Geoffrey Brooks, Ph.D.

EDUCATION

1996: PhD in Electrical Engineering
FAMU-FSU College of Engineering, Tallahassee FL.

1992: MS in Electrical Engineering
UF Graduate Engineering Research Center (GERC), Eglin AFB FL.

1981: BS in Electrical Engineering
UF College of Engineering, Gainesville FL.

RESEARCH EXPERIENCE

• FAMU-FSU COLLEGE OF ENGINEERING – (2001 – present) Developing undergraduate extension to FSU at PC of the FAMU-FSU COE ECE program to include undergraduate research projects useful to the Naval Surface Warfare Center Coastal Systems Station in Panama City, FL. Class projects have lead to undergraduate research contract with Naval Experimental Dive Unit (NEDU) as well as senior design projects sponsored by local engineering firms (EDO and L3). Other projects include obstacle avoidance robots, VHDL-based video games, audio equalization, and a surface vessel remotely controlled sending wireless video/sensory data to land computer.
• US ARMY AVIATION TECHNICAL TEST CENTER – (1999 – 2001, see Employment Experience)) Modeling and Simulation Division; Managed world's first mobile infrared scene projector system. Executed simulated flight tests to refine missile target detection/tracking algorithm
• US AIR FORCE RESEARCH LABORATORY – (1989 – 2001, see Employment Experience) Managed advanced signal processing research program (see below, in Employment Experience) Directed high-school, undergraduate, graduate, and post-doc summer research participants Awarded surf-zone image analysis research grant from the navy (NWSC-CSS, Panama City)

PROFESSIONAL SOCIETIES

• Member Association for Unmanned Vehicle Systems International (AUVSI) 2003-2004
• Participant in numerous conferences sponsored by IEEE, SPIE, IRIS, AIAA and AHS, 1991-2001
• President, Emerald Coast Chapter of the Optical Society of America (OSA), 1998-1999
• Vice-President, Emerald Coast Chapter of the OSA, 1997-1998
• Member of the Emerald Coast Chapter of OSA, 1996-1999
• Chair of the Modeling of Physical and Biological Systems Session of the Wavelet Applications V Conference of the SPIE AeroSense Symposium (Orlando FL), 1997-1998
• Program committee member for the Smart Infrared Focal Plane Arrays and Technology

Conference of the SPIE AeroSense Symposium (Orlando FL), 1994-1995
• Co-chair of the TriService Neural Network Working Group, 1992-1993

TEACHING EXPERIENCE

FAMU-FSU COLLEGE OF ENGINEERING – (2001 – present) Full-time undergraduate and graduate electrical and computer engineering courses at the FSU Panama City Campus (FSU-PCC). Duties include teaching, advising, and recruitment. Current courses taught once per year include:

Computer Engineering: EEL 3705 – Digital Logic, EEL 4746 – Microprocessors, EEL 4712/5707 - FPLD / ASIC Design, EEL 4713/5764 - Computer Architecture, EEL 4911/L Senior Design

Signal Processing and Communications: EEL 3135 - Signals and Systems , EEL 3512 Comm., EEL 4021 - Statistical Topic in Electrical Engineering, EEL 5173 - Signals and Systems

Previous courses: MAP 3305 – Engineering Mathematics 1 (Differential equations), EEL 4748 - Microcontroller Applications (Motorola 68HC12), EEL/L 3300 – Electronics and Electronics Lab, EEL 3705L – Digital Logic Design Lab, EEL 4746L – Microprocessor-based systems design Lab, EEL 4930/5930 – Sp. Topics in EE: Biomimetic Sensory Systems and Sig. Proc.

EMBRY-RIDDLE AERONAUTICAL UNIVERSITY - Intermediate Algebra, 1998
FAMU-FSU COLLEGE OF ENGINEERING - EEL 3003, Intro. to Electrical Engineering, 1995
HOME-SCHOOLING PARENT - math, science, grammar/composition, music, and PE, 1992-2003

ELECTRICAL AND COMPUTER ENGINEERING EXPERIENCE

• *Military (DOD Civilian) Research, Development, Test and Evaluation (RDT&E) Experience*

US ARMY AVIATION TECHNICAL TEST CENTER - Ft. Rucker, Alabama, 1999 - 2001
Modeling and simulation (M&S) engineer responsible for world premier $4.3M mobile infrared scene projection (MIRSP) system. The MIRSP utilizes an 8-processor SGI Onyx computer image generator for rendering real-time infrared battlefield simulations through special purpose digital and analog electronics to a resistive array with long-wavelength IR optics. Present duties include supervising three other M&S engineers, operating the MIRSP, marketing technical capability, developing customer relationships, coordinating tests, managing budgets, and representing the M&S Division to the ATTC Command Group and higher headquarters. Authored Army Small Business Innovative Research (SBIR) topic "Image Generation for Infrared Simulation of Aviation Sensors" and other proposals as well as co-authored technical papers. Received recognition for outstanding work in the form of a performance pay award.

