

William B. Kuhn

Professor

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Education:

Ph.D. (EE)	Virginia Polytechnic Institute and State University	1996
MSEE	Georgia Institute of Technology	1982
BSEE	Virginia Polytechnic Institute and State University	1979

Academic Employment:

Professor, Kansas State University	2006 - Present
Associate Professor, Kansas State University	2000 - 2006
Assistant Professor, Kansas State University	1996 - 2000
EECE210 (Introduction to Electrical Engineering)	
EECE512 (Linear Systems)	
EECE526 (Electronics II)	
EECE660 (Communication Systems I)	
EECE661 (Communication Systems II)	
EECE662 (Communications Circuits)	
EECE696 (Integrated Circuit Design)	
EECE764 (Microwave Circuits)	
EECE765 (Digital Radio Microelectronics)	
EECE890 (Advanced CMOS IC Design)	
EECE690/890 (Digital Radio Hardware Design)	
Instructor, Virginia Tech	1994 - 1995
Radio Engineering Course (Summer 1995)	
Industrial Electronics Course (Summer 1994)	

Non-Academic Professional Employment:

Research Engineer, Georgia Tech Research Institute, Atlanta GA (Circuit simulator software development, radar countermeasures, systems engineering)	1983 - 1993
NASA, Ames Research Center, Moffet Field, CA (Error correction coding, hardware technology assessment)	Summer 1982
Engineer, Ford Aerospace and Communications Corp., Palo Alto, CA (Analog/digital/RF circuit design, ATE software development)	1979 - 1981

Professional Affiliations and Activities

Life Member IEEE Microwave Theory and Techniques Society	1999 - Present
Senior Member IEEE	1998 - Present
Technical Program Committee Member for IEEE RFIC Symposium	2000 - 2003

Reviewer for IEEE Transactions on Microwave Theory and Techniques	1998 - Present
National Science Foundation Grant Review Panelist	2000
IEEE Admissions/Advancement Panel Member	2000
Reviewer for University of California Micro Program	1999 - 2000
Reviewer for Wiley and IEEE Press	1996 - 1997
Session chair at IEEE International Symposium on Circuits and Systems	1996
Referee for IEEE Transactions on Circuits and Systems	1995
Reviewer for IEEE Midwest Symposium	1995
Licensed amateur radio operator (Advanced class)	1972 - Present

Honors/Awards:

Paslay Professorship	2004 - 2007
Eta Kappa Nu Distinguished Faculty Award	2002 & 2003
Hollis Award for Excellence in Undergraduate Teaching	2001
Semiconductor Research Corp/UMC Copper Contest Finalist	2000
Bradley Research Fellowship, Virginia Tech	1993 - 1995
Eta Kappa Nu, Phi Kappa Phi	1979

Web Sites

W. Kuhn, Home Page,

<http://www.eece.ksu.edu/~wkuhn>

W. Kuhn, N. Lay, E. Grigorian, and D. Nobbe, Mars Microtransceiver Public Pages,

<http://www.eece.ksu.edu/research/mars>

W. Kuhn, B. Natarajan, D. Gruenbacher, A. Rys, Y. Tugnawat, et.al., Communications Research Laboratory,

<http://www.eece.ksu.edu/crl>

W. Kuhn, Y. Tugnawat, et.al., Communications Circuits Laboratory

<http://www.eece.ksu.edu/crl/ccl>

B. Natarajan, D. Gruenbacher, W. Kuhn, NSF Sponsored Integrated Systems Laboratory,

<http://www.eece.ksu.edu/isl>

K. Wong and W. Kuhn, Budget Network Analyzer Software,

http://www.eece.ksu.edu/~wkuhn/netan/Low_Cost_Microwave_Network_Analyzer.html

W. Kuhn, Creating Microwave Labs on a Budget,

http://www.eece.ksu.edu/~wkuhn/test_equip/home.html

Refereed Journal/Conference Publications

J. Jeon and W.B. Kuhn, "A UHF CMOS transceiver front-end with a resonant TR switch," IEEE Radio and Wireless Symposium, 2007.

