

MONDAY, AUGUST 11th	
8:30-8:45	Welcome
	Keynote 1
8:45-9:45	Low power design techniques in mobile processors, Karim Arabi, VP of Engineering for Qualcomm Research <i>Session Chair: Yuan Xie (University of California, Santa Barbara)</i>
10:15-11:55	Session 1
	Photonics, Spintronics, approximate computing and front-end throttling Approximate Computing and quality driven power-aware system design
	<i>Session Chairs: Hans Jacobson (IBM) and Umit Ogras (Arizona State University)</i> <i>Session Chairs: Xiangyu Dong (Qualcomm) and Vivek Joy (Intel)</i>
	EcoLaser: An Adaptive Laser Control for Energy Efficient On-Chip Photonic Interconnects AxNN: Energy Efficient Neuromorphic Systems using Approximate Computing
	Yigit Demir, Nikos Hardavellas <i>Northwestern University</i> Swagath Venkataramani; Ashish Ranjan; Kaushik Roy; Anand Raghunathan <i>Purdue University</i>
	A Model for Array-based Approximate Arithmetic Computing with Application to Multiplier and Squarer Design TONE: Adaptive Temperature Optimization for the Next Generation Video Encoders
	Botang Shao, Peng Li <i>Texas A&M University</i> Daniel Palomino ¹ ; Muhammad Shafique ² ; Altamiro Susin ¹ ; Joerg Henkel ² ¹ <i>Federal University of Rio Grande do Sul</i> ; ² <i>Karlsruhe Institute of Technology</i>
	SPINDLE: SPIntronic Deep Learning Engine for Large-scale Neuromorphic Computing StoRM: Stochastic Recognition and Mining Processor
	Shankar Ganesh Ramasubramanian; Rangharajan Venkatesan; Mrigank Sharad; Kaushik Roy; Anand Raghunathan <i>Purdue University</i> Vinay Chippa; Swagath Venkataramani; Kaushik Roy; Anand Raghunathan <i>Purdue University</i>
	Adaptive Front-End Throttling for Superscalar Processors Approximate Compressed Sensing: Ultra-Low Power Biosignal Processing via Aggressive Voltage Scaling on a Hybrid Memory Multi-core Processor
	Wei Zhang; Hang Zhang; John Lach <i>University of Virginia</i> Daniele Bortolotti ¹ ; Hossein Mamaghanian ² ; Andrea Bartolini ¹ ; Maryam Ashouei ³ ; Jan Stuijt ³ ; Pierre Vandergheynst ² ; Luca Benini ¹ ; David Atienza ² ¹ <i>University of Bologna</i> ; ² <i>École polytechnique fédérale de Lausanne</i> ; ³ <i>IMEC / Holst Center</i>
11:55-1:30	Lunch / Posters
1:30-2:45	Session 2
	Emerging Technologies Energy-efficient systems using emerging non-volatile memory technologies
	<i>Session Chairs: Arijit Raychowdhury (Georgia Institute of Technology) and Patrick Mercier (University of California, San Diego)</i> <i>Session Chairs: Vijay Raghunathan (Purdue University) and Zhenyu Sun (Broadcom)</i>
	An On-chip Autonomous Thermoelectric Energy Management System for Energy-Efficient Active Cooling Making B+ Tree Efficient in PCM-Based Main Memory
	Borislav Alexandrov; Khondker Z. Ahmed; Saibal Mukhopadhyay <i>Georgia Institute of Technology</i> Ping Chi; Wang-Chien Lee; Yuan Xie <i>Pennsylvania State University</i>
	Tunnel FET-Based Ultra-Low Power, Low-Noise Amplifier Design for Bio-signal Acquisition Sleep-Aware Variable Partitioning for Energy-Efficient Hybrid PRAM and DRAM Main Memory
	Huichu Liu ¹ ; Mahsa Shoaran ² ; Xueqing Li ¹ ; Suman Datta ¹ ; Alexandre Schmid ² ; Vijaykrishnan Narayanan ¹ ¹ <i>Pennsylvania State University</i> ; ² <i>Swiss Federal Institute of Technology (EPFL)</i> Chenchen Fu ¹ ; Mengying Zhao ¹ ; Chun Jason Xue ¹ ; Alex Orailoglu ² ¹ <i>City University of Hong Kong</i> ; ² <i>University of California</i>
	(INVITED) Performance Modeling for Emerging Interconnect Technologies in CMOS and Beyond-CMOS Circuits DR. Swap: Energy-Efficient Paging for Smartphones
	Sou-Chi Chang, Rouhollah M. Iraei, Vachan Kumar, Ahmet Ceyhan, and Azad Naeemi <i>Georgia Tech University.</i> Kan Zhong ¹ ; Xiao Zhu ¹ ; Tianzheng Wang ² ; Dan Zhang ¹ ; Xianlu Luo ¹ ; Duo Liu ¹ ; Weichen Liu ¹ ; Edwin Sha ¹ ¹ <i>Chongqing University</i> ; ² <i>University of Toronto</i>
2:45-3:15	Break
3:15-4:30	Session 3
	Clock and IO circuit techniques Thermal-Aware Design: from Device to System
	<i>Session Chairs: Gordon Gammie (MediaTek) and Jie Gu (Maxlinear)</i> <i>Session Chairs: Jiang Hu (Texas A&M University) and Umit Ogras (Arizona State University)</i>
	Quasi-Resonant Clocking: A Run-time Control Approach for True Voltage-Frequency-Scalability Dynamic Thermal Management for FinFET-Based Circuits Exploiting the Temperature Effect Inversion Phenomenon
	Visvesh Sathe <i>University of Washington</i> Woojoo Lee; Yanzhi Wang; Tiansong Cui; Shahin Nazarian; Massoud Pedram <i>University of Southern California</i>
	An Energy-efficient 2.5D Through-silicon Interposer I/O with Self-adaptive Adjustment of Output-voltage Swing Buffered Clock Tree Synthesis Considering Self-Heating Effects
	Sai Manoj PD ¹ ; Dongjun Xu ² ; Hantao Huang ¹ ; Jiacheng Wang ¹ ; Ningmei Yu ² ; Mingbin Yu ³ ; Hao Yu ¹ Chung-Wei Lin ¹ ; Tzu-Hsuan Hsu ² ; Xin-Wei Shih ² ; Yao-Wen Chang ²

