



SCOTT DELOACH

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Citizenship: USA

EDUCATION

- 1996 - Ph.D. Computer Engineering, Air Force Institute of Technology, WPAFB, OH. Thesis focused on the formal specification acquisition through automatic translation of graphically based models to algebraic specifications.
- 1987 - MS in Computer Engineering, Air Force Institute of Technology. Thesis focused on developing a portable and extensible programming support environment based on well-defined interfaces.
- 1982 - BS in Computer Engineering, Iowa State University.

PROFESSIONAL EXPERIENCE

- 2005 – Associate Professor, Department of Computing & Information Sciences, Kansas State University
- 2001 – 2005 Assistant Professor, Department of Computing & Information Sciences, Kansas State University
- 1998 – 2001 Assistant Professor of Computer Science and Engineering, Department of Electrical and Computer Engineering, Graduate School of Engineering, Air Force Institute of Technology, Wright-Patterson AFB, OH.
- 1997 – 2000 Adjunct Assistant Professor, Department of Computer Science and Engineering, College of Engineering and Computer Science, Wright State University, Dayton Ohio.
- 1997 – 1998 Air Force Office of Scientific Research Program Director, Sensor Automatic Target Recognition Technology Division, Sensors Directorate, Air Force Research Lab, Wright-Patterson AFB, OH.
- 1996 – 1997 Director, Fusion Technology Branch, Combat Information Division, Avionics Directorate, Wright Laboratories, Wright-Patterson AFB, OH.
- 1991 – 1993 Chief, Electronic Combat Computer Support Section, 513th Test and Engineering Squadron, USAF Air Warfare Center/Electronic Combat Reprogramming Engineering Division, Headquarters Strategic Air Command, Offutt AFB, NE.
- 1989 – 1991 Chief, Systems Engineering Support Section, 544th Strategic Intelligence Wing, Offutt AFB, NE.
- 1988 – 1992 Adjunct Faculty, Metropolitan Community College, Omaha Nebraska.
- 1988 – 1989 Computer Systems Engineer, 544th Strategic Intelligence Wing, Offutt AFB, NE.
- 1984 – 1986 Computer Resources Engineer, Strategic Systems Program Office, Aeronautical Systems Division, Wright-Patterson AFB, OH.
- 1982 – 1984 Computer Resources Engineer, Deputy for Engineering, Aeronautical Systems Division, Wright-Patterson AFB, OH.

RESEARCH INTERESTS

My current research interests focus on applying software engineering methods, techniques, and models to the design and development of intelligent, complex, adaptive, and autonomous multiagent systems. My research in this area is currently focused on building the tools and techniques necessary to design and build cooperative robotic systems, where the robots work autonomously, but cooperate as part of a team. I am also interested in building and developing hybrid intelligent systems that include humans, software agents, and mobile hardware agents.

SELECTED REFEREEED PUBLICATIONS

JOURNALS AND BOOK CHAPTERS

1. Scott DeLoach, Lin Padgham, Anna Perini, Angelo Susi, and John Thangarajah. Using Three AOSE Toolkits to Develop a Sample Design. *International Journal of Agent-Oriented Software Engineering (IJAOSE)*. (in press 2009).
2. Scott A. DeLoach. Moving Multiagent Systems from Research to Practice, in Special section on Future of software engineering and multi-agent systems, *International Journal of Agent-Oriented Software Engineering (IJAOSE)*. (in press 2009).
3. Walamitien Oyenand and Scott DeLoach. "Towards a Systematic Approach for Designing Autonomic Systems." *Web Intelligence and Agent Systems: An International Journal*. (in press).
4. Eric Matson, Scott A. DeLoach, Raj Bhatnagar. Evaluation of Properties in the Transition of Capability Based Agent Organization. *Web Intelligence and Agent Systems: An International Journal*. Volume 7, no. 1, 2009, pp. 1-21.
5. Scott A. DeLoach. Organizational Model for Adaptive Complex Systems. in Virginia Dignum (ed.) *Multi-Agent Systems: Semantics and Dynamics of Organizational Models*. IGI Global: Hershey, PA. ISBN: 1-60566-256-9 (in press, March 2009).
6. Scott A. DeLoach, Walamitien Oyenand & Eric T. Matson. A Capabilities Based Model for Artificial Organizations. *Journal of Autonomous Agents and Multiagent Systems*. Volume 16, no. 1, February 2008, pp. 13-56. DOI: 10.1007/s10458-007-9019-4.
7. Eugene Santos Jr., Scott A. DeLoach, Michael T. Cox. *Achieving Dynamic, Multi-Commander, Multi-Mission Planning and Execution*. *Journal of Applied Intelligence* Volume 25, no. 3, December 2006, pp. 335–357.
8. Eric Matson, Scott A. DeLoach, and Robyn Pauly. *Building Interest in Math and Science for Rural and Underserved Elementary School Children Using Robot*. *The Journal of STEM Education: Innovations and Research*, 2004 Volume 5, no. 3 & 4, July-December 2004, pp. 35-46.
9. Scott A. DeLoach. *The MaSE Methodology*. In *Methodologies and Software Engineering for Agent Systems. The Agent-Oriented Software Engineering Handbook Series : Multiagent Systems, Artificial Societies, and Simulated Organizations*, Vol. 11. Bergenti, Gleizes, Zambonelli (Eds.) Kluwer Academic Publishing, 2004.
10. Scott A. DeLoach and Madhukar Kumar. Multiagent Systems Engineering: a Case Study. In *Agent-Oriented Methodologies*. Brian Henderson-Sellers and Paolo Giorgini (eds). ISBN 1-59140-586-6. Idea Group Inc., 2005.
11. Scott A. DeLoach, Eric T. Matson, Yonghua Li. *Exploiting Agent Oriented Software Engineering in the Design of a Cooperative Robotics Search and Rescue System*. *The International Journal of Pattern Recognition and Artificial Intelligence*, 17 (5), pp. 817-835, August 2003.
12. Scott A. DeLoach, Mark F. Wood and Clint H. Sparkman, *Multiagent Systems Engineering*, *The International Journal of Software Engineering and Knowledge Engineering*, Volume 11 no. 3, pp. 231-258, June 2001.
13. Scott A. DeLoach & Thomas C. Hartrum. *A Theory-Based Representation for Object-Oriented Domain Models*, *IEEE Transactions on Software Engineering*, Volume 26, no. 6, pp. 500-517, June 2000.

