Loukas Petrou

BSc, MSc, DIC, PhD, MIEEE

Personal Info

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22 September 1992

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Memberships

- IEEE Member
- IEEE CAS Member
- ETEK Member (Cyprus Scientific and Technical Chamber)

Certificates

- Analogue IC Design Training from Europractice
- Analogue Mixed-Signal Design Training from Europractice
- Digital IC Design Training from Europractice
- Digital Mixed-Signal Design Training from Europractice
- Summer School on Tunable and Software-Driven Functional Metasurfaces at Aalto University
- Summer School on Asynchronous Circuit Design from Yale University (online)
- Fire extinguisher and building evacuation training
- Laser equipment usage training

Education

2018 – 2023 **Doctor of Philosophy (PhD) in Electrical Engineering**
Department of Electrical and Computer Engineering, University of Cyprus (UCY)
Thesis Title: Asynchronous Chiplets for Reconfigurable Metasurfaces
Supervisor: Professor Julius Georgiou

2016 – 2017 **Master of Science (MSc) in Analogue and Digital Integrated Circuit Design**
Department of Electrical and Electronic Engineering, Imperial College London
Thesis Title: Exploiting 65 nm CMOS for Advanced ISFET Sensing Arrays
Supervisor: Professor Pantelis Georgiou

2012 – 2016 **Bachelor of Science (BSc) in Electrical Engineering**
Department of Electrical and Computer Engineering, University of Cyprus (UCY)
Thesis Title: Design of Hodgkin-Huxley Analog Circuit Components
Supervisor: Professor Julius Georgiou

Research And Teaching Interests

Research Interests

My current research interests (2023) are the implementation of electronic and/or microelectronic systems to enable or enhance emerging technologies, mainly (but not only) in the field of communication.

- Circuits and systems for:
  - Adaptive metamaterials
  - Reconfigurable intelligent surfaces (RIS)
  - ICT applications
  - Sensors and biomedical applications
- Asynchronous circuit design
- Low-power, low-latency mixed-signal integrated circuits
- Future emerging technologies
- RF IC design for communication systems

Teaching Interests

My teaching interests cover the fundamental knowledge and skills required for microelectronics, as well as advanced devices and circuit techniques.

- Full-custom integrated circuit design
- Analogue integrated circuits and systems
- Advanced analogue and digital system design
- Advanced electronic devices
- Analogue signal processing
- High performance circuits and systems
- Asynchronous circuit design
- Digital circuits and logic
- Electrical circuits and networks
- Instrumentation
- Electronics and/or microelectronics laboratory
- RF IC design

Cadence Design Systems Digital Badges

- 5G mmWave Handset System Design S1 Simulation and Verification of the RFIC transceiver
- Cadence RTL to GDSII flow v5.0
- Digital IC Design Fundamentals Class v2.0
- High Performance Spectre Simulation
- Mixed-Signal Simulations Using Spectre AMS Designer – AVUM v23.1
- Mixed-Signal Simulations Using Spectre AMS Designer v Xcelium 19.09 with IC 6.1.8 ISR7
- Quantus Transistor-Level T1 Overview and Technology Setup v22.1
- Quantus Transistor-Level T1 Overview and Technology Setup v23.1
- Spectre Simulator Fundamentals S1 Spectre Basics
- Spectre Simulator Fundamentals S2 Large Signal Analyses vSpectre 23.1
- Spectre Simulator Fundamentals S3 Small Signal Analyses vSpectre 23.1
- Virtuoso Abstract Generator vIC6.1.7
- Virtuoso ADE Explorer and Assembler S1 ADE Explorer and Single Test Corner Analysis IC23.1
- Virtuoso ADE Explorer and Assembler S2 ADE Explorer and Multi Test Corner Analysis IC23.1
- Virtuoso ADE Explorer and Assembler S3 Sweeping Variables and Simulating Corners vIC23.1
- Virtuoso ADE Explorer and Assembler S4 Monte Carlo Analysis Real Time Tuning and Run Plans

EMPLOYMENT

Sep 2017 – Present: Special Scientist, University of Cyprus

Working at the University of Cyprus in parallel to my PhD, gave me the opportunity to engage in depth with the following activities, which are outside of the responsibilities of a PhD student:

