IEEE icecs 2022

29th IEEE International Conference on
Electronics Circuits and Systems

Glasgow, UK | October 24-26, 2022

ICECS 2022 CONFERENCE PROGRAM

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General Chair Welcome Message

Dear Colleagues and Friends,

Welcome to Glasgow!

On behalf of the Organizing Committee of the 29th IEEE International Conference on Electronics Circuits and Systems (IEEE ICECS 2022), it is a great pleasure to welcome you to the UK and Glasgow, Scotland. IEEE ICECS is the Region 8 flagship conference of the IEEE Circuits and Systems. The Technology and Innovation Centre (TIC) is an ideal venue for this conference as it lies in the city centre and the financial, cultural and shopping districts. Glasgow is the largest city in Scotland, famous for its scientific and engineering heritage. The city showcases some of the most exemplary Victorian architecture, and some of the finest art nouveau buildings, including the Glasgow School of Art and House for an Art Lover, designed by Scotland's best-known architect Charles Rennie Mackintosh. The city is home to great inventions, from the development of penicillin to the first long-distance television transmission, and is a world-leading research city. Today it is considered one of the cultural capitals of Europe, with a wide range of excellent concert, entertainment and sports venues, and an array of attractions such as the Kelvingrove Art Gallery and Museum, the Riverside Museum, and the Glasgow Science Centre, all within easy reach. The city boasts vibrant nightlife, excellent shopping, and a diverse array of pubs, clubs, bars and restaurants. Glasgow is well situated, with world-renowned lochs, mountains, historic castles and championship golf courses reachable within 30 minutes of the city. We hope that you will learn more about the city while you are here and take away many fond memories.

In addition to the Technical Sessions, there will also be a Tutorial Day parallel to the Industry Day Session (Monday, 24 October). We have 2 exciting Events for Young Professionals and Women in Circuits and Systems (WiCAS): a Young Professionals Event and Luncheon, and a WiCAS Session and Reception on Tuesday, 25 October.

We recognise and thank all our Keynote Speakers for their contributions. Professor Themis Prodromakis (University of Edinburgh, UK) will present the development of metal-oxide Resistive Random-Access Memory technologies and related technologies. Our second Keynote is by Prof Elisabetta Chicca (the University of Groningen, The Netherlands), who will speak on CMOS models of cortical circuits for brain-inspired computation, learning in spiking CMOS neural networks and memristive systems, bio-inspired sensing and motor control. Professor Prof. Wouter Serdijn (TU Delft, The Netherlands), our third Keynote speaker, will present on electroceuticals or bioelectronic medicine. We appreciate their expertise and willingness to share their knowledge and time with us in Glasgow.

On Wednesday, 26 October afternoon, following the Keynote, a short Awards and Closing Ceremony concludes the IEEE ICECS 2022. The success of a

conference depends not only on the technical program but also the social program. The City of Glasgow will host a Welcome Reception at the Glasgow City Chamber on Monday, 24 October, while our Gala Dinner will take place at The Oran Mor in what will be an evening of excellent dining, live music and Scottish dancing.

IEEE ICECS 2022 would not be successful without the support of the City of Glasgow, the Glasgow Convention Bureau and the TIC, and we thank them for all their contributions and assistance. We also sincerely appreciate the support received from our Sponsors (Cadence, EPSRC and Wiley) and Promotional Sponsors (University of Glasgow) and the support and participation of all our exhibitors and other sponsors.

The success of IEEE ICECS 2022 is due to the dedication of more than 350 volunteers comprising over 200 Reviewers together with the Organizing Committee, the Track Chairs (Regular and Special Sessions) and the YP/WiCAS organisers. Our gratitude goes to all the volunteers who have contributed, both directly and indirectly, to the numerous details and tasks of the conference. We would like to thank the TPC chairs, Erika and Dimitri, for their hard work, dedication and initiative.

We would also like to record our thanks to the professional conference organisers, Conference Catalysts, LLC, under the leadership of Chris Dyer and Laura LeBlanc, who has been fantastic at efficiency, organisation, budgeting and selection, and to Tom Wehner of ePapers for providing the online conference paper submission portal, reviewing support and associated logistics.

Thank you for participating in IEEE ICECS 2022. We hope you will take back good memories, renew old friendships, and form new friendships in Glasgow, and we look forward to seeing you in Istanbul, Turkey, next year!

Start exploring!

Hadi Heidari & Elena Blokhina
IEEE ICECS 2022 General Co-Chairs

Technical Program Chair Welcome Message

This year 238 papers will be presented during the conference. Accepted papers are divided into 143 lecture and 95 poster presentations determined by author preference, suitability, session planning and other considerations. All accepted papers underwent an identical peer-review process and will be published in the conference proceedings on IEEE Xplore. Submissions are primarily from academia (~88%), with growing participation from industry (~7%) and research facilities and government laboratories (~5%). Submitted papers have come from all global regions, with about 59% from Europe, 24% from Asia/Pacific, 12% from North/Latin America and about 5% from Middle East/Africa.

We have created an exciting program and conference structure designed to stimulate discussion and participation of attendees from different corners of the world in a hybrid format (on-site and virtual). The Virtual Platform we are using has many features to allow virtual attendees to contact and network with other attendees. We hope virtual attendees engage with IEEE ICECS 2022 as fully as they would if they were in Glasgow in person.

With 13 tracks, including 11 Regular tracks, a new "Industry Forum" track to capture industrial contributions, 7 Special Sessions, 3 Keynote presentations, 3 Posters sessions, a Young Professionals Session, a Women in Circuits And Systems (WiCAS) Event, and a Live Demos session, the conference promises to be packed with exciting presentations, posters and demos highlighting all areas of electronic circuits and systems. The circuits and systems community proposed special sessions to the TPC, so the suggestions for topics came directly from you, our conference delegates. This year, the 7 Special Sessions are on Challenges and Requirements in Sensory Circuit Design, 5G advanced Radiofrequency Architectures, CMOS for Quantum Computing, Embedded and Intelligent Systems for Health Applications, Innovations in Memristor Modelling, Analysis, & Fabrication Toward a Systematic Approach to Circuit, Piezoelectric Transducers & Their Interface Circuits for Device Energy Harvesting & Remote Powering, and Wireless Energy Harvesting Circuits & Applications.

We would like to thank our Track Chairs proactively led the review process and submitted their decisions in a timely fashion. Our reviewers did an excellent job, and we thank them for performing this essential task. We would also like to thank our special session organizers, session chairs, and reviewers for making this conference memorable. Our biggest thanks go to the authors who took the time to write and now presenting their work and making this conference an unforgettable event.

Dimitri Galayko & Erika Covi
IEEE ICECS 2022 Technical Program Chairs

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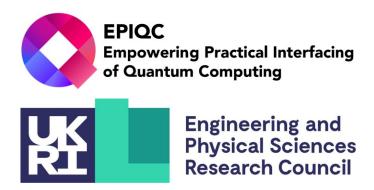*Conference Catalysts, LLC.*

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Special Sessions

Challenges and Requirements in Sensory Circuit Design
- **Antonio Aprile,** *University of Pavia, Italy*
- **Elisabetta Moisello,** *University of Pavia, Italy*
- **Malcovati Piero,** *University of Pavia, Italy*

Innovations in Memristor Modelling, Analysis, and Fabrication Toward a Systematic Approach to Circuit and System Design
- **Ronald Tetzlaff,** *TU Dresden, Germany*
- **Alon Ascoli,** *TU Dresden, Germany*
- **Georgios Sirakoulis,** *Democritus University of Thrace, Greece*
- **Angela Slavova,** *Bulgarian Academy of Sciences, Bulgaria*

Piezoelectric Transducers & Their Interface Circuits for Device Energy Harvesting & Remote Powering
- **Josep Maria Sánchez-Chiva,** *Omega Microelectronics Lab, France*

5G advanced Radiofrequency Architectures
- **François Rivet,** *Univ. Bordeaux, France*
- **Didier Belot,** *CEA-LETI, France*

Wireless Energy Harvesting Circuits & Applications
- **Mahmoud Wagih,** University of Southampton, UK
- **Rupam Das,** *University of Glasgow, UK*

CMOS in Quantum Computing
- **Christos Giagkoulovits,** *University of Glasgow, UK*
- **Meraj Ahmad,** *University of Glasgow, UK*

Embedded and Intelligent Systems for Health Applications
- **Slavisa Jovanovic,** *Université de Lorraine, France*
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Khalil Yousef
Shengqi Yu
Muhammad Zada
Sebastian Zaunseder
Ming Zhang
Ruoyu Zhao
Yafan Zhao
Alexandra Zimpeck
Domenico Zito
Gianluca Zopp

Keynote Speakers

Prof. Wouter Serdijn
TU Delft, Netherlands

PhD, F-IEEE, Professor of Bioelectronics at Delft University of Technology and Medical Delta Honorary Professor at Delft University of Technology and Erasmus Medical Center, Rotterdam, Fellow of the IEEE, Distinguished Lecturer of the IEEE, Recipient of the IEEE Circuits and Systems Meritorious Service Award. Working on biomedical circuits and systems for interaction with the electrophysiology of cells, tissues, organs and the human body, by means of electrical, magnetic, optical and ultrasound stimulation, recording, sensing, communication and powering, for in-vitro, ex-vivo and in-vivo medical and clinical applications. In short, electroceuticals or bioelectronic medicine. http://bioelectronics.tudelft.nl/~wout/

Prof. Themis Prodromakis
School of Engineering | University of Edinburgh

Themis holds the Regius Chair of Engineering at the University of Edinburgh and is Director of the Centre for Electronics Frontiers. His work focuses on developing metal-oxide Resistive Random-Access Memory technologies and related applications and is leading an interdisciplinary team comprising 30 researchers with expertise ranging from materials process development to electron devices and circuits and systems for embedded applications. He holds a Royal Academy of Engineering Chair in Emerging Technologies and a Royal Society Industry Fellowship. He is an Adjunct Professor at UTS Australia, visiting Professor at the Department of Microelectronics and Nanoelectronics at Tsinghua University, and Honorary Fellow at Imperial College London. He is Fellow of the Royal Society of Chemistry, the British Computer Society, the IET and the Institute of Physics and is also Senior Member of the IEEE. He served as the Director of the Lloyds Register Foundation International Consortium for Nanotechnology and Co-Director of the UKRI Centre for Doctoral Training in Machine Intelligence for Nano-Electronic Devices and Systems (MINDS). In 2015, he established ArC Instruments Ltd that delivers high-performance testing infrastructure for automating characterisation of novel nanodevices in over 21 countries and in 2019 he founded SoneT.ai that is building new power-efficient AI hardware solutions. His contributions in memristive technologies and applications have brought this emerging technology one step closer to the electronics industry for which he was recognised as a 2021 Blavatnik Award UK Honoree in Physical Sciences and Engineering.

Keynote Speakers (continued)

Prof. Dr. Elisabetta Chicca
University of Groningen, The Netherlands

Elisabetta Chicca is a full professor at the Zernike Institute for Advanced Materials (ZIAM) and the Groningen Cognitive Systems and Material Center (CogniGron), University of Groningen, The Netherlands. She is Chair of Bio-Inspired Circuit and Systems (BICS) since 2020. Her current interests are in the development of CMOS models of cortical circuits for brain-inspired computation, learning in spiking CMOS neural networks and memristive systems, bio-inspired sensing (vision, olfaction, audition, touch) and motor control. She combines these research approaches with the aim of understanding neural computation by constructing behaving agents which can robustly operate in real-world environments.

WICAS Event

WICAS EVENT

25th October, 2022
"Building Up Your Network: Academic Collaboration and Gender Balance"

The **WiCAS Event** will include an amazing panel discussion on how to turn a career path into a success, with contributions from both academy and industry representatives, followed by a welcome cocktail.

