

April 16-18, 2019

Mykonos, Greece



# 14<sup>th</sup> International Conference on Design & Technology of Integrated Systems in Nanoscale Era (DTIS 2019)



# Program

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### Keynote Speech I: Fabrication, Design and Automation of Inorganic Printed Electronics

**Mehdi Tahoori**, Karlsruhe Institute of Technology

#### Abstract

Flexible electronics is an emerging and fast growing field which can be used in many demanding and emerging application domains such as wearables, smart sensors, and Internet of Things (IoT). Unlike traditional computing and electronics domain which is mostly driven by performance characteristics, flexible electronics are mainly associated with low fabrication costs (as they are used even in consumer market) and low energy consumption (as they could be used in energy-harvested systems). Printed electronics offer certain technological advantages over their silicon based counterparts, like mechanical flexibility, low process temperatures, maskless and additive manufacturing possibilities. However, it is essential that the printed devices operate at low supply voltages. Electrolyte gated field effect transistors (EGFETs) using solution-processed inorganic materials which are fully printed using inkjet printers at low temperatures are very promising to provide such solutions. In this talk, I discuss the technology, process, modeling, fabrication, and design (automation) aspects of circuits based on EGFETs. I show how the measurements performed in the lab can accurately be modeled to be integrated in the design automation tool flow in the form of Process Design Kit (PDK). I also review some of the remaining challenges with this technology and associated design implications.

#### Short Bio of Mehdi Tahoori

Mehdi Tahoori is currently a Full Professor and the Chair of Dependable Nano-Computing, Institute of Computer Science and Engineering, Department of Computer Science, Karlsruhe Institute of Technology, Karlsruhe, Germany. He received the B.S. degree in computer engineering from the Sharif University of Technology, Tehran, Iran, in 2000, and the M.S. and Ph.D. degrees in electrical engineering from Stanford University, Stanford, CA, in 2002 and 2003, respectively. In 2003, he was an Assistant Professor with the Department of Electrical and Computer Engineering, Northeastern University, where he became an Associate Professor in 2009. From August to December 2015, he was a visiting professor at VLSI Design and Education Center (VDEC), University of Tokyo, Japan. From 2002 to 2003, he was a Research Scientist with Fujitsu Laboratories of America, Sunnyvale, CA. He has authored over 300 publications in major journals and conference proceedings on a wide range of topics, from dependable computing and emerging nanotechnologies to system biology, and holds several US and European patents. He is currently the editor-in-chief of Microelectronic Reliability journal, associate editor for IEEE Design and Test Magazine, coordinating editor for Springer Journal of Electronic Testing (JETTA), and associate editor of IET Computers and Digital Techniques. He is the program chair of VLSI Test Symposium 2018 and General Chair of European Test Symposium 2019. Prof. Tahoori was a recipient of the National Science Foundation Early Faculty Development (CAREER) Award. He has received a number of best paper nominations and awards at various conferences and journals.

## **Keynote Speech II: Trends & Challenges in Today's Automotive SOCs**

**Dr. Yervant Zorian**, Chief Architect and Fellow at Synopsys, President of Synopsys Armenia

### **Abstract**

Given today's fast growing automotive semiconductor industry, this keynote will discuss its implications on automotive quality, reliability, functional safety and security in all aspects of the SOC lifecycle. The SOC lifecycle includes design, silicon bring-up, volume production, and particularly in-system reliability. Today's automotive safety critical chips need multiple in-system robustness modes, such as key-on and key-off test and repair, periodic in-field self-test during mission mode, advanced error correction solutions, security authentication, and functional safety. The keynote will also discuss these in-system robustness modes and the show the benefits of meeting the ISO 26262 standard.

### **Short Bio of Yervant Zorian**

Dr. Zorian is a Chief Architect and Fellow at Synopsys, as well as President of Synopsys Armenia. Formerly, he was Vice President and Chief Scientist of Virage Logic, Chief Technologist at LogicVision, and a Distinguished Member of Technical Staff AT&T Bell Laboratories. He is currently the President of IEEE Test Technology Technical Council (TTTC), the founder and chair of the IEEE 1500 Standardization Working Group, the Editor-in-Chief Emeritus of the IEEE Design and Test of Computers and an Adjunct Professor at University of British Columbia. He served on the Board of Governors of Computer Society and CEDA, was the Vice President of IEEE Computer Society, and the General Chair of the 50th Design Automation Conference (DAC) and several other symposia and workshops. Dr. Zorian holds 35 US patents, has authored four books, published over 350 refereed papers and received numerous best paper awards. A Fellow of the IEEE since 1999, Dr. Zorian was the 2005 recipient of the prestigious Industrial Pioneer Award for his contribution to BIST, and the 2006 recipient of the IEEE Hans Karlsson Award for diplomacy. He received the IEEE Distinguished Services Award for leading the TTTC, the IEEE Meritorious Award for outstanding contributions to EDA, and in 2014, the Republic of Armenia's National Medal of Science. He received an MS degree in Computer Engineering from University of Southern California, a PhD in Electrical Engineering from McGill University, and an MBA from Wharton School of Business, University of Pennsylvania.