REFEREEED CONFERENCES AND WORKSHOPS

14. Scott A. DeLoach & Matthew Miller. A Goal Model for Adaptive Complex Systems. International Conference on Knowledge-Intensive Multi-Agent Systems (KIMAS 2009). St. Louis, MO, October 11-14, 2009.
15. Scott J. Harmon, Scott A. DeLoach, and Robby. Abstract Requirement Analysis in Multiagent System Design, IEEE/WIC/ACM International Conference on Intelligent Agent Technology (IAT '09). Milan, Italy, September 15-18, 2009. (Acceptance rate 42%)
16. Walamitien Oyenand, Scott DeLoach, & Gurdip Singh. Exploiting Reusable Organizations to Reduce Complexity in Multiagent System Design. Proceedings of the 9th International Workshop on Agent Oriented Software Engineering, Budapest Hungary, May 2009. (Acceptance rate 30%)

17. Walamitien Oyenon, Scott DeLoach, & Gurdip Singh. A Service-Oriented Approach for Integrating Multiagent System Designs. Proceedings of the Proceedings of 8th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2009), Decker, Sichman, Sierra, and Castelfranchi (eds.), May, 10–15, 2009, Budapest, Hungary. (Short paper acceptance rate 44%)
18. Scott Harmon, Scott DeLoach, & Robby. From Abstract Qualities to Concrete Specification using Guidance Policies. Proceedings of the Proceedings of 8th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2009), Decker, Sichman, Sierra, and Castelfranchi (eds.), May, 10–15, 2009, Budapest, Hungary. (Short paper acceptance rate 44%)
19. agentTool III: From Process Definition to Code Generation, Juan C. Garca-Ojeda, Scott A. DeLoach, and Robby, Proc. of 8th Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS 2009), Decker, Sichman, Sierra, and Castelfranchi (eds.), May, 10–15., 2009, Budapest, Hungary, pp. 1393-1394.
20. Juan C. Garcia-Ojeda, Scott A. DeLoach, and Robby. agentTool Process Editor: Supporting the Design of Tailored Agent-based Processes. Proceedings of the 24th Annual 2009 ACM Symposium on Applied Computing March 8 - 12, 2009. (Acceptance rate 30%)
21. Scott J. Harmon, Scott A. DeLoach, Robby, and Doina Caragea. Leveraging Organizational Guidance Policies with Learning to Self-Tune Multiagent Systems. Proceedings of the Second IEEE International Conference on Self-Adaptive and Self-Organizing Systems Isola di San Servolo (Venice), Italy, October 20-24, 2008. (Acceptance rate 27%)
22. Lin Padgham, Michael Winikoff, Scott DeLoach, and Massimo Cossentino. A Unified Graphical Notation for AOSE. Proceedings of the 8th International Workshop on Agent Oriented Software Engineering, Estoril Portugal, May 2008. (Acceptance rate 19%)
23. Scott A. DeLoach. Developing a Multiagent Conference Management System Using the O-MaSE Process Framework. In Michael Luck (eds.), Agent-Oriented Software Engineering VIII: The 8th International Workshop on Agent Oriented Software Engineering (AOSE 2007), LNCS 4951, 171-185, Springer-Verlag: Berlin. (invited)
24. Juan C. Garcia-Ojeda, Scott A. DeLoach, Robby, Walamitien H. Oyenon and Jorge Valenzuela. O-MaSE: A Customizable Approach to Developing Multiagent Development Processes. In Michael Luck (eds.), Agent-Oriented Software Engineering VIII: The 8th International Workshop on Agent Oriented Software Engineering (AOSE 2007), LNCS 4951, 1-15, Springer-Verlag: Berlin. (Acceptance rate 36%)
25. Walamitien Oyenon and Scott A. DeLoach. Design and Evaluation of a Multiagent Autonomic Information System. International Conference on Intelligent Agent Technology (IAT'07). Fremont, California. November 2007. (Acceptance rate 19%)
26. Scott Harmon, Scott A. DeLoach, and Robby. Trace-based Specification of Law and Guidance Policies for Multiagent Systems. The Eighth Annual International Workshop "Engineering Societies in the Agents World" (ESAW 07) Athens, Greece, October, 2007. LNCS 4995, 333-349, Springer-Verlag: Berlin, DOI 10.1007/978-3-540-87654-0.
27. Scott A. DeLoach and Jorge L. Valenzuela. An Agent-Environment Interaction Model. In Padgham, Lin; Zambonelli, Franco (Eds.), Agent-Oriented Software Engineering VII: The 7th International Workshop (AOSE 2006). LNCS Vol. 4405, 2007. (invited paper)
28. Christopher Zhong and Scott A. DeLoach. An Investigation of Reorganization Algorithms. Proceedings of the International Conference on Artificial Intelligence (IC-AI'2006). June 2006, Las Vegas, Nevada, CSREA Press, 2006. (Acceptance rate 36%)
29. Robby, Scott A. DeLoach, Valeriy A. Kolesnikov. Using Design Metrics for Predicting System Flexibility. Fundamental Approaches to Software Engineering (FASE'06), Vienna Austria, March 27-29, 2006. (Acceptance rate 16%).
30. Scott A. DeLoach. Multiagent Systems Engineering of Organization-based Multiagent Systems. In in A. Garcia et al. (Eds.): SELMAS 2005, LNCS 3914, pp. 109 – 125, 2006. Springer, Berlin Heidelberg 2006. (Acceptance rate 45%).
31. Eric Matson & Scott A. DeLoach. *Formal Transition in Agent Organizations*, IEEE International Conference on Knowledge Intensive Multiagent Systems (KIMAS '05), Waltham, MA, April 18-21, 2005.