US AIR FORCE RESEARCH LABORATORY - Eglin Air Force Base, Florida, 1989 - 1999
Researched advanced seeker concepts for futuristic precision guided munitions. Technologies included high-performance and embedded computing, advanced signal/image processing

algorithms and architectures, and computer simulations. Particular expertise acquired in the mimicry of biological vision systems to address signal processor throughput, latency, and power issues. Authored and managed programs funded by BAA topic “Biomimetic Signal Processing and Control” and SBIR topic “Biological Paradigms for Autonomous Seekers”. Awarded Navy research grant to perform in-house multi-spectral image analysis for surf-zone applications. Tasks included algorithm modeling and scenario simulation. Research results are published.

US AIR FORCE 46TH TEST WING - Eglin Air Force Base, Florida, 1988 - 1989 Flight test engineer for the F-15E Tactical Electronic Warfare System. Duties included planning and executing test flight missions, data collection and analysis, and documentation of test results in technical report format.

US AIR FORCE AMRAAM PROJECT OFFICE - Eglin Air Force Base, Florida, 1987 - 1988 Software program manager in the Advanced Medium Ranged Air-to-Air Missile (AMRAAM) program office. Duties included oversight of the Hughes General Missile Processor (GMP) Assembler, Linker, and Emulator (GALE) development, review of the detailed design documents, configuration management practices and standards compliance, and other program management responsibilities associated with software products.

US NAVAL COASTAL SYSTEMS STATION - Panama City, Florida, 1984 - 1987 Electronics engineer in the Advanced Digital Technology Branch serving as (1) integration engineer of the Combat Simulation Test System for the Mine Countermeasures Ship, (2) independent verification and validation (IV&V) of guidance and control software (in C and Motorola 68000 assembly language) for an acoustic device countermeasure, and (3) software (ForTran) developer for the countermeasure evaluation simulator.

US NAVAL UNDERWATER SYSTEMS CENTER - New London, Connecticutt, 1983 - 1984 Electronics engineer researching advanced signal transducer formats for spherical sonar arrays. A ForTran programming assignment resulted in a technical report entitled “ADADS Reader Interface”.

• *Non-Military ECE Experience*

FINANCIAL RISK MANAGEMENT, INC - Tuscaloosa, Alabama, 1989 - 1993 Software developer, avaraging about 20 hrs/wk developing computational tools for financial risk analysis. Developed and translated ForTran code into C and C++ modules; maintained software in C and C++.

SCHLUMBERGER OFFSHORE SERVICES - Larose, Louisiana, 1982 Oil field wireline logging engineer; developed customer relationships and provided technical services.

DUPONT DENEMOURS - Starke, Florida, 1981 Co-op student engineer at dredge mining plant.

COMPUTER SPECIFIC EXPERIENCE

Computer Architecture

• Altera CPLD and FPGA: Applications in computer engineering courses and robotics (ongoing)
• MIPS: Architecture application used for computer architecture course (Summer 2004)
• Motorola 68HC12: Microcontroller used for course application and senior design (ongoing)
• Reconfigurable computing: Evaluated proposals in current position for upgrading complex computational approach for IR scene generation/rendering for real-time closed-loop test applications.
• Analog Devices 2106x SHARC Processor: Managed research projects using SHARC processors/simulators. TI-C80 Multimedia Video Processor: PhD Dissertation Appendix B contains C80 source code used in research.
• TI-C30/40 Floating-point Digital Signal Processors: Managed processor programs involving multiple TI-C30 DSP chips packaged in multi-chip module technology. Measured performance on core image processing kernels.
• MIPS R3000/4000 and the Intel 8086 families: Studies of these processor families were an integral part of the graduate program accomplished for the PhD degree.
• Motorola 68000 Processors: Wrote test code in C and assembly to verify accuracy of contractor delivered M68000 assembly code for a Navy acoustic device countermeasure.