Kuhn, W.; Lay, N.; Grigorian, E.; "A UHF proximity micro-transceiver for Mars exploration," 2006 IEEE Aerospace Conference, 4-11 March 2006.

Tugnawat, Y. and Kuhn, W., "Low temperature performance of COTS electronic components for Martian surface applications," IEEE Aerospace Conference, 2006, 4-11 March 2006.

Don Gruenbacher, Balasubramaniam Natarajan and William B Kuhn, "WORK IN PROGRESS: AN INTEGRATED LABORATORY EXPERIENCE - A NEW ENVIRONMENT FOR TEACHING COMMUNICATIONS," 36th annual Frontiers in Education Conference, San Diego, California, October 28 - 31, 2006.

William B Kuhn, Balasubramaniam Natarajan and Don Gruenbacher, "WORK IN PROGRESS: A COMPREHENSIVE DESIGN EXPERIENCE BASED ON PRODUCT DEVELOPMENT ACROSS MULTIPLE COURSES," 36th annual Frontiers in Education Conference, San Diego, California, October 28 - 31, 2006.

Y. Tugnawat; and W. Kuhn, "Low Temperature Performance of COTS Electronic Components for Future Mars Missions," 12th NASA Symposium on VLSI Design, Oct 4-5, 2005.

W. Kuhn; N. Lay; and E. Grigorian, "A Low-Volume, Low-Mass, Low-Power UHF Proximity Micro-Transceiver for Mars Exploration," 12th NASA Symposium on VLSI Design, Oct 4-5, 2005.

W. B. Kuhn, M. Mojarradi, and A. Moussessian, "A resonant switch for LNA protection in watt-level CMOS transceivers," IEEE Transactions on Microwave Theory and Techniques, pp. 2819-2825, Sept 2005.

Xin He and William B. Kuhn, "A 2.5 GHz Low-power, High-dynamic range, Self-tuned Q-Enhanced LC filter in SOI," IEEE Journal of Solid State Circuits, pp. 1618-1628, Aug 2005.

W. B. Kuhn, Xin He, M. Mojarradi, "Modeling spiral inductors in SOS processes", IEEE Transactions on Electron Devices, vol. 51, (2004), p. 677-683, May 2004.

Xin He and William B. Kuhn, "A Fully Integrated Q-enhanced LC Filter with 6 dB Noise Figure at 2.5 GHz in SOI", IEEE Radio Frequency Integrated Circuits Symposium, p. 643 - 646, 2004.

W. B. Kuhn, D. Nobbe, D. Kelly, and A.W. Orsborn, "Dynamic Range Performance of On-Chip RF Bandpass Filters," IEEE Transactions on Circuits and Systems II: Analog and Digital Signal Processing, pp. 685-694, October 2003.

Erik J. Brandon, Emily Wesseling, Vincent Chang and William Kuhn, "Printed microinductors on flexible substrates for power applications" IEEE Transactions on Components and Packaging Technologies, pp. 517-523, Sept. 2003.

N. M. Ibrahim, and W. B. Kuhn, "An approach for the calculation of magnetic field within square spiral inductors at low frequency," International Journal of Numerical Modelling: Electronic Networks, Devices, and Fields, 15:339-354, 2002.

W. B. Kuhn, "Fully Integrated Bandpass Filters for Wireless Transceivers - Problems and Promises," Proceedings IEEE Midwest Symposium on Circuits and Systems (MWSCAS 2002).

William B. Kuhn, Aaron W. Orsborn, Matthew C. Peterson, Shobak R. Kythakyapuzha, Aziza I. Hussein, Jun Zhang, Jianming Li, Eric A. Shumaker, and Nandakumar C. Nair, "Spiral Inductor Performance in Deep-Submicron Bulk-CMOS with Copper Interconnects," Proceedings of the 2002 IEEE Radio Frequency Integrated Circuits (RFIC) Symposium, pp. 385-388, 2002.

W. B. Kuhn and N. M. Ibrahim, "Analytical Modeling of Current Crowding Effects in Multi-turn Spiral Inductors," IEEE Transactions on Microwave Theory and Techniques, pp. 31-38, Jan. 2001.