32. Eric Matson & Scott A. DeLoach. *Autonomous Organization-Based Adaptive Information Systems*, IEEE International Conference on Knowledge Intensive Multiagent Systems (KIMAS '05), Waltham, MA, April 18-21, 2005.
33. David Gustafson, Venkata Prashant Rapaka, Scott DeLoach. *A Comparison of Algorithms for Teams of Robots*. Proceedings of the 2004 International Conference on Systems, Man and Cybernetics. October 10-13 2004, The Hague, The Netherlands.
34. Scott A. DeLoach, Eric Matson. *An Organizational Model for Designing Adaptive Multiagent Systems*. The AAAI-04 Workshop on Agent Organizations: Theory and Practice (AOTP 2004). July 25-29, 2004, San Jose, California. (Acceptance rate 62%).
35. Eric Matson and Scott A. DeLoach. *Integrating Robotic Sensor and Effector Capabilities with Multi-Agent Organizations*. Proceedings of The 2004 International Conference on Artificial Intelligence (IC-AI'04). Las Vegas, Nevada, USA. June 21 - 24, 2004. (Acceptance rate 34%).
36. Eric Matson, Scott DeLoach. *Using Robots to Increase Interest of Technical Disciplines in Rural and Underserved Schools*, 36th 2005 ASEE Annual Conference, June 20-23, 2004. Salt Lake City, Utah. (*National Best Zone paper – out of 600*).
37. Eric Matson & Scott A. DeLoach. *Enabling Intra-Robotic Capabilities Adaptation Using an Organization-Based Multiagent System*. Proceedings of the 2004 IEEE International Conference on Robotics and Automation (ICRA 2004). April 26 – May 1, 2004. New Orleans, LA. (Acceptance rate 58%).
38. Eric Matson, Scott DeLoach. *Capability in Organization Based Multiagent Systems*, Proceedings of the Intelligent and Computer Systems (IS '03) Conference, Information Society. Institute Jozef Stefan, Ljubljana, Slovenia, October 13-17, 2003.
39. Scott DeLoach and Eric Matson. *Autonomously Reorganizing Information Systems*. 2003 International Conference on Advanced Technologies for Homeland Security (ICATHS). September 25-26, 2003. Storrs, CT.
40. Eric Matson & Scott A. DeLoach. *An Organization-Based Adaptive Information System for Battlefield Situational Analysis*. Proceedings of the International Conference on Integration of Knowledge Intensive Multi-Agent Systems: KIMAS'03: Modeling, Exploration, and Engineering. pp. 46-51, 30 Sep – 4 Oct 2003. Boston, MA. (Acceptance rate 22%)
41. Eric Matson, Robyn Pauly, Scott DeLoach. *Robotic Simulators to Develop Logic and Critical Thinking Skills in K-6 School Children*, 38th ASEE Midwest Section Conference, Rolla, Missouri, September 10-12, 2003.
42. Eric Matson, Robyn Pauly, Scott DeLoach. *The Impact of the Robot Roadshow Program to Increase Interest of Technical Disciplines in Rural and Under Served Schools*, 38th ASEE Midwest Section Conference, Rolla, Missouri, September 10-12, 2003.
43. Eric Matson and Scott DeLoach. *Using Dynamic Capability Evaluation to Organize a Team of Cooperative, Autonomous Robots*. Proceedings of The 2003 International Conference on Artificial Intelligence (IC-AI'03) June 23-26, 2003, Las Vegas, Nevada, USA. (Acceptance rate 37%)
44. Athie Self & Scott A. DeLoach. *Designing and Specifying Mobility within the Multiagent Systems Engineering Methodology*. Special Track on Agents, Interactions, Mobility, and Systems (AIMS) in Proceedings of the 18th ACM Symposium on Applied Computing (SAC 2003). March 9 - 12, 2003, Melbourne, Florida, USA. (Acceptance rate 29%)
45. Eric Matson, Scott A. DeLoach. *Organizational Model for Cooperative and Sustaining Robotic Ecologies*. Proceedings of Robosphere 2002, a workshop on Self Sustaining Robotic Ecologies. NASA Ames Research Center November 14-15, 2002.
46. Eric Matson, Scott DeLoach. *Using Robots to Increase Interest of Technical Disciplines in Rural and Underserved Schools*, 36th ASEE Midwest Section Conference, Norman, Oklahoma, September 11-13, 2002. Best Paper Award.
47. Jonathan DiLeo, Timothy Jacobs, and Scott DeLoach. *Integrating Ontologies into Multiagent Systems Engineering*. Fourth International Bi-Conference Workshop on Agent-Oriented Information Systems (AOIS-2002). 15-16 July 2002, Bologna (Italy).