- Researcher for the following projects:
  - **Sep 2017 – Jun 2020:** "Visorsurf – A Hardware Platform for Software-driven Functional Metasurfaces", €5,000,000, *H2020-FETOPEN-1-2016-2017*
  - **Apr 18 – Apr 20:** "HSAdapt-JG – Real-time Control of the Wireless Behavior of Environments with Hypersurfaces", €55,000, *RPF Complementary/0916/0008*
  - **Jan 19 – Jan 23:** "Advanced RF Electronics Center for Adaptive Metamaterials (RF-META)", €1,000,000, *RPF Infrastructure Grant*
  - **Feb 23 – Feb 25:** "Chip-Enabled Adaptive Metasurfaces for ICT Systems", €594,000, *Cyprus Research and Innovation Foundation (CO-DEVELOP-ICT-HEALTH)*
  - **Upcoming (2025):** "Cyprus Space Research and Innovation Centre", €2,500,000, *Cyprus Research and Innovation Foundation (STRATEGIC INFRASTRUCTURES)*
- Teacher for core ECE modules at UCY
  - ECE 305 (2021) – Electronic devices and Circuits II: This module is for 3rd year students and looks at secondary effects in MOS devices, single stage amplifiers, differential amplifiers, current mirrors, frequency response, noise, feedback, op-amp design, stability and compensation, and reference circuits.
  - ECE 306 (2022) – Electronics circuits laboratory: This module is for 3rd year students, where they get a hands-on experience with analogue integrated circuits. They also design integrated circuits on Cadence Virtuoso using a commercially available PDK (TSMC 0.18 um).
- Teaching assistant for core ECE modules at UCY
  - ECE 305 (2023) – Electronic devices and Circuits II
  - ECE 306 (2017-2021) – Electronics circuits laboratory
- Proposal writing
  - Successful proposal (under the supervision of my professor) for continuation of my PhD research – "Chip-Enabled Adaptive Metasurfaces for ICT Systems", *Cyprus Research and Innovation Foundation (CO-DEVELOP-ICT-HEALTH)*, €360,000 of €594,000.
  - Engaged in EU proposals as partner and delivered the contribution required from our laboratory.
  - Engaged in infrastructure proposal for a state-of-the-art microelectronics centre in Cyprus.
- Technical committee co-chair for conference (on-going)
  - PRIME 2024
- Regular reviewer for IEEE

- Virtuoso Schematic Editor vIC 6.1.8 ICADVM 20.1 ISR25 and SPECTRE 20.1
- Virtuoso Schematic Editor vIC 23.1 ISR2 and SPECTRE 23.1 ISR1
- Virtuoso Floorplanner vIC6.1.7
- Virtuoso Layout Design Basics vIC23.1

Invited

- Invited presenter at the 18th International Conference on PhD Research in Microelectronics and Electronics (PRIME), 21 June 2023, Valencia, Spain

Achievements and Interests

- 2015: Participated in the UROP program of the University of Cyprus
- 2010: Awarded the position of Officer of Communications from Cyprus Ministry of Defence
- 2009: Participated in the Summer School of Science and Computer Engineering at the University of Cyprus
- 2008: Awarded with black belt / 1 Dan in Shaolin Kung Fu
- 2006 – 2009: Various certificates of attendance in football tournaments with local football club
- 2003 – 2006: Certificates of participation in national mathematical Olympiad

Languages – Fluent

- Greek
- English

- Seminars/Talks
  - UCY ECE Seminar Series, 25/11/20: Asynchronous Digital ASIC Design for the Realization of Scalable and Programmable Metamaterials
  - EMPHASIS Launch Event, 25/11/20: Integrated Circuits for RF Metasurfaces
  - UCY ECE Seminar Series, 15/03/23: ASICs for Adaptive Metasurfaces
- Co-supervise final year students
- Key researcher on EU project
  - Manage Consortium Meetings
  - Meeting strict deadlines
  - Presentations, Technical Discussions and Key Decisions
  - Made significant contribution to the field
- Project coordination skills
  - Interview personnel
  - Budgeting
  - Tasks assignment and implementation. Keeping track using industry-preferred tools (Jira, Notion)
  - Meeting coordination between partners
  - Handling all project needs and/or issues.

