

FEBRUARY 21, 2011

## JOHN E. LAIRD

COMPUTER SCIENCE AND ENGINEERING DIVISION  
EECS DEPARTMENT  
COLLEGE OF ENGINEERING  
UNIVERSITY OF MICHIGAN  
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### RESEARCH INTERESTS

- Cognitive Architecture and Human-level Artificial Intelligence

### EDUCATION

- Ph.D. (Computer Science), Carnegie Mellon University, 1983
- M.S. (Computer Science), Carnegie Mellon University, 1978
- B.S. (Communication and Computer Sciences), University of Michigan, 1975, with high distinction.

### PROFESSIONAL EMPLOYMENT

- Interim Chair, Computer Science and Engineering, University of Michigan, Spring 2011
- Chairman of the Board, Soar Technology, Inc., 2009 – present
- Associate Chair, EECS Department, University of Michigan, 2000 – 2004
- Professor, EECS Department, University of Michigan, 1998 – present
- Associate Professor, EECS Department, University of Michigan, 1992 – 1998
- Assistant Professor, EECS Department, University of Michigan, 1986 – 1992
- Member of Research Staff, Xerox Corporation, Palo Alto Research Center, 1984 – 1986

### AWARDS AND HONORS

- John L. Tishman Professor of Engineering, University of Michigan, 2008 – present
- Fellow of Cognitive Science Society, 2008
- Fellow of the ACM, 2007
- Service Excellence Award, University of Michigan, College of Engineering, 2006
- Research Excellence Award, University of Michigan, College of Engineering, 1999
- Honorable Mention for Tau Beta PI Teacher of the Year Award, 1999
- Department Service Award, Electrical Engineering and Computer Science, 1998
- Fellow of the American Association of Artificial Intelligence, 1995
- Department Research Award, Electrical Engineering and Computer Science, 1993
- Phi Beta Kappa, University of Michigan, 1976
- Angell Scholar, University of Michigan, 1973, 1974
- Branstrom Scholar, University of Michigan, 1973
- Regent Scholar, University of Michigan, 1972

### PROFESSIONAL SOCIETY MEMBERSHIPS

- Association for Advancement of Artificial Intelligence (AAAI)
- Association for Computing Machinery (ACM)
- American Association for the Advancement of Science (AAAS)

## **NATIONAL AND INTERNATIONAL SERVICE**

### *Conference and Workshop Organization*

- Organizing Committee, Fourth International Conference on Artificial General Intelligence, 2011.
- Organizing Committee, Behavior Representations in Modeling and Simulation, 2011
- Organizer, Workshop on Evaluation of Human-Level Intelligence, Sponsored by ONR, Oct. 2008, Ann Arbor, MI
- Member of oversight committee for the Foundations of Digital Games conference, 2009-2010.
- General Chair, International Conference on Cognitive Modeling, July 2007, Ann Arbor, MI
- General Chair, Second Conference on Artificial Intelligence and Interactive Digital Entertainment, June 2006, Los Angeles, CA
- Program Chair, First Conference on Artificial Intelligence and Interactive Digital Entertainment, June 2005, Los Angeles, CA
- Co-Chair, InCog Symposium, March 2003, Stanford, CA
- Co-Chair AAAI Spring Symposium for AI and Interactive Entertainment, 2001
- Area Chair, National Conference on Artificial Intelligence 1994
- Video Chair, National Conference on Artificial Intelligence 1994
- Chair, AAAI Spring Symposium on Integrated Intelligent Architectures, 1991
- Area Chair, IJCAI 1991
- Member, Local Arrangements Committee for IJCAI-89
- General Chair, Fifth International Conference on Machine Learning, 1988
- Organizer/Chair of the Soar workshops, 1987, 1989, 1992, 1994, 1997, 1999, 2001-2010, Ann Arbor, MI.