48. Scott A. DeLoach. *Analysis and Design of Multiagent Systems Using Hybrid Coordination Media*. Proceedings of the 6th World Multi-Conference on Systemics, Cybernetics and Informatics (SCI 2002). July 14-18, 2002. Orlando, Florida. (Acceptance rate 63%).
49. Scott A. DeLoach. *Modeling Organizational Rules in Multiagent Systems Engineering*, Proceedings of the 15th Canadian Conference on Artificial Intelligence (AI'2002). Calgary, Alberta, Canada, May 27 – 29, 2002. (Acceptance rate 46%)
50. Scott A. DeLoach, Eric L. Matson, and Yonghua Li. *Applying Agent Oriented Software Engineering to Cooperative Robotics*, Proceedings of the 15th International FLAIRS Conference, Pensacola, Florida. May 16-18, 2002 (Acceptance rate 67%).
51. Scott A. O'Malley & Scott A. DeLoach. *Determining When to Use an Agent-Oriented Software Engineering Paradigm*, Proceedings of the Second International Workshop on Agent-Oriented Software Engineering (AOSE-2001), held in conjunction with the Fifth International Conference on Autonomous Agents 2001, Montreal, Canada - May 29th 2001, pp 9-16. (Acceptance rate 40%)
52. Clint H. Sparkman, Scott A. DeLoach, and Athie L. Self. *Automated Derivation of Complex Agent Architectures from Analysis Specifications*, Proceedings of the Second International Workshop on Agent-Oriented Software Engineering (AOSE-2001), held in conjunction with the Fifth International Conference on Autonomous Agents 2001, Montreal, Canada - May 29th 2001, pp. 77-84. (Acceptance rate 40%)
53. Scott A. DeLoach. *Specifying Agent Behavior as Concurrent Tasks: Defining the Behavior of Social Agents*. Proceedings of the Fifth Annual Conference on Autonomous Agents, Montreal Canada, May 28 - June 1, 2001, ACM Press, pp. 102-103. (Acceptance rate 58%)
54. Scott A. DeLoach. *Analysis and Design using MaSE and agentTool*, Proceedings of the 12th Midwest Artificial Intelligence and Cognitive Science Conference (MAICS 2001). Miami University, Oxford, Ohio, March 31 - April 1, 2001. (Invited paper)
55. Joanna Bryson, Keith Decker, Scott DeLoach, Michael Huhns, & Michael Wooldridge. *Agent Development Tools*, in Intelligent Agents VII. Agent Theories Architectures and Languages, 7th International Workshop (ATAL 2000, Boston, MA, USA, July 7-9, 2000), C. Castelfranchi, Y. Lesperance (Eds.). Lecture Notes in Computer Science. Vol. 1986, Springer Verlag, Berlin, pages 331-338, 2001. (Acceptance rate 32%)
56. Scott A. DeLoach & Mark Wood. *Developing Multiagent Systems with agentTool*, in Intelligent Agents VII. Agent Theories Architectures and Languages, 7th International Workshop (ATAL 2000, Boston, MA, USA, July 7-9, 2000), C. Castelfranchi, Y. Lesperance (Eds.). Lecture Notes in Computer Science. Vol. 1986, Springer Verlag, Berlin, pages 46-60, 2001. (Acceptance rate 32%)
57. Mark Wood & Scott A. DeLoach. *An Overview of the Multiagent Systems Engineering Methodology*, in Agent-Oriented Software Engineering – Proceedings of the First International Workshop on Agent-Oriented Software Engineering, 10th June 2000, Limerick, Ireland. P. Ciancarini, M. Wooldridge, (Eds.) Lecture Notes in Computer Science. Vol. 1957, Springer Verlag, Berlin, pages 207-222, January 2001. (Acceptance rate 50%)
58. Marc J. Raphael & Scott A. DeLoach. *A Knowledge Base for Knowledge-Based Multiagent System Construction*, National Aerospace and Electronics Conference (NAECON) to Dayton, OH, October 10-12, IEEE Press, pages 383-390, 2000. (Acceptance rate 75%)
59. Scott A. O'Malley, Athie L. Self, & Scott A. DeLoach. *Comparing Performance of Static versus Mobile Multiagent Systems*, National Aerospace and Electronics Conference (NAECON) Dayton, OH, October 10-12, IEEE Press, pages 282-289, 2000. (Acceptance rate 75%)
60. Timothy H. Lacey & Scott A. DeLoach, *Verification of Agent Behavioral Models*. Proceedings of the International Conference on Artificial Intelligence (IC-AI'2000). June 26 - 29, 2000 Monte Carlo Resort, Las Vegas, Nevada, CSREA Press, pages 557-564, 2000. (Acceptance rate 24%)
61. J. Todd McDonald, Michael L. Talbert, and Scott A. DeLoach, *Heterogeneous Database Integration Using Agent Oriented Information Systems*. Proceedings of the International Conference on Artificial Intelligence (IC-AI'2000). June 26 - 29, 2000 Monte Carlo Resort, Las Vegas, Nevada, CSREA Press, pages 1359-1366, 2000. (Acceptance rate 24%)

62. Jeffrey Smith, Mieczyslaw Kokar, Kenneth Baclawski and Scott DeLoach, *Category Theoretic Approaches of Representing Precise UML Semantics*. ECOOP'2000 Workshop on Defining Precise Semantics for UML. June 2000.
63. Timothy H. Lacey & Scott A. DeLoach. *Automatic Verification of Multiagent Conversations*, Proceedings of the 11th Annual Midwest Artificial Intelligence and Cognitive Science Conference, Fayetteville, Arkansas, April, 2000, AAAI Press, pages 93-100. (Acceptance rate 71%)
64. Scott A. DeLoach & Mieczyslaw M. Kokar. *Category Theory Approach to Fusion of Wavelet-Based Features*. Proceedings of the 2nd International Conference on Information Fusion (Fusion '99). Sunnyvale CA. July 1999. (Acceptance rate 60%)
65. Thomas C. Hartrum & Scott A. DeLoach. *Design Issues for Mixed-Initiative Agent Systems*. AAAI-99 Workshop on Mixed-Initiative Intelligence. Orlando FL, July 1999, pages 40-44. (Acceptance rate 80%)
66. Scott A. DeLoach. *Multiagent Systems Engineering: a Methodology and Language for Designing Agent Systems*. Proceedings of Agent Oriented Information Systems '99 (AOIS'99), pp. 45-57. Seattle WA, 1 May 1999. (Acceptance rate 47%)
67. Kenneth Baclawski, Scott A. DeLoach, Mieczyslaw M. Kokar, and Jeffrey Smith. *Object-Oriented Transformation*. In Behavioral Specifications of Businesses and Systems, H. Kilov, B. Rumpe, I. Simmonds, eds. Kluwer Academic Publishers, Norwell, Massachusetts, 1999. (Acceptance rate 33%)
68. Kenneth Baclawski, Scott A. DeLoach, Mieczyslaw M. Kokar, and Jeffrey Smith. *Object-Oriented Parsing and Transformation*. The 7th OOPSLA Workshop on Behavioral Semantics of OO Business and System Specifications, OOPSLA 98. (Acceptance rate 100%)
69. Scott DeLoach, Paul Bailor, and Thomas Hartrum. *Representing Object Models as Theories*, Proceedings 10th Knowledge-Based Software Engineering Conference, IEEE Press, pp. 28-35, November 1995. (Acceptance rate 41%)
70. Scott A. DeLoach. An Interface-Based Ada Programming Support Environment, ACM Ada Letters, pp. 70-82, May-June, 1988. (Winner, Graduate Division, 1987 Association for Computing Machinery SIGAda student paper competition)

OTHER PUBLICATIONS

71. Scott J. Harmon, Scott A. DeLoach, and Robby. Guidance and Law Policies in Multiagent Systems. Multiagent & Cooperative Robotics Laboratory Technical Report No. MACR-TR-2007-02. Kansas State University. March 2007.
72. Scott A. DeLoach, Juan C. Garcia-Ojeda, Jorge Valenzuela, and Walamitien H. Oyen. Organization-based Multiagent System Engineering (O-MaSE). Multiagent & Cooperative Robotics Laboratory Technical Report No. MACR-TR-2007-01 (Draft). Kansas State University. February 6, 2007.
73. Scott A. DeLoach & Walamitien H. Oyen. An Organizational Model and Dynamic Goal Model for Autonomous, Adaptive Systems. Multiagent & Cooperative Robotics Laboratory Technical Report No. MACR-TR-2006-01. Kansas State University. March 13, 2006.
74. Eugene Santos, Jr., Scott DeLoach, Michael T. Cox. MADGS: An Architecture for Dynamic, Multi-Commander, Multi-Mission Planning and Execution. IDIS Laboratory Technical Report No. 105. University of Connecticut. September 2003.
75. Michael T. Cox, Thomas Hartrum, Scott DeLoach, and S. Narayanan. *Agent-Based Mixed-Initiative Collaboration: The ABMIC project final report*. Wright State University, WSU-CS-02-01, July 2002.
76. Scott A. DeLoach. *Specifying Agent Behavior as Concurrent Tasks: Defining the Behavior of Social Agents*. Technical Report, Air Force Institute of Technology, AFIT/EN-TR-00-03, July 2000.
77. Scott A. DeLoach and Mark F. Wood. *Multiagent Systems Engineering: the Analysis Phase*, Technical Report, Air Force Institute of Technology, AFIT/EN-TR-00-02, June 2000.
78. Scott A. DeLoach. *Formal Transformation from Graphically-Based Object-Oriented Representations to Theory-Based Specifications*, PhD Thesis, Air Force Institute of Technology, AFIT/DS/ENG/96-05, 1996.