¹ Nanyang Technological University; ² Xian University of Technology; ³ A*Star Institute of Microelectronics

¹ University of California, Berkeley; ² National Taiwan University

Reconfigurable Regenerator-based Interconnect Design for Ultra-Dynamic-Voltage Scaling Systems

Seongjong Kim; Mingoo Seok
Columbia University

Therminator: A Thermal Simulator for Smartphones Producing Accurate Chip and Skin Temperature Maps

Qing Xie; Mohammad Javad Dousti; Massoud Pedram
University of Southern California

4:30-4:45
4:45-6:00

Break
Session 4
Industry Special Session
Embedded Tutorial

Session Chair: Muhammad Khellah (Intel)

Session Chairs: Massimo Poncino (Politecnico di Torino) and Renu Mehra (Synopsys)

(INVITED) Challenges in Low-Power Analog Integrated Circuit Design for sub-28nm CMOS Technologies

Amr Fahim
Semtech Corp.

(INVITED) Failing to Fail - Achieving Success in Advanced Low Power Design using UPF

Rick Koster¹, Shreedhar Ramachandra², Sushma Honnavara Prasad³
¹ Mentor Graphics; ² Synopsys Inc.; ³ Broadcom Corp

(INVITED) Process and design solutions for exploiting FD-SOI technology towards energy efficient SOCs

Philippe Flatresse
ST Microelectronics

(INVITED) Embedded STT-MRAM for Emerging Mobile Applications: Toward Unified eNVM Solution

Kangho Lee, Seung H. Kang
Qualcomm

6:00-xxx

Industry reception dinner

TUESDAY, AUGUST 12th

Keynote 2

8:45-9:45

Accelerator-Rich Architectures – from Single-chip to Datacenters,
Session Chair: Tanay Karnik (Intel)

9:30-10:00
10:00-11:40

Break
Session 1
GPU voltage noise, Uncore power modeling, Memory power management, and Testing
Session Chairs: John Sampson (Penn State University) and Yaojun Zhang (Qualcomm)
CAD for Low Power and Reliability
Session Chairs: Zhiru Zhang (Cornell University) and Yiran Chen (University of Pittsburgh)

GPUVolt: Modeling and Characterizing Voltage Noise in GPU Architectures

Jingwen Leng¹, Yazhou Zu¹, Minsoo Ryu¹, Meeta Sharma Gupta² and Vijay Janapa Reddi¹
¹ The University of Texas at Austin; ² IBM T.J. Watson