1. **WiCAS Panel Discussion -** Time: 15:00 – 16:30
2. **WiCAS Cocktail -** Time: 16:30 – 18:00

Don't miss the chance to attend! All the participants will receive promotional items and gadgets during the WiCAS social event

WiCAS 2022 INVITED Panelists

Elisabetta Chicca
*University of
Groningen,
The Netherlands*

Lina Mohjazi
*University of
Glasgow,
UK*

Ilke Ercan
*TU Delft,
The Netherlands*

Iana Dulskaia
*Eurokleis srl,
Italy*

WICAS CHAIRS @ ICECS2022

Giulia Di Capua, *University of Cassino and Southern Lazio, Italy*
Yoko Uwate, *Tokushima University, Japan*
Eve McGlynn, *University of Glasgow, United Kingdom*

Young Professional Event

What's in the locker? Verification techniques for Interface Controller IP

Speaker: Ciaran Haughey from Cadence Design Systems Edinburgh IPG team will present at the event

Abstract: Cadence is a pivotal leader in electronic systems design, building upon more than 30 years of computational software expertise. The company applies its underlying Intelligent System Design strategy to deliver software, hardware, and IP that turn design concepts into reality for the most dynamic market applications including hyperscale computing, 5G communications, automotive, mobile, aerospace, consumer, industrial, and healthcare.

In this presentation we shall provide a high-level overview of the Verification Techniques employed by our research and development teams, in verifying complex Interface Controller IP. The presentation shall cover topics such as Code Coverage, UVM, Formal Verification, Verification IP and Gate Level simulations.

Program Grid: Monday, October 24th

	Auditoria	Breakout Room 2	Breakout Room 6	Breakout Room 7	Breakout Room 8
8:00 – 9:00					Agile EDA Developments in Merristor Devices, Circuits, Systems, and Manufacturing
9:00 – 10:00	Industry Forum	Tiny Energy-Harvesting Piezoelectric Chargers	EDA Tools for Physical Design - Fundamentals and Challenges	Fundamental and Applications of Modern Single Photon Detector Circuits and Processing Systems	
10:00 – 10:30		Coffee Break (Level 2 Foyer)			
10:30 – 11:30		Tiny Energy-Harvesting Piezoelectric Chargers	EDA Tools for Physical Design - Fundamentals and Challenges	Fundamental and Applications of Modern Single Photon Detector Circuits and Processing Systems	Memristive Digital Processing-in-Memory
11:30 – 12:30					
12:30 – 13:30	Lunch (Level 2 Foyer)				
13:30 – 14:00					
14:00 – 15:30	Poster Session (Virtual ONLY)	Analog and Mixed Circuits and Systems (Virtual ONLY)	Digital Circuits and Signal Processing (Virtual ONLY)	IOT and Smart Systems (Virtual ONLY)	RF and Wireless Circuits and Systems (Virtual ONLY)
15:30 – 17:30					
17:30 - 19:00	Welcome Reception (City Chambers)				

Program Grid: Tuesday, October 25th

	Auditoria	Breakout Room 2	Breakout Room 6	Breakout Room 7	Breakout Room 8
9:00 – 9:30	Opening Session *(Auditoria)*				
9:30 – 10:30	Keynote Presentation: Prof. Themis Prodromakis *(Auditoria)*				
10:30 – 11:00	Coffee Break *(Level 2 Foyer)*				
11:00 – 12:00	Young Professional Session	Analog Circuits and Systems	Linear & Nonlinear Circuits & Systems	Digital Circuits & Embedded Systems I	Innovations in Memristor Modelling, Analysis, & Fabrication Toward a Systematic Approach to Circuit
12:00 – 12:30	Young Professional Lunch *(Level 3 Mezzanine)*				
12:30 – 13:00		Lunch *(Level 2 Foyer)*			
13:00 – 13:30	Young Professional Session				
13:30 – 14:00		RF Building Blocks and Circuits for High-Speed Data Transfer	Bio-inspired and Bio-engineering Circuits and Systems	Piezoelectric Transducers & Their Interface Circuits for Device Energy Harvesting & Remote Powering	5G advanced Radiofrequency Architectures
14:00 – 15:00	Young Professional Poster Session *(Level 2 Foyer)*				

	Auditoria	Breakout Room 2	Breakout Room 6	Breakout Room 7	Breakout Room 8
15:00 – 15:30	WiCAS Session	Coffee Break *(Level 2 Foyer)*			
15:30 – 16:30		Oscillators and PLLs	Challenges and Requirements in Sensory Circuit Design	Circuit Design, EDA, Optimization, Test and Reliability	Embedded and Intelligent Systems for Health Applications
16:30 – 17:00	WiCAS Reception *(Level 3 Mezzanine)*				
17:00 – 18:00		Poster Session *(Level 2 Foyer)*			
18:00 – 18:30					
18:30 – 22:30	Conference Dinner *(Oran Mor)*				

Program Grid: Wednesday, October 26th

	Breakout Room 2	Breakout Room 6	Breakout Room 7	Breakout Room 8
9:00 – 10:30	Analog Integrated Circuits	Energy Harvesting and Power Efficient Electronics	Digital Circuits & Embedded Systems II	Circuits and Systems for IOT
10:30 – 11:00	Coffee Break *(Level 2 Foyer)*			
11:00 – 12:00	Keynote Presentation: Prof. Dr. Elisabetta Chicca *(Auditoria)*			
12:00 – 13:30	Lunch *(Level 2 Foyer)*		Poster Session *(Level 2 Foyer)*	
13:30 – 14:30	Keynote Presentation: Prof. Wouter Serdijn *(Auditoria)*			
14:30 – 15:00	Coffee Break *(Level 2 Foyer)*			
15:00 – 16:30	MEMS & Sensory Circuits & Systems	Signal Image and Video Processing Architectures	CMOS for Quantum Computing	Wireless Energy Harvesting Circuits & Applications
16:30 – 17:00	Closing Session *(Auditoria)*			

Technical Program: Monday, October 24th

Abstract: As the integrated circuit industry enters the post-Moore era, the development direction of chips is gradually shifting from computing performance to energy efficiency. However, in the traditional von Neumann architecture, the process of data transferring between computing units and storage units consumes a lot of energy, limiting the energy efficiency of the chip. Memristor is an emerging non-volatile memory device, which can reduce the transmission overhead between computing and storage units and improving energy efficiency. This provides a new paradigm in "in-memory computing".

With the rapid increase in the scale of applications (e.g., neural networks) and the continuous innovation of material and fabrication process, memristor-based in-memory computing circuits and systems need to shorten the design cycle to achieve the co-optimization of devices, circuits, and systems. This tutorial presents a new way to further improve the current performance on Electronic Design Automation (EDA) software to handle large scale simulation and optimization problems with memristor devices. We first present the state-of-the-art EDA works in abstraction and optimization methods of memristor device, circuits, and systems. Then, we will present our contributions in these areas.

Prof Yongfu Li
Shanghai Jiaotong University, China

Prof Yuhang Zhang
Pujiang National Laboratory, China

This tutorial will be presented in-person ONLY.

Abstract: Wireless microsensors and other miniaturized electronics cannot only monitor and better-manage power consumption in emerging small- and large-scale applications (for space, military, medical, agricultural, and consumer markets) but also add energy-saving and performance-enhancing intelligence to old, expensive, and difficult-to-replace infrastructures and tiny contraptions in difficult-to-reach places (like the human body). The energy these smart devices store, however, is often insufficient to power the functions they incorporate (such as telemetry, interface, processing, and others) for extended periods. Still more, replacing or recharging the batteries of hundreds of networked nodes is costly, and invasive in the case of the human body. Harvesting ambient kinetic energy in motion to continually replenish a battery is therefore an appealing alternative, even if relevant technologies are still the subject of ardent research today. This talk illustrates, assesses, and compares the state of the art in miniaturized piezoelectric chargers that draw kinetic energy from motion to charge a battery.

Prof Gabriel A. Rincón-Mora
Georgia Institute of Technology

9:00 – 10:00
EDA Tools for Physical Design - Fundamentals and Challenges
Room: Breakout Room 6

Abstract: The development of any integrated circuit depends heavily on the quality of the EDA tools used in the design flow. Improved CAD tools and algorithms are needed to cope with new fabrication technology requirements, advanced performance constraints, or simply the enormous number of elements involved. In this tutorial, we will start by giving an overview of the importance of automation in the design process. Then some trends on EDA that are needed to deal with the evolution of manufacturing processes will be presented. Basic and advanced optimization algorithms will be presented for selected physical design problems (layout). An important aspect of the design is to reduce power consumption at all levels of abstraction. Power optimization is fundamental in nanoCMOS and in the IoT world. At logic and physical levels, one approach that can be used to optimize the circuit, specially reducing static leakage power and using the automatic generation of the cell layout. With on-the-fly cell generation, the same function can be implemented with a reduced number of transistors, requiring less area and significantly optimizing power and performance. A set of tools and algorithms for cell generation will be briefly discussed. Finally, the use of estimation and visualization tools is equally important. They can be applied either in the design flow or just in the tool's development and research environments as a way to observe and understand the behavior and interactions of algorithms and their operation on real designs and benchmarks. Keywords: EDA, VLSI Design, Physical Design, Optimization, Cell Synthesis, Placement, Routing

Prof Ricardo Reis
Federal University of Rio Grande do Sul

Prof Marcelo Johann
Federal University of Rio Grande do Sul

9:00 – 10:00
Fundamental and Applications of Modern Single Photon Detector Circuits and Processing Systems
Room: Breakout Room 7

Abstract: This tutorial will present a comprehensive analysis of single-photon detector sensors and systems. The material will range from semiconductor structure, front-end and readout circuit architectures, to intellectual property. Specifically, we will cover device structures that are configured to yield high-performance single photon detection in CMOS platforms, and we will cover readout circuit architectures that allow complex photon counting applications. We will discuss several high-impact applications including silicon photomultiplier configurations for nuclear imaging/detection and integrated single photon arrays for computer vision. The tutorial has three main educational objectives. The first is to cover the fundamental aspects of single photon detector technology in circuits and systems. The second is to identify the latest research trends in the field. And the third is to situate the technology in the commercial landscape.

Prof Marc Dandin
Carnegie Mellon University

Prof Nicole McFarlane
University of Tennessee

9:30 – 12:30
Industry Forum – Future of Quantum Computers
Room: Auditoria
Session Chair: Prof Martin Weides

Establishing a new National Laboratory: NQCC Purpose & Progress
Michael Cuthbert, Director of NQCC, and Professor at the University of Bristol

Deployment of UK cloud QPUs and FPGA Accelerated Error Mitigation
Andy Patterson, Lead Quantum Engineer at Rigetti

RF Measurements for Quantum Computing Technologies
Nick Ridler, National Physical Laboratory

10:00 – 10:30
Coffee Break
Room: Level 2 Foyer

10:30 – 11:30
Tiny Energy-Harvesting Piezoelectric Chargers (continued)
Room: Breakout Room 2

10:30 – 11:30
EDA Tools for Physical Design - Fundamentals and Challenges (continued)
Room: Breakout Room 6

10:30 – 11:30
Fundamental and Applications of Modern Single Photon Detector Circuits and Processing Systems (continued)
Room: Breakout Room 7

10:30 – 12:30
Memristive Digital Processing-in-Memory
Room: Breakout Room 8

Abstract: Memristive technologies are candidates to replace conventional memory technologies and storage class memories. They are also widely explored for neuromorphic applications. This tutorial focuses on a different attractive capability of memristors, their ability to perform logic and arithmetic operations using a technique called 'stateful logic.' Using stateful logic, data storage and computation can be combined in the memory array to enable a novel non-von Neumann architecture, where both the operations are performed within a memristive Memory Processing Unit (mMPU).

The mMPU relies on adding computing capabilities to the memristive memory cells without changing the basic memory array structure. The use of an mMPU alleviates the primary restriction on performance and energy in von Neumann machine, which is the data transfer between CPU and memory.