### *Program Committees*

- Foundations of Digital Games, 2009
- Virtual Humans Workshop, 2006
- Game Technology Conference, 2003
- Computer Game Conference and workshop, July 2002, Alberta
- 11<sup>th</sup> Conference on Computer Generated Forces and Behavior Representation, 2002
- AAAI Spring Symposium for AI and Interactive Entertainment, 1999, 2000, 2001, 2002
- International Machine Learning Conference, 1990, 1991, 1993
- National Conference on Artificial Intelligence, 1987, 1988, 1993, 1997, 2010

### *Invited DOD DARPA workshops and studies to set research priorities*

- Member, ONR Scientific Advisory Committee on Machine Reasoning, 2010
- ONR Workshop on Machine Reasoning, November 2009
- DARPA Workshop on Complete Intelligence, February 2009
- ONR Workshop on Synthetic Environments for Assessment, January 2009
- DARPA Workshop on Deep Learning, September 2008
- DARPA Workshop on Learning Generalized Task Models, August 2004
- DARPA Workshop on AI Big Problems, March 2004
- DARPA Workshop on Information and Decision Analysis System Engineering Workshop, Stanford, March 3-4, 2004
- DARPA Workshop on Cognitive Systems Metrics and Benchmarks, May 6, 2004
- DARPA Workshop on Cognitive Systems and Visibly Controllable Computing,

Washington, D.C., Jan. 2003

- DARPA Workshop on Cognitive Systems, November 4, 2002
- DARPA ISAT Study on Massively Multi-Player Games, 2002
- Defense Modeling and Simulation Office Expert Panel on Human Behavior Representation 2002
- DARPA ISAT Summer Study on Agents, 1996
- DARPA ISAT Summer Study on Autonomous Agents, 1991

*Editorial activities:*

- Advisory Board, Journal of Game Development, 2003-2007
- Editor, Special Issue of IEEE Intelligent Systems on Interactive Entertainment, 2002
- Editorial Board of Journal of Artificial Intelligence Research (JAIR), 1996-1999

*Other*

- Doctorial Consortium, International Conference on Cognitive Modeling, 2010.
- Officer: Society for the Advancement of the Science of Digital Games, 2008-2010.
- Blue-ribbon Review Panel for Computer Science Program at Virginia Commonwealth University, January 2002.
- Final Panel on CISE Research Infrastructure Program, April 1997.

## **INTERNAL SERVICE**

*University of Michigan:*

- Director of the Center for Cognitive Architecture (2006-)
- Member, Provost Search Committee (2005)
- Chair, School of Information Internal Review Committee (2004)
- Faculty advisor to Women's Club Volleyball team (2003-2004)
- Faculty advisor to Wolverine Soft: Student computer game development club (2002-)
- UM Digital Strategy Council (2002-2005)
- Provost Seminars on Teaching (PSOT) Planning Group (2002-2003)
- ADVANCE Implementation Committee (oversee NSF grant, 2002-2004)
- Provost Faculty Advisory Committee (2001-2004)
- CITI Advisory Board (2001-2003)
- Rackham Interdisciplinary Grant Review Panel (2001-2003)
- President's Information Revolution Commission, co-chair of research subcommission, (2000-2001)
- President's Information Revolution Commission, member of the teaching subcommission (2000-2001)
- School of Information Dean Search (Fall 1998-Summer 1999)
- Co-coordinator: Rackham Interdisciplinary Summer School (Summer 1998)
- UM VCM Oversight Committee (1995-2000)
- Cognitive Science and Cognitive Neuroscience Executive Committee (1994-1998)
- UM Committee to study Cognitive Science (1992-1993)
- CSMIL Executive Committee (1986-1987)

*College of Engineering:*

- COE Executive Committee (2008-2011)
- COE Department Chair Committee (2001-2004)

- Faculty oversight for Visual Special Effects Lecture Series (2001)
- Task Force on Technology Transfer and Commercialization (1998)
- College Graduate Committee (1996-1999)