Algorithms for Power-Efficient QoS in Application-Specific NoCs

Hao He, Gongming Yang and Jiang Hu
Texas A&M University

Empirically Derived Abstractions in Uncore Power Modeling for a Server-Class Processor Chip

Hans Jacobson, Arun Joseph, Dharmesh Parikh, Pradip Bose and Alper Buyuktosunoglu
IBM

Design and CAD Methodologies for Low Power Gate-level Monolithic 3D ICs

Shreepad Panth¹, Kambiz Samadi², Yang Du² and Sung Kyu Lim¹
¹ Georgia Institute of Technology; ² Qualcomm Research

Content-Driven Memory Pressure Balancing and Video Memory Power Management for Parallel High Efficiency Video Coding

Felipe Sampaio¹, Muhammad Shafique², Bruno Zatt¹, Sergio Bampi¹ and Joerg Henkel²
¹ Federal University of Rio Grande do Sul; ² Karlsruhe Institute of Technology

Efficient NBTI modeling technique considering recovery effects

Reef Eilers¹, Malte Metzdorf¹, Domenik Helms¹ and Wolfgang Nebel^{1,2}
¹ OFFIS Institute for Computer Science; ² University of Oldenburg

Software Canaries: Software-based Path Delay Fault Testing for Variation-aware Energy-efficient Design

John Sartori¹ and Rakesh Kumar²
¹ University of Minnesota; ² University of Illinois at Urbana-Champaign

(INVITED) Bridging High Performance and Low Power in the era of Heterogeneous Computing

Ruchir Puri
IBM

11:40-12:10
12:20-13:30
1:30-2:45

Posters
Lunch
Session 2
Energy Efficient Digital Circuit Techniques
Optimizing computation and communication in mobile systems

Session Chairs: Rob Gilmore (Qualcomm) and Joyce Kwong (TI)

Session Chairs: Sujit Dey (University of California, San Diego) and Yiran Chen (University of Pittsburgh)

CASA: Correlation-Aware Speculative Adders

A case for leveraging 802.11p for direct phone-to-phone communications

Gai Liu; Ye Tao; Mingxing Tan; Zhiru Zhang

Cornell University

Pilsoon Choi¹; Jason Gao¹; Nadesh Ramanathan²; Mengda Mao²; Shipeng Xu²; Chirn-Chye Boon²; Suhaib Fahmy²; Li-Shiuan Peh¹

¹ MIT; ² NTU;

Synergistic Circuit and System Design for Energy-Efficient and Robust Domain Wall Caches

Seyedhamidreza Motaman; Anirudh Iyengar; Swaroop Ghosh
University of South Florida

(INVITED) Leakage Mitigation Techniques in Smartphone SoCs"

John Redmond

Broadcom Corporation

Timing Errors in LDPC Decoding Computations with Overscaled Supply Voltage

Behnam Sedighi¹; N. Prasanth Anthapadmanabhar²; Dusan Suvakov²

¹ University of Notre Dame; ² Bell Labs, Alcatel-Lucent;

2:45-3:15
3:15-4:30

Break
Session 3

Voltage reference and power converter circuits

Session Chairs: Swaroop Ghosh (University of Florida) and Nilanjan Banerjee (Qualcomm)

Variation and reliability consideration for low-power systems

Session Chairs: Eli Bozorgzadeh (University of California, Irvine) and Younghyun Kim (Purdue University)

2.3 ppm/°C, 40 nW MOSFET-Only Voltage Reference

Oscar Elisio Mattia; Hamilton Klimach; Sergio Bampi
Federal University of Rio Grande do Sul

Aging Mitigation of Power Supply-Connected Batteries

Jaemin Kim¹; Alma Proebst²; Samarjit Chakraborty²; Naehyuck Chang¹
¹ Seoul National University; ² TU Munich

A Bipolar ±40 mV Self-Starting Boost Converter with Transformer Reuse for Thermoelectric Energy Harvesting

Nachiket Desai; Yogesh Ramadass; Anantha Chandrakasan

Variation tolerant design of a vector processor for Recognition, Mining and Synthesis

