Samuel Palermo

Assistant Professor of Electrical and Computer Engineering
Texas A&M University
315E WERC Bldg., 3128 TAMU, College Station, TX 77843
Tel. 979-458-4114, Fax. 979-845-7161
spalermo@ece.tamu.edu, www.ece.tamu.edu/~spalermo

RESEARCH OVERVIEW

My research focuses on developing novel, energy-efficient, high-performance mixed-signal integrated circuit architectures in nanometer CMOS technologies. Specifically, my research interests cover the following areas: 1) High-speed electrical and optical chip-to-chip and on-chip interconnect architectures, 2) Clocking and synchronization circuits and systems, 3) Robust analog circuit design with digital-assistance techniques to address increasing process variability in highly-scaled CMOS technologies, 4) Sensor circuits for emerging applications.

EDUCATION

Stanford University	Electrical Engineering	Ph.D. 2007
Texas A&M University	Electrical Engineering	M.S. 1999
Texas A&M University	Electrical Engineering	B.S. 1997

RESEARCH AND PROFESSIONAL EXPERIENCE

Texas A&M University, *College Station, TX* 2009 - present
Assistant Professor, Department of Electrical and Computer Engineering

Intel Corp., *Hillsboro, OR* 2006 - 2008
Senior Design Engineer, Advanced Circuits and Technology Integration Group

Stanford University, *Stanford, CA* 2000 - 2006
Research Assistant, Computer Systems Laboratory

Texas Instruments, Inc., *Dallas, TX* 1999 - 2000, Summer 2002
Design Engineer, High-Speed Serial Interfaces Group

Texas A&M University, *College Station, TX* 1997 - 1999
Research Assistant, Analog & Mixed-Signal Design Group

Motorola, Inc., Austin*, TX* Summer 1997
Design Intern, Microcontroller Design Group

Texas Instruments, Inc., *Dallas, TX* Summer 1995, Spring & Fall 1996
Design & Test Co-op, ASIC Design & Test Groups

TEACHING EXPERIENCE

Texas A&M University, Department of Electrical and Computer Engineering

(Analog) VLSI Circuit Design (ECEN474) Fall 2010

This course covers analog CMOS integrated circuit design. Basic transistor models, layout techniques, and analog design methodologies are covered. The course includes a semester-long CAD design lab with current IC design tools and concludes with a final transistor-level design project.

Special Topics in High-Speed Links Circuits and Systems (ECEN689) Spring 2010 and 2011

This graduate course covers high-speed serial and parallel wireline interfaces (links) circuits and systems issues. Electrical and optical channel properties and modeling, link measurements and communications techniques, and drivers, receivers, equalizers, and synchronization circuits are covered. A comprehensive final design project includes systems analysis with a statistical bit-error-rate simulator and circuit design of key link circuit blocks.

Electronics (ECEN325) Spring and Fall 2009, Fall 2011

In this course, students are introduced to electronic systems. Linear circuits, operational amplifiers, semiconductor-based electronic devices (diodes, bipolar junction and field effect transistors), and analog circuit design concepts are covered. The course includes a semester-long measurement and design lab and concludes with a final multi-stage amplifier design project.

Electronics (ECEN325), Teaching Assistant Spring 1998 and Summer 1999

Electrical Circuit Theory (ECEN214), Teaching Assistant Fall 1997

PUBLICATIONS

*Indicates Graduate Student

Peer-Reviewed Journal Articles

Y. Song* and **S. Palermo,** "A 6Gb/s Hybrid Voltage-Mode Transmitter with Current-Mode Equalization in 90nm CMOS," submitted to *IEEE Transactions on Circuits and Systems-II*.

K. Hu*, R. Bai*, T. Jiang*, C. Ma*, A. Ragab*, **S. Palermo,** and P. Chiang, "Near-Threshold, 8 Gb/s Forwarded-Clock Receiver Using Super-harmonic Injection-Locking in 65nm CMOS," submitted to *IEEE Journal of Solid-State Circuits*.

B. Min*, K. Lee*, and **S. Palermo,** "A 20Gb/s Triple-Mode (PAM-2, PAM-4, and Duobinary) Transmitter," submitted to *Microelectronics Journal*.

A. Palaniappan* and **S. Palermo**, "Power Efficiency Modeling and Optimization of High-Speed Equalized-Electrical I/O Architectures," submitted to *IEEE Transactions on Very Large Scale Integration Systems*.

