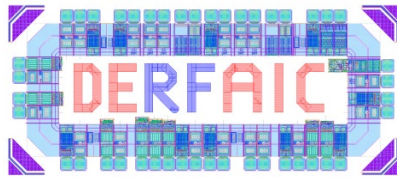
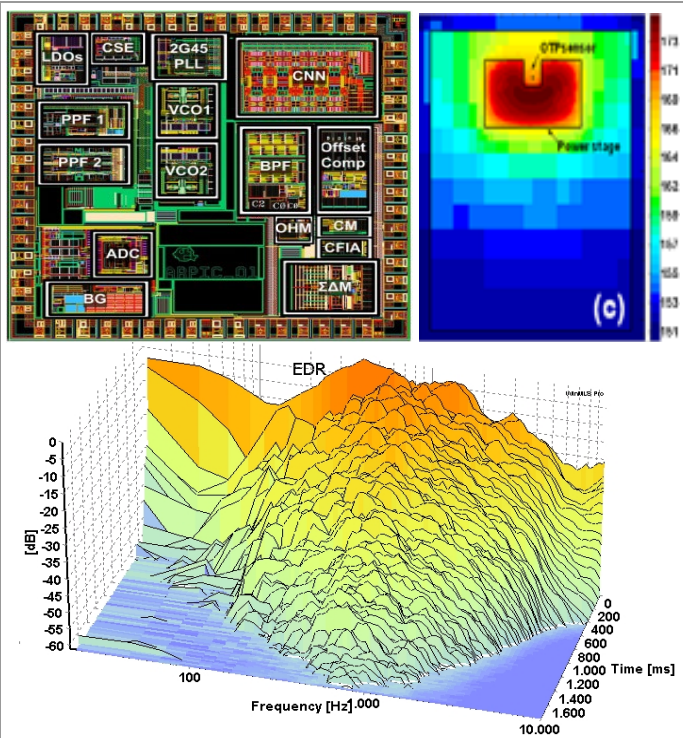


DIGITALLY ENHANCED ANALOG AND RF INTEGRATED CIRCUITS

Contact details

Name	Digitally Enhanced Analog and RF Integrated Circuits
Acronym	DERFAIC
Logo	
Site	http://www.icdesign.utcluj.ro/
Address	26-28 G. Baritiu St, Cluj-Napoca Rooms 26, G02, B2, B3, S3.1, S3.2
Faculty	Faculty of Electronics, Telecommunications and Information Technology
Department	Basis of Electronics Department
Telephone	+40 264 401243, +40 264 402454
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Director	Prof. Dr. Marina Topa
e-mail	Marina.Topa@bel.utcluj.ro



Areas of expertise

Design of RF, Analog and Mixed-Signal Integrated Circuits

- High performance Power Management circuitry, including Energy harvesting and conversion
- Reconfigurable and programmable Analog Front-Ends for sensors and transceivers, support circuitry for MEMS
- Digitally-intensive frequency synthesizers and Low-power radio transceivers

Methodologies for optimized design, analysis and verification of integrated circuits and systems

- Systematic design of analog integrated circuits (ICs) and AI-driven optimization
- Multivariate IC pre-silicon verification based on Machine Learning; Metamodeling
- AI-based analysis and processing of post-silicon data; Yield analysis;
- AI-assisted systematic and optimized sizing of analog and mixed-signal circuits;

Tools and methodologies for analysis, design & implementation of electronic systems

- Electro-thermal modelling and analysis of power integrated circuits; AI-assisted modelling of complex systems;
- Tools and methodologies for individualised training in hardware electronics: “Lab-in-a-bag” kits for students

Algorithms and techniques for compensating effects of non-idealities inherent to analog circuits & systems

- Digital control of DC-DC Converters
- Compensation of IQ mismatch in integrated radio receivers; Reduction and compensation of DC offsets

Electronic circuits and systems for acoustics

- Optimized synthesis of acoustic equalizers; Analysis and improvement of the acoustic behaviour of enclosures

Team

Prof. Dr. Marina Topa, Assoc.Prof. Dr. Marius Neag, Assoc.Prof. Dr. Botond-Sandor Kirej, Lect. Dr. Ioana Sărăcuț, Lect. Dr. Erwin Szopos, Lecturer Dr. Raul Onet, Assist. Prof. Dr. Călin Fărcaș, Dr. A. Rusu, 7 PhD and 10+ Master students