This tutorial focuses on the various aspects of mMPU. We start by describing memristors and memristive stateful logic. Then, the mMPU architecture and relevant implications on the computing system and software will be discussed, as well as the examination of the microarchitectural aspects. Examples of applications that can benefit from processing within memristive memory will be shown. Lastly, issues such as design automation and reliability of the mMPU will be presented.

Prof Shahar Kvatinsky
Technion – Israel Institute of Technology

12:30 – 13:30
Lunch
Room: Level 2 Foyer

A 10.8-to-37.4Gb/S Single-Loop Quarter-Rate BBCDR Without External Reference and Separate FD Featuring a Wide-Frequency-Acquisition Scheme

Lin Wang{1}, Yong Chen{1}, Chaowei Yang{1}, Xiaoteng Zhao{1}, Pui-In Mak{1}, Franco Maloberti{2}, Rui P. Martins{1}
{1}University of Macau, China; {2}University of Pavia, Italy

Mitigating the Impact of Variability in NCFET-Based Coupled-Oscillator Networks Applications

Juan Nuñez{1}, Simon Thomann{2}, Hussam Amrouch{2}, María J. Avedillo{1}
{1}Instituto de Microelectrónica de Sevilla, IMSE-CNM (CSIC/Universidad de Sevilla), Spain; {2}University of Stuttgart, Germany

A Burst-Mode TIA with Automatic Power Saving and DC Wander Reduction in 65-nm CMOS

Toshiyuki Inoue{2}, Akira Tsuchiya{2}, Keiji Kishine{2}, Daisuke Ito{1}, Yasuhiro Takahashi{1}, Makoto Nakamura{1}
{1}Gifu University, Japan; {2}The University of Shiga Prefecture, Japan

Ring-VCO-Based ReLU Activation Function with Linearity Improvement for Pulsed Neuron Circuits

Pitchayapatchaya Srikram{1}, Prasoon Ambalathankandy{2}, Yuri Kanazawa{2}, Masato Motomura{3}, Masayuki Ikebe{2}
{1}Hokkaido Univerisity, Japan; {2}Hokkaido University, Japan; {3}Tokyo Institute of Technology, Japan

Analysis and Comparison of Two- and Four-State Operation Modes of Parallel-Hybrid Multi-Path Buck DC-DC Converter

Jinahao Zhang{2}, Rami Ghannam{4}, Jinwei Zhao{3}, Yuanjie Xia{4}, Chuang Wang{1}, Hadi Heidari{4}
{1}Beijing University of Posts and Telecommunications, China; {2}Beijing University of Technology, China; {3}QV Bioelectronics, United Kingdom; {4}University of Glasgow, United Kingdom

140 Frames-per-Second Ionoacoustic Imaging Detector for Real-Time Particle Therapy Monitoring

Elia Arturo Vallicelli
University of Milano-Bicocca, Italy

Unified Lightweight Authenticated Encryption for Resource-Constrained Electronic Control Unit

Chunxu Guo{2}, Yi Wang{1}, Fupeng Chen{3}, Yajun Ha{2}
{1}Continental Automotive Singapore, Singapore; {2}ShanghaiTech University, China; {3}Synopsys, China

An Efficient Exponential Unit Designed in VLSI CMOS with Custom Operators

Patrícia Da Costa{3}, Morgana Da Rosa{2}, Guilherme Paim{3}, Eduardo Da Costa{1}, Rafael Soares{2}, Sergio Bampi{3}
{1}UCPel, Brazil; {2}UFPel, Brazil; {3}UFRGS, Brazil

A Robust and Energy-Efficient Discrete Haar Wavelet Transform for Image Watermarking

Morgana Macedo Azevedo Da Rosa{2}, Rafael Soares{2}, Eduardo Costa{1}, Guilherme Paim{3}, Sergio Bampi{3}
{1}Universidade Católica de Pelotas, Brazil; {2}Universidade Federal de Pelotas, Brazil; {3}Universidade Federal do Rio Grande do Sul, Brazil

A Hardware-Friendly and Configurable Heuristic Targeting VVC Inter-Frame Prediction

Marta Loose{2}, Ramiro Viana{2}, Fernando Sagrilo{3}, Gustavo Sanchez{1}, Guilherme Corrêa{2}, Luciano Agostini{2}
{1}IFSertaoPE, Brazil; {2}UFPel, Brazil; {3}UNIPAMPA, Brazil

VVC Interpicture Prediction Using SAD with Imprecise Subtractors: A Quantitative Analysis

Rafael Dos Santos Ferreira{1}, Lucas Santos{1}, Luciano Agostini{1}, Claudio Diniz{2}
{1}UFPEL-Federal University of Pelotas, Brazil; {2}UFRGS-Federal University of Rio Grande do Sul, Brazil

Virtual and Augmented Reality As Educational Tools for Modern Quantum Applications

Connor Maclean{2}, Austin Wolfe{1}, Satyam Bhatti{2}, Anthony Centino{2}, Rami Ghannam{2}
{1}Glasgow School of Art, United Kingdom; {2}University of Glasgow, United Kingdom

Digital Realization of Conductance-Based Adaptive Exponential Integrate-and-Fire Neuron Model

Mahsasadat Seyedbarhagh, Narjes Zamani, Arash Ahmadi, Majid Ahmadi
University of Windsor, Canada

Leveraging NoC-Based Many-Core Performance Through Runtime Mapping Defragmentation

Angelo Dalzotto, Caroline Borges, Marcelo Ruaro, Fernando Moraes
PUCRS, Brazil

Hardware Implementation of an Efficient FIR Filter for ECG Signal Denoising Application

Ajaydas U.R., Naresh Kumar Reddy, Alex P James
Digital University Kerala, India

Towards Smart Sensor Systems for Precision Farming: Electrode Potential Energy Harvesting from Plants' Soil

Alfiero Leoni{2}, Giuseppe Ferri{2}, Daniele Ursini{2}, Alessandro Zompanti{1}, Anna Sabatini{1}, Vincenzo Stornelli{2}
{1}Università Campus Bio-Medico di Roma, Italy; {2}University of L'Aquila, Italy

GLAAPE: Graph Learning Assisted Average Power Estimation for ASIC RTL Designs

Rakesh M B, Sai Pranav K R, Pabitra Das, Amit Acharyya
IIT Hyderabad, India

Effects of Adaptive Memristor Crossbar Arrays on Chimera States of Fitzhugh-Nagumo Networks

Georgios Delaroudis, Karolos-Alexandros Tsakalos, Georgios Sirakoulis
Democritus University of Thrace, Greece

Localization Using Wireless Sensing for Future Healthcare
Muhammad Zakir Khan, Muhammad Farooq, Ahmad Taha
UNIVERSITY OF GLASGOW, United Kingdom

Highly Efficient Smart 3-Coil Wireless Power Transfer System with Automatic Tracking
Xingxiao Chen, Dai Jiang, Andreas Demosthenous
University College London, United Kingdom

Design Strategies for High-Resolution High-Speed Flash-Assisted Pipelined SAR ADCs
Mustafa Oz{3}, Alper Akdikmen{2}, Edoardo Bonizzoni{3}, Franco Maloberti{3}, Yao Liu{1}
{1}Microtera Semiconductor Co. Ltd., China; {2}Microtera-M2, Italy; {3}University of Pavia, Italy

A Fine-Tuning Phase Shifter with Vector Synthesizer Using 65-nm CMOS for Beamforming in 24-GHz Band
Masataka Inoue, Shinya Nakashioya, Toshiyuki Inoue, Akira Tsuchiya, Keiji Kishine
The University of Shiga Prefecture, Japan

A Fully-Integrated 40nm CMOS 58.1% PAE Push-Pull Class E/Fodd Power Amplifier for NB-IoT Applications
Moataz Medhat{1}, Faisal Hussien{1}, Mohammad El-Ghoneimy{1}, Ahmed Mohieldin{2}
{1}Cairo University, Egypt; {2}Galala University, Egypt

Impedance Measurement Using Wide-Band Signals
Mohammed El-Badi, Ahmed Elwakil, Sohaib Majzoub
University of Sharjah, U.A.E.

A 18.05 ppm/oC, 38.5 µW Bandgap Reference Based on Weak Inversion Region Operation Design

Seyed Ali Asghar Hosseini Asl, Kang-Yoon Lee
Department of Electrical and Computer Engineering Sungkyunkwan University, Korea

A Novel Low Power Single Bit SRAM Cell Using Quasi-Adiabatic Logic

Mohammad Redwan Islam{2}, Susmita Karmaker{1}, Md.Abrar Ibtesham{2}, Irfan Rahman{2}
{1}Synapse Design Inc., Bangladesh; {2}ULKASEMI Pvt. Limited, Bangladesh

A Power-Efficient Magnetic Actuator Driver Design

Berkay Kebapcıoğlu, Onur Ferhanoğlu, Mustafa Berke Yelten
Istanbul Technical University Electronics and Communications Engineering Department, Turkey

Novel Design Partitioning Technique for ASIC Prototyping on multi-FPGA Platforms Using Graph Deep Learning

Divyasree Tummalapalli, Chiranjeevi Kunapareddy, Vikas Akalwadi, Rahul Govindan, Balaji G
Intel Corporation, India

Unified Inductance Calculations for On-Chip Planar Spirals

Shuangwen Xie, Jun Fu
Tsinghua University, China

Fault-Tolerant Core Mapping for NoC Based Architectures with Improved Performance and Energy Efficiency

Naresh Kumar Reddy{1}, Alex P James{1}, Aruru Sai Kumar{2}
{1}Digital University Kerala, India; {2}VNR Vignana Jyothi College of Engineering and Technology, India

An Embodied Approach for Teaching Advanced Electronics in Metaverse Environment

Fengyi Wu{1}, Waqas Javed{2}, Olaoluwa R. Popoola{2}, Qammer Abbasi{2}, Muhammad Imran{2}
{1}University of Electronic Science and Technology of China, China; {2}University of Glasgow, United Kingdom

Moving Receiver Tracking in Wireless Power Transfer Systems
Zhenzhe Han{2}, Dai Jiang{1}, Andreas Demosthenous{1}
{1}University College London, United Kingdom; {2}University of Cambridge, United Kingdom

Pruning-Based Neural Network Reduction for Faster Profiling Side-Channel Attacks
Rodrigo Lellis{1}, Rafael Soares{1}, Guilherme Perin{2}
{1}Federal University of Pelotas (UFPel), Brazil; {2}Radboud University, Netherlands

A Comparative Study of Fault Diagnosis Methods of Photovoltaic Cells
Jinwei Zhao{3}, Jiahao Zhang{2}, Finlay Walton{4}, Rami Ghannam{4}, Chuang Wang{1}, Hadi Heidari{4}
{1}Beijing University of Posts and Telecommunications, China; {2}Beijing University of Technology, China; {3}QV Bioelectronics, United Kingdom; {4}University of Glasgow, United Kingdom

A Physical Reservoir Computing Model Based on Volatile Memristor for Temporal Signal Processing
Xiangpeng Liang{2}, Yanan Zhong{1}, Xinyi Li{1}, Heyi Huang{1}, Jianshi Tang{1}, Bin Gao{1}, He Qian{1}, Huaqiang Wu{1}, Hadi Heidari{2}
{1}Tsinghua University, China; {2}University of Glasgow, United Kingdom

A 0.46 nV/√Hz JFET Low-Noise Amplifier for Characterization of Nanoelectrode Coating Materials
Elia Arturo Vallicelli
University of Milano-Bicocca, Italy

Low-Cost PVDF High-Frequency Ultrasound Sensor Design and Manufacturing for Thermoacoustic Imaging Applications
Elia Arturo Vallicelli
University of Milano-Bicocca, Italy

Exploring Approximate Arithmetic Units for a Power-Efficient Kalman Gain VLSI Design
Pedro Pereira{2}, Guilherme Paim{2}, Eduardo Da Costa{1}, Sérgio Almeida{1}, Sergio Bampi{2}
{1}Universidade Católica de Pelotas (UCPel), Brazil; {2}Universidade Federal do Rio Grande do Sul (UFRGS), Brazil