*EECS Department:*

- Interim Chair of CSE (spring 2011)
- CSE Graduate Committee (2007-2008)
- CSE@50 Organizing Committee (2007-2008)
- Director of the Artificial Intelligence Laboratory (2005-2006)
- EECS Strategic Planning Subcommittee on Department Structure and Faculty Environment (2005)
- CSE Scholars Program Principle Investigator (2004-2008)
- Associate Chair of EECS, CSE Division (2000-2004)
- EECS Administration Committee (2000-2004)
- Chair CSE Search Committee (2000-2004)
- EECS Awards Committee (2000-2004)
- Chair EECS Executive Committee (2000-2004)
- CSE Building Steering and Executive Committees (2000-2008)
- EECS Future Committee (2000-2001)
- Organizer of the Computer Games Distinguished Lecture Series (2000-2004)
- EECS Search Committee for Department Chair (1996-1997)
- Chair, CSE Graduate Affairs Committee (1996-1999)
- EECS Departmental Review Committee (1996)
- EECS Executive Committee (1994-1996)
- CSE Search Committee (1994-1995)
- EECS Ad hoc committee on graduate education (1994)
- Director of the Artificial Intelligence Laboratory (1993-1999)
- CS Advisory Committee (1991-1993)
- Chair, CSE Ad-Hoc Committee on Undergraduate Education (1991)
- CSE Ad-Hoc Committee on Candidacy (1991)
- EECS Search Committee for Department Chair (1990)
- CSE Graduate Committee (1989-1990)
- Director of AI Lab (1989)
- CSE Ad-Hoc Committee on Research Directions in CSE (1989)
- CSE Ad-Hoc Committee on Qualifying Exams (1989)

**PH.D. COMMITTEES CHAIRED AT THE UNIVERSITY OF MICHIGAN**

- Shaul Markovitch, 1989, co-chair with Paul Scott
- John Paxton, 1990, co-chair with Paul Scott
- Mark Wiesmeyer, 1991, chair
- Arie Covrigaru, 1992, chair
- Eric Yager, 1992, chair
- Craig Miller, 1993, chair
- Scott Huffman, 1993, chair
- Doug Pearson, 1996, chair
- Seth Rogers, 1997, co-chair with Paul Nielsen

- Robert Wray III, 1998, chair
- Ron Chong, 1998, chair
- Michael van Lent, 2000, chair
- Joe Phillips, 2000, chair
- Scott Wallace, 2003, chair
- Brian Magerko, 2006, chair
- Tolga Konik, 2007, chair
- Andrew Nuxoll, 2007, chair
- Scott Lathrop, 2008, chair
- Robert Marinier, 2008, co-chair with Rick Lewis
- Sam Wintermute, 2010, chair
- Yongjia Wang, 2010, chair

## COURSES TAUGHT

Courses taught at the University of Michigan. Includes student responses to end of term surveys.

The two questions listed are:

Q1: Overall, this was an excellent course

Q2: Overall, the instructor was an excellent teacher

The responses are averages across all students who responded based on the following scale:

1 strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree

- |   |               |                |          |
|---|---------------|----------------|----------|
| • Fall 2010 Computer Games Development, EECS 494:   | 45 students,  | Q1: 4.39,      | Q2: 4.35 |
| • Winter 2010 Professionalism, EECS 496:            | 129 students, | Q1: 4.23,      | Q2: 4.7  |
| • Fall 2009 Computer Games Development, EECS 494:   | 41 students,  | Q1: 4.30,      | Q2: 4.5  |
| • Winter 2009 Advanced AI, EECS 592:                | 14 students,  | Q1: 4.75,      | Q2: 4.75 |
| • Fall 2008 Computer Games Development, EECS 494:   | 28 students,  | Q1: 4.94,      | Q2: 4.86 |
| • Winter 2008 Advanced AI Techniques, EECS 792:     | 10 students,  | Q1: 4.67,      | Q2: 4.67 |
| • Fall 2007 Computer Games Development, EECS 494:   | 38 students,  | Q1: 4.56,      | Q2: 4.56 |
| • Winter 2006 Advanced AI Techniques, EECS 792:     | 14 students,  | Q1: 4.13,      | Q2: 4.36 |
| • Fall 2005 Computer Games Development, EECS 494:   | 38 students,  | Q1: 4.55,      | Q2: 4.55 |
| • Winter 2005 Advanced AI Techniques, EECS 598, 4:  | 18 students,  | Q1: 3.81,      | Q2: 4.65 |
| • Fall 2004 Computer Games Development, EECS 494:   | 60 students,  | Q1: 4.42,      | Q2: 4.63 |
| • Fall 2003 Computer Games Development, EECS 494:   | 47 students,  | Q1: 4.75,      | Q2: 4.84 |
| • Winter 2003 AI & Computer Games, EECS 498:        | 40 students,  | Q1: 4.32,      | Q2: 4.36 |
| • Fall 2002 Computer Games Development, EECS 494:   | 50 students,  | Q1: 4.86,      | Q2: 4.83 |
| • Winter 2002 Digital Foundry, EECS 498:            | 20 students,  | No evaluations |          |
| • Fall 2001 Computer Games Development, EECS 494:   | 50 students,  | Q1: 4.81,      | Q2: 4.81 |
| • Fall 2000: Computer Games Development, EECS 494:  | 45 students,  | Q1: 4.77,      | Q2: 4.70 |
| • Winter 1999, Data Structures, EECS 380:           | 85 students,  | Q1: 3.98,      | Q2: 4.05 |
| • Fall 1998: Computer Games Development, EECS 494:  | 57 students,  | Q1: 4.91,      | Q2: 4.78 |
| • Winter 1998: Machine Learning, EECS 545:          | 13 students,  | Q1: 4.40,      | Q2: 4.60 |
| • Fall 1997: Computer Games Development, EECS 494:  | 40 students,  | Q1: 4.21,      | Q2: 4.12 |
| • Fall 1996: Computer Games Development, EECS 498:  | 40 students,  | Q1: 4.88,      | Q2: 4.83 |
| • Winter 1996: Data Structures, EECS 380:           | 50 students,  | Q1: 3.95,      | Q2: 4.22 |
| • Fall 1995: Symbolic Cognitive Modeling, EECS 596: | 20 students,  | Q1: 4.30,      | Q2: 4.20 |
| • Winter 1995: Introduction to AI, EECS 492:        | 65 students,  | Q1: 3.75,      | Q2: 3.83 |