Representative projects

EuroDrives, Senthicom & Asst IXC – IPCEI Microelectronics, industrial partners Bosch, NXP, Continental, 2025-2028
HRIA – Romanian Hub for AI (<https://hria.upb.ro/>); PCIDIF/709/PCIDIF_P4/OP1/RSO1.6/PCIDIF_A12 – Microelectronics Lab
HELP - Home Electronic Laboratory Platform; Erasmus+ ; Grant No. 2020-1-IE02-KA226-HE-000786, 2021-2023
PartEneriC - Parteneriate pentru transfer de cunoștințe și tehnologie în vederea dezvoltării de circuite integrate specializate pentru creșterea eficienței energetice a noilor generații de vehicule, POC2014, Ctr.19 (2016-2022)
iDev4.0 - Integrated development 4.0 (Dezvoltare integrată 4.0), Program ECSEL Call H2020-ECSEL-2017-1-IA-TWO STAGE, contract nr. 783163-iDev40, POC 72/1/2, Componenta 1: RO-ECSEL - Crearea de sinergii cu acțiunile de CDI ale programului cadru ORIZONT 2020 al Uniunii Europene și alte programe CDI internaționale (2020-2021)
NAPOSIP – “New Approaches to Analyzing and Designing High Frequency Synthetisers Performance for Modern Communication Systems”, PNIII 43 BG/2016 (2016-2018), <https://naposip.utcluj.ro/node/1>
“Automation of Split Lot Analysis based on AI methods”, R&D Consultancy for Romanian IC company, 2024-2026
“Optimized design of automotive power management integrated circuits” R&D Consultancy, 2014-2017, 2021-2026
“Analog Front-End for Automotive Sensors”, R&D Contract for Bulgarian IC design company, 2015-2017
“New Methodologies for multivariate performance analysis”, R&D Consultancy for RO industrial partner, 2014-2016

Significant results

Representative publications in the last 5 years:

1. I. Kovács, P. Coste, M. Neag "Programmable Gain Amplifier with Programmable Bandwidth for Ultrasound Imaging Application" *Electronics* 14, no. 6: 1186, doi 10.3390/electronics14061186
2. A. -T. Grăjdeanu, C. Răducan, M. Neag and I. -A. Ilie, "Linear Voltage Regulators with Gate-Driving Buffer for Automotive Applications," in *IEEE Access*, October 2024, doi: 10.1109/ACCESS.2024.3468882
3. A. Rusu, E. David, V. Grosu, M. Topa, A. Buzo, B. Carbunescu, G. Pelz, "On Multivariate Electrical Performance Machine Learning Driven Pre-Silicon IC Adaptive Verification" *IEEE Access*, vol. 12, pp. 136436-136450, 2024
4. R. Onet, M. Neag, A. Fazakas, P. Miresan, G. Petrasuc, I. Sularea, A. Battigelli, M. Murray, M. Hill – "A Blended On-Campus and At-Home Approach to Laboratories on Electronic Circuits", *Romjst*, Vol. 26, No. 2, 2023, pp.167–180
5. C. Răducan, M. Neag, "Slew-Rate Booster and Frequency Compensation Circuit for Automotive LDOs", *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 69, no. 1, pp. 465-477, Jan. 2022
6. C. Răducan, M. Neag and A. -G. Băjenaru, "Automotive Switched-Capacitor DC-DC Converter With High BW Power Mirror and Dual Supply Driver," in *IEEE Trans. Circuits and Systems I*, vol. 69, no.1, pp. 452-464, Jan. 2022,
7. A.-T. Grăjdeanu, C. Răducan, C.-S. Pleșa, M. Neag, L. Vârzaru & M. Țopa, "Fast LDO Handles a Wide Range of Load Currents and Load Capacitors, up to 100 mA and over 1 μ F", *IEEE Access*, vol. 10, pp. 9124-9141, Jan.2022
8. C.-S. Pleșa, C. Răducan, A.-T. Grăjdeanu, O. Serpedin, M. Neag, "An Area-Efficient Automotive LDO with Scalable Maximum Load Current Exhibits Excellent Response to Line and Load Transients", *AEU - International Journal of Electronics and Communications*, Volume 149, May 2022, 154136, ISSN 1434-8411,
9. C. Răducan, M. Neag, A.-T. Grăjdeanu, M. Țopa, A. Negoită, – "A High-Precision Low-Temperature Drift LDO Regulator Tailored for Time-Domain Temperature Sensors", *Sensors*, vol 22, issue 4:1518, February 2022,
10. P. Coste, I. Kovács, M. Neag, A. -T. Grăjdeanu, V. -A. Ionescu and M. D. Țopa, "Type-II Compensation for Automotive Buck Converters Implemented by Fully Integrated Capacitor Multiplier," in *IEEE Access*, vol. 10, 2022,
11. V. Belega, C.-S. Pleșa, R. Onet, M. Neag, "Methods for Assessing the Stability of Conditionally Stable Circuits by Using Small-signal Simulations", *ROMJIST*, Volume 25, No 2, 2022, pages 205-223
12. I. Sularea, C. Răducan, M. Neag, - "High Power Supply Rejection Capacitor-less Low Dropout Regulators Based on High Slew Rate Symmetrical Operational Transconductance Amplifiers", *ROMJIST*, Vol. 25, No 2, 2022, pp 179-204
13. P. Miresan, M. Neag, M. Topa, I. Kovacs, L. Vârzaru, "Multipurpose Drivers for MEMS Devices Based on a Single ASIC Implemented in a Low-Cost HV CMOS Process Without Triple Well", *Journal of Sensors*, vol. 2021
14. G. Petrasuc, P. Miresan, M. Neag, C. Chira, "A Novel Full-Wave Current Sensor for Automotive Synchronous Buck Converters"- *ROMJIST*, Volume 24, Number 2, June 2021, pages 161-181
15. Marius Neag, István Kovács, Raul Onet, Iulian Câmpanu, "Design options for high-speed OA-based fully differential buffers able to drive large loads", *Microelectronics Journal*, Volume 114, (2021), 105115,
16. P. Coste, P. Mărtari, M. Neag, M. Topa, V. Ionescu, "Programmable Capacitor Multiplier Based on Gm-cell with Two Outputs – Topology, Circuit Implementations and Applications" - *ROMJIST*, Vol.24, No.1, March 2021, pages 4–27
17. Fărcaș, C.A., Szopos, E., Sărăcuț, I., Neag, M., Topa, M.D. - Experiments on Multiple-point Room Equalization Applied to Medium-sized Enclosed Spaces. *Acoustical Physics*, vol 67, issue 5, pp. 537–552 (2021).
18. Paul Miresan, Raul Onet, Marius Neag, Marina Topa, Cosmin Chira – "Design options for implementing in standard CMOS drivers for MEMS body biasing", *Microelectronics Journal*, vol. 97 (2020) 104705
19. C. Răducan, A.-T. Grăjdeanu, C.-S. Plesa, M. Neag, A. Negoită, M. Țopa – "LDO with Improved Common Gate Class-AB OTA Handles any Load Capacitors and Provides Fast Response to Load Transients", *IEEE Trans. on Circuits and Systems I - Regular Papers*, vol 67, issue 11, November 2020, pp. 3740-3752
20. C.-S. Plesa, B. Dimitriu, M. Neag – Design Options for Thermal Shutdown Circuitry with Hysteresis Width Independent on the Activation Temperature, *Advances in Electrical and Computer Engineering*, Vol. 19, No 1, 2019,
21. C.-S. Plesa, M. Neag, C. Boianeanu - "Design of Over-Temperature Protection for Switched-Capacitor DC-DC Converter Based on Electro-Thermal Simulations", *ROMJIST*, Volume 22, Number 2, 2019, pages 144–157

