

## INTEGRATED CIRCUITS AND SYSTEMS GROUP

### Contact details

Name	Integrated Circuits and Systems Group	
Acronym	ICSG	
Logo		
Site	<a href="http://www.bel.utcluj.ro/grup_csi">http://www.bel.utcluj.ro/grup_csi</a>	
Address	26-28 G. Baritiu Str., 400027, Cluj-Napoca, Romania	
Faculty Department	<b>Faculty of Electronics, Telecommunications and Information Theory, Basis of Electronics Department</b>	
Telephone	+40 264 401227	
Fax	+40 264 591340	
Director	Prof. Dr. Eng. Sorin Hintea	
e-mail	<a href="mailto:Sorin.Hintea@bel.utcluj.ro">Sorin.Hintea@bel.utcluj.ro</a>	

### Areas of expertise

#### **Design of mixed analog/digital circuits for telecommunication systems**

The study and the development of some analog adaptive circuits, aimed for the practical realization of the "software defined radio" concept. The emphasis was the development of some reconfigurable filter architectures with programmable parameters, and their digital control with evolutionary methods.

#### **Design of low-power programmable analog circuits for biomedical applications**

The development of some analog programmable circuits, aimed for bio-potential monitoring and electro-stimulation of the human tissue.

#### **Analysis and design of electronic circuits using computational intelligence techniques**

The development and implementation in Matlab of automatic design algorithms for analog circuits; the algorithms use computational intelligent techniques. Development of models based on FLS and ANN for electronic circuits and systems: performance function models, functional models, and metamodels for not-yet simulated waveform.

#### **Optoelectronics and optical communications**

The modeling and simulation of LMA fibres, rare earth doped fibres, some optical amplifiers, bending effects, multimode propagation, polarization effect and non-linear effects at transmission through optical fibres.

#### **Advanced design techniques of analog and digital integrated circuits**

The design of complex electronic circuit structures under the Mentor Graphics and Cadence design environment: reconfigurable circuits with applications in auditory prosthesis, transmission of the biomedical parameters over an electromagnetic link, radiofrequency receptors, low-power integrated circuits.

### Team

**Prof. Dr. Eng. Sorin Hintea**, Prof. Dr. Eng. Gabriel Oltean, Assoc. Prof. Dr. Eng. Ramona Galatus, Assist Prof. Dr. Eng. Gabor Csipkes, Assist Prof. Dr. Eng. Paul Farago

### Representative projects

#### **"Design of some integrated circuits for biomedical applications using evolutionary computation techniques"**

POSDRU/159/1.5/S/137516 „Parteneriat interuniversitar pentru excelenta in inginerie - PARTING"

#### **"Design of analog reconfigurable circuits using evolutionary algorithms for fourth generation mobile communication terminals"** (IDEI 657/2009-2011)

**"Analog modules in nanometric technology"** – [CNCSIS 2005-2006, Tema nr. A38, Cod CNCSIS: 937, Contract nr. 2930 / 2006; Tema nr. 20, Cod CNCSIS: 937, Contract nr. 27702 / 2005](#),

**INTEREVISS** – **"Serviciu interactiv, in timp real pentru cresterea sigurantei publice in aglomerari urbane"**, Contract PN-II-PT-PCCA-2013-4, 2014, iunie 2014 - iunie 2016.

**"MP 1401 - Advanced Fibre Laser and Coherent Source as tools for Society, Manufacturing and Lifescience"**, TD1205-Innovative methods in radiotherapy and radiosurgery using synchrotron radiation Femtosecond - laser Assisted Self-Organization Processes for Photonics: Design of Photonic Devices and Experim Characterization FP7-COST MP1307-**"Stable Next-Generation Photovoltaics: Unraveling degradation mechanisms of Organic Solar Cells by complementary characterization techniques (StableNextSol)"**

