curriculum vitae of Professor Alexios N. Birbas (June 2019)

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Alexios Birbas is a Professor of Electronics in the Department of Electrical and Computer Engineering of the University of Patras. In 1980 he entered the Department of Electrical Engineering of the University of Patras (ranking first at the nationwide entrance examinations). He received the Diploma in Electrical Engineering in 1985. He also received the MSEE and PhD degrees from the University of Minnesota, Minneapolis, Minnesota USA in 1986 and 1988 respectively. He has also held faculty positions at the Assistant Professor level at the University of Minnesota (1988-1989) and at INPG, Grenoble, France (1990-1991).

Academics He has supervised a large number of Diploma Theses and 19 PhD Theses (17 awarded). His former students pursue careers in Academia and Industry holding senior positions in Companies such as Erickson, Broadcom, Dialog, and Intel etc. His research interests include device electronics, optoelectronics, noise and fluctuation problems in electronics, mixed signal high speed design, hardware/software system co-design, sensors, readout and error correcting circuits, IoT, smart grid, transactive energy markets and Cyber Physical Systems. During his course at the University of Patras he has attracted a considerable amount of research grants. He taught numerous undergraduate and graduate level Electronics related courses for the last 28 years.

He has established *'The Microelectronics Group of the Applied Electronics Laboratory'* which has accumulated experience (28 years) in device modeling, mixed mode, RF and optoelectronic circuit design, co-simulation, sensors and embedded systems.

- Dr. Birbas is involved in device and circuit modeling (along with his students he has provided detailed thermal noise model for the submicron MOSFET device [1996] and for the sub-40nm device [2015]), in system on a chip design, in integrated sensors systems design and in high level hw-sw system modeling by employing multiple formalisms and computational models. His group has been exposed to various tools and CAD platforms and he has also delivered the full implementation of chips (silicon proven through MOSIS and Europractice) down to 65-22 nm.
- He has been involved in circuit design where "digital goes analog". He has performed design of high-speed PHY components for wire-line/wireless applications and optical communications. (Trans-impedance amplifiers, Limiting amplifiers, Serialiser / Deserialiser modules, electro-optical interfaces) up to 40 GHz and has studied the implementation of distributed circuits (VCOs, amplifiers) as well as he has been involved into the design of a 60 GHz PLLs for telecoms and a 5 GHz PLL for ultra high speed serial interface applications.
- In the area of sensor systems on a chip (LoC), Dr. Birbas has been involved in the design of readout mixed mode circuits for various sensor applications. He has designed circuits in the past for optical and x-ray sensors and he was recently involved in the design of read out (capacitive) circuits for bio- applications. The designs include the charge amplifier the signal conditioning, the ADC as well the digital control circuitry and the embedded control software of the instrumentation.
- Dr. Birbas has been also involved in the smart metering for IoT applications and real time Cyber Physical Systems. He is also involved in the design of sensing/readout

electronics devices suitable for sensing in particle physics detection (fast comparators TDCs, post measurement processing)

Industrial Experience: During his academic carrier Dr. Birbas has served as a consultant to the Industry. He has been responsible for the introduction of Microelectronics in Greek Industry (in the 90's), an EU driven Initiative (Esprit Special action). From 1999 -2002 he was the general manager of INTRACOM SA-Patras Division, a Telecom Software Unit which he established and managed to scale up to 250 engineers producing telecom networking software. He was also co-founder of Synergy Systems, a Company specializing in Microelectronics which later was acquired by Giga and Intel. He has been also co-founder and Scientific Advisor of Analogies (University Spin-off), a mixed signal design semiconductor company.

