J.W. Bruce

Curriculum Vitae

(662) 325-1530 *jwbruce@ieee.org*

EDUCATION

University of Nevada Las Vegas Las Vegas, Nevada
Ph.D., Electrical Engineering 5/00
Course Emphases: Computer Engineering and Digital Signal Processing
Dissertation: Dynamic element matching techniques for data converters

Georgia Institute of Technology Atlanta, Georgia
M.S.E.E., Electrical Engineering 6/93
Course Emphases: Digital Signal Processing and Digital Communications
Research: Enhancement of digital speech signals in noisy environments

University of Alabama in Huntsville Huntsville, Alabama
B.S.E., Electrical Engineering 6/91
Course Emphases: Computer Engineering

RESEARCH AND TEACHING EXPERIENCE

Assistant Professor Mississippi State University
8/00 - present

Presently conducting research in the design and analysis of low harmonic distortion, high resolution data converter architectures, direct digital frequency synthesis, and ubiquitous, networked sensor-driven embedded systems. Teaching undergraduate and graduate electrical and computer engineering courses.

- Developed new introductory VLSI laboratory.
- Created new microprocessors course and project-based laboratory focused on microcontrollers, hardware interfacing, and embedded systems development.
- Earned excellent teaching evaluations. (See www.ece.msstate.edu/~jwbruce/reviews.html)
- Directing undergraduate and graduate research. Undergraduate research project earned third place in Intel Research Laboratory Research Contest. (See www.intel.com/research/awards/winners.htm)
- Graduated four MSEE and MSCPE students.

Courses Taught

- Electrical Engineering Systems
- Principles of VLSI Design
- Mixed-Signal IC Design
- Advanced Microprocessors
- Microprocessors II
- Consumer Electronics Design
- Senior Design
  - Smart controller for residential dishwasher
  - Stand-alone graphical I2C bus analyzer
  - Low-cost MCU development environment
  - PDA-hosted I2C bus analyzer

Research Assistant University of Nevada Las Vegas
8/96 - 8/00

Conducted research in the design and analysis of low harmonic distortion dynamic element matching data converter architectures. Research includes determination of suitable metrics for comparison of dynamic element matching networks, design of efficient circuit implementations, determination of network's effects on data converter output and fabrication of several prototypes. Assisted research in neural networks, optical character recognition, and machine vision.

- Taught several laboratory sections and a service course for non-majors.
- Directed senior design projects.
- Authored laboratory manual for department wide use in Circuits laboratory courses.
- Guest lecturer for Advanced Analog IC Design course.

Courses Taught

- Circuits Laboratory
- Electronics Laboratory
- VLSI Design Laboratory
- Senior Design (D/A converter designs)
- Fundamentals of Electrical Engineering

Adjunct Instructor University of Alabama in Huntsville
1/96 - 8/96

Taught DSP laboratory and Capstone design course in real-time signal processing.

Courses Taught

- Digital Signal Processing Laboratory
- Senior Design (Real-time DSP systems)

Research Assistant Georgia Institute of Technology
8/91 - 12/93

Conducted research in the enhancement of digital speech signals acquired in noisy environments. Enhancement was optimized for subsequent processing by speech recognition systems. Analyzed inverse synthetic aperture radar imaging systems in GTRI's Modeling and Analysis Laboratory. Taught undergraduate circuits, electronics and digital design course for non-majors.

Courses Taught

- Fundamentals of Electrical Engineering

Undergraduate Research Assistant University of Alabama in Huntsville
8/88 - 12/89

Assisted in design of space plasma measurement instrument at the NASA's MSFC Space Science Laboratory. Authored software to determine shuttle interception of Aurora Borealis/Australis.

INDUSTRIAL EXPERIENCE

Senior Computer Engineer Intergraph Corporation
1/95 - 8/96

Authored firmware for MIMD parallel processor OpenGL graphics geometry accelerator capable of 840 MFLOPS. Development included DSP and x86 assembly language programming and Windows device driver development.