79. Scott A. DeLoach. *An Interface-Based Ada Programming Support Environment*, MS Thesis, Air Force Institute of Technology, AFIT/GCE/MA/87D-1, 1987.
80. Scott A. DeLoach. *Environment Portability and Extensibility Measures*, Technical Report, Air Force Institute of Technology, AFIT-EN-TM-87-7, 10 August 1987.
81. *Essays on Software Environments*, Technical Report, Air Force Institute of Technology, AFIT-ENC-TR-86-5, 1986.

RESEARCH GRANTS & AWARDS

Kansas State University.

- (PI) Adams, J. (co-PI) DeLoach, S. Human-robot teams informed by human performance moderator functions. Air Force Office of Scientific Research (AFOSR/NM). June 2009 – May 2012, \$604,480 .
- (PI) DeLoach, S. (co-PIs), Gustafson, D., Adams, J. Controlling Robots Teams in Urban Environments (Single Platform Multi-Sensor Control System). US Marine Corp/M2 Technologies/K-State Urban Operations Lab. 2007-2010+, 2007: \$67k, 2008: \$149k, 2009: \$160k.
- (PI) DeLoach, S., (co-PIs) Singh, G., Gustafson, D., Hatcliff, J. A Test-bed for Intelligent, Mobile Sensor Experiments. Air Force Office of Scientific Research (AFOSR/NM). 2007–2008, \$219,140.
- (PI) Singh, G. (co-PIs) Natarajan, B. DeLoach, S. Warren, S. Andresen, D. CRI: An Experimentation Platform for Developing Customized, Large-Scale Sensor Systems (NSF). 2006-2009. \$200,000.
- (PI) DeLoach, Scott A., (co-PI) Robby. Organization-based Model-driven Development of High-assurance Multiagent Systems. Air Force Office of Scientific Research (AFOSR/NM). Dec 2005 – Nov 2008, \$481,816.
- (PIs) Singh, G. McGregor, D. Edgar, J. (Senior Personnel) DeLoach, S. et. al. KSU Targeted Excellence Award, Center for Sensors and Sensor Systems, 2006-2010, \$1,500,000.
- (PI) DeLoach, Scott A. Information Management Staff Toolkit – Information System (IMTK-IS), Stanfield Systems, Inc. (from AFRL). 2005-2007, \$78,735.
- (PI) DeLoach, Scott A. Autonomous Reorganization of Cooperative Robotic Teams for Robust Performance, NSF CAREER Grant. 2004-2010, \$450,000.
- (PI) DeLoach, Scott A. Autonomous, Adaptive Information Systems, Air Force Office of Scientific Research (AFOSR/NM). 2002-2005, \$177,723.

Note – The AFIT portion of all grants below include neither faculty salary nor student support since AFIT cannot charge for manpower. Personnel are either military or of government service. Includes only 16.2% overhead unless stated.

- (co-PI) DeLoach, Scott A., (PI) Jacobs, and Mathias, Visualization of Collaborative Software Systems, Air Force Office of Scientific Research (AFOSR/NM). 2001-2003, \$90,000.
- (PI) DeLoach, Scott A., Development Environments for Large-Scale Multi-Agent, Distributed Mission Planning and Execution in Complex Dynamic Environments, Air Force Office of Scientific Research (AFOSR/NM). 1999-2001, \$90,400.
- (co-PI) DeLoach, Scott A., (PI) Cox, (co-PIs) Chen, Narayanan, and Hartrum, Agent-Based Mixed Initiative Collaboration, Ohio Board of Regents and Dayton Area Graduate Studies Institute. 1999-2001, \$399,572 (AFIT: \$95,476, WSU: 304,096 – includes 26% overhead).
- (PI) DeLoach, Scott A., (co-PIs) Hartrum, Graham. Formal Specification and Design of Secure Agents, Air Force Office of Scientific Research (AFOSR/NM). 1999-2000, \$35,000.
- (co-PI) DeLoach, Scott A., Talbert, Hartrum. An Agent-Based Methodology for Integrating Heterogeneous Resources, Air Force Research Laboratory, Sensor Directorate, 1999-2000, \$24,000.
- (co-PI) DeLoach, Scott A., (PI) Santos, Eugene, (co-PI) Cox, Michael T. Multi-Agent Distributed Goal Satisfaction, AFOSR MURI Grant No. F49620-99-1-0244. 1999-2001. \$775k.

COLLABORATORS

- Julie Adams (Vanderbilt University), Eugene Santos (Dartmouth), Michael Cox (BBN), Timothy Jacobs (Stanfield Systems Inc.), Lin Padgham & Michael Winikoff (RMIT University), Paolo Giorgini (University of Trento), Massimo Cossentino (High Performance Computing and Network Institute Italy), Anna Perini (FBK-IRST, Trento, Italy), Eric Matson (Purdue University), Gurdip Singh, Robby, Doina Caragea (Kansas State University)

UNIVERSITY SERVICE

KANSAS STATE UNIVERSITY

- Chair, PhD Committee, 2009 – present
- Director, Multiagent & Cooperative Robotics Lab, 2001–present.
- Member, Department Strategic Planning Committee, 2006-present.
- Member, Faculty Evaluation Procedures Committee, 2003-present.
- Member, Master of Software Engineering Curriculum Committee, 2006-present.
- Chair, Master of Software Engineering Curriculum Committee, 2002-2006.
- Member, College of Engineering Honors and Awards Committee, 2006-2009.
- Member, Cybersecurity Curriculum Committee, 2007-2008.
- Member, Department PhD Prelim Exam Restructuring Committee, 2006.
- Member, Department Head Evaluation Committee, 2005.