A Wearable and Smart System for Diaper Change Identification
Bixun Chen, Muhammad Usman, Rami Ghannam, Muhammad Ali,
Muhammad Imran, Qammer Abbasi
University of Glasgow, United Kingdom

Analysis of an Inverter-Based CMOS Envelope Detector
Jack Ou{1}, Pietro Ferreira{2}
*{1}California State University Northridge, United States; {2}University
Paris-Saclay, France*

17:30 – 19:00
Welcome Reception
Room: City Chambers (Glasgow City Chambers, George Square, G2 1DU)

Technical Program: Tuesday, October 25th

9:00 – 9:30
Opening Session
Room: Auditoria

9:30 – 10:30
Keynote Presentation: Prof. Themis Prodromakis
Room: Auditoria

10:30 – 11:00
Coffee Break
Room: Level 2 Foyer

11:00 – 12:30
Analog Circuits and Systems
Room: Breakout Room 2

A 10-Bit 4 MS/s SAR ADC with Fully-Dynamic Duty-Cycled Input Driver
Hanyue Li, Yuting Shen, Eugenio Cantatore, Pieter Harpe
Eindhoven University of Technology, Netherlands

Analog/Mixed-Signal Classification for Voice Activity Detection
Prashant Kurrey, Mihir Kavishwar, Rajesh Zele
IIT Bombay, India

A Schmitt Trigger to Benchmark the Performance of a New zero-Cost Transistor
Paul Devoge{3}, Hassen Aziza{1}, Philippe Lorenzini{4}, Pascal Masson{4}, Alexandre Malherbe{2}, Franck Julien{2}, Abderrezak Marzaki{2}, Arnaud Regier{2}, Stephan Niel{2}
{1}Aix-Marseille University, France; {2}STMicroelectronics, France; {3}STMicroelectronics/Aix-Marseille University, France; {4}University of Côte d'Azur, France

Time-Mode z-1 Programmable Multiplier
Orfeas Panetas-Felouris, Spyridon Vlassis
University of Patras, Greece

Simultaneous Pixel Calibration for Global Shutter THz Imager
Yuri Kanazawa, Prasoon Ambalathankandy, Masayuki Ikebe
hokkaido university, Japan

Fast Over-Voltage and Surge Detector
Siamak Delshadpour
NXP Semiconductors, United States

State-Space Modeling of a Novel 2-output, single-L Driver for PZT Actuators with Charge Recovery
Matteo Gianollo{1}, Raffaele Enrico Furceri{2}, Marco Zamprogno{2}, Giacomo Langfelder{1}
{1}Politecnico di Milano, Italy; {2}STMicroelectronics, Italy

Generalized Non-Integer Order Multi-Phase Sinusoidal Oscillator Designs
Stavroula Kapoulea{2}, Costas Psychalinos{3}, Ahmed Elwakil{4}, Brent Maundy{1}
{1}University of Calgary, Canada; {2}University of Glasgow, United Kingdom; {3}University of Patras, Greece; {4}University of Sharjah, U.A.E.

Effect of Equalization Bandwidth and Linearity on NRZ and PAM4 Eye Diagram
Siamak Delshadpour
NXP Semiconductors, United States

Fast Solving Complete 2000-Node Optimization Using Stochastic-Computing Simulated Annealing
Kota Katsuki, Duckgyu Shin, Naoya Onizawa, Takahiro Hanyu
Tohoku University, Japan

Analysis and Design of Oscillator Coupling for Solving Combinatorial Optimization Problems
Markus Graber, Klaus Hofmann
Technical University of Darmstadt, Germany

Analysis of the Manhattan Update Rule Algorithm
Lylia Thiziri Chabane, Dang-Kièn Germain Pham, Patricia Desgreys
Télécom Paris, France

An Efficient Low Cost FPGA MIMO Channel Model
Andrew Slaney{1}, Yichuang Sun{2}, Oluyomi Simpson{2}
{1}BiTronix Pty Ltd, Australia; {2}University of Hertfordshire, United Kingdom

Accelerated Piece-Wise-Linear Implementation of Floating-Point Power Function
Nandagopal R, Rajashree V, Madhav Rao
IIITB, India

Total Dose Tolerance Analysis of an Optically Reconfigurable Gate Array VLSI
Kaho Yamada, Takeshi Okazaki, Minoru Watanabe, Nobuya Watanabe
Okayama University, Japan

Efficient LoRa-Like Transmitter Stacks for SDR Applications
Léa Volpin, Bertrand Le Gal, Guillaume Ferre
IMS Laboratory, CNRS UMR 5218, France

Hardware-Software Co-Design of BIKE with HLS-Generated Accelerators
Gabriele Montanaro{1}, Andrea Galimberti{1}, Ernesto Colizzi{2}, Davide Zoni{1}
{1}Politecnico di Milano, Italy; {2}SIAE MICROELETTRONICA, Italy

A Trusted Communication Unit for Secure Tiled Hardware Architectures
Sebastian Haas, Nils Asmussen
Barkhausen Institut, Germany

Innovations in Memristor Modelling, Analysis, & Fabrication Toward a Systematic Approach to Circuit
Room: Breakout Room 8

Memristor Based Integrated System for the long-Term Analysis of Chronic wounds: Design and Clinical Trial

Jacopo Secco{3}, Monica Pittarello{1}, Filippo Begarani{2}, Fedrica Sartori{2}, Fernando Corinto{3}, Elia Ricci{1}
{1}Clinica San Luca, Italy; {2}Omnidermal Biomedics, Italy; {3}Politecnico di Torino, Italy

Decision Making by a Neuromorphic Network of Volatile Resistive Switching Memories

Saverio Ricci{2}, David Kappel{3}, Christian Tetzlaff{3}, Daniele Ielmini{3}, Erika Covi{1}
{1}NaMLab gGmbH, Germany; {2}Politecnico di Milano, Italy; {3}University of Göttingen, Italy; {3}University of Göttingen, Germany

Analytical Study of the Fading Memory Phenomenon in a TaOx Memristor Model

Ioannis Messaris, Alon Ascoli, Ahmet Samil Demirkol, Vasileios Ntinas, Ronald Tetzlaff
Technische Universität Dresden, Germany

A Ferroelectric Tunnel Junction-Based Integrate-and-Fire Neuron

Paolo Gibertini{3}, Luca Fehlings{3}, Suzanne Lancaster{3}, Quang Duong{3}, Thomas Mikolajick{4}, Catherine Dubourdieu{2}, Stefan Slesazeck{3}, Erika Covi{3}, Veeresh Deshpande{1}
{1}Helmholtz Zentrum Berlin, Germany; {2}Helmholtz Zentrum Berlin, Free University Berlin, Germany; {3}NaMLab gGmbH, Germany; {4}NaMLab gGmbH, Technical University of Dresden, Germany

Synthesis of Nonlinear Impedance Converters for Emulating Memory Elements

Dalibor Biolek{2}, Zdenek Biolek{1}, Viera Biolkova{1}, Zdenek Kolka{1}
{1}BUT, Czech Rep.; {2}Univ. of Defence/BUT, Czech Rep.

Reliability Analysis of Memristor Crossbar Routers: Collisions and On/Off Ratio Requirement

Junren Chen, Chenxi Wu, Giacomo Indiveri, Melika Payvand
Institute of Neuroinformatics, University of Zurich and ETH Zurich, Switzerland

Solving Boolean Satisfiability with Stochastic Nanomagnets

Amit Ranjan Trivedi{1}, Maeesha Binte Hashem{1}, Nastaran Darabi{1}, Supriyo Bandyopadhyay{2}
{1}University of Illinois at Chicago, United States; {2}Virginia Commonwealth University, United States

A Switched-Capacitor Hybrid Quadratic Buck Converter for 48V-Input Wide-Range Conversion

Ruijie Zhao, Xiongjie Zhang, Xuchu Mu, Huihua Li, Yang Jiang, Man-Kay Law, Pui-In Mak, Rui Martins
University of Macau, Portugal; University of Macau, Macau; University of Macau, China

12:00 – 13:00
Young Professional Lunch
Room: Level 3 Mezzanine

12:30 – 13:30
Lunch
Room: Level 2 Foyer

Single Photon Avalanche Diode Circuits for Ultra-Violet Imaging

Zhenjie Wang, Ivor Fleck, Bhaskar Choubey
University of Siegen, Germany

A Delay-Based Reservoir Computing Model for Chaotic Series Prediction

Antonia Pavlidou, Xiangpeng Liang, Hadi Heidari
University of Glasgow, United Kingdom

Simple Expression of the Thermal Noise Excess Factor for LNA Design
Christian Enz
EPFL, Switzerland

A 100-GHz-RF-Bandwidth Up-Conversion Mixer in 130 nm SiGe BiCMOS
Luca Steinweg, Corrado Carta, Frank Ellinger
TU Dresden, Germany

A 40 GHz Varactor-Less Class-C VCO with 17.1% Tuning Range and Long-Term Reliability in 28nm FD-SOI for Satellite Communications
Ayoub Ait Ihda{2}, Yann Deval{3}, Hervé Lapuyade{3}, François Rivet{3}, Matthieu Gastaldi{1}, Stephane Rochette{4}
{1}CNES, France; {2}IMS Lab, Univ. Bordeaux, CNES., France; {3}IMS Lab., Univ. Bordeaux, Bordeaux INP, CNRS UMR 5218, France; {4}Thales Alenia Space, France

A 224Gbit/S Transceiver Front-End Design for Next Generation Data Centers
Enne Wittenhagen{3}, Urs Hecht{3}, Halil Cirit{2}, Saman Behtash{1}, Srinivas Venkataram{2}, Friedel Gerfers{3}
{1}Exsilica Corp., United States; {2}Meta Inc., United States; {3}TU-Berlin, Germany

An 8th-Order Butterworth Filter Employing Source Follower Based bi-Quad Sections Capable of Realizing high-Q Pole Pairs
Sakthidasan Kalidasan, Ross Walker
University Of Utah, United States

An Equalization Technique for Reducing Ringing in High-Speed Can Bus Transceivers
Andrea Gallone, Piero Malcovati
University of Pavia, Italy

TinyStat: a Miniaturised Potentiostat for Portable Electrochemical Measurements

Dean Corva{1}, Scott Adams{1}, Egan Doeven{1}, Parastoo Hashemi{2}, Abbas Kouzani{1}
{1}Deakin University, Australia; {2}Imperial College London, United Kingdom

A servo-loop-Free Charge Sharing Technique to Mitigate Electrode DC Offsets in Biomedical Multiplexed Interfaces

Marco Francesco Carlino, Georges Gielen
KU Leuven, Belgium

An Accurate and Flexible Analog Emulation of AdEx Neuron Dynamics in Silicon

Sebastian Billaudelle, Johannes Weis, Philipp Dauer, Johannes Schemmel
Kirchhoff-Institute for Physics, Heidelberg University, Germany

Investigating Volume Conduction Effect in MMG and EMG During Action Potential Recording

Negin Ghahremani Arekhloo{2}, Siming Zuo{2}, Huxi Wang{2}, Muhammad Imran{2}, Thomas Klotz{3}, Kianoush Nazarpour{1}, Hadi Heidari{2}
{1}University of Edinburgh, United Kingdom; {2}University of Glasgow, United Kingdom; {3}University of Stuttgart, Germany

Mixing Integrator for Compact Electrochemical Impedance Spectroscopy

Kerim Ture, Sara Seyedeh Ghoreishizadeh
University College London, United Kingdom

Microfabrication of Implantable, Flexible Neural Probes Towards

Bidirectional Interfacing in the Deep Brain
Eve McGlynn, Bhavani Yalagala, Hadi Heidari
University of Glasgow, United Kingdom

A 2-Mode Reconfigurable SSHI Rectifier with 3.2X Lower Cold-Start Requirement for Piezoelectric Energy Harvesting
Xinling Yue, Sijun Du
Delft University of Technology, Netherlands