Vice-President Diacoustics, Inc.
1/94 - 8/96

Developed multi-platform multimedia software for music synthesis utilizing frequency modulation, additive synthesis, ADSR wavetable, non-homogeneous multisampling, synthesis-by-analysis and physical modeling.

Engineer Mevatec Corporation
2/94 - 1/95

Analyzed low frequency broadband shuttle microgravity environment data. Designed electrical and optic subsystems for fluid diffusion experiment to fly on shuttle missions.

Systems Analyst Science Application International Corporation
12/89 - 6/91

Designed software for simulation of SDI theater defense scenarios. Co-authored documents detailing outcomes and analyses of space theater defense simulations.

PROFESSIONAL AFFILIATIONS

Institute of Electrical and Electronics Engineers
IEEE Circuits and Systems Society
IEEE Consumer Electronics Society
Audio Engineering Society
Tau Beta Pi
Eta Kappa Nu
Upsilon Pi Epsilon

SERVICE AND PROFESSIONAL ACTIVITIES

Associate Editor, *IEEE Potentials*	1997-2001
Reviewer, IEEE Midwest Symposium on Circuits and Systems	2002
Reviewer, Pearson Education Publishing	2001
Reviewer, *Computers and Electrical Engineering*	2001
Reviewer, IEEE International Symposium on Circuits and Systems	2001
Reviewer, Annual ASEE Pacific Southwest Meeting	1999
Reviewer, IEEE International Joint Conference on Neural Networks	1998
Session Chair, Midwest Symposium on Circuits and Systems	2000, 2002
Author, *MSU Principles of VLSI text*	2001, 2002
Author, *MSU Principles of VLSI Laboratory Manual*	2001, 2002
Author, *MSU Microprocessors II Laboratory Manual*	2001, 2002
Author, *UNLV Circuits Laboratory Manual*	1997, 1998, 1999
Instructor, UNLV ΤΒΠ EIT/FE Circuits Review Sessions	1999
Chapter Advisor, ΤΒΠ Mississippi Alpha	2002

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PUBLICATIONS

J.W. Bruce, J.E. Creekmore, and B.J. Blalock, "Adaptive Design Method for Efficient Direct Digital Synthesis," *Proc. IEEE Midwest Symposium on Circuits and Systems*, pp. xxx-xxx, Tulsa, Oklahoma, August 2002. (Invited paper) (in press)

J.A. Bell and **J.W. Bruce**, "CMOS current mode interpolating flash analog to digital converter," *Proc. IEEE Midwest Symposium on Circuits and Systems*, pp. xxx-xxx, Tulsa, Oklahoma, August 2002. (in press)

J.W. Bruce, M.A. Thornton, L. Shivakumaraiah, P.S. Kokate, and X. Li, "Efficient Adder Circuits Based on a Conservative Reversible Logic Gate", *Proc. IEEE International Symposium on VLSI*, pp. 83-88, Pittsburgh, Pennsylvania, April 2002.

J.W. Bruce, "Nyquist-rate digital to analog converter architectures," *IEEE Potentials*, vol. 20, no. 3, pp. 24-28, August 2001.

J.A. Bell, **J.W. Bruce**, B.J. Blalock, and P. Stubberud, "CMOS current mode flash analog to digital converter," *Proc. IEEE Midwest Symposium on Circuits and Systems*, pp. 272-275, Dayton, Ohio, August 2001.

J.A. Bell, **J.W. Bruce**, B.J. Blalock, and P. Stubberud, "CMOS current mode flash analog to digital converter," *Proc. IEEE Midwest Symposium on Circuits and Systems*, pp. 272-275, Dayton, Ohio, August 2001.

J.E. Creekmore, S.R. Porter, **J.W. Bruce**, and B.J. Blalock, "Direct digital frequency synthesis using nonlinear digital-to-analog conversion," *Proc. IEEE Midwest Symposium on Circuits and Systems*, pp. 897-900, Dayton, Ohio, August 2001.