W. B. Kuhn, R. M. Boyd, E. A. Shumaker, M. M. Mojarradi, and H. W. Li, "An RF-Based IEEE 1394 Ground Isolator Designed in a Silicon-on-Insulator Process," Proceedings IEEE Midwest Symposium on Circuits and Systems (MWSCAS 2001), pp. 764-767, 2001.

M. C. Peterson and W. B. Kuhn, "A Low-Sensitivity Switched Capacitance VCO," Proceedings IEEE Midwest Symposium on Circuits and Systems (MWSCAS 2001), pp. 793-796, 2001.

W. B. Kuhn, "Student-Designed Bluetooth Radio in Silicon-on-Sapphire," Proceedings of the 2001 IEEE Radio Frequency Integrated Circuits (RFIC) Symposium, pp. 107-110, 2001.

S. R. Kythakyapuzha and W. B. Kuhn, "Modeling of Inductors and Transformers", Proceedings of the 2001 IEEE Radio Frequency Integrated Circuits (RFIC) Symposium, pp. 283-286, 2001.

R. M. Boyd, W. B. Kuhn, M. M. Mojarradi, and E. A. Shumaker, "Electrically Isolating Subsystems in SOAC Technologies," Forum on Innovative Approaches to Outer Planetary Exploration 2001-2020, Lunar and Planetary Institute, Houston, TX Feb 21-22, 2001, pg 14.

W. B. Kuhn, "Creating Product Development and Research Teams in a Classroom Setting," Frontiers in Education Conference, September 2000.

W. B. Kuhn, D.R. Hummels, and S. A. Dyer, "A Senior-Level RF Design Course Combining Traditional Lectures with an Open-Laboratory Format," Frontiers in Education Conference, September 2000.

W. B. Kuhn and N. M. Ibrahim, "Approximate Analytical Modeling of Current Crowding Effects in Multi-turn Spiral Inductors," Proceedings of the 2000 IEEE Radio Frequency Integrated Circuits (RFIC) Symposium, pp. 271-274, 2000.

A.I. Hussein and W. B. Kuhn, "Bandpass Sigma-Delta Modulator Employing Undersampling of RF Signals for Wireless Communication," IEEE Transactions on Circuits and Systems, Part II, pp. 614-620, July 2000.

A.I. Hussein and W. B. Kuhn, "Bandpass Sigma-Delta Modulator Employing Undersampling of RF Signals for Wireless Communication," IEEE Transactions on Circuits and Systems, Part II, pp. 614-620, July 2000.

Kuhn, W. B., and Yanduru, N., "Spiral Inductor Substrate Loss Modeling in Silicon RFICs," Microwave Journal (Invited), pp. 66 - 81, March 1999.

Kuhn, W. B., and Oskarrson, H., "Modern Product Design in an Undergraduate Course," 1999 Frontiers in Education Conference, Nov. 1999.

Hussein, A. I., and Kuhn, W. B., "Bandpass Sigma-Delta Modulator Employing Undersampling and On-Chip Q-Enhanced LC Filter," Proc of the IEEE Southwest Symposium on Mixed-Signal Design, pp. 47-51, 1999.

Kuhn, W. B., Yanduru, N., and Wyszynski, A., "Q-Enhanced LC Bandpass Filters for Integrated Wireless Applications," IEEE Transactions on Microwave Theory and Techniques, pp. 2577-2586, Dec. 1998.

Kuhn, W. B., and Yanduru, N., "Spiral Inductor Substrate Loss Modeling in Silicon RFICs," IEEE Radio and Wireless Conference, pp. 305-308, 1998.

Kuhn, W. B., Yanduru, N., and Wyszynski, A., "A High Dynamic Range, Digitally Tuned, Q-Enhanced LC Bandpass Filter for Cellular/PCS Receivers," Proc. IEEE RFIC Symposium, pp. 261-264, June 1998.