Vivek Kozhikkottu¹; Swagath Venkataramani¹; Sujit Dey²; Anand Raghunathan¹

Massachusetts Institute of Technology

¹ Purdue University; ² University of California, San Diego

Impact of Process Variation in Inductive Integrated Voltage Regulator on Delay and Power of Digital Circuits

Monodeep Kar¹; Harish Krishnamurthy²; Sergio Carlo¹; Saibal Mukhopadhyay¹

Thermal-Aware Layout Planning for Heterogeneous Datacenters

Reza Azimi; Xin Zhan; Sherief Reda

¹ Georgia Institute of Technology; ² Intel

Brown University

4:30-4:45
4:45-6:00

Break
Session 4

Design Contest

Session Chair: Yiran Chen, University of Pittsburg

Poster Presentations

A 0.15-V input energy harvesting charge pump with switching body biasing and adaptive dead-time for efficiency improvement

Jungmoon Kim¹, Chulwoo Kim¹ and Philip Mok²
¹ Korea University; ² Hong Kong University of Science and Technology

QPR.js: A Runtime Framework for QoS-Aware Power Optimization for Parallel JavaScript Programs

Wonjun Lee^{1,2}; Jae W. Lee²; Channoh Kim²
¹ Samsung Electronics; ² Sungkyunkwan University

Storage and converter-less energy harvesting and applications

Hyung Gyu Lee¹ and Naehyuck Chang²
¹ Daegu University; ² Seoul National University

Ultra-Low Voltage Mixed TFET-MOSFET 8T SRAM Cell

Yin-Nien Chen; Ming-Long Fan; Pi-Ho Hu; Pin Su; Ching-Te Chuang
National Chiao-Tung University

When they are not listening: harvesting power from idle sensors in embedded systems

Woo Suk Lee, Hrishikesh Jayakumar and Vijay Raghunathan
Purdue University

A-SAD: Power Efficient SAD Calculator for Real time H.264 Video Encoder Using MSB-Approximation Technique

Le Dinh Trang Dang; Ik Joon Chang; Jinsang Kim
IEEE

Design Exploration of Racetrack Lower-level Caches

Zhenyu Sun¹; Xiuyuan Bi²; Alex K. Jones²; Hai Li²
¹ Broadcom Corp.; ² University of Pittsburgh

A Compact Macromodel for the Charge Phase of a Battery with Typical Charging Protocol

Donghwa Shin¹; Alessandro Sassone²; Alberto Bocca²; Alberto Macii²; Enrico Macii²; Massimo Poncino²
¹ Yeungnam University; ² Politecnico di Torino

Energy Efficient Task Scheduling on a Multi-core Platform using Real-time Energy Measurements

Digvijay Singh; William Kaiser
University of California, Los Angeles

Energy-Efficient Mapping of Biomedical Applications on Domain-Specific Accelerator under Process Variation

Mohammad Khavari Tavana¹; Arney Kulkarni²; Abbas Rahimi³; Tinoosh Mohsenin²; Houman Homayoun¹

¹ George Mason University; ² University of Maryland, Baltimore; ³ University of California, San Diego;

[A Memory Rename Table to Reduce Energy and Improve Performance](#)

Benjamin VanderSloot; Trevor Mudge
University of Michigan

[A deterministic-dither-based, all-digital system for on-chip power supply noise measurement](#)

Kannan Sankaragomathi; William Smith; Brian Otis; Visvesh Sathe
University of Washington

[An Open-Source Framework for the Formal Specification and Simulation of Electrical Energy Systems](#)

Sara Vinco¹; Alessandro Sassone¹; Franco Fummi²; Enrico Macii¹; Massimo Poncino¹

¹ Politecnico di Torino; ² Universita' di Verona

[Analysis and Optimization of In-Situ Error Detection Techniques in Ultra-Low-Voltage Pipeline](#)

Seongjong Kim; Mingoo Seok
Columbia University

[Quantifying the impact of variability on the energy efficiency for a next-generation ultra-green supercomputer](#)

Francesco Fraternali¹; Andrea Bartolini¹; Carlo Cavazzoni²; Giampietro Tecchiolli³; Luca Benini¹

¹ University of Bologna; ² Cineca; ³ Eurotech Group;

[MIN: A Power Efficient Mechanism to Mitigate the Impact of Process Variations on Nanophotonic Networks](#)

Majed Valad Beigi; Gokhan Memik
Northwestern university

[EECache: Exploiting Design Choices in Energy-Efficient Last-Level Caches for Chip Multiprocessors](#)

