Textbooks and Resources for Students Lead Bookroom Sales at ISSCC 2013

New Reference Works for Practicing Engineers Also Attract Attention

Of the vendors that return to ISSCC every year, Cambridge, Springer, and McGraw-Hill reported special interest this February in volumes for classrooms, while Wiley's three top sellers aimed at practitioners.

Students milling around the Oxford University Press booth in the midst of the Monday evening social hour gravitated to the company's tried and true CMOS textbooks by Yannis Tzividis and Allen and Holberg and to two learn-on-your-own guides—the *Hands-On Introduction to LabVIEW for Scientists and Engineers*, second edition, by Essick and Pratap's *Getting Started with MATLAB*. Oxford Higher Education Group Editorial Director Patrick Lynch, who was on the scene, said the latter is "ubiquitous" in engineering, "very focused on getting students started doing stuff immediately, very brief, only US$38," and valuable for instructors looking for teaching tools. (Oxford books that Dr. Lynch recommended for undergraduates are in "Oxford Books for Undergraduates, on p. 88")

According to Cambridge Engineering Publisher Dr. Julie Lancashire, *High-Frequency Integrated Circuits* by Sorin Voinigescu, which debuted at the conference, is "an absolutely fabulous read," as a graduate-level textbook and resource for professionals." "It's packed full of details and hints and tips about how to design high-frequency and RF circuits," with lecture slides, lab classroom assignments, and solutions that attracted "enormous attention at ISSCC," she said. "I've been completely mobbed. Somebody called it a masterpiece."

New also for graduate students and experienced professionals from Springer was its ISSC 2013 best seller—the second edition of Marcel Pelgrom's *Analog-to-Digital Conversion*, which updates the first edition with novel calibration concepts, requirements of new systems, the consequences of 45-nm CMOS technology, and some first results with metal-gate 28-nm technologies, with background information and practical tips, from designing a PCB, to lay-out aspects, to trade-offs on system level, complementing the discussion of basic principles. In a succinct summation, Springer Executive Editor for Engineering Charles Glaser said, "A to D conversion is what 90% of the people here are involved in. It's a really common, really enabling technology, and it's a new edition."

In an e-mail, the author said "This textbook is for master's students, based on my experiences during a teaching career of over 15 years with EE master's students and young graduates working in industry. Its ambition is to bring them up to a level where today's publications in the field of analog-to-digital conversion can be read, interpreted, and evaluated, based on a 160-page background summary in math, statistics, electricity, device physics, network theory, and basic circuits and 400 pages that discuss typical analog-to-digital features such as sampling, sample-and-hold circuits, quantization, reference circuits, analog-to-digital and digital-to-analog conversion, and sigma-delta conversion. Additional sections
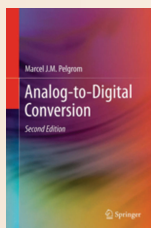
NUMBER-ONE SELLERS

Three new books for students and a new introduction to CMOS for practitioners.
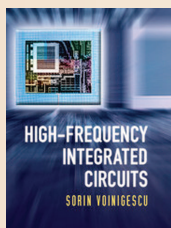
Cambridge

High-Frequency Integrated Circuits: The Cambridge RF and Microwave Engineering Series by Sorin Voinigescu (available March 2013, ISBN: 9780521873024) US$95.00.

Springer

Analog-to-Digital Conversion by Marcel J.M. Pelgrom, second edition, 2013 (ISBN 978-1-4614-1371-4, available per PDF download) US$89.95.

McGraw-Hill

High Performance Integrated Circuit Design by Emre Salman, Eby Friedman (August 21, 2012, ISBN: 0071635769/ 9780071635769, hardback) US$150.00.

Wiley

CMOS Sigma-Delta Converters: Practical Design Guide by José M. de la Rosa, Rocío del Río (May 2013, ISBN: 978-1-1199-7925-8, hardcover) US$120.00.

SECOND-PLACE SELLERS

Cambridge

A Student's Guide to Maxwell's Equations by Daniel Fleisch (January 2008, ISBN: 9780521701471, paperback) US$30.99. Other formats: Adobe eBook Reader, Mobipocket eBook, hardback.

Springer

Analog Design Essentials (The Springer International Series in Engineering and Computer Science, Vol. 859) by Willy M. Sansen (1st ed. 2006. Corr. 2nd printing 2006, ISBN: 978-0-387-25747-1, hardcover) US$99.00 for ebook; US$129 for hardcover.

McGraw-Hill

Charge Pump Circuit Design by Feng Pan and Tapan Samaddar (July 20, 2010, ISBN: 0071491422/9780071491426) US$110.00, format: eBook, other formats: hardback.

Wiley

Engineering the CMOS Library: Enhancing Digital Design Kits for Competitive Silicon by David Doman (May 2012, ISBN: 978-1-1182-4304-6), hardcover (e-book also available) US$110.00.