Computer Programming and Contemporary Simulation Tools

• LabVIEW: Introduced “virtual instrumentation” technical elective (2007) using NI-LabVIEW.
• Teach VHDL annually as the primary subject of EEL 4712, Intro. To Field-Prog. Logic Devices
• Altera Max+PlusII and QuartusII: Schematic capture and VHDL for Altera CPLD, FPGA, and Stratix
• MIPS: Assemply language for MIPS processor; SPIM simulator (Summer 2004)
• Motorola 68HC12: Assembly language for 68HC12 Microcontroller (ongoing)
• Multi-processor C: Appendix to PhD Dissertation includes C code for the TI-C80 Multimedia Video Processor. Code represents approaches for using parallel processors for real-time processing solutions.
• Matlab: Engineering computational tool used extensively in academic and professional efforts. Script files compose Master's Thesis Appendix A and PhD Dissertation Appendix A.
• ForTran: A significant amount of ForTran programming resulted in a technical report “ADADS Reader Interface” while employed at the Navel Underwater Systems Center (1983). Approximately one year (86-87) at the Naval Coastal Systems Station was devoted to ForTran design and programming for a Countermeasure Evaluation system. Much more experience was gained through employment with Financial Risk Management, Inc. (FRMI)
• Assembly code: Motorola 68000 assembly code validation for Navy, including comparisons between hand-coded assembly and C compiler assembly. Graduate courses included MIPS2000 and Intel 8086 assembly languages.
• C: Experience with the C language began on the Navy project, continued through employment with Financial Risk Managememt, Inc. (FRMI), and later through graduate level academic programs. C++: Object-oriented programming with C++ was as a natural consequence of developing and maintaining large quantities of source code for FRMI. All code was converted to C++ for easier maintenance. Experience with C++ is reflected in the source code for various adaptive filters (Master’s Thesis, Appendix B, and IEEE paper.)
• Ada and Pascal: Structured and object-oriented program development using Ada and Pascal in graduate school.

COMMUNITY SERVICE

• Choir Director, Westwood Presbyterian Church, Dothan AL. (2008 – present)
• Sunday school teacher, Westwood Presbyterian Church, Dothan, AL, (2007 – present)
• Hospice: Patient-family volunteer (2008 – present)
• Holmes County High School Advisory Council (2003 - 2004)
• Puppy raiser for Southeastern Guide Dog Association, Palmetto, FL, (2000-2002)
• Sunday school teacher, Westwood Presbyterian Church, Dothan, AL, 1999-2000
• Host-parent for 11 international exchange students (Europe and South America), 1992-2000
• Eglin Ceremony Band, Eglin Sax Quartet, and Ft. Walton Beach Community Band, 1996-1999
• Bass/Sax player for White Sands Dance Band (Big-Band), Ft. Walton Beach, FL, 1997-2000
• Member and vice-president of Citizen's Voice Association, Bonifay FL, 1992-1993

HONORS AND AWARDS

• Promotion from Assistant-In to Associate-In Professor (2005)
• Merit Pay Performance Aware, Feb 2004 (FSU-PC)
• Merit Pay, Performance Award, 2000 (Army Ft Rucker)
• Numerous accommodations for participation in Eglin Ceremony Band and Sax Quartet, 1996-1999
• First PhD in EE from Florida State University (special FSU commencement recognition and articles in Air Force Leading Edge magazine, Eglin Eagle, and other papers), 1996
• Selected to represent District 1 on Holmes County Planning Commission, 1993
• Awarded Long-Term Full-Time Training Assignments, 1992 and 1994 Invited to join Eta Kappa Nu, the international Electrical Engineering Honor Society, 1992 and 1993
• Merit Pay, Performance Award, 1992 (Eglin AFB)
• Sergeant-at-arms and vice-president of local chapter of Toastmaster's International, 1987 and 1988 Competent Toastmaster Achievement, 1987