- Fall 1994: Advanced AI, EECS 592: 8 students, Q1: 4.10, Q2: 4.50
- Winter 1994: Cognitive Architecture, EECS 547: 21 students, Q1: 4.29, Q2: 4.23
- Winter 1992: Advanced AI, EECS 592: 16 students, Q1: 4.50, Q2: 4.61
- Fall 1991: Foundations of AI, EECS 492: 45 students, Q1: 4.40, Q2: 4.39
- Winter 1991: Cognitive Architecture, EECS 547: 24 students, Q1: 4.38, Q2: 4.55
- Fall 1990: Foundations of AI, EECS 492: 48 students, Q1: 4.13, Q2: 4.18
- Winter 1990: Machine Learning, EECS 545: 39 students, Q1: 4.18, Q2: 4.46
- Fall 1989: Foundations of AI, EECS 492: 45 students, Q1: 4.39, Q2: 4.30
- Winter 1989: Cognitive Architecture, EECS 547: 27 students, Q1: 4.32, Q2: 4.50
- Fall 1988: Foundations of AI, EECS 492: 68 students, Q1: 4.39, Q2: 4.16
- Winter 1988: Cognitive Science, University 325: 25 students, No evaluations
- Fall 1987: Foundations of AI, EECS 492: 73 students, Q1: 3.93 Q2: 3.68
- Winter 1987: Machine Learning, EECS 598 (545): 21 students, Q1: 4.40, Q2: 4.25
- Fall 1986: Cognitive Architecture, EECS 598 (547): 24 students, Q1: 3.63, Q2: 3.5