Current Interests

- Sensors, electronic sensing, read-out mixed signal electronics for detection/sensing, NanoFET device modelling, Neuromorphic devices, SoC design and post signal conditioning for biochemical sensing. Exploration of device noise properties (low and high frequencies) for accurate device (nano FETs) noise modelling, noise spectroscopy as a diagnostic tool.
- Smart Grid Electronics, IoT devices, Cyber Physical Systems, "Connecting bits with physics", real time Transient State Estimation, noise in data time series, energy markets and physical operation of the smart Grid, Transactive Energy

Selective list of publications:

- "Adhesive Low Frequency Noise (LFN) in Charge Trap Transistors (CTT) for Neuromorphic Analog Processing", A.N. Birbas , *25th International Conference on Noise and Fluctuations (ICNF 2019)*, Neuchâtel, Switzerland June18th-21st
- "Computationally efficient representation of energy grid-cyber physical system," N. Tzanis, N. Andriopoulos, G. Proiskos, M. Birbas, A. Birbas and E. Housos *2018 IEEE Industrial Cyber-Physical Systems (ICPS)*, St. Petersburg, 2018, pp. 679-683.
- "Noise Injection/machine learning Fraud Detection Framework in Time Series Data" Aristidis Magklaras, Nikolaos Andriopoulos and Alexios Birbas, *25th International Conference on Noise and Fluctuations (ICNF 2019)*, Neuchâtel, Switzerland June18th-21st
- "Modeling of LF fluctuations induced to the power grid with renewable generation," Birbas, E. Housos, N. Tzanis and A. Papalexopoulos, *2017 IEEE -International Conference on Noise and Fluctuations (ICNF)*, Vilnius, 2017,
- "100 ps multi-time over threshold data acquisition system for cosmic ray detection", K Georgakopoulou, C Spathis, G Bourlis, A G Tsigotis, A Leisos, M Birbas, A Birbas and S E Tzamaris" *IOP-Measurement Science and Technology, Volume 29, Number 11, September 2018.*
- "Noise and Uncertainty in Comparator/TDC Sensor Readout Circuits", C. Spathis, A. Birbas, K. Georgakopoulou and M. Birbas", *Proceedings of IEEE ICNF 2017* , Vilnius 2017.
- "A Capacitive to Digital Converter with automatic range adaptation for Readout Instrumentation", K. Georgakopoulou, C. Spathis, N. Petrellis and Alexios Birbas, *IEEE Trans. on Instrumentation and Measurement vol.65, issue2, pp336-345(2016).*
- "Architecture of a modular, multichannel readout system for dense electrochemical biosensor microarrays" Ioannis Ramfos, Spyridon Blionas and Alexios Birbas, *Meas. Sci. Technol. 26, 015701 (2015).*
- "Semi-classical noise investigation for sub-40nm metal-oxide-semiconductor field-effect transistors" C. Spathis, A. Birbas, K. Georgakopoulou, *AIP Advances 5, 087114, (2015).*

- “Modelling of fluctuation processes on the biochemically sensorial surface of silicon nano-wire field-effect transistors” K. Georgakopoulou, C. Spathis and Alexios Birbas, *Journal of Applied Physics* 03/2015; 117(10) 2015.
- “Integrated microelectronic capacitive readout subsystem for LoC applications,” C. Spathis, K. Georgakopoulou, N. Petrellis, K. Efstathiou and A. Birbas, *Meas. Sci. Technol.* 25 (2014) 055702.
- “VCO phase noise model at high RF frequencies and sub90 nm processes”, V. Panagiotopoulos and A. Birbas, 2nd International Conference on Noise and Fluctuations, *ICNF 2013; Montpellier; France; 24-28 June 2013*.
- “Capacitive Sensor Estimation Based on Self-Configurable Reference Capacitance” N. Petrellis, C. Spathis, K. Georgakopoulou and A Birbas, *Recent Patents on Signal Processing*, 2013, 3, pp 12-21.
- “Integrated circuit distributed oscillator”, US patent 8149066, 2012/4/3, Billionis G.P., Birbas, A.N., Birbas, M.K also in: ‘Fully Integrated Differential Distributed VCO in 0.35- μm SiGe BiCMOS Technology’ *IEEE Transactions on Microwave Theory and Techniques*, Vol.55,1, pp13-22, (2007).
- “10 Gb/s Full-Duplex Bidirectional Transmission with RSOA-based ONU using Offset Filtering and Electronic Equalization”, M. Omella, I. Papagiannakis, B. Schrenk , D. Klondis, J. A. Lázaro, A. N. Birbas, J. Kikidis, J. Prat and I. Tomkos, *Optics Express* Vol. 17, Issue 7, pp. 5008–5013 (2009).