## Program Brief

### Tuesday 16/04/2019

08:00 - 09:00	Registration
09:00 - 09:30	Opening Session
09:30 - 10:30	<b>Keynote 1:</b> <b>Fabrication, Design and Automation of Inorganic Printed Electronics</b>
10:30 - 11:00	Poster Session
11:00 - 12:00	Session 1 Hardware Security
12:00 - 12:30	Embedded Tutorial Multiterminal Spintronic Devices based on Spin Orbit Torque
12:30 - 14:00	Lunch
14:00 - 15:00	Special Session Neuromorphic Computing
15:00 - 15:30	Poster Session
15:30 - 16:30	Session 2 Analog Design
16:30 - 17:00	Coffee Break
17:00 - 17:40	Session 3 Functional Verification and Safety
17:40 - 18:00	Project Dissemination Session Sector Skills Alliance for the design of innovative VET programs to Data Science and Internet of Things (SEnDIng)

### Wednesday 17/04/2019

09:00 - 10:00	Embedded Tutorial Memristive devices for computing: circuits, architectures and applications
10:00 - 10:30	Coffee Break
10:30 - 11:30	Session 4 Emerging Devices for Neuromorphic Computing
11:30 - 12:30	Special Session Hardware Security
12:30 - 14:00	Lunch
14:00 - 15:00	Session 5 Quality of Integrated Systems
15:30 -	Social Event

### Thursday 18/04/2019

09:00 - 10:00	<b>Keynote 2:</b> <b>Trends &amp; Challenges in Today's Automotive SOCs</b>
10:00 - 10:30	Coffee Break
10:30 - 11:30	Session 6 Novel Technologies for Integrated Circuits
11:30 - 12:00	Closing Session
12:00 - 14:00	Lunch

## Conference Agenda

Tuesday 16/04/2019

08:00 - 09:00	<b>Registration</b>
09:00 – 09:30	<b>Opening Session</b> Welcome address from the General Chairs, Program description and statistics from the Program Chair and Program Vice-Chair
09:30 – 10:30	<b>Keynote I:</b> <b>Fabrication, Design and Automation of Inorganic Printed Electronics,</b> Prof. Mehdi Tahoori Moderator: Elena – Ioana Vatajelu
10:30 – 11:00	<b>Poster Session</b>
	<b>Luminescence Efficiency of Zn-Cu-In-S / ZnS Quantum Dot films</b> George Saatsaki <sup>1</sup> , Christos Michail <sup>2</sup> , Christina Fountzoula <sup>2</sup> , Nektarios Kalyvas <sup>2</sup> , Konstantinos Ninos <sup>2</sup> , Athanasios Bakas <sup>2</sup> , Ioannis Sianoudis <sup>2</sup> , Ioannis Kandarakis <sup>2</sup> , George Fountos <sup>2</sup> , George Panayiotakis <sup>1</sup> , Ioannis Valais <sup>2</sup> , <sup>1</sup> University of Patras, GR, <sup>2</sup> University of West Attica, GR
	<b>Hierarchical Dependability Models based on Non-Homogeneous Continuous Time Markov Chains</b> Jan Řezníček, Martin Kohlík, Hana Kubátová, Czech Technical University in Prague, CZ
	<b>LUT- Oriented Asynchronous Logic Design Based on Resubstitution</b> Igor Lemberski, Artjoms Suponenkovs, Marina Uhanova, Ventspils University College, LV
	<b>Efficient Reed-Muller Implementation for Fuzzy Extractor Schemes</b> Mario Barbareschi, Salvatore Barone, Antonino Mazzeo, Nicola Mazzocca, University of Naples Federico II, IT
	<b>Phase selector for RFID localization system based on RSSI filter</b> H.Hadj-Mihoub-Sidi-Moussa <sup>1</sup> , Smail Tedjini <sup>2</sup> , RachidaTouhami <sup>1</sup> , <sup>1</sup> Instrumentation Laboratory USTHB University, AL; <sup>2</sup> Grenoble Alpes University LCIS Laboratory, FR
11:00 – 12:00	<b>Session 1 Hardware Security</b> Moderator: Apostolos Fournaris
	<b>Providing Confidentiality and Integrity in Ultra Low Power IoT Devices</b> Emanuele Valea <sup>1</sup> , Mathieu Da Silva <sup>1</sup> , Marie-Lise Flottes <sup>1</sup> , Giorgio Di Natale <sup>2</sup> , Sophie Dupuis <sup>1</sup> , Bruno Rouzeyre <sup>1</sup> , <sup>1</sup> LIRMM FR, <sup>2</sup> TIMA FR
	<b>Horizontal DPA Attacks against ECC: Impact of Implemented Field Multiplication Formula</b> Ievgen Kabin, Zoya Dyka, Dan Klann, Peter Langendoerfer, IHP
	<b>Hardware Trojan Prevention Through Limiting Access to the Active Region</b> Tareq Muhammad Supon, Mahasadat Seyedbarhagh, Rashid Rashidzadeh, Roberto Muscedere, University of Windsor, CA