## TUTORIALS

1. Soar Tutorial, 12 attendees, 29<sup>th</sup> Soar Workshop, Ann Arbor, MI. June 22-23, Leader.
2. Soar Tutorial (1 hour), 60 attendees, 2009, AGI Conference, March 1, 2009.
3. Soar Tutorial, 10 attendees, 2008, 28<sup>th</sup> Soar workshop.
4. Soar Tutorial, 7 attendees, May 21-22, 2007, 27<sup>th</sup> Soar Workshop, Ann Arbor, MI.
5. Soar Tutorial, 8, ICCM, July 26, 2007.
6. Soar Tutorial, 18, Cognitive Science, Aug. 1, 2007.
7. Soar Tutorial. 24 attendees, May 22-24, 2006, 26<sup>th</sup> Soar Workshop, Ann Arbor, MI.
8. Soar Tutorial. 25 attendees, July 9, 2005, AAI, Pittsburgh, PA, Leader.
9. Soar Tutorial. 15 attendees, June 13-14, 2005, 25<sup>th</sup> Soar Workshop, Ann Arbor, MI.
10. AI Learning Techniques for Games, 200 attendees, March 2005, GDC, San Francisco, CA, with Michael van Lent.
11. DXFramework, 20 attendees, Feb. 24-25, 2005, SIGCSE, St. Louis, MO.
12. Soar Tutorial. 18 attendees, July 2004, ICCM Conference, Pittsburgh, PA.
13. Soar Tutorial. 19 attendees, July 2004, AAI, San Jose, CA.
14. Soar Tutorial. 14 attendees, May 2004, 24<sup>th</sup> Soar Workshop, Ann Arbor, MI.
15. Soar Tutorial. 25 attendees, May 2003, 23<sup>rd</sup> Soar Workshop, Ann Arbor, MI, Leader.
16. Soar Tutorial. 20 attendees, May 2002, 22<sup>nd</sup> Soar Workshop, Ann Arbor, MI, Leader.
17. AI & Computer Games, 180 attendees, March 2002, Game Developer Conference, joint with Michael van Lent.
18. Computer Games and AI, 50 attendees, August 2001, International Joint Conference on Artificial Intelligence, joint with Michael van Lent.
19. AI Tactical Decision Making Techniques, 50 attendees, May 2001, Computer Generated Forces and Behavior Representation, joint with Michael van Lent.
20. Soar Tutorial, 12 attendees, May 2001, 21<sup>st</sup> Soar Workshop, Ann Arbor, MI, Leader.
21. AI Tactical Decision Making Techniques, 200 attendees, March 2001, Game Developers Conference, San Jose, CA. joint with Michael van Lent.
22. AI and Computer Games, 120 attendees, March 2001, Game Developers Conference.
23. Computer Games, 20 attendees, September 2000, Washington D.C., joint with Michael van Lent.
24. Soar Tutorial. 10 attendees. June, 2000. Middlesex University. Leader.
25. Soar Tutorial. 12 attendees. May, 2000. 20<sup>th</sup> Soar Workshop. Leader.

26. Soar Tutorial. 16 attendees. May, 1999. 19<sup>th</sup> Soar Workshop. Leader.
27. Agent Development in Soar. 24 attendees. July 26, 1997. National Conference on Artificial Intelligence. Providence, Rhode Island. Leader.
28. Agent Development in Soar. 20 attendees, July 16-17, 1997. University of Michigan, Leader
29. Soar/IFOR Tutorials. Two five day tutorials, Summer of 1996. 24 attendees. Leader.
30. Soar/IFOR Tutorials. One five day tutorials, Summer of 1995. 13 attendees. Leader.
31. Organized UM workshop on Cognitive Science and Cognitive Neuroscience, May 31, 1995.
32. Soar Tutorial, The 12th Annual Conference of The Cognitive Science Society, Boston, MA, June 1990.
33. Integrating Knowledge Acquisition and Machine Learning, Autumn School at Campus Thomson, Paris, France. Sponsored by the Institut d'Expertise et de Prospective de l'Ecole Normale Superieure and Thomson, Sept. 6, 1989
34. Soar Tutorial, The 11th Annual Conference of The Cognitive Science Society, The University of Michigan, Aug. 15, 1989
35. Three presentations at the Soar Tutorial and Workshop, The University of Groningen, The Netherlands, June 18-22, 1989.