V. Sekar*, W. Torke*, **S. Palermo**, and K. Entesari, "A Self-Sustained Microwave System for Dielectric Constant Measurement of Lossy Organic Liquids," accepted in *IEEE Transactions on Microwave Theory and Techniques*.

A. Ragab*, Y. Liu*, K. Hu*, P. Chiang, and **S. Palermo**, "Receiver Jitter Tracking Characteristics in High-Speed Source Synchronous Links," *Journal of Electrical and Computer Engineering*, vol. 2011, Article ID 982314, 2011.

S. Hoyos, S. Pentakota*, Z. Yu*, E. Sobhy*, X. Chen*, R. Saad*, **S. Palermo**, and J. Silva-Martinez, "Clock-Jitter Tolerant Wideband Receivers: An Optimized Multi-Channel Filter-Bank Approach," *IEEE Transactions on Circuits and Systems-I*, vol. 58, no. 2, pp. 253-263, Feb. 2011.

I. Young, E. Mohammed, J. Liao, A. Kern, **S. Palermo,** B. Block, M. Reshotko, and P. Chang, "Optical Technology for Energy Efficient I/O in High Performance Computing," *IEEE Communications Magazine*, vol. 48, no. 10, pp. 184-191, Oct. 2010.

A. Palaniappan* and **S. Palermo**, "Power Efficiency Comparisons of Inter-chip Optical Interconnect Architectures," *IEEE Transactions on Circuits and Systems-II*, vol. 57, no. 5, pp. 343-347, May 2010.

I. Young, E. Mohammed, J. Liao, A. Kern, **S. Palermo,** B. Block, M. Reshotko, and P. Chang, "Optical I/O Technology for Tera-Scale Computing," *IEEE Journal of Solid-State Circuits*, vol. 45, no. 1, pp. 235-248, Jan. 2010.

S. Palermo, A. Emami-Neyestanak, and M. Horowitz, "A 90nm CMOS 16Gb/s Transceiver for Optical Interconnects," *IEEE Journal of Solid-State Circuits*, vol. 43, no. 5, pp. 1235-1246, May 2008.

J. Roth, **S. Palermo**, N. Helman, D. Bour, D. Miller, and M. Horowitz, "An Optical Interconnect Transceiver at 1550nm using Low Voltage Electroabsorption Modulators Directly Integrated to CMOS," *IEEE-OSA Journal of Lightwave Technology*, vol. 25, no. 12, pp. 3739-3747, Dec. 2007.

Peer-Reviewed Conference Proceedings

C. Li*, M. Browning*, P. Ghoshal*, P. Gratz, and **S. Palermo**, "LumiNOC: Photonic Interconnect Architecture for Power Efficient On-Chip Communication," submitted to *International Symposium on Computer Architecture*.

A. Shafik*, K. Lee*, E. Zhian Tabasy*, and **S. Palermo**, "Embedded Equalization for ADC-Based Serial I/O Receivers," *IEEE Conference on Electrical Performance of Electronic Packaging and Systems,* Oct. 2011.

C. Li* and **S. Palermo**, "A Low-Power, 26-GHz Transformer-Based Regulated Cascode Amplifier in 0.25µm SiGe BiCMOS," *IEEE Bipolar/BiCMOS Circuits and Technology Meeting,* Oct. 2011.

K. Hu*, T. Jiang*, **S. Palermo**, and P. Chiang, "Low-Power 8Gb/s Near-Threshold Serial Link Receivers Using Super-Harmonic Injection Locking in 65nm CMOS," *IEEE Custom Integrated Circuits Conference*, Sept. 2011.

B. Min* and **S. Palermo**, "A 20Gb/s Triple-Mode (PAM-2, PAM-4, and Duobinary) Transmitter," *IEEE International Midwest Symposium on Circuits and Systems*, Aug. 2011.

V. Sekar*, W. Torke*, **S. Palermo**, and K. Entesari, "A Novel Approach for Dielectric Constant Measurement Using Microwave Oscillators," *IEEE International Microwave Symposium*, June 2011.

A. Palaniappan* and **S. Palermo**, "Power Efficiency Modeling and Optimization of High-Speed Equalized-Electrical I/O Architectures," *IEEE Conference on Electrical Performance of Electronic Packaging and Systems*, Oct. 2010.

V. Gurumoorthy* and **S. Palermo**, "Supply Regulation Techniques for Phase-Locked Loops," *IEEE Dallas Circuits and Systems Workshop*, Oct. 2009.