J.W. Bruce, B. Steadman, and P. Stubberud, "Generalized cube-based dynamic element matching algorithms for digital-to-analogue converters," *IEE Electronics Letters*, vol. 37, no. 8, pp. 485-487, April 2001.

P. Stubberud and **J.W. Bruce**, "An analysis of dynamic element matching flash digital to analog converters," *IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing*, vol. 48, no. 2, pp. 205-213, Feb. 2001

J.W. Bruce and P. Stubberud, "A comparison of hardware efficient dynamic element matching networks for digital to analog converters", *Proc. IEEE Midwest Symposium on Circuits and Systems*, Lansing, Michigan, pp. 672-675, August 2000.

P. Stubberud and **J.W. Bruce**, "An analysis of dynamic element matching algorithms for analog to digital converters", *Proc. IEEE Midwest Symposium on Circuits and Systems,* Lansing, Michigan, pp. 684-687, August 2000.

J.W. Bruce and P. Stubberud, "An analysis of analog to digital conversion and harmonic distortion", *Proc. IEEE Midwest Symposium on Circuits and Systems*, Lansing, Michigan, pp. 656-659, August 2000.

J.W. Bruce, "Dynamic element matching techniques for data converters", Ph.D. dissertation, Department of Electrical and Computer Engineering, Howard Hughes College of Engineering, University of Nevada Las Vegas, May 2000.

P. Stubberud and **J.W. Bruce**, "A Fourier analysis that relates a digital to analog converter's integral nonlinearity to its harmonic distortion", submitted to *IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing*. June 1999.

J.W. Bruce, "Nyquist-rate analog-to-digital converter architectures", *IEEE Potentials*, vol. 17, no. 5, pp. 36-39, 1999.

J.W. Bruce and P. Stubberud, "An analysis of harmonic distortion and integral nonlinearity in digital-to-analog converters", *Proc. IEEE Midwest Symposium on Circuits and Systems,* Las Cruces, New Mexico, pp. 470-473, August 1999.

P. Stubberud and **J.W. Bruce**, "An analysis of stochastic dynamic element matching DACs", *Proc. IEEE Midwest Symposium on Circuits and Systems*, Las Cruces, New Mexico, pp. 481-484, August 1999.

P. Stubberud and **J.W. Bruce**, "A frequency analysis of stochastic dynamic element matching flash digital-to-analog converters", *Proc. International Conference on Systems Engineering XIV,* Las Vegas, pp. EE13-18, August 1999.

P. Stubberud and **J.W. Bruce**, "Exposing undergraduates to collaborative engineering design teams", *Proc. ASEE Pacific Southwest Section Meeting*, Las Vegas, pp. 79-86, March 1999.

J.W. Bruce, P. Stubberud and A. Iyer, "Range estimation and object identification with a single camera machine vision system", *Proc. International Conference on Systems Engineering XIII*, Wroclaw, Poland, pp. 253-259, September 1998.

J.W. Bruce and P. Stubberud, "Circuit switching topologies for dynamic element matching data converters", 105th Convention of the Audio Engineering Society, San Francisco, preprint 4773, September 1998.

J.W. Bruce and P. Stubberud, "Generalized cube networks for dynamic element matching in digital-to-analog converters", *Proc. IEEE Midwest Symposium on Circuits and Systems,* Notre Dame, Indiana, pp. 522-525, August 1998.

P. Stubberud, **J.W. Bruce** and B. Steadman, "A DAC architecture with a hardware efficient dynamic element matching network", *Proc. International Conference on Mixed-Signal Integrated Circuit Design and Applications*, Guanajuato, Mexico, pp. 9-12, August 1998

P. Stubberud and **J.W. Bruce**, "An LMS algorithm for training single layer globally recursive neural networks", *Proc. International Joint Conference on Neural Networks*, Anchorage, Alaska, pp. 2214-2217, May 1998.

