JANUARY 2010

Currents

CEDA

IEEE Council on Electronic Design Automation

Kaufman Award

In November, at the 2009 International Conference on Computer-Aided Design (ICCAD), the EDA Consortium presented the Kaufman Award to Randal (Randy) Bryant.

Bryant invented switch-level simulation with a tool called Mossim. Until then, all semiconductor simulations used Spice-type algorithms, and one of the main concerns was fast evaluation of the transistors' transfer functions. But, with the coming of Mead and Conway, computer scientists wanted a far simpler model of the world so that they could apply programming techniques to design.

Switch-level simulators treat transistors as switches that are either on or off and with a unit delay (meaning all transistors are turned on and off at the same speed). Mossim, developed around 1980, was the first of these switch-level simulators. At VLSI Technology, we developed a similar tool, called VSIM. Later, the switch model was enhanced to add timing (and ours was called TSIM). It's interesting now to realize that in the early 1980s, IC design was largely done without timing, using Spice for paths that looked like they might be important.

Bryant also invented binary decision diagrams (BDDs), which provide an efficient representation of combinational logic. BDDs are one of the key technologies underlying logic optimization and, hence, both synthesis and formal verification. Even though a BDD provides a fairly compressed representation of a circuit, many logic operations can be efficiently performed directly on the BDD without expanding the representation into something less space efficient and then recompressing it afterward. However, BDDs are not good at representing everything; multipliers are notorious for exploding BDD size—but, of course, they are hard to represent, period.

Bryant first published his ideas in 1986. An amazing fact that came to light at the Kaufman Award dinner is that, for years, his paper just kept getting more citations. Soon after publication, a paper usually generates a flurry of interest, which then dies down. But 15 years after publication—in fact, for most of the early part of this decade—Bryant's paper was the most cited paper, not only in EDA, but in all of computer science.

The Kaufman Award recognizes an individual's impact on EDA. The ideas in Mossim, although very important in the early 1980s, have become less so since simulation has moved up to higher levels. But, more than 20 years after Bryant invented BDDs, every synthesis and formal-verification tool still relies heavily on them. Thus, his impact on EDA is unmistakable.

Paul McLellan, paul@greenfolder.com

ICCAD and VLSI-SoC Best Paper Awards

In memory of William J. McCalla, for his contributions to ICCAD and his CAD technical work throughout his career, the 2009 ICCAD Best Paper Awards were presented to Thomas Ebi, Mohammad Abdullah Al Faruque, and Jörg Henkel (University of Karlsruhe) for "TAPE: Thermal-Aware Agent-Based Power Economy for Multi/Many-Core Architectures," and to Rouwaida Kanj, Rajiv Joshi, Chad Adams, James Warnock, and Sani Nassif (IBM) for "An Elegant Hardware-Corroborated Statistical Repair and Test Methodology for Conquering Aging Effects."

The second paper presents techniques for modeling FET-based devices and variability. In this work, the authors study the yield improvements of mixed- and split-gate designs in FinFET technology. They propose a fast statistical analysis for FinFET designs, including 6T and 8T column-decoupled designs, as well as a low-voltage 6T-column-decoupled SRAM cell using stacked and FinFET devices.

The winners of the Best Paper Award for the 17th IFIP/IEEE International Conference on Very Large Scale Integration (VLSI-SoC 2009) were Ayse K. Coskun, Jose L. Ayala, David Atienza, and Tajana Simunic Rosing for "Modeling and Dynamic Management of 3D Multicore Systems with Liquid Cooling." The authors target the novel approach of liquid cooling for 3D multicore systems. They propose modeling the thermal behavior of a 3D stack when a liquid coolant flows along existing microchannels. They also provide a set of dynamic management techniques that control the flux of the coolant and the task assignment to the cores for optimizing the thermal profile.

Jose L. Ayala, jayala@fdi.ucm.es

CEDA Currents is a publication of IEEE CEDA. Please send contributions to Jose L. Ayala (jayala@fdi.ucm.es) or Rajesh Gupta.

Early Career Award

The IEEE Council on EDA presented the very first Early Career Award to Igor Markov (University of Michigan, Ann Arbor) at ICCAD 2009. Markov is well-known for his strong contributions to the physical-design area in terms of algorithms, methodologies, software, and open standards.

CEDA will present the Early Career Award annually to an individual who has made important contributions to the field of EDA in the early stages of his or her career. The award will be open to IEEE members at any level (regular, senior, or fellow) who has received his or her highest degree within eight years of the nomination deadline.

In the near future, CEDA will request nominations for next year's award. You can look for the link to the award page on CEDA's main Web site. Please consider nominating one of our many deserving contributors to EDA, whether in academia or industry.

In the mean time, we send our warmest congratulations to Igor Markov for this distinguished accomplishment in winning this year's Early Career Award.

Papers in IEEE Embedded Systems Letters

CEDA's *IEEE Embedded Systems Letters* (*IEEE ESL*) seeks to provide a forum for quick dissemination of research results in the domain of embedded systems, with a target turn-around time of no more than three months. This journal is currently published quarterly and includes new, brief, critically refereed technical papers. Submissions are welcome on any topic concerning embedded systems and embedded software.

The top-five accessed articles from *IEEE Embedded Systems Letters* during October 2009 were as follows:

- "Hardware Resource Virtualization for Dynamically Partially Reconfigurable Systems," by Chun-Hsian Huang and Pao-Ann Hsiung
- "Optimizing Bandwidth of Call Traces for Wireless Embedded Systems" by R. Shea, M.B. Srivastava, and Young Cho
- "Verification of Synchronous Elastic Processors" by S.K. Srinivasan, K. Sarker, and R.S. Katti
- "ASIP-Based Universal Demapper for Multi-wireless Standards" by A.R. Jafri, A. Baghdadi, and M. Jezequel
- "Temperature Driven Time Synchronization" by T. Schmid, Z. Charbiwala, R. Shea, and M.B. Srivastava

Find us online at www.c-eda.org.

Upcoming Conferences (Bill Joyner, william.joyner@src.org)	
DATE	Dresden, Germany, 8-12 March 2010
NOCS	Grenoble, France,, 3-6 May 2010
GLSVLSI	Providence, Rhode Island, May 2010
DAC	Anaheim, California, 13-18 June 2010
MPSOC	Gifu, Japan, 28 June – 2 July 2010
MEMOCODE	Grenoble, France, 26-28 July 2010
FMCAD	Lugano, Switzerland, 20-23 Oct. 2010

IEEE Embedded Systems Letters *is open for submissions. Visit mc.manuscriptcentral.com/les-ieee*