I. Young, E. Mohammed, J. Liao, A. Kern, **S. Palermo,** B. Block, M. Reshotko, and P. Chang, "Optical I/O Technology for Tera-Scale Computing," *IEEE International Solid-State Circuits Conference*, Feb. 2009. [**Premier Integrated Circuits Conference, 35% Acceptance Rate, Outstanding Technology Directions Paper Award**].

E. Mohammed, J. Liao, A. Kern, D. Lu, H. Braunisch, T. Thomas, S. Hyvonen, **S. Palermo**, and I. Young, "An Optical Hybrid Package with an 8-channel 18GT/s CMOS Transceiver for Chip-to-Chip Optical Interconnect," *SPIE Photonics West*, Jan. 2008.

S. Palermo, A. Emami-Neyestanak, and M. Horowitz, "A 90nm CMOS 16Gb/s Transceiver for Optical Interconnects," *IEEE International Solid-State Circuits Conference*, Feb. 2007. [**Premier Integrated Circuits Conference, 35% Acceptance Rate**].

J. Roth, **S. Palermo**, N. Helman, D. Bour, D. Miller, and M. Horowitz, "1550nm Optical Interconnect Transceiver with Low Voltage Electroabsorption Modulators Flip-Chip Bonded to 90nm CMOS," *IEEE-OSA Optical Fiber Communications Conference*, Feb. 2007.

S. Palermo and M. Horowitz, "High-Speed Transmitters in 90nm CMOS for High-Density Optical Interconnects," *IEEE European Solid-State Circuits Conference*, Sep. 2006.

D. Miller, A. Bhatnagar, **S. Palermo**, A. Emami-Neyestanak, and M. Horowitz, "Opportunities for Optics in Integrated Circuits Applications," *IEEE International Solid-State Circuits Conference*, Feb. 2005. [**Premier Integrated Circuits Conference, 35% Acceptance Rate**].

A. Emami-Neyestanak, **S. Palermo**, H. Lee, and M. Horowitz, "CMOS Transceiver with Baud Rate Clock Recovery for Optical Interconnects," *IEEE Symposium on VLSI Circuits*, June 2004.

H. Lee, C. Yue, **S. Palermo**, K. Mai, and M. Horowitz, "Burst Mode Packet Receiver using a Second Order DLL," *IEEE Symposium on VLSI Circuits*, June 2004.

S. Palermo and J. Pineda de Gyvez, "A Multi-Band Single-Loop PLL Frequency Synthesizer with Dynamically-Controlled Switched Tuning VCO", *IEEE Midwest Symposium on Circuits and Systems*, Aug. 2000.

B. Provost, **S. Palermo**, E. Sánchez-Sinencio, and S.H.K. Embabi, "Built-In Self Test for Pipeline ADCs", *IEEE International Workshop on Design of Mixed-Mode Integrated Circuits and Applications*, July 1998.

Book Chapters

S. Palermo, "CMOS Nanoelectronics Analog and RF VLSI Circuits. Chapter 9: High-Speed Serial I/O Design for Channel-Limited and Power-Constrained Systems," McGraw-Hill, 2011.

Patents

"High speed voltage mode differential digital output driver with edge-emphasis and pre-equalization," R. Payne, C. Chan, **S. Palermo**, U.S. Patent #6,624,670, Issued September 23, 2003.

Theses

W. Torke*, "A PLL-Based Frequency Shift Measurement System for Chemical and Biological Sensing," *M.S. Thesis*, Texas A&M University, Department of Electrical and Computer Engineering, Dec. 2011.

Y. Liu*, "Jitter Tracking Bandwidth Optimization Using Active-Inductor-Based Bandpass Filtering in high-Speed Forwarded Clock Transceivers," *M.S. Thesis*, Texas A&M University, Department of Electrical and Computer Engineering, May 2011.

A. Palaniappan*, "Modeling, Optimization and Power Efficiency Comparison of High-Speed Inter-Chip Electrical and Optical Interconnect Architectures in Nanometer CMOS Technologies," *M.S. Thesis*, Texas A&M University, Department of Electrical and Computer Engineering, Dec. 2010.

S. Palermo, "Design of High-Speed Optical Interconnect Transceivers," *Ph.D. Dissertation*, Stanford University, Department of Electrical Engineering, Sep. 2007.