Hsiang-Yun Cheng; Matthew Poremba; Narges Shahidi ; Ivan Stalev; Mary Jane Irwin; Mahmut Kandemir; John Sampson; Yuan Xie
Pennsylvania State University

[A Digital Dynamic Write Margin Sensor for Low Power Read/Write Operations in 28nm SRAM](#)

Peter Beshay¹; Vikas Chandra²; Rob Aitken²; Benton Calhoun¹

¹ University of Virginia; ² ARM;

[Smart Butterfly: Reducing Static Power Dissipation of Network-on-Chip with Core-State-Awareness](#)

Siyu Yue; Lizhong Chen; Di Zhu; Timothy Pinkston; Massoud Pedram
University of Southern California

[Energy-Efficient Dot Product Computing using a Switched Analog Circuit Architecture](#)

Ihab Nahlus¹; Eric Kim¹; Naresh Shanbhag¹; David Blaauw²

¹ University Of Illinois Urbana Champaign; ² University Of Michigan Ann-Arbor)

[Gated low-power clock tree synthesis for 3D-ICs](#)

Tiantao Lu; Ankur Srivastava
University of Maryland

[Unlocking the True Potential of 3D CPUs with Micro-Fluidic Cooling](#)

Caleb Serafy; Ankur Srivastava; Donald Yeung
University of Maryland, College Park

[Prolonging PCM Lifetime through Energy-efficient, Segment-aware, and Wear-resistant Page Allocation](#)

Hoda Aghaei Khouzani; Yuan Xue; Archana Pandurangi; Chengmo Yang

6:00--

Dinner + Banquet

WEDNESDAY AUGUST 13th

Keynote 3

8:30-9:30

The new (system) balance of power and opportunities for optimizations, Dr. Partha Ranganathan, Google
Session Chairs: Muhammad Khellah (Intel) and Renu Mehra (Synopsys,

9:30-10:00

Break

10:00-11:40

Session 1

Energy efficient cache and memory design

Energy harvesting and energy-aware system design

Session Chairs: Naehyuck Chang (Seoul National University) and Hyung Gyu Lee (Daegu University)

Session Chairs: Xi Chen (Qualcomm) and Zhenyu Sun (Broadcom)

[eDRAM-Based Tiered-Reliability Memory with Applications to Low-Power Frame Buffers](#)

[Fast Photovoltaic Array Reconfiguration for Partial Solar Powered Vehicles](#)

Kyungsang Cho^{1,2}; Yongjun Lee^{1,2}; Younghwan Oh²; Gyoo-cheol Hwang¹; Jae W. Lee²

Jaemin Kim¹; Yanzhi Wang²; Massoud Pedram²; Naehyuck Chang¹

¹ Samsung Electronics; ² Sungkyunkwan University

¹ Seoul National University; ² USC;

[Enabling High-Performance LPDDRx-Compatible MRAM](#)

[Energy Harvesting from Anti-Corrosion Power Sources](#)

Jue Wang¹; Xiangyu Dong²; Yuan Xie¹

Minseok Lee¹; Kyeongsu Park¹; Sehwan Kim¹; Pai Chou²

¹ Pennsylvania State University; ² Qualcomm Technology, Inc.

¹ Dankook University; ² University of California, Irvine

[SBAC: A Statistics based Cache Bypassing Method for Asymmetric-access Caches](#)

[Intelligent Frame Refresh for Energy-Aware Display Subsystems in Mobile Devices](#)

Chao Zhang¹; Guangyu Sun¹; Peng Li²; Tao Wang¹; Dimin Niu³; Yiran Chen⁴
¹ Peking University; ² UCLA; ³ Samsung Semiconductor Inc.; ⁴ University of Pittsburgh

Yongbing Huang¹; Shihai Xiao²; Mingyu Chen¹; Lixin Zhang¹
¹ Chinese Academy of Sciences; ² Huawei Technologies Co.

[Tag Check Elision](#)

(INVITED) [Powering the Internet of Things](#)

Zhong Zheng¹; Zhiying Wang¹; Mikko Lipasti²

Hrishikesh Jayakumar, Kangwoo Lee, Woosuk Lee, Arnab Raha, Younghyun Kim, and Vijay Raghunathan

¹ National University of Defense Technology; ² University of Wisconsin, Madison

Purdue University

11:40-12:10

Break