Patents:

M. Neag, I. Kovacs, P. Miresan – "Method and circuit for current detection", DE102021132633B4, granted December 2023
 Stefan Marinca, Alina-Teodora Cirlescu, Marius Neag - "Start-up Circuit", DE102021134256A1, published June 2023
 Cristian Răducan, Alina-Teodora Cirlescu, Marius Neag - "Voltage regulator and method of voltage regulation, International patent: DE102020115851B3, US11733725B2, CN113805630B, granted October 2021
 M. Neag, M. McCullagh, G. Marow, M. McLaughlin, I. Kovács - Frequency Comparator and Early-Late Detector, US patent US20160191035, granted 2019

Product realized for industrial beneficiaries:

1. Low-power, high-performance Low dropout voltage regulators, DC-DC converters with and without inductors
2. High-Voltage LDO for automotive applications: IC designed for Infineon Technologies Romania, in mass production
3. Analog Front-End for automotive sensors – integrated in 0.18 μ m CMOS technology, for Melexis Technologies NV,
4. Frequency synthesizer integrated within an UWB transceiver produced in 90nm technology

The offer addressed to the economic environment

Research & development	Low-Power, High-Performance RF, Analog and Mixed-signal Integrated Circuits and Systems Design of electronic systems and circuits using advanced modelling and optimization methods Adaptive filters for processing of non-stationary signals by non-linear systems, acoustics Electronic systems and circuits for harvesting power from un-conventional energy sources
Consulting	Analysis and design of analog, RF and mixed-signal integrated circuits Analysis and design of digital systems, including FPGA and/or ASIC implementation Design of electro-acoustic systems – echo cancellation, reverberation, signal separation, equalization
Training	Systematic & Optimized Design of RF, Analog and Mixed-Signal Integrated Circuits

Last updated on February 2026