Kuhn, W. B., Stephenson, F. W., and Elshabini-Riad, A. "A 200 MHz CMOS Q-Enhanced LC Bandpass Filter," IEEE Journal of Solid-State Circuits, vol. 31, no. 8, pp. 1112 - 1122, August 1996.

Kuhn, W. B., "Design of Integrated RF Bandpass Filters and Oscillators for Low-Power Radio Receivers," Proceedings of the Ninth Annual IEEE International ASIC Conference, pp. 87 - 91, September 1996.

Kuhn, W. B., Elshabini-Riad, A., and Stephenson, F. W., "An Experimental, Ultra-High-Q, VHF Receiver Front-End," IEEE Int. Symp. on Circuits and Systems, pp. 353-356, 1996.

Kuhn, W. B., Elshabini-Riad, A., and Stephenson, F. W., "Centre-tapped Spiral Inductors for Monolithic Bandpass Filters," Electronics Letters, vol. 31, no. 8, pp. 625-626, 13 April 1995.

Kuhn, W. B., Stephenson, F. W., and Elashabini-Riad, A., "Dynamic Range of High-Q OTA-C and Enhanced-Q LC RF Bandpass Filters," Proceedings of the 1994 IEEE Midwest Symposium on Circuits and Systems, pp. 767-771, 1994.

Kuhn, W. B., Elshabini-Riad, A., and Stephenson, F. W., "A New Tuning Technique for Implementing Very High Q, Continuous-Time, Bandpass Filters in Radio Receiver Applications," Proceedings of the IEEE International Symposium on Circuits and Systems, pp. 5-257 - 5-260, 1994.

Cox, F. L., Kuhn, W. B., Murray, J. P., and Tynor, S. D., "Code-Level Modeling in XSPICE," Proceedings of IEEE ISCAS, pp. 871 - 874, 1992.

Kuhn, W. B., "A Real-Time Pitch Recognition Algorithm for Music Applications," Computer Music Journal, vol. 14, no. 3, pp. 60-71, Fall 1990.

Research Reports and Dissertation

Kuhn, W. B. NASA/JPL Mars Exploration Program Reports, 2004 - Present.

Kuhn, W. B. Honeywell Kansas City Plant Annual Reports, 2004 - Present.

Kuhn, W. B. JPL Various Project Annual Reports, 1999 - 2004

Kuhn, W.B. NSF CAREER Project Annual Reports and final report, 1999 - 2004.

Kuhn, W. B., Yanduru, N., Oskarsson, O., and Tokgozoglul, S., Final Report for Microtune Inc., Feb 1998.

Kuhn, W. B., *Design of Integrated, Low-Power, Radio Receivers in BiCMOS Technologies*, Ph.D. Dissertation, Bradley Department of Electrical Engineering, Virginia Polytechnic Institute and State University, December 1995. (Available through WWW at <http://www.ksu.edu/~wkuhn>. Downloads > 1700).

Cox, F. L., Kuhn, W. B., Li, H. W., Murray, J. P., Tynor, S. D., and Willis, M. J., "Software User's Manual for the XSPICE Simulator of the Automatic Test Equipment Software Support Environment (ATESSE)," Georgia Tech Research Institute, Atlanta, GA, September 1992.

Cox, F. L., Kuhn, W. B., Li, H. W., Murray, J. P., and Tynor, S. D., "Software Design Document for the XSPICE Simulator of the Automatic Test Equipment Software Support Environment (ATESSE)," Georgia Tech Research Institute, Atlanta, GA, December 1992.

Cox, F. L., Kuhn, W. B., Li, H. W., Murray, J. P., and Tynor, S. D., "Interface Design Document for the XSPICE Simulator of the Automatic Test Equipment Software Support Environment (ATESSE)," Georgia Tech Research Institute, Atlanta, GA, September 1992.

Cox, F. L., Kuhn, W. B., Murray, J. P., and Tynor, S. D., "Software Requirements Specification for the XSPICE Simulator of the Automatic Test Equipment Software Support Environment (ATESSE)," Georgia Tech Research Institute, Atlanta, GA, December 1992.

