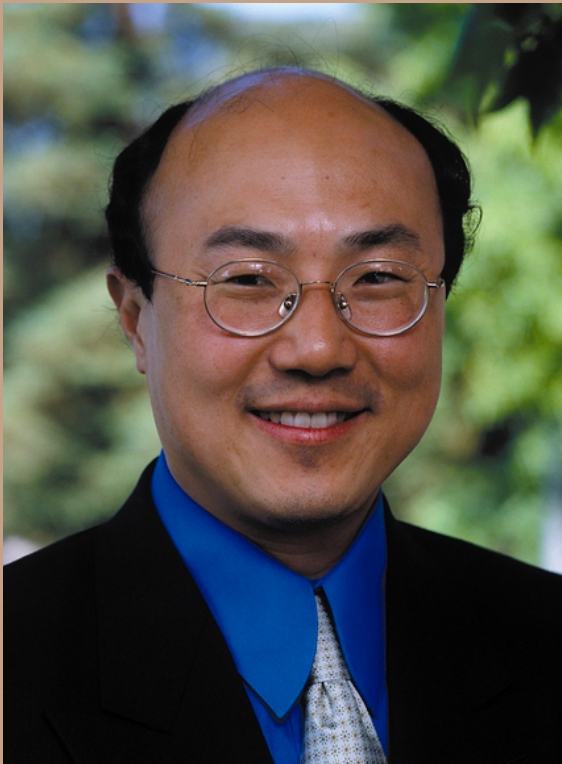


To commemorate the 75th anniversary of the transistor

San Diego SSCS Presents

Tom Lee

From Rocks to Chips:
Stories of the Transistor



Chris Mangelsdorf
Don't Try This With
CMOS!

Friday, June 23, 2023

1:00-3:00pm PDT

Qualcomm AZ Auditorium

more info : www.tinyurl.com/sscs75

Tom Lee

From Rocks to Chips: Stories of the Transistor

Abstract

The discovery, then invention, of the transistor sits almost exactly midway between Ferdinand Braun's discovery of solid-state rectification in 1874 and the modern era of gigascale ICs. As with other epoch-shattering inventions, the story of the transistor isn't quite as neatly linear as some recountings might suggest. Very few newly-minted EEs have ever heard of a point-contact transistor, and even those few are unlikely to know that these devices often exhibited a negative current gain (beta). This talk will answer questions such as, "What was an alloy-junction transistor? What were surface-barrier transistors? What was the hometaxial process? What happened to germanium devices? How can you build a single-transistor, non-switching voltage inverter?" Retracing some of the steps of the pioneers generates important insights into the nature of innovation, as well as a much deeper appreciation of the role of chance. As the end of lithographic scaling seemingly positions us on the threshold of a major technological discontinuity, it is perhaps helpful to study the story of the previous one.

Biography

Thomas Lee received his degrees from MIT, where his 1989 thesis described the first CMOS radio. He established the Stanford Microwave Integrated Circuits Laboratory in 1994, after having worked at Analog Devices, Rambus and other companies. He's helped design PLLs for several AMD and DEC microprocessors, and founded Matrix Semiconductor, ZeroG Wireless and Ayla Networks, among others. He is a Ho-Am (Samsung) Prize laureate, an IEEE and Packard Foundation Fellow, has won "Best Paper" awards at CICC and ISSCC; an Honoris Causa doctorate from U. of Waterloo (2013); and the 2021 IEEE Gustav Kirchhoff award. He was awarded a U.S. Secretary of Defense Medal (2012) for his work as Director of DARPA's MTO, and served as a Director at Xilinx up to its acquisition by AMD in 2022. He owns thousands of vacuum tubes, hundreds of oscilloscopes, and countless obsolete semiconductors. No one, including himself, quite knows why.

Chris Mangelsdorf

Don't Try This With CMOS!

Abstract

This is really a love story. Not about antique technology, but about a wild period of jaw-dropping creativity that was the golden era of the bipolar transistor. The almost magical properties of the BJT and the diverse set of problems it was called on to solve are nothing short of astonishing: a DAC that automatically corrects for transistor sizing, an LDO loop invariant to PVT, a multiplier made from one transistor, and an equation for synthesizing...well, almost anything. No, this is not just nostalgia. It is a lesson in creative thinking. It is a blueprint for the next golden era of circuit magic.

Biography

Chris Mangelsdorf (S'77 - M'84) received a B.S. in physics, magna cum laude, from Davidson College, Davidson, NC in 1977. In 1980 and 1984, he received the M.S. and Ph.D. degrees in electrical engineering at M.I.T. where he held the first Analog Devices Fellowship.

Biography (cont.)

He has been associated with Analog Devices since summer employment in 1980 and has been a Fellow of Analog Devices since 1998. From 1996 to 2013, Dr. Mangelsdorf worked in Tokyo, running the Analog Devices Tokyo Design Center and then adding responsibility for the Shanghai and Beijing Design Centers with the title of Asia Technical Director. In 2013, he moved to the Analog Devices San Diego office, where he was engaged in the development of high-speed A/D converters. As of September 2020, Chris has retired from Analog Devices and is now an independent consultant and author of the "Shop Talk" column in Solid-State Circuits Magazine. Dr. Mangelsdorf is a member of Phi Beta Kappa and Sigma Pi Sigma (physics) and has served on both the ISSCC Program Committee and the AdCom for the IEEE Solid-State Circuits Society. He holds 18 patents and has won the ISSCC Best Evening Session Award 10 times.