## **FUNDING**

- PI, Cognitive Architecture Approaches to Continuous Action Model Learning and Long-term Goal Management, ONR, \$700,000, January 2011-December 2013
- PI, Support of Virtual Human Development Using Soar, USC subcontract, \$50,000, January 2010-October 2010.
- PI, Extending Semantic and Episodic Memory to Support Robust Decision Making, AFOSR, \$502,000. July 2010-June 2013.
- Co-PI, Building Flexible, Robust, and Autonomous Agents, NSF, \$1,100,000 (1 of 4 UM faculty). July 2009-June 2013
- PI, Workshop on Evaluation of Human-Level AI, ONR, \$10,000. July 2008
- PI, Research on Computer Game Engines, Microsoft (gift), \$11,000. June 2008
- PI, Integration and Interactions among Cognitive Architecture Learning Modules, ONR. \$675K, January 2008-January 2011
- Co-PI, Ground Robotics Reliability Center, TARDEC, \$1,100,000 (my portion). July 2007- June 2010
- PI, Support of the International Conference on Cognitive Modeling, ONR, AFOSR, NSF, \$42,000. Oct. 2006
- PI, Extending the Soar Cognitive Architecture, DARPA, \$1,106,000. September 2005-June 2007
- PI, Research on Transfer Learning in Soar, Subcontract from ISLE, originally from DARPA, \$758,000. October 2005-September 2008
- PI, Integrating Soar with TIELT, DARPA-NRL, \$100,000. September 2004-August 2005
- PI, Research in Architectural Approaches to the Integration of Empirical, Analytic and Episodic Learning, \$480,000. DARPA-AFRL, September 2004-Dec. 2005
- PI, Integrating Reinforcement and Episodic Learning in a General Cognitive Architecture, NSF, \$435,000. June 2004-May 2007
- PI, CSE Scholars Program, NSF, \$400,000. July 2004 to June 2008
- PI, Research in Architectural Approaches to the Integration of Empirical, Analytic, and Episodic Learning within Soar, DARPA, \$300,000. September 2003-December 2004
- PI, Gift from Microsoft for using computer game technology in support of computer

- science education. \$30,000. 2003
- PI, Gift from SAIC to support research in human level synthetic characters, \$25,000. 2003
- Co-PI, An Infrastructure for Wide Area Pervasive Computing, NSF, \$550,000, September 2003-August 2006. I had only a minor role in this proposal.
- PI, Towards Human-like Adversaries for MOUT Training, Office of Naval Research, \$365,000, Dec. 2001-Sept. 2003
- PI, Dynamic Modeling using Computer Game Technology, subcontract from Veridian, \$80,000, August 2000-August 2001
- PI, Generic Interfaces to AI Architectures, Institute for Creative Technology/Defense Modeling and Simulation Office, \$50,000, September 2002-June 2003
- PI, Interactive Diagrammatic Knowledge Management Tools for Human Behavior Models, Office of Naval Research, \$350,000, January 2003-December 2005
- PI, Development of a Pedagogical Computer Game Library, NSF, \$75,000, Jan 2003-Dec. 2004
- PI, Natural Agents for Autonomous Adaptation to Threats, DARPA, \$50,000, 2002-2003.
- PI, Integrating Direction in Believable Synthetic Characters, subcontract from Institute for Creative Technology, University of Southern California, \$150,000, March 2001-November 2004
- PI, Intelligent Synthetic Characters for Computer Games, Dell Computer Corporation \$30,000. 1999-2000
- PI, Research on Autonomous Synthetic Entities, Office of Naval Research, \$923,699 August 1999-July 2002
- PI, Cognitive Modeling of Skill Levels, Office of Naval Research, \$280,000 Jan. 1998-Oct. 2000
- PI, Research and Development of Fatigue Models in TacAir-Soar. Subcontract from Systems Research Laboratories, Air Force Contract F41624-95-D-6026, \$43,037, July 1,1997-December 31, 1998.
- PI, Modeling Airman Cognitive Performance Using Soar-ModSAF Architecture. Subcontract from Sytronics Inc. from DARPA. \$15,000, July 1, 1997-Sept. 30,1997.
- PI, Intelligence Reconnaissance Synthetic Theater of War. Subcontract from Sytronics Inc. from DARPA. \$35,000, July 1, 1997-December 31, 1997.
- PI, Research on Advanced Intelligent Synthetic Forces, DARPA/ITO via STRICOM. \$2,288,000, May 1997-Oct. 1999
- PI, Intelligent Forces for Simulated Environments (Air Force Entities). Subcontract with University of Southern California (which is contracted with NRaD, ARPA/ITO), \$90,975, October 1996-October 1997.
- PI, Intelligent Forces for Air and Navy Command in Simulated Environments, Subcontract from University of Southern California (which was contracted with NRaD, ARPA/ASTO). ~ \$2,500,000, Feb. 1995-Feb. 1998
- PI, Research on Soar, gift from Carnegie Mellon University, \$60,000.
- PI, Intelligent Automated Agents and Analysis Tools for Simulated Environments, ARPA/ASTO. ~ \$4,000,000, July 92-June 95, Approx. 65% subcontracted to USC/ISI and Carnegie Mellon University
- PI, Fusion of Robotics, Artificial Intelligence, Perception and Human Systems for Advanced Space Missions. NASA Ames and ONR \$550,000 for Oct. 1990-Sept. 1993.