12:00 – 12:30	<b>Embedded Tutorial</b> Moderator: Udo Schwalke
	<b>Multiterminal Spintronic Devices based on Spin Orbit Torque,</b> Dr. Mihai Miron, CEA-Spintec/CNRS, FR
12:30 – 14:00	<b>Lunch</b>
14:00 – 15:00	<b>Special Session</b> Moderator: Farshad Moradi
	<b>Neuromorphic Computing</b> Organizer: Farshad Moradi
	<b>Spin-Torque-Nano-Oscillator based neuromorphic computing assisted by laser</b> Hooman Farkhani, Farshad Moradi, Integrated Circuits and Electronics Lab, Aarhus University, DK
	<b>Memristors make spin Hall nano-oscillators synchronize and remember</b> Mohammad Zahedinejad <sup>1</sup> , S. Fukami <sup>2</sup> , S. Kanai <sup>2</sup> , H. Ohno <sup>2</sup> , Johan Akerman <sup>1</sup> , <sup>1</sup> Physics Department, University of Gothenburg, Gothenburg SE, <sup>2</sup> Laboratory for Nanoelectronics and Spintronics, Tohoku University JP
	<b>Learning weights with STDP to build prototype images for classification</b> Ajay Vasudevan, Teresa Serrano, Bernabe Linares-Barranco, IMSE-CNM-CSIC Sevilla ES
15:00 – 15:30	<b>Poster Session</b>
15:30 – 16:30	<b>Session 2 Analog Design</b> Moderator: Hassen Aziza
	<b>Linear Current-to-Time Converter</b> Spyridon Vlassis <sup>1</sup> , Orfeas Felouris-Panetas <sup>1</sup> , Geroge Souliots <sup>2</sup> , Fotis Plessas <sup>3</sup> , <sup>1</sup> Electronics Laboratory Physics Department University of Patras GR, <sup>2</sup> Department of Electrical Engineering Technological Educational Institute of Western Greece GR, <sup>3</sup> Department of Electrical and Computer Engineering University of Thessaly GR
	<b>Millimeter-Wave Analog Pre-Distorted Power Amplifier at 65nm Node</b> Lutfi Albasha <sup>1</sup> , Seyed Kashfi <sup>2</sup> , Amit Jain <sup>1</sup> , Nasir Quadir <sup>2</sup> , <sup>1</sup> Department of Electronics and Communication Engineering CMR Institute of Technology IN, <sup>2</sup> Department of Electrical Engineering American University of Sharjah UAE
	<b>A Boost Converter for Energy Harvesting Utilizing MEMS Switch</b> Maryam Eshaghi, Rashid Rashidzadeh, Electrical and Computer Engineering University of Windsor CA
16:30 – 17:00	<b>Coffee Break</b>
17:00 – 17:40	<b>Session 3 Functional Verification and Safety</b> Moderator: Paolo Bernardi
	<b>Symbolic Execution based Verification of Compliance with the ISO 26262 Functional Safety Standard</b> Mazen Ahmed <sup>1</sup> , Mona Safar <sup>2</sup> , <sup>1</sup> Mentor Graphics Electronics and Communications Department Faculty of Engineering, Cairo University EG,

	<sup>2</sup> Computer Engineering and Systems Department Faculty of Engineering Ain-Shams University EG
	<b>Functional Failure Rate Due to Single-Event Transients in Clock Distribution Networks</b> Thomas Lange <sup>1,2</sup> , Maximilien Glorieux <sup>1</sup> , Dan Alexandrescu <sup>1</sup> , Luca Sterpone <sup>2</sup> , <sup>1</sup> iRoC Technologies FR, <sup>2</sup> Dipartimento di Informatica e Automatica, Politecnico di Torino, IT
17:40 – 18:00	<b>Project Dissemination Session</b> <b>Sector Skills Alliance for the design of innovative VET programs to Data Science and Internet of Things (SEnDIng), Ioannis Voyiatzis, GCS</b>