L. Bruce, R. Adhami and **J.W. Bruce**, "Appropriate scales when using wavelets for feature extraction," Intelligent Engineering Systems Through Artificial Neural Networks, (Dagli et al, eds), *Proc. of Artificial Neural Networks in Engineering*, pp. 507-512, November 1996.

L. Bruce, R. Adhami and **J.W. Bruce**, "Wavelets for shape recognition with applications to mammography," Intelligent Engineering Systems Through Artificial Neural Networks, (Dagli et al, eds), *Proc. of Artificial Neural Networks in Engineering*, pp. 653-658, November 1996.

PROPOSALS AND GRANTS

J.W. Bruce, "CAREER: Research and Education in Data Conversion and Processing using Self-timed Circuits," National Science Foundation, $402689, July 2002. (under review)

J.W. Bruce, "Design of a Logic Synthesis Technique for Quantum Logic Systems," Southeastern Center for Electrical Engineering Education, $27380, May 2002.

J.W. Bruce, L.M. Bruce, and R.B. Reese, "Phased Logic Circuits for Real-time Processing of Hyperspectral Data," U.S. Army Space and Missile Defense Command, $165508, March 2002.

M. Thornton and **J.W. Bruce**, "Design of Reversible and Quantum Logic Circuits," National Science Foundation proposal, $245362, February 2002.

J.W. Bruce and J. Harden, "Electronic Controls Design for Major Appliances," Viking Range Corporation proposal, $50343, January 2002.

M. Thornton and **J.W. Bruce**, "Methodology and Tools for Reversible and Quantum Logic Synthesis," National Science Foundation proposal, $245362, October 2001.

J.W. Bruce and J.E. Creekmore, "Efficient Direct Digital Frequency Synthesis using Nonlinear D/A Conversion," Intel Research Laboratories proposal, $2000, July 2001, ($2000 funded).

J.W. Bruce, "Mixed signal circuit designs suitable for extreme environments," Southeastern Center for Electrical Engineering Education, $22000, May 2001.

J.W. Bruce, "Assessment of Dedicated Computing Remote Sensing Hardware," NASA Stennis Space Center, Commercial Remote Sensing Laboratory proposal, $86545, October 2000, ($44000 funded).

J.W. Bruce, “Data Acquisition Systems for Extreme Environments,” Mississippi Research Initiation Program, $10000, September 2000.

P. Stubberud and **J.W. Bruce**, “A novel dynamic element matching algorithm for data converters,” HRL Laboratories (Hughes/Raytheon) proposal, $15000, August 1999, ($15000 funded).

J.W. Bruce, “Graduate Research Grant,” UNLV Graduate Student Association proposal, $495, March 1999, ($322 funded).

J.W. Bruce, Audio Engineering Society Graduate Fellowship, AES Educational Foundation, Inc., proposal, $4000, May 1998, ($4000 funded).

P. Stubberud and **J.W. Bruce**, “Dynamic element matching techniques for analog-to-digital and digital-to-analog converters,” Conexant Systems (formerly Rockwell Semiconductor) proposal, $20000, March 1998, ($20000 funded).

P. Stubberud and **J.W. Bruce**, “Dynamic element matching techniques for analog-to-digital and digital-to-analog converters,” State of Nevada Applied Research Initiative Program proposal, $17000, March 1998, ($17000 funded).

J.W. Bruce, “IJCNN Travel Fellowship,” IEEE International Joint Conference on Neural Networks proposal, $800, February 1998, ($800 funded).

J.W. Bruce, “Graduate Research Grant,” UNLV Graduate Student Association proposal, $500, January 1998, ($250 funded).

J.W. Bruce, Audio Engineering Society Graduate Fellowship, AES Educational Foundation, Inc., proposal, $3000, May 1997, ($3000 funded).

J.W. Bruce, “Simulation of Arbitrary Acoustical Environments,” NASA Ames Research Center proposal, $22000, March 1997.