Piezoelectric Transducers for Energy Harvesting: Electromechanical Model, Ambient Motion, and Electrical Loads
Michael Isaf, Gabriel Rincon-Mora
Georgia Institute of Technology, United States

Magnetoelectric Wireless Power Receiver for a Wearable non-Enzymatic Lactic Acid Sensor
Shih-Hao Lin{3}, Hsiang-Yu Wang{2}, Emile Martincic{1}, Elie Lefeuvre{1}
{1}Centre for Nanoscience and Nanotechnology, Univ. Paris-Saclay - CNRS, Palaiseau, France; {2}Department of Engineering and System Science, National Tsing Hua University, Taiwan; {3}Université Paris-Saclay and National Tsing Hua University, Taiwan

Piezoelectric Transducers Energy Extraction for Device Remote powering: state-of-the-Art Review
Josep Maria Sánchez-Chiva{2}, Hakeim Talleb{1}, Dimitri Galayko{2}
{1}Laboratoire Génie électrique et électronique de Paris - GeePs UMR 8507 CNRS, France; {2}Sorbonne Université, CNRS, LIP6, UMR7606, France

Origin of Capacitance in Perovskite Solar Cells: Insight Vision on the Energy Band Diagram
Sameh Abdellatif, Monica Roman, Ziad Khalifa
The British university in Egypt, Egypt

Channel Bonding Transceivers for Efficient 100 Gb/S and Beyond Wireless and Plastic Waveguide Communications

Jose Luis Gonzalez-Jimenez, Alexandre Siligaris, Abdelaziz Hamani, Cedirc Dehos, Francesco Foglia Manzillo, Antonio Clemente, Nicolas Cassiau
Université Grenoble-Alpes, CEA-Leti, France

D-Band Channel Aggregation Receiver Architecture Based on IF Analog Processing Using Digital Wavelet

Cedric Dehos, Jorge-Luis Monsalve Gulfo, David Lachartre, Didier Belot, Pierre Courouve, Michael Pelissier
CEA Leti, France

A 24-31GHz 28nm FD-SOI CMOS Power Amplifier Supporting 5G NR FR2 64-QAM Signals

Gwennaël Diverrez{1}, Eric Kerhervé{1}, Andreia Cathelin{2}
{1}IMS Laboratory, France; {2}STMicroelectronics Crolles, France

A PAE-Controlled Wideband Power Amplifier for Sub-6GHz 5G Applications in 28nm FDSOI Technology

Remi Queheille, Maxandre Fellmann, Yann Deval, Eric Kerherve, Francois Rivet, Nathalie Deltimple
Univ Bordeaux IMS Lab, France

RF to Bits Highly Tunable Sub-1 pJ/Bit Digital Beamforming Receiver Architectures for 5G Applications

Ahmed Ghoniem{2}, Alhassan Sayed{3}, Ziad Saeed{1}, Bahy Yehia{1}, Abdelrahman Emad{2}, Marco Saif{2}, Mahmoud Tarek{2}, Mohamed Abdelmaksoud{2}, Hassan Aboushady{3}
{1}Cairo Univeristy, Egypt; {2}Insspectrum, Egypt; {3}Seamless Waves, France

A 0.8-6 GHz True-Time-Delay Beam-Nulling Receiver Front-End

Kalle Spoof{2}, Miikka Tenhunen{2}, Vishnu Unnikrishnan{3}, Kari Stadius{1}, Marko Kosunen{1}, Jussi Ryynanen{1}
{1}Aalto University, Finland; {2}Saab Finland, Finland; {3}Tampere University, Finland

33: A Comparative Study of Deep-Learning Object Detectors for Semiconductor Defect Detection

Enrique Dehaerne[2], Bappaditya Dey[1], Sandip Halder[1]
[1]Interuniversity Microelectronics Centre (IMEC), Belgium; [2]KU Leuven, Belgium

34: Accurate Reconstruction of ECG Signals Using Chebyshev Polynomials

Maryam Saeed, Deepu John, Barry Cardiff
University College Dublin, Ireland

35: Cryogenic Transistor Confinement Well Simulation Through Material and Carrier Transport Decoupling

Conor Power, Robert Bogdan Staszewski, Elena Blokhina
University College Dublin, Ireland

36: CMOS PPG Sensor with Correcting Feedback for Effects of Skin Pigmentation

Hedayatipour, Bazurto

37: Smart Shoe Insole with Flexible Pressure and Temperature Sensor Using Additive Manufacturing

Ava Hedayatipour, Eric Garcia, Adam Saied
CalState Long Beach, United States

15:00 – 15:30
Coffee Break
Room: Level 2 Foyer

15:00 – 16:30
WiCAS Session - Building Up Your Network: Academic Collaboration and Gender Balance
Room: Auditoria

Design of Hexagonal Oscillator for True Random Number Generation

Krishan Mehra, Dhirendra Kumar, Kavindra Kandpal, Prasanna Kumar Misra, Manish Goswami
IIIT Allahabad, India

A Divider-Less General PLL Lock Assist and Automatic Frequency Calibration System for Millimeter-Wave Sub-Sampling Phase-Locked Loops

Patrick Kurth, Philipp Nickel, Urs Hecht, Friedel Gefers
Technische Universität Berlin, Germany

A K-Band Wide-Tuning-Range Low-Phase-Noise Digitally Controlled Oscillator in 22 nm FD-SOI for Automotive Radars

Zhigang Li{1}, David Cordeau{1}, Jean-Marie Paillot{1}, Sébastien Charpentier{2}, Matthieu Lécuyer{2}, Francis Huin{2}
{1}CNRS-XLIM, UMR 7252, University of Poitiers, France; {2}IDDO-IC Company, France

A 55nm CMOS Linearized Oscillator for Audio VCO-ADCs Achieving 78dBA of SNDR with 153µW

Ruben Garvi, Javier Granizo, Angel Salvador, Luis Hernadez
Carlos III University, Spain

Evaluation of the Frequency Response of Electro-Mechanical Actuators with a Zero-IF 24-GHz Doppler Vibrometer

Giordano Cicioni, Raffaele Salvati, Roberto Vincenti Gatti, Valentina Palazzi, Paolo Mezzanotte, Luca Roselli, Federico Alimenti
University of Perugia, Italy

A Low-Power RFID with 100kbps Data Rate Employing High-Speed Power Clock Generator for Complementary Pass-Transistor Adiabatic Logic

Saito Shibata, Yoshiki Sawabe, Kota Shiba, Atsutake Kosuge, Mototsugu Hamada, Tadahiro Kuroda
The University of Tokyo, Japan

A Fast Offset Reduction Loop Based on a Bilinear Integrator for Sensor Readout Circuits

Robbe Riem, Johan Raman, Pieter Rombouts
Ghent University, Belgium

Performance Comparison of BJT and MOS Devices as Temperature Sensing Elements

Antonio Aprile, Elisabetta Moisello, Edoardo Bonizzoni, Piero Malcovati
Università degli Studi di Pavia, Italy

A General-Purpose CMOS Vision Sensor with In-Pixel 5-Bit Convolutional Layer Computation

Daniel García Lesta, Óscar Pereira Rial, Víctor Manuel Brea Sánchez, Paula López Martínez, Diego Cabello Ferrer
Universidade de Santiago de Compostela, Spain

Preamplifier Design Strategies for Capacitive Sensing of Electrophysiological Signals

Yijing Zhang[1], Sotir Ouzounov[2], Mohammed Meftah[2], Eugenio Cantatore[1], Pieter Harpe[1]
[1]Eindhoven University of Technology, Netherlands; [2]Philips Research, Netherlands

Complexity Reduction of CNNs Using Multi-Scale Group Convolution for IoT Edge Sensors

Qingyuan Wang[2], Antoine Frappé[1], Benoit Larras[1], Barry Cardiff[2], Deepu John[2]
[1]Univ. Lille, CNRS, Centrale Lille, Junia, Univ. Polytechnique Hauts-de-France, UMR 8520 - IEMN, France; [2]University College Dublin, Ireland

CMOS/STT-MRAM Based Ascon LWC: a Power Efficient Hardware Implementation

Nathan Roussel[1], Olivier Potin[1], Gregory Di Pendina[2], Jean-Max Dutertre[1], Jean-Baptiste Rigaud[1]
[1]Mines Saint-Etienne, France; [2]Spintec, France

A Methodology for Defect Detection in Analog Circuits Based on Causal Feature Selection

Gildas Leger{1}, Antonio Gines{1}, Valentin Gutierrez{1}, Manuel Barragan{2}
{1}IMSE-CNM, Spain; {2}TIMA, France

Effectiveness of Control Flow Checking Algorithms Using a Model-Based Software Design Approach: an Empirical Study

Mohammadreza Amel Solouki, Jacopo Sini, Massimo Violante
Politecnico di Torino, Italy

Investigation of Pass Transistor Logic in a 12nm FinFET CMOS Technology

André Lucas Chinazzo{2}, Jan Lappas{2}, Christian Weis{2}, Qinhui Huang{1}, Zhihang Wu{1}, Leibin Ni{1}, Norbert Wehn{2}
{1}Huawei Technologies Co., China; {2}TU Kaiserslautern, Germany

A Comparative Overview of ATPG Flows Targeting Traditional and cell-Aware Fault Models

Nunzio Mirabella{1}, Andrea Floridia{2}, Riccardo Cantoro{1}, Michelangelo Grosso{2}, Matteo Sonza Reorda{1}
{1}Politecnico di Torino, Italy; {2}STMicroelectronics S.R.L., Italy

Soft Error Assessment of CNN Inference Models Running on a RISC-V Processor

Jonas Gava{3}, Guilherme Dorneles{3}, Ricardo Reis{3}, Rafael Garibotti{2}, Luciano Ost{1}
{1}Loughborough University, United Kingdom; {2}PUCRS, Brazil; {3}UFRGS, Brazil

Neural Network\'s Reliability to Permanent Faults: Analyzing the Impact of Performance Optimizations in GPUs

Juan David Guerrero, Josie E. Rodriguez, Matteo Sonza Reorda
Politecnico di Torino, Italy

ECG Signal Classification Using Temporal Convolutional Network

Ali Rida Ismail{1}, Slavisa Jovanovic{1}, Hassan Rabah{1}, Naeem Ramzan{2}

{1}Université de Lorraine, France; {2}University of West of Scotland, United Kingdom

An Explainable and Reliable Facial Expression Recognition System for Remote Health Monitoring

Mohammad Mahdi Deramgozin{1}, Slavisa Jovanovic{1}, Miguel Arevalillo-Herraez{2}, Hassan Rabah{1}

{1}Université de Lorraine, CNRS, IJL, France; {2}University of Valencia, Valencia, Spain

Stroke Prediction in Elderly Persons Using Remote

Nagina Razzaq{1}, Nayyer Masood{1}, Saba Nawaz{1}, Nadeem Anjum{1}, Naeem Ramzan{2}

{1}Capital University of Science and Technology, Pakistan; {2}University of West Scotland, United Kingdom

NC-Emotions: Neuromorphic Hardware Accelerator Design for Facial Emotion Recognition

Ajay B S{3}, Sumedh R Risbud{2}, Madhav Rao{1}

{1}IIIT Bangalore, India; {2}Intel Labs, Intel Corporation, United States; {3}Intel Technology India Pvt. Ltd., India

MMG/EMG Mapping with Reservoir Computing

Yuqi Ding{1}, Xiangpeng Liang{1}, Thomas Middelmann{2}, Justus Marquetand{2}, Hadi Heidari{1}

{1}University of Glasgow, United Kingdom; {2}University of Tubingen, Germany

Employing a Wearable Eye-Tracker to Observe Mind-Wandering in Dynamic Stimuli

Sara Khosravi, Ahsan Raza Khan, Ahmed Zoha, Rami Ghannam
University of Glasgow, United Kingdom

1: CMOS FD-SOI Technologies Ruggedness for Millimeter Wave Power Amplifier Design

Baudouin Martineau{1}, Alice Bossuet{1}, Alexis Divay{1}, Benjamin Blampey{1}, Yvan Morandini{2}
{1}CEA Leti, France; {2}SOITEC, France