AIR FORCE INSTITUTE OF TECHNOLOGY

- Member, School of Engineering & Management Academic Standards Committee, 1999-2001.
- Member, Dept. Electrical & Computer Engineering Public Relations Steering Group, 2000-2001.
- Curriculum Chair, Computer Engineering, 1998-2001.
- Curriculum Chair, Artificial Intelligence, 1998-2001.
- Academic Advisor, Graduate Computer Engineering classes of 2000 and 2001 (21 students).
- Faculty Search & Evaluation Committee, 1999.
- Director, AFIT Agent & Artificial Intelligence Laboratory, 1998-2001.
- Electrical and Computer Engineering Department DAGSI Scholarship Committee, 2000.
- Electrical and Computer Engineering Department Webmaster, 1998-2001.

INVITED TALKS & PRESENTATIONS

- “Human – Robot Teams”, Information and Cyberspace Symposium, Fort Leavenworth, KS. Sept 22-25, 2008
- “Adapting robotic and human teams in real-time based upon human performance metrics” Joint AFOSR-AFRL Cognitive Science/Software Engineering Workshop. Arlington, VA, July 21, 2008.
- “Moving Multi-Agent Systems from Research to Practice”, invited talk at a special session on the Future of Software Engineering and Multi-Agent Systems (FOSE-MAS) at the 7th International Conference on Autonomous Agents and Multiagent Systems, Estoril, Portugal, May 12-16, 2008.
- “Autonomous, Adaptive Information Systems”, Air Force Office of Scientific Research Program Review, Rome, New York. August 16, 2005.
- Invited Talk, "Adaptive Agent Organizations in Persistent Multiagent Societies", to University Of Connecticut, Department Of Computer Science & Engineering Computer Science Colloquium. November 6, 2002.

- Invited Talk, “Engineering Multiagent Systems”, at the Twelfth Annual Midwest Artificial Intelligence and Cognitive Science Conference (MAICS'2001), March 31 - April 1, 2001, Miami University, Oxford, OH.
- Panelist, “Agent Development Tools,” The Seventh International Workshop on Agent Theories, Architectures, and Languages (ATAL-2000), Boston, MA, July 7, 2000
- Panelist, “Developing Intelligent Mixed Initiative Systems,” AAAI-99 Workshop on Mixed-Initiative Intelligence. Orlando FL, July, 1999.
- Invited presentation, “A Model for Research: The Center of Excellence for Multisource Information Fusion” at Special Session on Information Fusion, NAECON, June 1997, Dayton Ohio.
- Invited lecture, “User Friendly Formal Methods, Multisource Information Fusion, and other Myths”, September 1997, Northeastern University, Boston Massachusetts.

PROFESSIONAL SERVICE

JOURNALS

- Editorial Board, International Journal of Agent-Oriented Software Engineering, 2005-present
- Reviewer, ACM Computing Surveys, 2008
- Reviewer, special issue on *Modelling Languages for Agent Systems* at the IEEE Transactions on Software Engineering, 2006, 2008
- Reviewer, Journal of Computer Systems Science and Engineering, 2005
- Reviewer, Journal of Systems and Software, 2004
- Reviewer, IEEE Transactions on Parallel and Distributed Systems, 2004.
- Reviewer, IEEE Transactions on Knowledge and Data Engineering, 2003.
- Reviewer, IEEE Transactions on Systems, Man and Cybernetics, 1999-2002.
- Reviewer for IEEE Transactions on Aerospace and Electronic Systems, 1998.

GRANT REVIEWS

- Panel Member, NSF Robust Intelligence, 2007, 2009.
- Panel Member, NSF Robotics Program, 2004.
- Panel Member, NSF Digital Society and Technologies Program, 2003.
- Proposal Review, Air Force Office Scientific Research (AFOSR/NM), 1997 – 2009.

CONFERENCE/PROGRAM COMMITTEE

- PC, ACM SAC - Special track on AOse Methodologies, Infrastructures and Processes, 2010
- PC, 5th IEEE Workshop on Situation Management (SIMA) 2009
- PC, International Conference on Agents and Artificial Intelligence (ICAART) 2009
- Reviewer, International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2009
- Reviewer, The 2009 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2009
- PC, ACM SAC - Special Track on Agent-Oriented Software Engineering Methodologies and Systems (AOMS) 2009
- PC, Intl Workshop on Integration of Software Engineering and Agent Technology (ISEAT) 2006-2008
- PC, Multi-Agent Systems and Software Architecture Workshop, 2008.
- PC, IEEE Systems, Man & Cybernetics Conference, 2003 – 2004, 2006-2007.
- PC, Agent-Oriented Information Systems (AOIS) Workshop, 2005-2007.
- PC, Intl Workshop on Agent-Oriented Software Engineering (AOSE) 2002 – 2008.
- PC, Intl Conference on Self-Organization and Autonomic Systems in Computing and Comm. (SOAS) 2006-2007.

- PC, Intl Workshop on Agent Organizations: Models and Simulations (AOMS), 2006.
- PC, Intl Workshop on Software Engineering for Large-scale Multi-Agent Systems (SELMAS) 2006.
- PC, Midwest Artificial Intelligence and Cognitive Science Conference (MAICS) 2001-2005.
- PC, Intl Workshop on UML and Agents. 2004.
- PC, Agent-Oriented Methodologies Workshop, 2002-2004.
- PC, Representing Multiagent Systems at Multi Conference on Systemics, Cybernetics, and Informatics (SCI) 2003.
- Advisory Board, IEEE Intl Conference on Integration of Knowledge Intensive Multi-Agent Systems, 2003.
- PC, International FLAIRS Conference (FLAIRS), 2003.
- PC, Agents, Interactions, Mobility, and Systems, in ACM Symposium on Applied Computing, 2002-2003.
- Evaluation Committee, "Software Engineering for Large-Scale Multi-Agent Systems", LNCS, Springer, 2002.
- PC, International Workshop on Agent Languages and Conversation Policies, 2002.
- PC, Workshop on Autonomy, Delegation, and Control, 2001 – 2002.
- PC, International Conference on Artificial Intelligence (IC-A!), 2001.
- PC, Autonomy Control Workshop, 1999.
- Technical Area Chair for Machine Intelligence, NAECON 1997.