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are devoted to testing, technology aspects, and system impact, all with many examples and exercises. My intention is for students to be able to study the material and understand the principles without the help of simulation tools."

For undergraduate senior- and graduate-level students, McGraw-Hill's *High Performance Integrated Circuit Design* by Salman and Friedman is described as a practical guide to interconnect-centric design methodologies, emphasizing "device-circuit topology interaction and optimization" and providing "an in-depth understanding of device structures and process limitations affecting circuit performance." The book appeared at ISSCC for the first

time this year, having been published in August 2012.

For practitioners, *Sigma-Delta Analog-to-Digital Converters: Practical Design Guide*—scheduled for release by Wiley in May 2013—is a "unique, "systematic," and "comprehensive compilation" of operating principles and advances in architectures and circuits, design methodologies and practical considerations from system-level specifications to silicon integration, packaging and measurements, emphasizing practical design issues from high-level behavioral modeling in MATLAB/SIMULINK to circuit-level implementation in Cadence Design FameWork II." The volume is also touted as "unique" for the importance it gives to practical

issues, exemplified by its detailed description of the different steps that constitute the whole design flow of sigma-delta ADCs. Thus, it is deemed "essential reading for researchers and electronics engineering practitioners" interested in the design of high-performance data converters integrated in nanometer CMOS technologies and for mixed-signal designers.

A Student's Guide to Maxwell's Equations, published by Cambridge as long ago as 2008, inexplicably attracted little interest at ISSCC until this year, although Dr. Lancashire said the book has been overall "a fabulous seller for Cambridge because it clearly explains the underpinnings of all radio communications for microwave and RF people like those who

NUMBER THREES

Cambridge

Electromagnetics for High-Speed Analog and Digital Communication Circuits by Ali M. (March 2007, ISBN: 9780521853507, Hardback) US$111.00.

The subject just does not go away," Dr. Lancashire said. "I always sell a few, but this year it was enormous" perhaps because the author was recognized as a newly elected IEEE Fellow during the opening plenary program. The book was a best seller at ISSCC when it came out in 2007.

Springer

Low Power Design Essentials Series: Integrated Circuits and Systems by Jan Rabaey (2009, ISBN 978-0-387-71713-5) US$89.99, available per PDF download, hardcover US$114.00

According to Springer, "the first book at the graduate level to address the design of low-power digital integrated circuits in an orderly, logical, and unique fashion" and an ISSCC best seller for two years after its publication in 2009.

Wiley

Multifunctional Antennas for Microwave Wireless Systems by Eng Hock Lim and Kwok Wa Leung (May 2012, ISBN: 978-0-470-40732-5, hardcover; E-book also available) US$99.95

Aimed at professional engineers and researchers designing compact antennas for wireless applications and advertised by the publisher as "an invaluable tool offering an up-to-date description of modern multifunctional antenna systems and microwave components."

come to the conference." Intended as a supplementary textbook for undergraduates, she said "it started to sell to all sorts of people as soon as it came out. Practicing engineers buy it all the time."

Charge Pump Circuit Design by Feng Pan and Tapan Samaddar (2010), is touted by McGraw-Hill as "a landmark design reference" and "the first book to focus solely on the

design and implementation of charge pumps used in EEPROMs, Flash memory, white LED drivers, and a myriad of other circuits finding mass applications in PDAs, digital cameras, MP3 players, video recorders, cell phones, USB drives, and more." It is said to be "filled with 100 detailed illustrations and a wealth of practical design tips and potential pitfalls to avoid."

Willy Sansen's classic *Analog Design Essentials*—a Springer best seller at ISSCC for as many as six years since its appearance in 2006— "is an essential reference for analog designers. Everyone needs it," said Mr. Glaser. A comparable volume, he said, is Jan Rabaey's *Low Power Design Essentials*—published in 2009 and "still going strong" as Springer's number three seller at ISSCC this

OXFORD BOOKS FOR UNDERGRADUATES
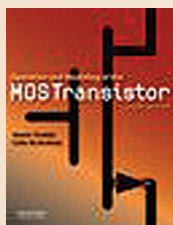
Operation and Modeling of the MOS Transistor, third edition, by Yannis Tsividis and Colin McAndrew (Oct. 2010, ISBN 13: 9780195170153, ISBN,10: 0195170156, hardcover) US$147.95.

According to Oxford, "a standard in academia and industry. Extensively revised and updated, the third edition of this highly acclaimed text provides a thorough treatment of the MOS transistor—the key element of modern microelectronic chips."


CMOS Analog Circuit Design, third edition, by Phillip E. Allen and Douglas R. Holberg (Aug. 2011, ISBN 13: 9780199765072, ISBN 10: 0199765073, hardcover) US$167.95.