Cox, F. L., Kuhn, W. B., et. al., "Program Design Specification for the Automatic Test Equipment Software Support Environment (ATESSE)," Georgia Tech Research Institute. Atlanta, GA, October 1988.

Doll, T. J., and Kuhn, W. B., "Combined Range-Angle ECM Requirements for the Cross-TRAK System," Georgia Tech Research Institute, Atlanta, GA, June 1986.

Kuhn, W. B., Cox, F. L., Youngblood, W. R., Brannen, J. M., Goins, C. D., and Wyatt, J. E., "F-16 ATE Software Support Environment Definition, Georgia Tech Research Institute, Atlanta, GA, September 1985.

Kuhn, W. B., and Cleveland, P. H., "Test Requirements Document for Transmitter Control Assembly AN/ALQ-131 (V) Countermeasures Set (U)," Georgia Tech Research Institute, Atlanta, GA, August 1985.

Doll, T. J., Kuhn, W. B., and Folds, D. J., "Combined Range-Angle ECM Against Human-Aided Monopulse Radars (U)," Georgia Tech Research Institute, Atlanta, GA, September 1984.

Kuhn, W. B., "Computer Component Classification: A Taxonomy of Digital's Hardware Products," Georgia Tech Research Institute, Atlanta, GA, September 1984.

Flowers, D. C., and Kuhn, W. B., "Monopulse Radar Signal Analysis for ECCM Applications (U)," Georgia Tech Research Institute (formerly Georgia Tech Engineering Experiment Station), Atlanta, GA, November 1983.

Kuhn, W. B., "Survey of Random and Burst Error Correction Coding Technology," Internal Report, NASA Ames Research Center, 1982.

Book Chapters

Stephenson, F. W., and Kuhn, W. B., "Higher-Order Filters", (book chapter in *CRC Handbook of Electrical Filters*, Taylor and Huang, Ed.), pp. 119 - 139, 1997.

Patents and Patent Applications

Kuhn, W. B., Stephenson, F.W., and Elshabini-Riad, A.A., U.S. Patent #5,892,425, "Interwound Center-Tapped Spiral Inductor," Assigned to Virginia Tech Intellectual Properties, 1999.

Kuhn, W. B., "Area Efficient Multi-Layer Spiral Inductor Devices for Silicon ICs," U.S. Patent Application, filed August 1998 by Kansas State University Research Foundation

Kuhn, W. B., "Wafer Fabrication Processes for Creating High-Q Spiral Inductors in CMOS and BiCMOS Integrated Circuits," U.S. Patent Application, filed August 1998 by Kansas State University Research Foundation.

Kuhn, W. B., U.S. Patent #4,375,694 "All-rate Bit Synchronizer with Automatic Frequency Ranging," Assigned to Ford Aerospace and Communications Corporation, 1983.

Kuhn, W. B., U.S. Patent #4,375,693 "Adaptive Sweep Bit Synchronizer," Assigned to Ford Aerospace and Communications Corporation, 1983.

Software Developed

S. R.Kythakyapuzha, W. B. Kuhn, and S. Johnson, "Spiral Inductor Modeling Program," Available on web at <http://www.eece.ksu.edu/vlsi/spiralmod>

Cox, F. L., Kuhn, W. B., Murray, J. P., and Tynor, S. D., "XSPIICE Mixed-Mode Circuit Simulator," Distributed by Georgia Tech Research Institute, 1993 - Present. Used in several commercial simulators.

Kuhn, W. B., "Music Transcription System" (PC program with real-time DSP for pitch detection. Used for vocal training and melody transcription). Distributed by Questar Products Inc., 1989 - 1992.

Grants/Contracts Awarded

NASA Jet Propulsion Lab, "Wide band Integrated Si-based Single Chip TR Module for UHF Radar," 1/15/07 – 10/14/07, \$60,000.

Garmin, Co-I with B. Natarajan, 1/15/07 – 12/31/07, \$35,575.

Sandia Labs, "RFIC Development in Peregrine SOS Phase I," 10/31/06 - 6/30/07, \$49,725.

