

SCOTT T. BLOCK

<https://sites.google.com/site/inventerx/>

4904 21st Street ◊ Lubbock, TX 79407

(806) · 787 · 1738 ◊ stblock@ucdavis.edu

RESEARCH INTERESTS

Low-voltage/subthreshold mixed-signal CMOS circuit design, MEMS & CMOS co-design, μ W-to-nW sensor interfaces, energy harvesting, and power electronics.

EDUCATION

PhD. Electrical Eng.	Univ. of California at Davis (UCD)	March 2017
M.S. Electrical Eng.	Texas Tech Univ. (TTU)	Dec. 2010
B.S. Mech. Eng.	Univ. of Illinois at Urbana-Champaign (UIUC)	May 2006

EXPERIENCE

- **Research Assistant** Aug. 2002 - Dec. 2016
 - From motion capture to nW mixed signal front-ends for MEMS sensors, see research and publications sections for more details ...
- **Picosense, Inc. (Startup), MEMS Magnetic sensing of heart beat** June - Oct. 2015
Hardware Intern SkyDeck|Berkeley, CA
 - Developed IC front-end test bed along with Labview based interface for MEMS magnetic switch valve sensor
 - PCB design, evaluation, debugging, and general improvement of hardware hacking skills
- **Chirp Microsystems (Startup), Ultra-Sonic MEMS gesture system** June - Dec. 2014
Hardware Contractor SkyDeck|Berkeley, CA
 - Designed CMOS front-end with variable gain amplifier and built in clip detector per PMUT in InvenSense 180 nm process
 - Wafer level (probe station) and mounted verification of piezoelectric micromachined ultrasound transducers (PMUTs)
 - PCB repurposing, debugging, hardware hacking, and retrofitted existing circuit tests bench for higher frequency PMUTs testing
- **Teaching Assistant (UCD)** July 2012 - June 2015
 - Consulted by department on future direction of lab course development and Current[†] core curriculum development
 - **Substitute Lecture:** EEC10, EEC289O, and EEC116 • **Head TA:** EEC289O[†] Introduction to Power electronics for grad students (*W15*), EEC10[†] Intro to Digital and Analog Systems (*W15-SP15*); EEC119AB[†] Integrated Circuits Senior Design (*W14-SP14*)
 - **Lab TA** for EEC116 VLSI Design (*FA13*), EEC118 Digital Integrated Circuits (*SP13*), ENG100 Circuits for non-majors (*W13*); EEC136[†] Senior Design project lab (*FA12*)
- **Educational Outreach**
 - **UCD:** Guided undergrad and graduate students in research June 2013 - on going
 - **TTU:** Student administrator, research mentor, and youth educational out reach programs (BEST, GEAR) FA 2007 to SP 2009
- **Site Plan Engineer** for Los Cazadores Restaurant Relocation Brownsville, TX|Summer 2009
- **United Conveyor Corporation** June 2006 - July 2007
Engineer Trainee Waukegan, Illinois
 - Designed, hardware trouble shooting, and project cost reduction through analysis of errors for pneumatic ash conveying systems

PUBLICATIONS

1. (*Work in Progress*) **Scott T. Block** and Rajeevan Amirtharajah, "MEM Relay-Based DC-DC Converters," ...
2. (*Work in Progress*) **Scott T. Block** and Rajeevan Amirtharajah, "A MEM Relay-Based Charge-Transfer Voltage Downconverter," ...
3. J. Segovia-Fernandez, S. Sonmezoglu, **S. T. Block**, Y. Kusano, J. M. Tsai, R. Amirtharajah, and D. A. Horsley "Monolithic Piezoelectric Aluminum Nitride MEMS-CMOS Microphone" Transducers 2017, Kaohsiung, Taiwan, 18-22 June, 2017
4. Soner Sonmezoglu, Jeronimo S. Fernandez, **Scott T. Block**, Yuri Kusano, Julius M. Tsai, Rajeevan Amirtharajah, and David A. Horsley "Passive Signal Amplification Via Series-Piezoelectric Read-Out" Transducers 2017, Kaohsiung, Taiwan, 18-22 June, 2017
5. **Scott T. Block**, Xiaonan Jiang, Brad Harris, Can Cui, Jeronimo Segovia Fernandez, Rajeevan Amirtharajah, Dave Horsely, Hooman Rashtian, and Xiaoguang (Leo) Liu "A 170 nW CMOS Wake-Up Receiver with -60 dBm Sensitivity Using AlN High-Q Piezoelectric Resonators" IEEE ISCAS, Baltimore, Maryland, USA, 28-31 May, 2017