2: Hardware Acceleration of a Fully Parallel Viterbi Decoder Architecture for Narrow Band IOT

Mamdouh Ellamei, Mohamed Abd El Ghany
German University in Cairo, Egypt

3: Digital Approaches on Frequency Tuning for Magnetoelectric Sensors

Johanna Munoz{1}, Johan Arbustini{2}, Eric Elzenheimer{2}, Michael Höft{2}, Andreas Bahr{2}
{1}Instituto Tecnologico de Costa Rica, Costa Rica; {2}Kiel University, Germany

4: A Dynamically Reconfigurable Column Streaming-based Convolution Engine for Edge AI Accelerators

Weison Lin, Yajun Zhu, Tughrul Arslan
The University of Edinburgh, United Kingdom

5: PUF-Entropy Extraction of DAC Intersymbol-Interference Using Continuous-Time Delta-Sigma ADCs

Bjoern Driemeyer, Holger Mandry, David-Peter Wiens, Joachim Becker, Maurits Ortmanns
University of Ulm, Germany

6: A Ti 12 GS/S Sampled Beam-Forming Receiver for a 2x2 Antenna-Array with 69dBc SFDR

Enne Wittenhagen, Patrick Kurth, Tobias Kaiser, Friedel Gerfers
TU-Berlin, Germany

7: A Novel Design Methodology for Low-Power, Low-Noise LC-Based Digital-Controlled Oscillators

Pablo Jiménez-Fernández{2}, Alberto Rodríguez-Pérez{2}, Enrique Prefasi{2}, Óscar Guerra{1}, Rocío Del Río{1}
{1}IMSE-CNM, Spain; {2}KDROC, Spain

8: First-Order Hold DAC Reconstruction Filtering for Efficient Image Rejection

Robbe Riem, Tobias Cromheecke, Johan Raman, Pieter Rombouts
Ghent University, Belgium

9: A -102dB PSRR 1.2V Bandgap Voltage Reference for Use in a Standalone MPPT Boost Converter for Solar Submodules

Léon Weihs{2}, Michael Hanhart{2}, Jan Grobe{1}, Jonas Zoche{2}, Ralf Wunderlich{2}, Stefan Heinen{2}
{1}IAS RWTH Aaachen, Germany; {2}IAS RWTH Aachen, Germany

10: Delta-Sigma Modulator Design Using a Memristive FIR DAC

Danyu Wang{3}, Shiwei Wang{2}, Themis Prodromakis{2}, Christos Papavassiliou{1}
{1}Imperial College London, United Kingdom; {2}The University of Edinburgh, United Kingdom; {3}University College London, United Kingdom

11: A 7 Gb/S Micro Rotatable Transmission Line Coupler with Deep Proximity Coupling Mode and Ground Shield Vias

Ximing Wang, Atsutake Kosuge, Yasuhiro Hayashi, Mototsugu Hamada, Tadahiro Kuroda
The University of Tokyo, Japan

12: Low-Power Techniques on a CMOS Vision Sensor Chip for Event Generation by Frame Differencing with High Dynamic Range

Marko Jaklin, Daniel García-Lesta, Victor Manuel Brea Sànchez, Paula López Martinez
CiTIUS, Universidade de Santiago de Compostela, Spain

13: Automated Synthesis of Asynchronous Tsetlin Machines on FPGA

Gang Mao, Alex Yakovlev, Fei Xia, Tian Lan, Shengqi Yu, Rishad Shafik
Newcastle University, United Kingdom

14: A 1.2 V to 3 V Low Power Resistor-Less All-MOSFET Voltage Reference Generator

Durgham Al-Shebanee, Ralf Wunderlich, Stefan Heinen
Insitute of Integrated Analog Circuits and RF Systems, RWTH Aachen University, Germany

15: Stability-Area Trade-Off in Static CMOS PUF Based on 4T Subthreshold Voltage Divider
Massimo Vatalaro, Raffaele De Rose, Marco Lanuzza, Felice Crupi
University of Calabria, Italy

16: Ka-Band 4-Bit Phase Shifter for SATCOM Active Electronically Scanned Array
Anael Lohou[1], Julien Lintignat[2]
{1}Safran Data Systems, France; {2}Université de Limoges, France

17: Low-Noise Ku-Band Receiver Frontend with Switchable SIW Filters for Cubesat Applications
Giulia Orecchini[2], Giacomo Schiavolini[2], Paolo Mezzanotte[2], Federico Dogo[1], Simone Pauletto[1], Guendalina Simoncini[2], Anna Gregorio[1], Mario Fragiacomo[1], Federico Alimenti[2]
{1}Picosats, Italy; {2}University of Perugia, Italy

18: A Modular Electronic Unit for Water Monitoring in Plastic Pipes with Leakage Detection
Daniele Crafa, Christian Riboldi, Marco Carminati
Politecnico di Milano, Italy

19: Position Sensing of Electrostatic MEMS Actuator
Zdenek Kolka[1], Viera Biolkova[1], Dalibor Biolek[2]
{1}Brno University of Technology, Czech Rep.; {2}University of Defence, Czech Rep.

20: Study of Chopping Magnetic Flux Modulation on Surface Acoustic Wave Magnetic Sensor
Huxi Wang[2], Johan Arbustini[1], Eric Elzenheimer[1], Viktor Schell[1], Michael Höft[1], Eckhard Quandt[1], Gerhard Schmidt[1], Hadi Heidari[2], Andreas Bahr[1]
{1}Kiel University, Germany; {2}University of Glasgow, United Kingdom

21: A Low-Cost Visible-Light-Communication-Enhancing Downlink Relay for Future Ultra-Massive IoT Networks
Dayu Shi[1], Xun Zhang[1], Lianxin Hu[3], Zefeng Wang[3], Wenjun Hu[4], Andrei Vladimirescu[2]
{1}Institut superieur d'electronique de Paris, France; {2}University of California, Berkeley, United States; {3}University of Huzhou, China; {4}Universityof Huzhou, China

22: E-RVP: an Initial Design Rule Violation Predictor Using Placement Information

Sheiny Fabre Almeida{1}, Aysa Fakheri Tabrizi{2}, Erfan Aghaeekiasaraee{2}, Renan Netto{1}, Tiago Augusto Fontana{1}, Upma Gandhi{2}, José Luís Güntzel{1}, Laleh Behjat{2}, Cristina Meinhardt{1}
{1}Dept. of Computer Science and Statistics (INE/PPGCC), Federal University of Santa Catarina (UFSC), Brazil; {2}Dept. of Electrical and Software Engineering, University of Calgary, Canada

23: Design and Equivalent Circuit Analysis of Tunable FBAR Resonators by Using Finite Element Method and Butterworth-Van Dyke Model

Yang Yang, Corinne Dejous, Hamida Hallil
IMS, France

24: Binary ECG Classification Using Explainable Boosting Machines for IoT Edge Devices

Xiaolin Li{2}, Qingyuan Wang{2}, Rajesh Panicker{1}, Barry Cardiff{2}, Deepu John{2}
{1}National University of Singapore, Singapore; {2}University College Dublin, Ireland

25: RF Power Transmission for Self-Sustaining Miniaturized IoT Devices

Lukas Schulthess, Federico Villani, Philipp Mayer, Michele Magno
ETH Zürich, Switzerland

26: An Analog Memristive and Memcapacitive Device for Neuromorphic Computing

Eter Mgeladze{2}, Melanie Herzig{2}, Richard Schroedter{1}, Ronald Tetzlaff{1}, Thomas Mikolajick{3}, Stefan Slesazeck{2}
{1}Chair of Fundamentals of Electrical Engineering, Technische Universität Dresden, Germany; {2}NaMLab gGmbH, Germany; {3}NaMLab gGmbH and Chair of Nanoelectronics, Technische Universität Dresden, Germany

27: CAD Modeling of mm-Wave Circuits Incorporating Avalanche Noise Diodes

Guendalina Simoncini, Valentina Palazzi, Giulia Orecchini, Paolo Mezzanotte, Luca Roselli, Federico Alimenti
University of Perugia, Italy

28: A Locally Active Device Model Based on a Minimal 2T1R Circuit

Ahmet Samil Demirkol[1], Mohamad Moner Al Chawa[1], Alon Ascoli[1], Daniel Bedau[2], Michael Grobis[2], Ronald Tetzlaff[1]

{1}Technische Universität Dresden, Germany; {2}Western Digital, United States

29: Efficient Association of Low and High RF Power Rectifiers for Powering Ultra-Low Power Devices

Jesus Argote Aguilar[2], Florin Doru Hutu[1], Guillaume Villemaud[1], Olivier Berder[2], Matthieu Gautier[2]

{1}University of Lyon, France; {2}University of Rennes 1, France

30: CryoCMOS Characterization Strategies and Challenges

Christos Giagkoulovits, Meraj Ahmad, Fatemeh Nikbakhtnasrabadi, Fiheon Imroze, Martin Weides, Hadi Heidari

University of Glasgow, United Kingdom

31: Packaged CMOS Cryogenic Characterization for Quantum Computing Applications

Fiheon Imroze[2], Fatemeh Nikbakhtnasrabadi[2], Sergey Danilin[2], Muhammad Ali[1], Meraj Ahmad[2], Christos Giagkoulovits[2], Hadi Heidari[2], Martin Weides[2]

{1}Oxford Instruments Nano Science, United Kingdom; {2}University of Glasgow, United Kingdom

18:30 – 22:30
Conference Dinner
Room: Oran Mor

Shuttle buses will run from the Technology and Innovation Centre to the Oran Mor from 18:15 – 18:45.

Shuttle buses back to the Technology and Innovation Centre will run from 21:00 – 22:00.

Technical Program: Wednesday, October 26th

An Analog Driver Compliant with Supply Voltages Exceeding the Ratings of Standard CMOS Processes

Francesco Gagliardi{2}, Mattia Cicalini{2}, Andrea Ria{1}, Massimo Piotto{2}, Paolo Bruschi{2}
{1}IEIIT - National Research Council (CNR), Pisa, Italy, Italy; {2}University of Pisa, Italy

A Calibration-Free 96.7 dB SNDR 4 MS/S CT I-SD Modulator with Single Feedback DAC

Kai Misselwitz, Marcel Runge, Friedel Gerfers
Technische Universität Berlin, Germany

Analysis and Effects of Aging and Electromigration on Mixed-Signal ICs in 22nm FDSOI Technology

Leila Sharara{3}, Seyedeh Masoumeh Navidi{3}, Hamza Al Maharmeh{3}, Mohammed Ismail{3}, Mohamad Alhawari{3}, Samad Parekh{2}, Ali Wehbi{1}
{1}Global Foundried, United States; {2}synopsys, United States; {3}wayne state university, United States

Compact Fully-Differential CMOS Current Driver for Bioimpedance Measurements

Israel Corbacho, Juan M. Carrillo, José L. Ausín, Miguel Á. Domínguez, Raquel Pérez-Aloe, J. Francisco Duque-Carrillo
Universidad de Extremadura, Spain

Design of an Analog and of a Digital-Based OTA in Flexible Integrated Circuit Technology

Sogand Adibi{1}, Roberto Rubino{1}, Pedro Toledo{2}, Paolo Crovetti{1}
{1}Politecnico di Torino, Italy; {2}Synopsys, Portugal

An all-MOSFET 69 ppm/°C Wide Range Programmable Current Reference with PV Insensitive Temperature Compensation

Vidushi Gaur, Surya Varchasvi Devaraj, Laxmeesha Somappa, Maryam Shojaei Baghini
IIT Bombay, India

A 6.78 MHz Dual-Output Reconfigurable Rectifier with Hysteretic Output Regulation for Wireless Power Transfer Systems
Tianqi Lu, Sijun Du
Delft University of Technology, Netherlands