COURSES TAUGHT

KANSAS STATE UNIVERSITY

- CIS 644 Object-Oriented Design and Development, Summer 2003
- CIS 706 Translator Design I, Fall 2001-2002, Fall 2004
- CIS 740 Advanced Software Engineering, Fall 2003-2009, Spring 2006-2009, Summer 2008
- CIS 544 Advanced Software Design and Development, Spring 2008-2009
- CIS 744 Advanced Software Analysis and Design, Spring 2008-2009
- CIS 748 Software Management, Spring 2002, Summer 2003-2008, Fall 2007
- CIS 771 Software Specification, Spring 2004
- CIS 844 Agent-Oriented Software Engineering, Fall 2002, Spring 2004-2007, Fall 2008

AIR FORCE INSTITUTE OF TECHNOLOGY

- CSCE 723 Advanced Topics in Artificial Intelligence, Summer 1998, Summer 1999 *, Summer 2000
- CSCE 623 Artificial Intelligence Systems Design, Spring 1998, Spring 1999, Spring 2000, Spring 2001
- CSCE 531 Discrete Mathematics, Winter 1999, Fall 1998, Winter 2001
- CSCE 523 Introduction to Artificial Intelligence, Winter 1999 *, Winter 2000, Winter 2001
- CSCE 699 Special Studies – 14 times, including Concurrent Systems, Planning, Specification Verification, Multiagent Systems Design, Agent Communication Frameworks, Software Synthesis, Agent Mobility, Rule-based Reasoning, Multiagent Systems

* Received highest student evaluation for any course in the Department of Electrical and Computer Engineering for the quarter.

WRIGHT STATE UNIVERSITY

- CEG 460/660 Software Engineering, Summer 1998, Summer 2000
- CEG 320/520 Computer Organization and Assembly Language Programming, Spring 1997, Spring 1998
- CEG 260 Digital Circuit Design, Fall 1997
- CEG 220 Introduction to C for Engineers, Fall 1999, Fall 1998, Fall 1999, Spring 2000, Fall 2000

Metropolitan Community College

- CPT 240 Advanced C Programming, Winter 1992
- CPT 123 C Programming, Spring 1992, Fall 1991, Summer 1991, Spring 1991, Winter 1991
- CPT 106 Advanced Basic, Fall 1989, Fall 1988, Spring 1990
- CPT 105 Principles of Data Processing, Winter 1990, Fall 1990, Summer 1990

CURRICULUM DEVELOPMENT

- Designed CIS 544 and CIS 744 to be an integrating software engineering course for both undergraduate and graduate students. The goal is to take the students through a complete software development cycle (analysis – testing) in a team setting for a moderate sized software development.
- Redesigned CIS 740 to be a self-paced course with an entry exam to ensure students have required background for entering MSE program at Kansas State University.
- Created Agent-Oriented Software Engineering course as capstone to both software engineering and artificial intelligence sequences at Kansas State University.
- During 1998-1999, extensively revised the AFIT Artificial Intelligence Sequence, consisting of CSCE 523, 623, and 723, from a traditional knowledge-based systems approach to an agent-based approach that encompassed many traditional artificial intelligence paradigms as well as the distributed artificial intelligence.

THESIS & DISSERTATION ADVISING

PHD (ADVISOR)

- Scott Harmon (current)
- Jorge Valenzuela (current)
- Herve Oyenon (current)
- Christopher Zhong (current)
- Matthew Miller (current)
- Juan Carlos Ojeda Garcia (current)

PHD (COMMITTEE MEMBER)

- Hassan Zamat, EECE, Current.
- Eric Matson, University of Cincinnati, Transition in Multiagent Organizations, 2008.

MS THESIS ADVISOR

- Matthew Miller. *A Goal Model for Adaptive, Dynamic Systems*, 2007.
- Christopher Zhong. *An Investigation of Reorganization Algorithms*. 2006.
- Sham Kashyap. *Reorganization in Multiagent Organizations*, 2006.
- Sparkman, Clint H., Lieutenant, USAF. *Transforming Analysis Models into Design Models for the Multiagent Systems Engineering Methodology*, 2001.
- O'Malley, Scott A, Lieutenant, USAF. *Selecting a Software Engineering Methodology Using Multiobjective Decision Analysis*, 2001.
- Self, Athie L., Captain, USAF. *Design & Specification of Dynamic, Mobile, and Reconfigurable Multiagent Systems*, 2001.
- Lacey, Timothy H., Captain, USAF. *A Formal Methodology and Technique for Verifying Communication Protocols in a Multi-agent Environment*, 2000.

- Raphael, Marc J., Captain, USAF. *Knowledge Base Support for Design and Synthesis of Multi-agent Systems*, 2000.
- Robinson, David J., Captain, USAF. *A Component Based Approach to Agent Specification*, 2000.
- Wood, Mark F., Captain, USAF. *Multiagent Systems Engineering: A Methodology for Analysis and Design fo Multiagent Systems*, 2000.
- Marks, Christopher G., Captain, USAF. *Extensible Multi-Agent System for Heterogeneous Database Association Rule Mining and Unification*, 1999.
- Stratton, Phillip G., Captain, USAF. *A Metrics-based Analysis of Interface Usability Improvements by Applying Intelligent Agents*, 1999.

MSE ADVISOR

- Patrick Gallagher (2007). agentTool III Verification Engine (2006).
- Binti Sepaha (2005). agentTool III (Dynamic), (2005).
- Deepti Gupta (2005). agentTool III (Static), (2005).
- Acharaporn (Ann) Pattaravanichanon. Cooperative Robotic Simulator: Communications Module, (2004).
- Esteban Guillen. Environment Model Building Tool (EMBT), (2004).
- Chairaj Mekpraservit. Applying Broadcasting/Multicasting/Secured Communication to agentMom in Multi-Agent Systems (2004).
- Kumar, Madhukar. Multi-Agent Research Tool (MART), (2003).