## Significant results

### The most representative publications of the past 5 years:

1. Farago, P., Farago, Claudia, Oltean, G., Hintea, S., An Electronically Tunable Transconductance Amplifier for Use in Auditory Prostheses, *Advances in Electrical and Computer Engineering*, ISSN: 1582-7445, e-ISSN: 1844-7600, Volume 15, Issue 4, DOI: 10.4316/AECE.2015.04013, 2015, pp. 95 -100;
2. Oltean, G., Ivanciu, Laura-Nicoleta, Kirei, B.S., Signal approximation using GA guided wavelet decomposition, *IEEE Internat Symp on Signals, Circuits and Systems (ISSCS2015)*, 9-10 July, 2015, Iasi, Romania, pp. 1- 4;
3. Juan Valles, Ramona Galatus, Modeling of Yb3+/Er3+-codoped microring resonators, in *OPTICAL MATERIALS*, vol. 41, pp. 126-130, 2015.
4. Juan Valles, R. Galatus, Requirements for Gain/Oscillation in Yb3+/Er3+-Codoped Microring Resonators, in *OPTICAL COMPONENTS AND MATERIALS XII*, vol. 9359, 2015.
5. N. Cennamo, R. Galatus, L. Zeni, Experimental results for characterization of a tapered plastic optical fiber sensor based on SPR, in *SPIE Optics+ Optoelectronics*, pp. 95061V-95061V-6, 2015. P. Farago, G. Csipkes, D. Csipkes, C. Farago, S. Hintea, "An FPA Approach to Adaptive Filter Design with Evolutionary Software-driven Reconfiguration", *Elektronika ir Elektrotehnika*, Vol 20, No 5, pp. 89-96, 2014.
6. P. Farago, C. Farago, R. Groza, S. Hintea, "An Evolutionary Optimization Methodology of a Low-Power Programmable Cochlear Implant", 2015 38th Internat Conf on Telecomm and Signal Proc (TSP), p.354-359, 2015
7. P. Faragó, C. Faragó, S. Hintea, M. Cîrlugea, "An Evolutionary Multi-objective Optimization Approach to Design the Sound Processor of a Hearing Aid", *International Conference on Advancements of Medicine and Health Care through Technology*; 5th–7th June 2014, Cluj-Napoca, Springer International Publishing, pp. 181-186, 2014.
8. Farago, P., Oltean, G., Ivanciu, Laura, Neural networks and wavelet transform in waveform approximation, *IEEE 14th International Workshop on Computational Intelligence (UKCI2014)*, September 8-10, 2014, Bradford, UK, DOI: 10.1109/UKCI.2014.6930164, pp. 1- 8;
9. P. Farago, L. Feștilă, S. Hintea, G. Csipkes, D. Csipkes, P. Söser, "A Transistor-Level Reconfigurable Circuit for Rapid Transconductor Design and Testing" *Elektronika ir Elektrotehnika*, 117 (1), pp. 99-104, 2012
10. P. Farago, G. Csipkes, D. Csipkes, S. Hintea, An evolutionary approach to design and calibration of reconfigurable OTA-C filters, *35th International Conf on Telecommunications and Signal Processing, TSP 2012*, pp.363-368.
11. S. Hintea, P. Faragó, M. N. Roman, G. Oltean, L. Festila, A Programmable Gain Amplifier for Automated Gain Control in Auditory Prostheses, *Journal of Medical and Biological Engineering*, ISSN 1609-0985, Vol. 13. No 3, June 2011, pp 185 – 192.
12. G. Oltean, C. Miron, E. Sipos, L. Ivanciu, A top-down approach to gaining an insight into transistor circuits in CS connection, *International Journal of Electrical Engineering Education (IJEEE)*, ISSN: 0020-7209, Publisher: Manchester University Press, Vol. 48, No. 1, January 2011, pp. 10-16
13. S. Hintea, P. Farago, L. Festila, P. Söser, Reconfigurable Filter Design for Implantable Auditory Prosthesis, *Electronics And Electrical Engineering*, 2010. ISSN 1392 – 1215, No. 3(99), 2010 pp. 7–12.
14. D. Csipkes, G. Csipkes, S. Hintea, H. Fernandez–Canque, An analog array approach to variable topology filters for multi–mode receivers, *Electronics And Electrical Engineering*, ISSN 1392 – 1215, No. 9(105), 2010, pp. 43–48.
15. S. Hintea, D. Csipkes, G. Csipkes, H. Fernandez-Canque, A Variable Topology Analog Filter Suitable for Multi-Mode Wireless Application, *Knowledge-Based and Intelligent Information and Engineering Systems*, Springer Lecture Notes in Computer Science, September 2010, Vol. 6279/2010, pp. 603-612.
16. M. Negoita, S. Hintea, "Bio-Inspired Technologies for the hardware of Adaptive Systems. Real-World Implementations and Applications", Springer Verlag, ISBN 978-3-540-76994-1, 2009.
17. S. Hintea, G. Csipkes, D. Csipkes, L. Festila, R. Groza, P. Farago, M. Cirlugea, *Reconfigurable Analog Circuits for Mobile Communications. Variable topology filters and design automation*, Ed Casa Cartii de Stiinta, 2011.
18. Ramona Galatus, Nicolae Puscas, Tiberiu Marita, *Senzori Optici: concepte fundamentale si aplicatii*, ISBN 978-606-17-0748-54

### The offer addressed to the economic environment

Research & development	<p>Analog, digital and mixed-signal VLSI integrated circuit design methods;            Analysis, synthesis and design techniques for current-mode analog VLSI circuits;            Evolutionary techniques used in the synthesis of VLSI electronic circuits;            Application development with HDL languages (Verilog, VHDL);            Design and implementation of digital systems with FPGAs;            Applications of computational intelligence in the analysis, modeling and design of electronic circuits;            Synthesis of some analog digital and mixed signal integrated circuits up to mask layer, using the Mentor Graphics and Cadence VLSI design environment;            Implementation of solutions for information processing on FPGA logical arrays;</p> <p>Performance measurement and testing of electronic circuits and systems</p>
Consulting	<p>Consulting: analog, digital and mixed-signal design, non-conventional design techniques: genetic algorithms, fuzzy systems, neural networks; optical sensors and optoelectronic systems; electronic systems for biomedical applications</p>
Training	<p>The Integrated Circuits and Systems Group offers instruction/training in the following domains: computer aided design of analog and digital circuits; computational intelligence techniques: genetic algorithms, fuzzy systems, neural networks; optical sensors and optoelectronic systems; electronic systems for medical applications.</p>