S. Palermo, "A Multi-Band Phase-Locked Loop Frequency Synthesizer," *M.S. Thesis*, Texas A&M University, Department of Electrical Engineering, Aug. 1999.

HONORS AND AWARDS

International Solid-State Circuits Conference Outstanding Technology Directions Paper Award, 2009

NSF Graduate Research Fellowship, 1999

INVITED TALKS AND SEMINARS

High-Speed Interface Group - Samsung – South Korea - Summer 2011

High-Speed Interface Group - Broadcom Corp. - Irvine, CA - Spring 2011

SRC-GRC Technology Transfer e-Workshop – University of Texas, Dallas – Dallas, TX - Summer 2010

IEEE RFIC Power Management for Integrated RF Circuits Workshop – Anaheim, CA – Spring 2010

IEEE RFIC Future of High-Speed I/O Panel – Anaheim, CA – Spring 2010

VLSI Research Group - Sun Microsystems - Menlo Park, CA - Spring 2009

Photonics Technology Lab - Intel Corp. - Santa Clara, CA - Spring 2009

Wireless Analog/RF Design Group - Texas Instruments, Inc. - Dallas, TX - Spring 2009

CMOS Emerging Technologies Workshop - Banff, Canada - Spring 2009

Analog Circuit Group Workshop - Texas A&M University - College Station, TX - Fall 2008

ECEN Seminar - Texas A&M University - College Station, TX - Spring 2008

IEEE SSCS Santa Clara Valley Seminar - Santa Clara, CA - Spring 2008

IEEE Photonics Society High Speed Interconnects Workshop - Santa Fe, New Mexico - Spring 2007

Circuits & Photonics Research Groups - IBM TJ Watson Research Center - Yorktown Heights, NY - Spring 2006

High-Speed Interface Group - Intel Corp. - Hillsboro, OR - Spring 2006

High-Speed Interface Group - Texas Instruments, Inc. - Dallas, TX - Spring 2006

FUNDING

Grants

Hewlett Packard, "Energy Efficient Electronics for Nanophotonic Interconnects," PI: **S. Palermo**, 10/2011-09/2012, $37,500 (100% of funds)

SRC Global Research Collaboration, "Design Techniques for Scalable, Sub-1mW/Gbps Serial I/O Transceivers," PI: **S. Palermo**, co-PI: P. Chiang (Oregon State University), 08/2010-07/2013, $180,000 (50% of funds)

SRC Global Research Collaboration, "A Fully-Integrated CMOS Platform for Microwave-Based Label-Free DNA Sensing," PI: K. Entesari, co-PI: **S. Palermo**, 08/2010-07/2013, $180,000 (50% of funds)

SRC Global Research Collaboration, "Energy Efficient CMOS 10GS/s 6-bit ADC with Embedded Equalization," PI: **S. Palermo**, 08/2009-07/2012, $180,000 (100% of funds)

PROFESSIONAL SERVICE

Membership

Member, Institute of Electrical and Electronics Engineers (IEEE)
- Circuits and Systems Society
- Solid-State Circuits Society

Editorship

Associate Editor, IEEE Transactions on Circuits and Systems II: Express Briefs (2011-2012)

Reviewing (Journals and Conferences)

IEEE Transactions on Circuits and Systems I: Regular Papers (TCAS-I)

IEEE Transactions on Circuits and Systems II: Express Briefs (TCAS-II)

IEEE Journal of Solid-State Circuits (JSSC)

IEEE Transactions on Very Large Scale Integration Systems (TVLSI)

IEEE Electron Device Letters (EDL)

IET Electronics Letters (Electron Lett)

Microelectronics Journal (MEJ)

SPIE Optical Engineering (OE)

ISQED Asia Symposium on Quality Electronic Design (ASQED)

General Co-Chair

Circuits and Systems for Medical and Environmental Applications Workshop (2012)

Technical Program Committee

IEEE Custom Integrated Circuits Conference (2012)

Interdisciplinary Engineering Design Education Conference (2012)

ISQED Asia Symposium on Quality Electronic Design (2009-2011)

CMOS Emerging Technologies Workshop (2009-2011)

Session Chair

IEEE International Midwest Symposium on Circuits and Systems (2011)

CMOS Emerging Technologies Workshop (2009, 2011)

Publication Chair

Circuits and Systems for Medical and Environmental Applications Workshop (2010)

Other

IEEE Circuits and Systems Society Board of Governors Member (2011)