MS PROJECT ADVISOR

- Jaidev Manghat (MS 2008). Simulation of Power Distribution Management System Using OMACS Metamodel.
- Balakumar Krishnamurthi (MS 2005)
- Thomas Kavukat (MS 2005)
- Vikram Raman (MS 2005)
- Arun Gansean. Cooperative Robotic Simulator: 3D Environment Viewer, (MS 2004)
- Venkata Prashant Rapaka. Cooperative Robotic Simulator: Scout Robot Emulator, (MS 2004)
- Scott Harmon. Cooperative Robotic Simulator: Environment Simulator (MS 2004)

UNDERGRADUATE HONORS ADVISOR

- Aaron Chavez. Cooperative Robotic Simulator: Environment Control Panel, (BS 2005)

PHD COMMITTEES

- Eric Matson, University of Cincinnati (current)
- Thomas M. Schorsch, AFIT. *Formally Representing and Applying Software Design Information*, 1999.
- Smith, Jeffrey E., Northeastern University. *UML Formalization and Transformation*, 1999.

CAREER HIGHLIGHTS

2005 – 2006 ASSOCIATE PROFESSOR, DEPARTMENT OF COMPUTING & INFORMATION SCIENCES

2001 – 2005 ASSISTANT PROFESSOR, DEPARTMENT OF COMPUTING & INFORMATION SCIENCES

Performs teaching and research in the areas of Software Engineering, Cooperative Robotics, and Multiagent Systems. Director of the Multiagent and Cooperative Robotics Laboratory. Responsible for advising MS and PhD students.

1998 – 2001 ASSISTANT PROFESSOR OF COMPUTER SCIENCE AND ENGINEERING

Performed teaching and research at Air Force Institute of Technology in Electrical and Computer Engineering Department. Responsible for all Artificial Intelligence (AI) courses and the AFIT AI laboratory. Thesis advisor for nine students who graduated with a Master of Science degree. Class advisor for 15 students in the 2000 graduate Computer Science and Engineering classes and 6 students in 2001 graduate Computer Engineering class.

1997 - 1998 AFOSR PROGRAM DIRECTOR

Created program to perform state of the art distributed tracking research while simultaneously building in-house expertise and national leadership. Program resulted in standard data sets, tools, and evaluation criteria for a new research area. Put the Sensors Directorate of the Air Force Research Laboratory in a national leadership position in distributed tracking.

1996 - 1997 TECHNICAL DIRECTOR, FUSION TECHNOLOGY BRANCH

Made new connection with AFOSR and convinced them to fund the Center of Excellence for Multisource Information Fusion (CMIF) and numerous Wright Laboratory in-house research efforts. Defined initial CMIF research thrusts to meet the needs of existing in-house research projects. Working with CMIF allowed Wright Laboratory personnel to collaborate with nationally known fusion researchers and make a name for themselves in the national community. Created a combined sensor-to-shooter sensor management program which combined division 6.2 funds and allowed research to continue on air-to-ground sensor-to-shooter scenarios.

1991-1993 -- CHIEF, ELECTRONIC COMBAT COMPUTER SUPPORT SECTION

In the first month on the job, cut through contracting red tape and got a \$500,000 computer system upgrade ordered and installed. The upgrade was mired in a Government Accounting Office protest that had stalled the upgrade for almost two years. Contract was let only days before the money would have been lost. Designed and acquired a new million dollar state-of-the-art computer system that doubled the computing power and on-line storage of an existing network thus providing the required computer support past the year 2000. Integrated existing PCs and new X-window terminals into local area network thereby increasing the flexibility and usefulness of existing hardware and software. Based on previous computer system security experience, developed and documented a comprehensive computer security program and obtained full accreditation of all computer systems in record time. Designed and implemented new office automation software to replace a system that caused serious system problems and bottlenecks. New software reduced system overhead and disk usage by 90 percent and added new features impossible using the old software. Used new equipment procurement method to save over \$100,000 on new equipment and used remaining funds to conduct critical study of real-life electronic warfare reprogramming practices. Standardized five networked VAX computer systems thereby reducing system management overhead by 80 percent.

1989-1991 CHIEF, SYSTEMS ENGINEERING SUPPORT SECTION

Managed the consolidation of all branch support functions into one cohesive unit allowing the remainder of the branch to concentrate on "doing the mission". Designed, justified, acquired funding, and implemented a network-based, state-of-the-art desktop publishing system. Featured color input and output for nationally distributed intelligence reports. Directed \$2 million hardware and software upgrade that more than doubled the on-line processing power and storage capacity of electronic intelligence laboratory. Enabled the analysis of new electronic warfare sensor data. Reorganized system engineering duties along functional lines thereby reducing project overlaps and discontinuities. Significantly improved engineer morale and job satisfaction.

1988-1989 COMPUTER SYSTEMS ENGINEER

Developed in-depth training courses for engineers and analysts on computer usage and security practices. Designed a comprehensive menu-based computer system that placed all major analysis functions at the analyst's fingertips thus reducing the required training time. Led highly classified computer system security accreditation team. Developed extensive system documentation, a comprehensive computer security program, and a thorough computer security test

and evaluation package. System passed with flying colors and documentation was used as a model for other systems to follow. Implemented an automated software configuration management system to manage both on-site and off-site software maintenance. Ensured mission critical software was controlled thereby reducing the probability that software errors could adversely affect intelligence ground processing. Developed state-of-the-art software for analysis of unique electronic intelligence data and manipulation of intelligence databases.

1984-1986 COMPUTER RESOURCES ENGINEER, STRATEGIC SYSTEMS SPO

Developed all computer resources requirements for SRAM II missile Statement of Work. Developed unique Ada software risk reduction plan that allowed the Air Force to switch from Ada to Jovial mid-stream in SRAM-II full-scale development. Critical to successful completion of SRAM II since Ada was considered high risk prior to full scale development (1986). Automated SRAM-II risk analysis procedures. Saved countless man-hours and allowed program managers to quickly evaluate many different approaches to reduce overall program risk. Picked by Aeronautical Systems Division's senior computer resources engineer to author the Software Integrity Master Plan that laid ground rules as to how future computer and software acquisition should take place. Convinced nuclear community that existing B-52 Offensive Avionics Program verification programs were adequate to certify the system without special study. Saved approximately \$45 million.

1982-1984 COMPUTER RESOURCES ENGINEER, DEPUTY FOR ENGINEERING

Took over development of an in-house computer aided design tool that had been in development for over two years. Rewrote tool in four months using state-of-the-art software practices; significantly reduce hardware engineer's circuit board design time. Developed software to test hardware MIL-STD-1553B avionics bus architecture compliance. Developed graphical computer aided design tool to aid hardware engineers in logical circuit design. Tool increased the level of detail and saved many man-hours in hardware documentation.