## Wednesday 17/04/2019

09:00 – 10:00	<b>Embedded Tutorial</b> Moderator: Michel Renovell
	<b>Memristive devices for computing: circuits, architectures and applications,</b> Prof. Said Hamdioui, Delft University of Technology, NL
10:00 – 10:30	<b>Coffee Break</b>
10:30 – 11:30	<b>Session 4 Emerging Devices for Neuromorphic Computing</b> Moderator: Farshad Moradi
	<b>Neural Network for Circuit Models of Monolithic InAlN/GaN NAND and NOR logic gates</b> Aleš Chvála, Lukáš Nagy, Juraj Marek, Juraj Priesol, Daniel Donoval, Alexander Šatka, Institute of Electronics and Photonics Slovak University of Technology, SK
	<b>An Augmented OxRAM Synapse for Spiking Neural Network (SNN) Circuits</b> H. Aziza <sup>1</sup> , H. Bazzi <sup>1,2</sup> , J. Postel-Pellerin <sup>1</sup> , P. Canet <sup>1</sup> , M. Moreau <sup>1</sup> , A. Harb <sup>3</sup> , <sup>1</sup> Aix Marseille Univ, IM2NP FR, <sup>2</sup> Lebanese International University, Department of Electrical and Electronics Engineering LB, <sup>3</sup> The International University of Beirut, Department of Electrical and Electronics Engineering LB
	<b>Perovskite based Low Power Synaptic Memristor Device for Neuromorphic application</b> Vishal Gupta, Giulia Lucarelli, Sergio Castro, Thomas Brown, Marco Ottavi, Department of Electronic Engineering, University of Rome IT
11:30 – 12:30	<b>Special Session</b> Moderator: Emanuele Valea
	<b>Hardware Security</b> Organizer: Francesco Regazzoni
	<b>Secure memory for tamperproof systems</b> D. Serpanos and D. Stachoulis, Industrial Systems Institute GR
	<b>Revisiting Rowhammer attacks in Embedded Systems</b> Lidia Pocero Fraile, Apostolos P. Fournaris and Odysseas Koufopavlou, University of Patras, GR

12:30 – 14:00	<b>Lunch</b>
14:00 – 15:00	<b>Session 5 Quality of Integrated Systems</b> Moderator: Ioannis Voyiatzis
	<b><i>A Hybrid In-Field Self-Test Technique for SoCs</i></b> S. Carbonara, P. Bernardi, M. Restifo, Politecnico di Torino Dipartimento di Automatica e Informatica IT
	<b>An extended model to support detailed GPGPU reliability analysis</b> B. Du, Josie E. Rodriguez Condia, Matteo Sonza Reorda, Politecnico di Torino, Dept. of Control and Computer Engineering IT
	<b>On-Line Adjustable Precision Computing</b> Ali Skaf, Mona Ezzadeen, Mounir Benabdenbi, Laurent Fesquet, Univ. Grenoble Alpes, CNRS, Grenoble INP, TIMA FR
15:30 –	<b>Social Event</b>

## Thursday 18/04/2019

09:00 – 10:00	<b>Keynote 2:</b> <b>Trends &amp; Challenges in Today's Automotive SOCs,</b> Dr. Yervant Zorian, Synopsis, US Moderator: Ioannis Voyiatzis
10:00 – 10:30	<b>Coffee Break</b>
10:30 – 11:30	<b>Session 6 Novel Technologies for Integrated Circuits</b> Moderator: Elena-Ioana Vatajelu
	<b>Modelling and measurements of thermomechanical stress induced drift on polysilicon resistors with different layout</b> Lorenzo Benvenuti <sup>1</sup> , Paolo Bruschi <sup>1</sup> , Luca Fanucci <sup>1</sup> , Raffaele Coppeta <sup>2</sup> , Sara Carniello <sup>2</sup> , Luigi Di Piro <sup>3</sup> , Francesco Tinfena <sup>3</sup> , <sup>1</sup> University of Pisa IT, <sup>2</sup> ams AG AT, <sup>3</sup> ams AG IT
	<b>Reliability issues and length dependence of nanocrystalline graphene field-effect transistors for gas sensing</b> D. Noll, U. Schwalke, Institute for Semiconductor Technology and Nanoelectronics Technische Universität Darmstadt, DE
	<b>The transport and optical sensing properties of Blue Phosphorene: A First-Principles Study</b> F. Safari <sup>1</sup> , M. Moradinasab <sup>2</sup> , M. Fathipour <sup>3</sup> , U. Schwalke <sup>2</sup> , <sup>1</sup> Department of Electrical Engineering, Dezful Branch, Islamic Azad University IR, <sup>2</sup> Institute for Semiconductor Technology and Nanoelectronics, Technische Universität Darmstadt DE, <sup>3</sup> Device Modeling and Simulation Lab School of Electrical and Computer Engineering, Faculty of Engineering, University of Tehran IR
11:30 – 12:00	<b>Closing Session</b>
12:00 – 14:00	<b>Lunch</b>