A 6.78 MHz Maximum Efficiency Tracking Active Rectifier with Load Modulation Control for Wireless Power Transfer to Implantable Medical Devices
Tommaso Rizzo{2}, Alessandro Catania{2}, Gabriele Bertolacci{1}, Sebastiano Strangio{2}, Giuseppe Iannaccone{2}
{1}Quantavis s.r.l., Italy; {2}Università di Pisa, Italy

A Dual-Mode 2:1 Switched Capacitor Converter with >65% Efficiency over 1000x Load Current Range and One Clock Cycle Transient Response
Yi Tan, Hiroki Ishikuro
Keio University, Japan

Evaluation of DrMOS-Based Buck Converter Operating in Diode Emulation Mode
Franjo Mikic, Josip Bacmaga, Adrijan Baric
University of Zagreb, Croatia

Predicting Renewable Energy Resources Using Machine Learning for Wireless Sensor Networks
Satyam Bhatti, Ahsan Raza Khan, Sajjad Hussain, Rami Ghannam
University of Glasgow, United Kingdom

Predictive Energy-Aware Adaptive Sampling with Deep Reinforcement Learning
Seonyeong Heo, Philipp Mayer, Michele Magno
ETH Zürich, Switzerland

A Multibit Mac Scheme Using Switched Capacitor Based 3C Multiplier for Analog Compute In-Memory Architecture

Neha Gupta{1}, Ashish Joshi{2}, Dinesh Kushwaha{1}, Vinod Menezes{3}, Rashmi Sachan{3}, Sudeb Dasgupta{1}, Anand Bulusu{1}
{1}IIT Roorkee, India; {2}Intel, Banglore, India; {3}Texas Instruments, India

Design-Time Scheduling of Periodic, Hard Real-Time Flows for NoC-Based Systems

Anderson Domingues{2}, Sergio Filho{2}, Luciano Ost{1}, Alexandre Amory{2}, Fernando Moraes{2}
{1}oughborough University, United Kingdom; {2}PUCRS, Italy; {2}PUCRS, Brazil

Accurate Energy Modelling on the Cortex-M0 Processor for Profiling and Static Analysis

Kris Nikov{2}, Kyriakos Georgiou{2}, Zbigniew Chamski{2}, Jose Nunez-Yanez{1}, Kerstin Eder{2}
{1}Linköping University, Sweden; {2}University of Bristol, United Kingdom

A Pipelined Implementation of the n-Mode Tensor-Matrix Multiplication

Edoardo Ragusa, Christian Gianoglio, Rodolfo Zunino, Maurizio Valle, Paolo Gastaldo
Universita degli studi di Genova, Italy

Neural Network Characteristics-Aware Proactive Boost for Heterogeneous Computing to Improve Energy Efficiency

Jungho Kim, Hoon Choi, Insang Cho, Youngchan Cho
Samsung Electronics, Korea

Balanced Ternary Logic Gates with Memristors

Moin Diwan{2}, Zidu Li{2}, Gregor Schiele{1}, Bhaskar Choubey{2}
{1}Universität Duisburg Essen, Germany; {2}Universität Siegen, Germany

An Integrated Low-Power 802.11ba Wake-Up Radio for IoT with Embedded Microprocessor

Marco Ronchi{1}, Francesco Malena{2}, Michele Caselli{2}, Devis Gatti{1}, Ermano Picco{1}, Elena Salurso{1}, Marco Sosio{1}, Lucio Ticli{1}, Alessandro Tomasoni{1}, Eusebio Di-Cola{1}, Tommaso Majo{1}, Fabio Osnato{1}, Guidetti Elio{1}, Andrea Boni{2}
{1}STMicroelectronics, Italy; {2}University of Parma, Italy

FPGA Implementation of IEEE 1588 Protocol for Bluetooth-Based Distributed Wireless Systems

Aamir Nagra, Muhammad Pasha, Shahid Masud
Lahore University of Management Sciences, Pakistan

Automatic Detection of People Getting Into a Bus in a Smart Public Transportation System

Roya Alizadeh, Yvon Savaria, Chahe Nerguizian
Ecole Polytechnique Montreal, Canada

Detection-Based Video Surveillance Using Deep Neural Networks on STM32 Microcontroller

Alessio Canepa, Edoardo Ragusa, Rodolfo Zunino, Paolo Gastaldo
Universita degli studi di Genova, Italy

Ground Based Inspection for Overhead Transmission Line Sag

Daniel Mitchell{2}, Jamie Blanche{2}, Marc Desmulliez{1}, Sumanth Pavuluri{1}, David Flynn{2}
{1}Heriot-Watt University, United Kingdom; {2}University of Glasgow, United Kingdom

Variable Length Quantization Based Design of Polar Codes Decoder for Resource-Limited IoT Devices

Arslan Hassan{2}, Muhammad Adeel Pasha{1}, Momin Uppal{2}
{1}EE Department, SBASSE, LUMS, Pakistan; {2}Lahore University of Management Sciences (LUMS), Pakistan

1: Real-Time Contactless WiFi Based Room Detection of Sitting and Standing Human Motions

William Taylor{2}, Ahmad Taha{2}, Ahsen Tahir{1}, Qammer H Abbasi{2}, Muhammad Imran{2}
{1}University of Engineering and Technology, Pakistan; {2}University of Glasgow, United Kingdom

2: DRX Mode Implementation Based on Virtual Machine

Boyoun Park, Chungwoo Park, Gang Li
Samsung Electronics, China; Samsung Electronics, Korea

3: 2D-Motion Detection Using SNNs with Graphene-Insulator-Graphene Memristive Synapses

Shubham Pande{1}, Karthi Srinivasan{1}, Suresh Balanethiram{2}, Bhaswar Chakrabarti{1}, Anjan Chakravorty{1}
{1}IIT Madras, India; {2}NIT Karaikal, India

4: Tracking the Effects of Tumor Treating Fields on Human Breast Cancer Cells in vitro Using a Capacitance Sensing Lab-on-CMOS Microsystem

Yann Gilpin, Ching-Yi Lin, Mats Forssell, Siyang Zheng, Pulkit Grover, Marc Dandin
Carnegie Mellon University, United States

5: High-Level Early Power Estimation of FPGA IP Based on Machine Learning

Majdi Richa{1}, Jean-Christophe Prévotet{1}, Mickaël Dardaillon{1}, Mohamad Mroué{2}, Abed Ellatif Samhat{2}
{1}INSA Rennes, France; {2}Lebanese University - FoE, Lebanon

6: Partial 8-Bit Magnitude Comparator Based on Gate Diffusion Input Logic Gates for Leaky Integrate-and-Fire Spiking Neuron Model

Philippe-Olivier Beaulieu{1}, Frederic Nabki{1}, Mounir Boukadoum{2}
{1}École de technologie supérieure, Canada; {2}Université du Québec à Montréal, Canada

7: Adaptive J-Wave Detection Architecture for Online BCG-Complex Recognition on FPGA

Ulf Kulau{2}, Christoph Richter{1}, Jochen Rust{1}
{1}DSI Aerospace Technologie GmbH, Germany; {2}Hamburg University of Technology, Germany

8: Ultra-Low-Power PPG Analog Signal Processing Circuit for Continuous Blood Pressure Estimation

Ruben Ruiz-Mateos Serrano{2}, Dai Jiang{1}, Andreas Demosthenous{1}
{1}University College London, United Kingdom; {2}University of Cambridge, United Kingdom

9: Systematic Analogue Realisation Strategy of Exact Hodgkin-Huxley Dynamics in MOS weak-Inversion

Ruben Ruiz-Mateos Serrano{2}, Olaf Sikorski{1}, E.M. Drakakis{1}
{1}Imperial College London, United Kingdom; {2}University of Cambridge, United Kingdom

10: Approximate Logarithmic Multiplier for Convolutional Neural Network Inference with Computational Reuse

Biyanu Zerom, Mohammed Tolba, Huruy Tesfai, Hani Saleh, Baker Mohammad, Mahmoud Al-Qutayri, Thanos Stouraitis, Ghada Alsuhli
Khalifa University, U.A.E.

11: Spiking Neural Network Based on Threshold Encoding for Texture Recognition

Haydar Al Haj Ali{2}, Ali Dabbous{2}, Ali Ibrahim{1}, Maurizio Valle{2}
{1}Lebanese International University, Lebanon; {2}University of Genoa, Italy

12: An Integrated Circuit for Galvanostatic Electrodeposition of on-Chip Electrochemical Sensors

Minghao Li{2}, Atal Anudeep Singh Gill{2}, Anne Vanhoestenberghe{1}, Sara S. Ghoreishizadeh{2}
{1}King's College London, United Kingdom; {2}University College London, United Kingdom

13: Architecture for 3D Convolutional Neural Networks Based on Temporal Similarity Removal

Udari De Alwis, Massimo Alioto

National University of Singapore, Singapore

14: Feasibility of a Neural Network with Linearly Approximated Functions on Zynq FPGA

Miroslav Skrbek, Pavel Kubalík

Faculty of information technology, Czech Technical University in Prague, Czech Rep.

15: An Improved Codec Design Architecture for Irregular LDPC Codes Applicable to WiMAX

Divita Shri, Arijit Mondal, Shayan Srinivasa Garani

Indian Institute of Science, India

16: Optimization of Deep-Learning Detection of Humans in Marine Environment on Edge Devices

Mostafa Rizk{3}, Dominique Heller{4}, Ronan Douguet{4}, Amer Baghdadi{2}, Jean-Philippe Diguet{1}

{1}CNRS IRL CROSSING, Australia; {2}IMT Atlantique, France; {3}Lab STICC CNRS 6285, France; {4}Universtité de Bretagne-Sud, France

17: DVFS Method of Memory Hierarchy Based on CPU microarchitectural Information

Bumgyu Park, Jonglae Park, Hyunwook Joo, Choonghoon Park, Daeyeong Lee, Chulmin Jo, Woonhaing Hur

Samsung Electronics, Korea

18: Fan Speed Control Based Defence for Thermal Covert Channel Attacks in Multi-Core Systems

Parisa Rahimi{2}, Amit Kumar Singh{2}, Xiaohang Wang{1}

{1}South China University of Technology, China; {2}Uninversity of Essex, United Kingdom

19: Blood Pressure Estimation from ECG Data Using XGBoost and ANN for Wearable Devices

Sourav Banerjee{2}, Binod Kumar{2}, Alex P James{1}, Jai Narayan Tripathi{2}

{1}DUK, India; {2}IIT Jodhpur, India

20: Computation Complexity Reduction Technique for Accurate Seizure Detection Implants
Keyvan Farhang Razi, Alexandre Schmid
Swiss Federal institute of Technology Lausanne, Switzerland

21: Hodgkin-Huxley Verilog-a Electrical Neuron Membrane Model
Andrea La Gala{1}, Lorenzo Stevenazzi{1}, Elia Arturo Vallicelli{1}, Mattia Tambaro{2}, Stefano Vassanelli{2}, Andrea Baschirotto{1}, Marcello De Matteis{1}
{1}University of Milano-Bicocca, Italy; {2}University of Padova, Italy

22: Neuromorphic Analog Implementation of Reservoir Computing for Machine Learning
Avi Hazan{2}, Elishai Ezra Tsur{1}
{1}Open University of Israel, Israel; {2}The Open University of Israel, Israel

23: Flexible Neural Probe Modelling for Optimal Microelectrode-Tissue Interaction
Maria Cerezo-Sanchez, Bhavani Yalagala, Eve McGlynn, Ewan Russell, Finlay Walton, Hadi Heidari
University of Glasgow, United Kingdom

24: Orientationally Selective micro-Coil Design of Intracortial Magnetic Neurostimulation
Changhao Ge, Finlay Walton, Wenhao Xu, Hadi Heidari
University of Glasgow, United Kingdom

25: A Bidirectional ASIC for Active Microchannel Neural Interfaces
Maryam Habibollahi, Dai Jiang, Henry Lancashire, Andreas Demosthenous
University College London, United Kingdom