6. Ofer Rozen, **Scott T. Block** (*Presenter*), Xuan Mo, Westley Bland, Paul Hurst, Julius M. Tsai, Mike Daneman, Rajeevan Amirtharajah, and David A. Horsley, "Monolithic MEMS-CMOS Ultrasonic Rangefinder Based on Dual-Electrode PMUTs" 29th IEEE Conference on Micro Electro Mechanical Systems Conference, Shanghai China, 24-28 January, 2016
7. Ofer Rozen, **Scott T. Block**, Stefon E. Shelton, David A. Horsley, "Piezoelectric Micromachined Ultrasonic Transducer With Increased Output Pressure via Concentric Venting Rings," 18th International Conference on Solid-State Sensors, Actuators, and Microsystems, Anchorage, Alaska, 21-25 June 2015
8. Ofer Rozen, **Scott T. Block**, Stefon E. Shelton, Richard J. Przybyla, David A. Horsley, "Air-Coupled Aluminum Nitride Piezoelectric Micromachined Ultrasonic Transducers at 0.3 MHz to 0.9 MHz," 28th IEEE Conference on Micro Electro Mechanical Systems Conference, Portugal, 18-22 Jan. 2015
9. Li Lu, **Scott T. Block**, David E. Duarte, Changzhi Li "A 0.45 V MOSFETs-Based Temperature Sensor Front-End in 90 nm CMOS With a Noncalibrated $\pm 3.5^{\circ}\text{C}$ 3σ Relative Inaccuracy From -55°C to 105°C ," Circuits and Systems II: Express Briefs, IEEE Transactions on, vol. 60, no. 11, pp. 771-775 Nov. 2013
10. Yiran Li, Li Lu, **Scott T. Block**, Changzhi Li, "Temperature Characteristics of Schottky Barrier Diodes for Low-Voltage Sensing Applications," IET Electronics Letters, Volume 48, Issue 7, p.406-408, 29 March 2012
11. Yiran, Li, **Scott T. Block**, Li Lu, Changzhi Li, "All-CMOS Low Voltage Temperature Sensor Front-End and Bandgap Circuit Using Bulk-Driven Technology," Semiconductor Research Corporation (SRC) Tech Conference, Austin, Tx, Sep. 2011
12. **Scott T. Block**, Yiran Li, Yi Yang, Changzhi Li, "0.6-2.0 V, ALL-CMOS Temperature Sensor Front-End Using Bulk-Driven Technology," IEEE/CAS 2010, Dallas, TX, October 17-18, 2010

RESEARCH

- **UCD: Graduate Researcher** Feb. 2012 - Dec. 2016
Micropower Circuits and Systems Group Davis, CA
 - Berkeley Sensor & Actuator Center (BSAC) Student Researcher with *UCD MEMS Group*
 - DARPA NZERO Project June 2015 - Dec. 2016
Designed, simulated, and tested $\sim 10\text{ nW}$ CMOS front-ends for MEM Sensors to be used as a trip sensor
3 versions designed in TI 180 nm, InvenSense 180 nm, and IBM 130 nm
 - PMUT Range Finding Project (*continuations of project at Chirp Microsystems*) Dec. 2014 - Jan. 2016
Designed, simulated, and tested monolith MEMS CMOS front-end for ultra-sonic range finder in InvenSense 180 nm process
 - MEM Relay Based DC-DC Regulator Jan. 2013 - on going
 - Simulated, defined analytical equations, and measured buck, boost, and on-demand regulators
 - Currently investigating the use of thyristors for cold switching of MEM relay (180 nm TI process)
 - Designed MEM relay with a floating gate for charge control to offset of pull-in and release voltages (ARL through XCOM)
 - Electrostatic discharge harvesting (*Past*) and low power logic design (on going)
- **TTU: Graduate Researcher** May 2010 - July 2011
*Pal's Group[†] & Li's RF and Analog Research Group** Lubbock, TX
 - [†] *Masters Thesis Topic*: Estimation of Volume from profile images of an object using localized-to-global voting method
 - *Simulate and layout several temperature sensor projects in IBM 90 nm, UMC 0.13 μm , and AMI 0.5 μm
- **UIUC: Under Graduate Researcher** FA02 - SU05
*Human Dynamics and Controls Lab[†] & Xtreme Coders Organization** Urbana-Champaign, IL
 - [†]Designed, built, & proposed data acquisition glove using accelerometers, results compared to VICON motion capture system
 - *Hardware Developer \rightarrow developed a mechanical interpolations of a hand glove

TECHNICAL STRENGTHS

Software	<i>Proficient</i> in Cadence, Matlab, Eagle Cad, LTSpice, Labview; Introduction to Auto-Cad
Programing Languages	Introduction to L ^A T _E X, C, Python; VerilogA
Hardware	Exposed to Verilog, Ocean Scripts, Hspice Probing station, laser doppler vibrometer, general lab equipment such as oscilloscope, function, generators, power supplies, NI myDAQ, MSP430; experience working around wood & metal shops

SEMINARS, AWARDS, & HONORS

- ECE Graduate Dissertation Writing Fellowship Fall 2016
- Stanford SystemX seminar, "DC-DC Regulators using MEMS Relay" 2nd of June 2016
- UCD ECE Excellence in Teaching Award 2015
 - Contributions to undergraduate project course development
- UCDavis ECE First Year Graduate Fellowship Fall 2011

INTERESTS

- Hiking, hammocking/backpacking, climbing, swimming, cooking, wood working, and movies.