

Design & Test



Approximate Computing

- Approximate Computing: A survey
 - An eDRAM-based Approximate Register File for GPUs
- Mitigating the Memory Bottleneck with Approximate Load Value Prediction
 - Quality Control for Approximate Accelerators by Error Prediction
- Exploring the Precision Limitation for RRAM-Based Analog Approximate Computing



Contents

January/February 2016
Volume 33 Number 1

Copublished by the IEEE Council
on Electronic Design Automation,
the IEEE Circuits and Systems
Society, the IEEE Solid-State
Circuits Society, and the Test
Technology Technical Council

Special Issue

- 6 Guest Editors' Introduction: Approximate Computing**
Qiang Xu, Todd Mytkowicz, and Nam Sung Kim
- 8 Approximate Computing: A Survey**
Qiang Xu, Todd Mytkowicz, and Nam Sung Kim
- 23 An eDRAM-Based Approximate Register File for GPUs**
Donghwan Jeong, Young H. Oh, Jae W. Lee, and Yongjun Park
- 32 Mitigating the Memory Bottleneck With Approximate Load Value Prediction**
Amir Yazdanbakhsh, Bradley Thwaites, Hadi Esmaeilzadeh, Gennady Pekhimenko, Onur Mutlu, and Todd C. Mowry
- 43 Quality Control for Approximate Accelerators by Error Prediction**
Daya Shanker Khudia, Babak Zamirai, Mehrzad Samadi, and Scott Mahlke
- 51 Exploring the Precision Limitation for RRAM-Based Analog Approximate Computing**
Boxun Li, Peng Gu, Yu Wang, and Huazhong Yang

General Interest

- 59 Architecture of a Reusable BIST Engine for Detection and Autocorrection of Memory Failures and for IO Debug, Validation, Link Training, and Power Optimization on 14-nm SoC**
Bruce Querbach, Rahul Khanna, Sudeep Puligundla, David Blankenbeckler, Joseph Crop, and Patrick Yin Chiang
- 68 Adapt&Cap: Coordinating System- and Application-Level Adaptation for Power-Constrained Systems**
Can Hankendi, Ayse Kivilcim Coskun, and Henry Hoffmann



Cover design by Alexander Torres

DEPARTMENTS

- 4** **From the EIC**
**“Approximate Computing:
Solving Computing’s
Inefficiency Problem?”**
Jörg Henkel
- 77** **Roundtable: ITC Plenary Panel**
**“Test: Wisdom From the Giants,
Visions for the Future—Part 2”**
Shawn Blanton and David Yeh
- 85** **Conference Reports**
**“Recap of the ITC15 Test
Conference”**
Bill Eklow
- 87** **“From the Heart of Silicon Valley
to the Hill Country—Highlights of
ICCAD 2015”**
Frank Liu
- 89** **“Report on MECO’2015”**
*Radovan Stojanović
and Radenka Krsmanović Whiffen*
- 91** **CEDA Currents**
93 **TTTC Newsletter**
- 96** **The Last Byte**
“Good Enough Computing”
Scott Davidson



IEEE
Design&Test