- PI, Rackham Research Partnership Program. Funded Scott Huffman's research for 1991-1992: approx. \$13,200.
- PI, IPoCSE grant from Nissan for \$20,000 to support research in Cognitive Systems.
- Co-PI with Ramesh Jain, Edmund Durfee, Michael Walker, and Terry Weymouth. A Proposal for IBM/UM Distributed Computing Initiative: Research on Distributed Artificial Intelligence. Awarded three RS/6000 workstations.
- Co-PI with Ramesh Jain, Edmund Durfee, Michael Walker, and Terry Weymouth. Engineering Research Equipment Grant for Real-Time Computer Vision and Robotics Integration. Total grant is \$73,710. This is an equipment grant that is shared between the PIs
- PI, Soar VI Workshop, from AAI, for \$5,000.
- PI, Fifth International Conference on Machine Learning, from AAI, for \$5,000.
- PI, Fifth International Conference on Machine Learning, from ONR, for \$7,000.
- PI, Integrating Learning of Perception, Cognition, and Motor Control in Soar, with Office of Naval Research, September 1988-August 1990 for \$150,000.
- Co-PI A Cognitive Science Model of Language Acquisition, with Susan Gelman, Steve Lytinen, and William Croft, Presidential Initiatives Fund of the University of Michigan. September 1988-August 1991, \$291,949.
- PI: Fusion of Robotics, Artificial Intelligence, Perception and Human Systems for Advanced Space Missions. NASA Ames, November 1988-October 1990 for \$400,000.
- Co-PI Fusion of Robotics, Artificial Intelligence, Perception and Human Systems for Advanced Space Missions with Lynn Conway and Richard Volz, NASA Ames, November, 1987-October 1988. \$135,000 for my research activities.
- PI Research on Soar as an Architecture for General Intelligence, subcontract from Carnegie Mellon University from DARPA. October 1985-September 1986 for \$202,265.00.

## PUBLICATIONS

### *Doctoral Dissertation*

1. Laird, J. E. (1983). *Universal Subgoaling*. Carnegie Mellon University. (Available in Laird, J. E., Rosenbloom, P. S., Newell, A. (1986). *Universal Subgoaling and Chunking: The Automatic Generation, Learning of Goal Hierarchies*. Hingham, MA: Kluwer, 1986.)

### *Books and Proceedings:*

1. Laird, J. E. (accepted for publication). *The Soar Cognitive Architecture*. MIT Press, Cambridge, MA.
2. Lewis, R.L., Polk, T. A., Laird, J. E. (Eds.) (2007). *The Proceedings of the 8th International Conference on Cognitive Modeling*. Psychology Press/ Taylor & Francis.
3. Laird, J. E., Schaeffer, J. (Eds.) (2006). *Proceedings of the Second Artificial Intelligence and Interactive Digital Entertainment Conference*, AAAI Press, Menlo Park, CA.
4. Young, R. M., Laird, J. E., (Eds.) (2005). *Proceedings of the First Artificial Intelligence and Interactive Digital Entertainment Conference*, AAAI Press, Menlo Park, CA.
5. Rosenbloom, P. S., Laird, J. E., Newell, A. (1993). *Soar Papers: Research on Integrated Intelligence*, MIT Press, Cambridge, MA.
6. Laird, J. E. (Editor). (1988). *Fifth International Conference on Machine Learning*. Morgan Kaufmann, Los Altos, CA.
7. Laird, J. E., Rosenbloom, P. S., Newell, A. (1986). *Universal Subgoaling and Chunking: The Automatic Generation, Learning of Goal Hierarchies*. Hingham, MA: Kluwer, 1986.