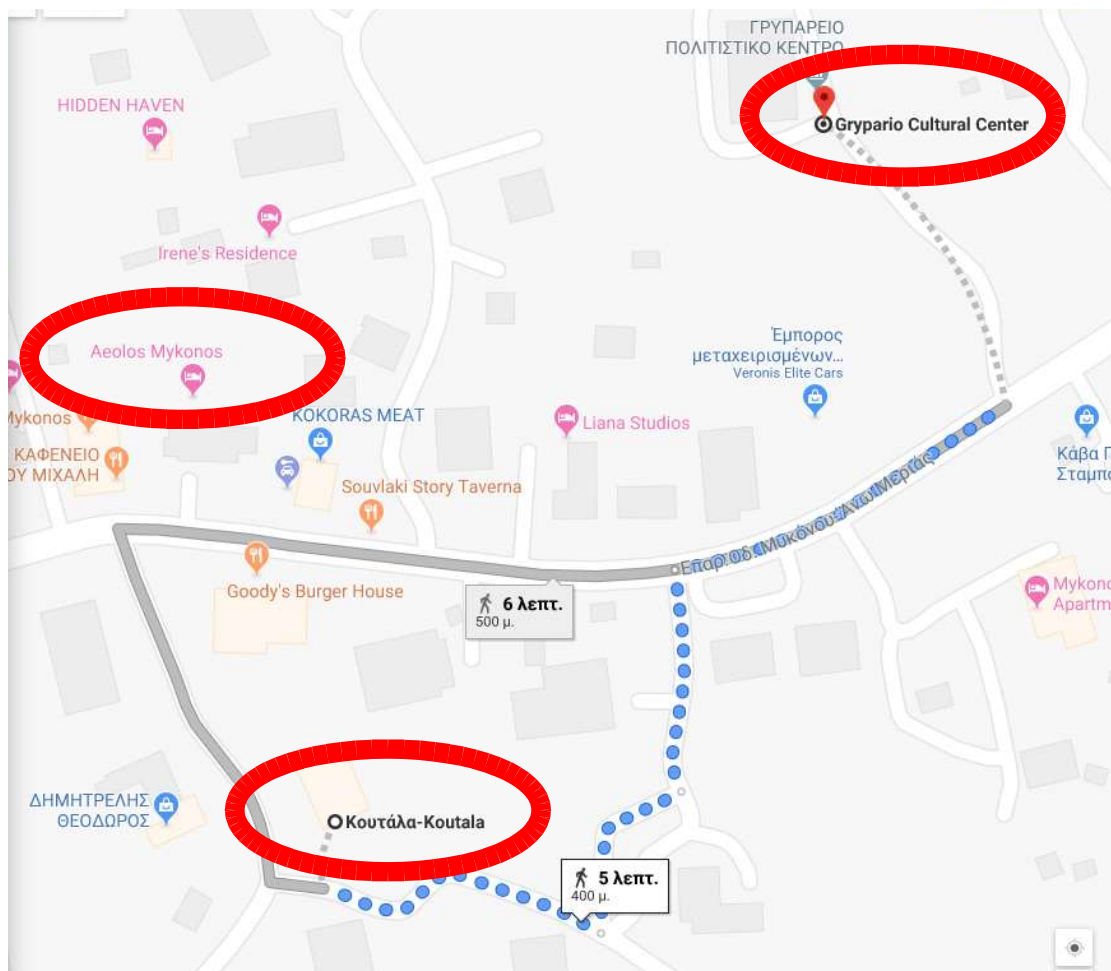
## Conference Venue

The 14<sup>th</sup> IEEE International Conference on Design & Technology of Integrated Systems in Nanoscale Era will take place at the "Grypario Cultural Center" of Mykonos, Greece, 500m from the Aeolos Hotel. Conference Lunch will be served in "Koutala-Koutala" restaurant.



## DTIS 2019 Conference map

### Grypareio Cultural Center, Aeolos Hotel and Koutala-koutala



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