PUBLICATIONS

1. C. Conklin, R. Watkins, S. Foo, G. Brooks, R. Perry and R. Roberts, "Dichromatic Color Perception: A fast alternative for machine vision systems", Engineering Applications of Artificial Intelligence: The International Journal of Intelligent Real-Time Automation, Vol. 15:3-4, pp 351-355, June-Aug 2002.
2. Zabel, K., Brooks, G., and Stumpf, R., "Characterizing the mobile infrared scene projector (MIRSP)," Society of Photo-Instrumentation Engineers (SPIE) AeroSense Conference, 2001.
3. Brooks, G., Zabel, K., and Stumpf, R., "MIRSP: Bringing IRSP capability to the fielded unit-under-test (UUT)," American Helicopter Society, 2001.
4. Zabel, K., Brooks, G., and Owens, B., "Maximizing operational effectiveness and utility of the mobile infrared scene projector during systems integration laboratory testing," Proc. of the SPIE, 4027:04, 2000.
5. Lastra, H., Vuong, C., Brown, R. and Brooks, G., "Trade-offs in designing a mobile infrared scene projector," Proc. of the SPIE, 4027:39, 2000.
6. Brooks, Geoffrey, Foster, Joe, and Jones, Tony, "Biomimetic Surf-Zone Image Analysis", Final Report, 1999.

7. Brooks, G., “Coarse coding in natural and artificial vision systems,” Proc. of the SPIE, 3691:28, 1999.
8. Stright, Jim, Coffield, Patrick, and Brooks, Geoffrey, “An Analog VLSI Implementation of a Morphological Associative Memory”, Proc. of the SPIE, 3452:3, 1998.
9. Brooks, G., “Natural waveform translation and scaling in early vision,” Proc. of the SPIE, 3391:44, 1998.
10. Brooks, Geoffrey and Conklin, Chuck, “Using coarse filters to encode intensity and color information,” Proc.of the SPIE, 3387:15, 1998.
11. Brooks, Geoffrey and McCarley, Paul, “Biomimetic Munition Seekers,” Precision Guidance of Small Diameter Weapons Workshop, Redstone Arsenal, Alabama, March 1998.
12. Brooks, Geoffrey, “Wavelet characteristics of early vision”, Neural Networks for Signal ProcessingVII: Proc. of the 1997 IEEE Workshop, September 1997.
13. Brooks, G., “Comparison of vision and conventional wavelet filters,” Proc. of the SPIE, 3078:48, 1997.
14. Brooks, Geoffrey, “Biologically-inspired analog wavelet analyzers,” Proc. of the SPIE, 3016:8, 1997.
15. Brooks, G., Modeling Retinal Processing using Wavelet Theory, PhD Dissertation, Florida State University, 1996.
16. Brooks, Geoffrey, “Image wavelet analysis with the Multimedia Video Processor,” Proc. of the IEEE Southeastcon ’96, Tampa, April 1996.
17. Brooks, Geoffrey, “Processors for wavelet analysis and synthesis: NIFS and TI-C80 MVP,” Proc. of the SPIE 2762:36, 1996.
18. Brooks, G., “Adaptive filtering image preprocessing for smart FPA tech.,” Proc. of the SPIE, 2474:5, 1996.
19. Brooks, Geoffrey, “An object-oriented design for adaptive filter performance comparisons,” Proc. of the IEEE Southeastern Symposium on System Theory, Mississippi State University, March 1995.
20. Brooks, Geoffrey and McCarley, Paul, “Missile seeker applications of retinal processing,” AIAA Missile Sciences Conference, Monterey CA, Nov. 1994.
21. Brooks, G., Rathbun, T., Scribner, D., Anderson, G. and Powell, C., “Neuromorphic processor for missile seekers,” AIAA/BMDO Interceptor Technology Conference, San Diego CA, July 1994.
22. Massie, M., Woolaway, J., Huynh, B., Johnson, G., Cannata, R., Parrish, W., and Brooks, G., “Neuromorphic infrared focal plane performs on-plane local contrast enhancement, spatial and temporal filtering,” IRIS Specialty Group on Passive Sensors. Laurel MD, 1992.
23. Brooks, G., “Adaptive filtering for pixel-level image prediction,” Masters Thesis, Univ. of FL, 1992.
24. Brooks, G., “On focal plane image processing using acoustic charge transport technology,” Proc. Of the SPIE, Vol. 1541, 1991.
25. Brooks, G., “Method of Test for F-15E Countermeasure Dispenser”, internal technical report, 1989.
26. Brooks, G., “ADADS Reader Interface”, NUSC technical report, 1984.