Honeywell Kansas-City-Plant, "Fully-Integrated, Multi-Watt Power Amplifier in Triquint GaAs Process", 10/1/05 – 9/30/06, \$50,579.

NSF CCLI A&I proposal # 0511669 – "Shared Laboratory Experience: A Comprehensive Resource for Teaching Engineering Concepts," Co-I with B. Natarajan (PI) and D. Gruenbacher. 10/05 – 9/08: \$160,000.

Peregrine Semiconductor Corporation, "Design of Watt-Level Power Amplifiers in Peregrine SOS – Phase II," 6/05 – 1/06, \$8,088.

Honeywell Kansas-City-Plant, "RFIC Circuit Development in Triquint GaAs and IC Optical Receiver Development, Phase II," Joint with Andrew Rys, W.Kuhn is PI, 10/1/04 – 9/30/05, \$180,026.

NASA, "A Proximity Microtransceiver for Interoperable Mars Communications," 8/04 - 9/07, Joint with JPL and Peregrine Semiconductor, W.Kuhn is PI, \$883,303 (K-State budget is \$368,103).

Honeywell Kansas-City-Plant, "RFIC Circuit Development in Triquint GaAs and IC Optical Receiver Development," Joint with Andrew Rys, W.Kuhn is PI, 1/1/04 – 9/30/04, \$99,864.

Peregrine Semiconductor Corporation, "Design of Watt-Level Power Amplifiers in Peregrine SOS," 4/1/04 - 3/31/05, \$20,177.

NASA Jet Propulsion Laboratory, "Design of RFICs in Peregrine Silicon-on-Sapphire, Phase II" 2/1/04 - 9/12/04, \$28,165.

NASA Jet Propulsion Laboratory, "A Fully-Integrated, Switchless, T/R Module for SAR Applications, Phase II" 4/1/04 to 8/31/04, \$27,222.

NASA Jet Propulsion Laboratory, "A Fully-Integrated, Switchless, T/R Module for SAR Applications" 2/10/03 to 8/31/03, \$29,782.

NASA Jet Propulsion Laboratory, "A Study of a Neural Prosthesis Wireless Power/Data Link" 1/1/03 - 1/1/04, \$9,875.

NASA Jet Propulsion Laboratory, "Design of RF Synthesizer and Power Amplifier Circuits in Peregrine Silicon-on-Sapphire" 7/9/02 - 9/15/03, \$31,773.

NASA Jet Propulsion Laboratory, "Applications of Spiral Inductors and Transformers in JPL's System-On-a-Chip (SOAC) Development Initiatives, Phase III" 1/01 - 1/03, \$64,374.

NASA Jet Propulsion Laboratory, "Applications of Spiral Inductors and Transformers in JPL's System-On-a-Chip (SOAC) Development Initiatives, Phase II" 2/00 - 1/01, \$55,793.

Motorola University Partners in Research (UPR) grant, "Alternative Receiver Architectures for Bluetooth," 2001, \$11,701.

Motorola University Partners in Research (UPR) grant, "Alternative Receiver Architectures for Bluetooth," 2000, \$17,648.

NSF CAREER Award Matching Funds grant, 2001, \$11,701.

NSF CAREER Award Matching Funds grant, 2000, \$15,746.

SRC Copper Contest Award, 2000, \$8000.

NASA Jet Propulsion Laboratory, "Applications of Spiral Inductors and Transformers in JPL's System-On-a-Chip (SOAC) Development Initiatives," 8/99 - 1/00, \$17,911.

NSF CAREER Award, "Combined Research and Education in Developing Fully Integrated Wireless Transceivers," 7/99 - 6/03, \$200,000.

K*STAR First Award, "Combined Research and Education in RFIC Design, 12/97 - 3/99, \$16,169.

Microtune Inc., "Q-Enhanced LC Filters at 1.2 GHz", 1/97 - 12/97, \$30,000.

Rockwell Collins, Equipment grant for communications lab (with D. Soldan), 98, \$1,000.

K*STAR First Award, "RF Microelectronics for Micro/pico-cellular Wireless Systems, 1/97 - 9/97, \$45,386.