26: Low Cost Real-Time Eye Tracking System for Motorsports
Yuanjie Xia, Andrew Lunardi, Hadi Heidari, Rami Ghannam
University of Glasgow, United Kingdom

27: Wireless Impedance Platform for Autonomous Vascular Implantable Devices
Jungang Zhang, Daniel Hoare, Rupam Das, Michael Holsgrove, Jakub Czyzewski, Nosrat Mirzai, John Mercer, Hadi Heidari
University of Glasgow, United Kingdom

28: High-Throughput FFT Architectures Using HLS Tools

Hugues Almorin{1}, Bertrand Le Gal{2}, Jeremie Crenne{2}, Christophe Jego{2}, Vincent Kissel{1}

{1}ARELIS - LGM Group, France; {2}IMS Laboratory (CNRS UMR 5218), Bordeaux-INP, Univ. of Bordeaux, France

29: FedClamp: an Algorithm for Identification of Anomalous Client in Federated Learning

Habib Ullah Manzoor{2}, Muhammed Shahzeb Khan{1}, Ahsan Raza Khan{3}, Fahad Ayaz{3}, David Flynn{3}, Muhammad Ali Imran{3}, Ahmed Zoha{3}

{1}Muhammad Ali Jinnah University, Pakistan, Pakistan; {2}University of Glasgow, UK, United Kingdom; {3}University of Glasgow, United Kingdom, United Kingdom

30: A Low Power, Low THD Current Driver with Discrete Common-Mode Feedback for EIT Applications

Jiayang Li{2}, Yu Wu{2}, Richard Bayford{1}, Dai Jiang{2}, Andreas Demosthenous{2}

{1}Department of Natural Sciences, Middlesex University, United Kingdom; {2}University College London, United Kingdom

31: Feature Selection Mechanism for Attention Classification Using Gaze Tracking Data

Ahsan Raza Khan, Syed Mohsin Bokhari, Sara Khosrav, Sajjad Hussain, Rami Ghannam, Muhammad Ali Imran, Ahmed Zoha

University of Glasgow, United Kingdom

32: Development and Evaluation of a Contactless Heart Rate Measurement Device Based on rPPG

Nur Ahmadi{1}, Muhammad Salman Al Farisyi{1}, Muhammad Dzaky Prihatmoko{1}, Muhammad Heronan Hyanda{1}, Habibur Muhaimin{1}, Rahmat Mulyawan{1}, Peter H Charlton{2}, Trio Adiono{1}

{1}Bandung Institute of Technology, Indonesia; {2}University of Cambridge, United Kingdom

33: Psychophysiological Approach for Measuring Social Presence in A Team-Based Activity: a Comparison Between Real and Virtual Environments

Xunan Wang, Xi Li, Bixun Chen, Rami Ghannam
University of Glasgow, United Kingdom

34: Light Weight RL Based Run Time Power Management Methodology for Edge Devices

Ratnala Vinay{1}, Pradip Sasmal{1}, Chandrajit Pal{1}, Toshihisa Haraki{2}, Kazuhiro Tamura{2}, Chirag Juyal{2}, Mohamed Amir Gabir Elbakri{2}, Sumohana Channappayya{1}, Amit Acharyya{1}
{1}IIT Hyderabad, India; {2}SMC Japan, Japan

35: In-Body Energy Harvesting Power Management Interface for Post Heart Transplantation Monitoring

Noora Almarri, Dai Jiang, Andreas Demosthenous
University College London, United Kingdom

36: Visualising Climate Change Using Extended Reality: a Review

Noor Alqallaf{3}, Satyam Bhatti{3}, Rachael Suett{1}, Sherif G. Aly{2}, Rami Ghannam{3}
{1}Glasgow School of Art, United Kingdom; {2}The American University in Cairo, Egypt; {3}University of Glasgow, United Kingdom

37: The Memristive Pupil: a Memristive Circuit Model of the Eye's Response to Illumination Fluctuations

David Sheppard
Rowan University, United States

38: A multi-Parametric Finite Element Analysis of Heat Distributions in Implanted micro-LEDs

Finlay Walton, Maria Cerezo-Sanchez, Changhao Ge, Hadi Heidari
University of Glasgow, United Kingdom

39: Plasmon-Activated Gas Sensor Based on Lossy MoS2/Au Coated Optical Fibre

Zohreh Teymoordel{2}, Roghaieh Parvizi{2}, Hadi Heidari{1}
{1}Glasgow University, United Kingdom; {2}Yasouj university, Iran

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13:30 – 14:30
Keynote Presentation: Prof. Wouter Serdijn
Room: Auditoria

14:30 – 15:00
Coffee Break
Room: Level 2 Foyer

Perimeter-Gated Single-Photon Avalanche Diode Imager with Vanishing Room Temperature Dark Count Probability

Md. Sakibur Sajal{1}, Kai-Chun Lin{1}, Bathiya Senevirathna{2}, Sheung Lu{2}, Marc Dandin{1}
{1}Carnegie Mellon University, United States; {2}University of Maryland, United States

Full-Digital Output ASIC for Lissajous Frequency Modulated MEMS Gyroscopes

Marco Bestetti{1}, Matteo Gianollo{1}, Andrea Giovanni Bonfanti{1}, Christian Padovani{1}, Luca Falorni{2}, Giacomo Langfelder{1}
{1}Politecnico di Milano, Italy; {2}STMicroelectronics, Italy

Ultrasound Non-Destructive Evaluation/Testing Using Capacitive Micromachined Ultrasound Transducer (CMUT)

Mohamed Abdalla, Meraj Ahmad, James Windmill, Sandy Cochran, Hadi Heidari
University of Glasgow, United Kingdom

Humidity and Temperature Dual Flexible Microwave Sensor

Bernard Bobby Ngoune{2}, Hamida Hallil{2}, Stéphane Bila{4}, Dominique Baillargeat{4}, Benoit Bondu{1}, Eric Clouet{3}, Corinne Dejous{2}
{1}ISORG, France; {2}Univ. Bordeaux, Bordeaux INP, CNRS, IMS, UMR 5218, France; {3}University of Bordeaux, LCPO, UMR 5629, France; {4}University of Limoges, CNRS, XLIM UMR 7252, France

A 54.8-nW, 256-Bit Codeword Temperature-Robust Wake-Up Receiver Minimizing False Wake-Ups for Ultra-Low-Power IoT Systems

Matteo D'Addato{2}, Alessia Maria Elgani{2}, Luca Perilli{2}, Eleonora Franchi Scarselli{2}, Antonio Gnudi{2}, Roberto Canegallo{1}, Giulio Ricotti{1}
{1}STMicroelectronics, Italy; {2}University of Bologna, Italy

Contact-Free Vital Sign Estimation Using UWB Radar

Fahad Ayaz{2}, Muhammad Shahzeb{1}, Sajjad Hussain{2}, Waseem Ahmad{2}, Fahim Kawsar{2}, Muhammad Imran{2}, Ahmed Zoha{2}
{1}Muhammad Ali Jinnah University, Pakistan; {2}University of Glasgow, United Kingdom

Fast Time-Domain Super-Resolution for Single-Shot Multi-Path ToF Imaging

Peyman Fayyaz Shahandashti{1}, Paula López Martínez{1}, Victor Manuel Brea{1}, Daniel Garcia Lesta{1}, Miguel Heredia Conde{2}
{1}University of Santiago de Compostela, Spain; {2}University of Siegen, Germany

High Quality and Low Latency Interpolation Filters for Fpga-Based Audio Digital-to-Analog Converters

Samuel Piché, Manouane Caza-Szoka, Messahoud Ahmed Ouameur, Daniel Massicotte
University of Quebec at Trois-Rivères, Canada

SemiSegPolyp: Semi-Supervised Polyp Segmentation Using Graph Signals

Marwa Chendeb El Rai, Muna Darweech, Mina Al-Saad, Wathiq Mansour, Hussain Al-Ahmad
University of Dubai, U.A.E.

Modelling of Electron Injection and Confinement in Cryogenic 22-nm FD-SOI Quantum Dot Arrays

Conor Power{2}, Dennis Andrade-Miceli{1}, Imran Bashir{1}, Mike Asker{1}, Dirk Leipold{1}, Robert Bogdan Staszewski{2}, Elena Blokhina{2}
{1}Equal1 Labs, United States; {1}Equal1 Labs, Ireland; {2}University College Dublin, Ireland

Characterisation and Modelling of 22-nm FD-SOI Transistors Operating at Cryogenic Temperatures

Dennis Andrade-Miceli{1}, Conor Power{2}, Ali Esmailiyan{1}, Teerachot Siriburanon{2}, Imran Bashir{1}, Mike Asker{1}, Dirk Leipold{1}, Robert Bogdan Staszewski{2}, Elena Blokhina{1}
{1}Equal1 Labs, United States; {1}Equal1 Labs, Ireland; {2}University College Dublin, Ireland

Control of Quantum Systems: Comparison of Different Techniques by the Example of Charge and Spin Semiconductor Qubits

Xutong Wu{2}, Panagiotis Giounanlis{1}, Elena Blokhina{2}, R.Bogdan Staszewski{2}

{1}Equal1.labs, Ireland; {2}University College Dublin, Ireland

Spin-Based Quantum Computing in silicon: Scaling with CMOS

Miguel Fernando Gonzalez Zalba

Quantum Motion Technologies, United Kingdom

Qubit Bias Using a CMOS DAC at mK Temperatures

René Otten{1}, Lea Schreckenberg{1}, Patrick Vliex{1}, Julian Ritzmann{2}, Arne Ludwig{2}, Andreas Wieck{2}, Hendrik Bluhm{1}

{1}Forschungszentrum Jülich GmbH, Germany; {2}Ruhr-Universität Bochum, Germany

Reproducing Aplysia R-15 Bursting Neurodynamics on a Neuromorphic Microchip

Paolo Cachi{3}, Soumil Jain{2}, Sebastian Ventura{1}, Gert Cauwenberghs{2}, Krzysztof Cios{3}

{1}Universidad de Córdoba, Spain; {2}University of California at San Diego, United States; {3}Virginia Commonwealth University, United States

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15:00 – 16:30
Wireless Energy Harvesting Circuits & Applications
Room: Breakout Room 8

Towards Solution-Processed RF Rectennas: Experimental Characterization and Non-Linear Modelling Based on ZnO Nanogap Diodes

Mahmoud Wagih{1}, Dimitra Georgiadou{2}

{1}University of Glasgow, United Kingdom; {2}University of Southampton, United Kingdom

Novel Energy Harvesting Antennas and Circuits for On-Body Stretchable and Flexible Electronics

Chaoyun Song{2}, Zhensheng Chen{3}, Jia Zhu{4}, Yalan Yang{1}

{1}Donghua University, China; {2}Heriot-Watt University, United Kingdom; {3}KU LEUVEN, Belgium; {4}Pennsylvania State University, United States

A Flexible Metamaterial Based on Split-Ring Resonator Design
Mengyao Yuan, Rupam Das, Rami Ghannam, Hadi Heidari
University of Glasgow, United Kingdom

A Wearable Backscattering Modulator and RF Energy Harvester for UHF RFID Applications
Irfan Ullah{2}, Mahmoud Wagih{1}, Steve Beeby{2}
{1}University of Glasgow, United Kingdom; {2}University of Southampton, United Kingdom

Solar Energy Systems Design in 2D and 3D: a Comparison of User Vital Signs
Noor Alqallaf, Fahad Ayaz, Satyam Bhatti, Sajjad Hussain, Ahmed Zoha, Rami Ghannam
University of Glasgow, United Kingdom

A 6-20 GHz 400-MHz Modulation-Bandwidth CMOS Transmitter IC
Ali Raza Saleem{1}, Saeed Naghavi{1}, Mahwish Zahra{1}, Kari Stadius{1}, Marko Kosunen{1}, Lauri Anttila{2}, Mikko Valkama{2}, Jussi Ryynanen{1}
{1}Aalto University, Finland; {2}Tampere University, Finland

16:30 – 17:00
Closing Session
Room: Auditoria

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