". . . design recipes take readers step by step through the creation of real circuits, explaining and demystifying complex design problems. . . . New to the third edition is an update to Chapter 2 that "reflects the latest technology on twin-well shallow-trench-isolation CMOS."

Hands-On Introduction to LabVIEW for Scientists and Engineers, second edition, by John Essick, (June 2012, ISBN 13: 9780199925155, ISBN 10: 0199925151, paperback) US$34.95.

A "learn-by-doing approach" that "leads its readers to mastery of this powerful laboratory tool through . . . interesting and relevant projects. " Readers, who are assumed to have no prior computer programming or LabVIEW background, "will begin writing meaningful programs within the first few pages."
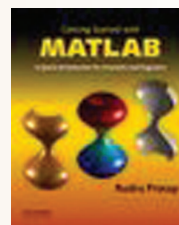
Getting Started with MATLAB by Rudra Pratap (Nov. 2009, ISBN 13: 978-0-19-973124-4, ISBN 10: 0-19-973124-1, paperback) US$37.95.

An affordable, interactive software package with "hundreds of built-in functions for technical computation, graphics, and animation."

year—notable likewise for its unique format: "Instead of starting with words, you start with a figure and then you just wrap the words around the figure. For some people, that works extremely well," he said.

Wiley's *Engineering the CMOS Library: Enhancing Digital Design Kits for Competitive Silicon,* published less than a year ago in the summer of 2012, is advertised as a comprehensive and "wholly unique perspective on the digital design kit" that "shows readers how to gain the competitive edge in the integrated circuit marketplace" by revealing "step by step how the generic, foundry-provided standard-cell library is built, and how to extract value from existing std-cells and EDA tools to produce tighter-margined,

smaller, faster, less power-hungry, and more yield-producing integrated circuits, including different views of CMOS std-cell libraries, with coverage of IO libraries, memory compilers, and small analog blocks." According to Wiley, the author, David Doman, is an expert in semiconductor IP design and development.

IC Layout Basics, A Practical Guide by Christopher and Judy Saint garnered significant student interest, said a McGraw Hill representative in the ISSCC book room. Designed to meet "an unprecedented demand for technicians skilled in CMOS and bipolar design and layout," it is regarded by the company as an "essential primer" for bringing [even] those without engineering degrees "up to

speed" by presenting concepts "from the ground up, building on the simple until the complex becomes crystal clear."

Sample MEAD Notes Snapped Up

According to veteran ISSCC Education representative Caroline Huber, many young people stopped by the Mead booth and purchased desk copies of course materials. Buyers said they had already taken a course or courses on the same topic, and wanted Mead's slides as extra resources. Workbooks for Mead's courses on High-Performance Data Converters, Advanced Analog IC Design, Practical Aspects in Mixed Signal ICs, and Power Management sold out, she said.

—Katherine Olstein

Empowering the Killer SoC Applications of 2020

So many daunting questions were posed in the Advance Program preface to this Tuesday evening panel as to cast doubt on whether forecasting "killer" SoC apps of 2020 is possible today.

"We have had the computing revolution, then communications, and now the sensor era," it began.

- Are sensors driving the next killer applications?
- Are there any other revolutions in sight?
- What circuits and system innovations can ISSCC bring forward for the next killer applications?
- What technology elements, device structures and memory architectures are required?
- Should we continue with silicon technology and find breakthroughs through system architecture, algorithms, SoC integration, and packaging?
- Or should we prepare for "beyond silicon" technologies?

- Are any beyond-silicon technologies realistic for the future?

Nevertheless, the six panelists, who represented geographically diverse companies from the United States to the United Kingdom, South Korea, and Japan, came up with a multiplicity of views on what should and could happen next, which they graciously summarized for *IEEE Solid-State Circuits Magazine.*

J. Augusto de Oliveira—Cypress

A "killer application" for 2020 will be sensors placed around our environment as well as our bodies, which will be connected to our Internet devices and the cloud. These sensors will provide information that will enhance our quality of life and improve our well-being. The chips implementing these smart sensors have silicon process requirements that are different from application processors and will not necessarily follow Moore's law: the focus is on extremely low energy usage, interfacing with the "real world," and cost.

Atsushi Murase—NTT

In 2020, mobile devices will handle huge amounts of broadband and sensing data to enhance the user experience based on cloud network environments. Innovations and networks aimed at 1,000x performance will be the driving force behind the evolution of future mobile services. Design of mobile and fixed network SoCs will be more important for achieving network innovation.

Babak Parviz—Google

During the past few decades, we have observed exponential progress in the semiconductor industry, enabling ever-increasing complexity in electronic systems.

Thus, many modern systems today are not purely electronic but may include optical, acoustic, MEMS, and other components that add to the complexity of purely electronic SoC design.

To date, complete simulation tools that offer a holistic approach to system design, taking multiple domains into account, are lacking,