TECHNICAL SKILLS

Circuits and Systems:	Full-Custom Analogue, Digital, Mixed-Signal and Asynchronous Digital IC Design with Cadence® and Synopsys® tools PCB Design with Altium Designer®
IC assembly	Analogue, Digital and mixed-signal IC verification, assembly and foundry contact for MPW or full-wafer fabrication, die cutting and packaging
PCB assembly	Rigid, Rigid Flex, Flexible PCB order, component order; PCB assembly/population
Tests and Measurements in Laboratory	IC Wire-Bonding; Pick-and-Place; Re-flow Oven; X-Ray Inspection; Probe Station; Logic analyser; Source-Measure Units; Oscilloscopes; Power supplies; Advanced Soldering/Desoldering; PCB manufacturing; BGA rework station and all basic tools and equipment of an electronics laboratory
FPGA/MCU programming	Xilinx® Vivado and Vivado HLS; Altera® – Quartus II; Raspberry Pi; Arduino; ESP32; ARM®
Technology CAD	Synopsys Sentaurus TCAD for 3D technology modelling
Programming	Verilog; VHDL; C; C++; Basic Java
Flowchart / Schematic Tools	Microsoft Visio; Adobe Photoshop; Canva
Video Editing	Camtasia Studio; OBS Studio
Math Tools / System Design	MathWorks MATLAB; NI LabView
Other Com. Skills	ECDL (7 courses) including Microsoft Word, Excel, Power Point, Access etc. Atlassian Jira and Notion for project coordination
Operating Systems	Windows; Linux/Unix

PUBLICATIONS

Journal Articles

1. **L. Petrou** and J. Georgiou, "An ASIC Architecture With Inter-Chip Networking for Individual Control of Adaptive-Metamaterial Cells," in *IEEE Access*, vol. 10, pp. 80234-80248, 2022.
2. **L. Petrou**, K. M. Kossifos, M. A. Antoniades and J. Georgiou, "A Programmable Complex Impedance IC for Scalable and Reconfigurable Meta-Atoms," in *IEEE Transactions on Nanotechnology*, vol. 21, pp. 692-702, 2022.
3. **Petrou, L.**, Kossifos, K.M., Antoniades, M.A. and Georgiou J., "The first family of application-specific integrated circuits for programmable and reconfigurable metasurfaces" *Sci Rep* 12, 5826 (2022).
4. Kossifos, K.M., **Petrou, L.**, Varnava, G., Pitilakis, A., Tsilipakos, O., Liu, F., Karousios, P., Tasolamprou, A.C., Seckel, M., Manessis, D., Kantartzis, N.V., Kwon, D., Antoniades, M.A. and Georgiou, J. "Toward the Realization of a Programmable Metasurface Absorber Enabled by Custom Integrated Circuit Technology," in *IEEE Access*, vol. 8, pp. 92986-92998, 2020.
5. Dimitrios Kouzapas, Constantinos Skitsas, Taqwa Saeed, Vassos Soteriou, Marios Lestas, Anna Philippou, Sergi Abadal, Christos Liaskos, **Loukas Petrou**, Julius Georgiou, Andreas Pitsillides, "Towards fault adaptive routing in metasurface controller networks", *Journal of Systems Architecture*, Volume 106, 2020, 101703.

Conference Papers & Workshops

1. **L. Petrou**, P. Karousios and J. Georgiou, "Asynchronous Circuits as an Enabler of Scalable and Programmable Metasurfaces," *2018 IEEE International Symposium on Circuits and Systems (ISCAS)*, Florence, Italy, 2018, pp. 1-5.
2. Kouvaros, P., Kouzapas, D., Philippou, A., Georgiou, J., **Petrou, L.**, Pitsillides, A. (2018), "Formal Verification of a Programmable Hypersurface", Howar, F., Barnat, J. *Formal Methods for Industrial Critical Systems. FMICS 2018*. Lecture Notes in Computer Science(), vol 11119. Springer, Cham.
3. Saeed, T., Skitsas, C., Kouzapas, D., Lestas, M., Soteriou, V., Philippou, A., Abadal, S., Liaskos, C., **Petrou, L.**, Georgiou, J. and Pitsillides, A., "Fault Adaptive Routing in Metasurface Controller Networks," *2018 11th International Workshop on Network on Chip Architectures (NoCArc)*, Fukuoka, Japan, 2018, pp. 1-6.
4. N. Moser, **L. Petrou**, Y. Hu and P. Georgiou, "An ISFET Pixel with Integrated Trapped Charge Compensation using Temperature Feedback," *2018 IEEE International Symposium on Circuits and Systems (ISCAS)*, Florence, Italy, 2018, pp. 1-5.
5. **L. Petrou**, M.A. Antoniades, and J. Georgiou, "Dynamic Control of Reconfigurable Intelligent Surfaces: An IC-Based MOS Varactor Approach", *2024 IEEE International Symposium on Circuits and Systems (ISCAS), (Accepted).*