*Rigorously Refereed Journals:*

1. Lathrop, S. D., Wintermute, S., Laird, J. E. (accepted), Exploring the Functional Advantages of Spatial and Visual Cognition from an Architectural Perspective. *Topics in Cognitive Science*, Special issue on Modeling Spatial Cognition.
2. Gorski, N. A., Laird, J. E. (2010), Learning to Use Episodic Memory. *Cognitive Systems Research* (invited).
3. Langley, P., Laird, J. E., & Rogers, S. (2009). Cognitive Architectures: Research Issues and Challenges. *Cognitive Systems Research*, 10(2), 141-160.
4. Marinier, R. P., Laird, J. E., & Lewis, R. L., (2009). A Computational Unification of Cognitive Behavior and Emotion, *Cognitive Systems Research*, 10(1), 48-69.
5. Konik, T. and Laird, J. (2006). Learning Goal Hierarchies from Structured Observations and Expert Annotations, *Machine Learning*, 64(1-3), 263-287.
6. Pearson, D. J., Laird, J. E. (2005). Incremental Learning of Procedural Planning Knowledge in Challenging Environments, *Computational Intelligence*, 21:4, 414-439.
7. Nason, S., Laird, J. E. (2005). Soar-RL: Integrating Reinforcement Learning with Soar, *Cognitive Systems*, 6 (1), 51-59.
8. Wray, R.E., Laird, J. E. (2003). An Architectural Approach to Ensuring Consistency in Hierarchical Execution, *Journal of Artificial Intelligence Research*, 19, 355-398.
9. Laird, J. E., Jones, R. M., Nielsen, P. E. (1998). Knowledge-Based Multiagent Coordination, *Presence*, 7(6), 547-563.
10. Laird, J. E., Pearson, D. J., Huffman, S. B. (1997). Knowledge-directed Adaptation in Multi-level Agents. *Journal of Intelligent Information Systems*, 9(3), 261-276.
11. Miller, C. S., Laird, J. E. (1996). Accounting for Graded Performance within a Discrete Search Framework, *Cognitive Science*, 20 (4), 499-537.
12. Huffman, S. B., Laird, J. E. (1995). Flexibly Instructable Agents, *Journal of Artificial Intelligence Research*, 3, 271-324.
13. Wray, R. E., Chong, R., Phillips, J., Rogers, S., Walsh, W., Laird, J. E. (1995). Organizing Information in Mosaic: A Classroom Experiment, *Computer Networks, ISDN Systems*, 28, 167-178.
14. Pearson, D. J., Huffman, S. B., Willis, M. B., Laird, J. E., Jones, R. M. (1993). A Symbolic Solution to Intelligent Real-Time Control, *Robotics and Autonomous Systems*, 11, 279-291.
15. Rosenbloom, P. S., Laird, J. E. (1993). On Unified Theories of Cognition.- A Response to the Reviews, *Artificial Intelligence*, 59 (1-2), 389-413.
16. Rosenbloom, P. S., Laird, J. E., Newell, A., McCarl, R., (1991). A Preliminary Analysis of the Foundations of Soar. *Artificial Intelligence* 47(1-3), 289-325.
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23. Laird, J. E., (1990). Building Interactive Agents. *AAAI workshop on Interactive Fiction, Synthetic Reality*.
24. Laird, J. E. (1990). Interaction with External Environments using Soar. *Invited Panel, Cognitive Science Annual Conference*.
25. Laird, J. E. (1990). Integrating Planning, Execution in Soar for External Environments, *AAAI workshop on Planning in Uncertain, Unpredictable, Changing Environments*, Stanford, CA, 82-86.
26. Laird, J. E. (1989). Learning from external advice in Soar. *ONR workshop on Machine Learning*, Washington, D.C.
27. Laird, J. E. (1989). Interaction with the External World. *Symposium on Soar, Unified Theories of Cognition*, University of Groningen, The Netherlands.
28. Laird, J. E. (1989). Learning New Domain Theories. *DARPA Machine Learning Workshop*, Snowbird, Utah.
29. Laird, J. E., Rosenbloom, P. S. (1987), Research on Learning in Soar. *Second Annual Artificial Intelligence Research Forum, NASA Ames Research Center*, Palo Alto, CA.
30. D. Steier, Laird, J. E., Newell, A., Rosenbloom, P. S. (1987). Varieties of learning in Soar: 1987. *Fourth International Workshop on Machine Learning*, P. Langley (Editor), Kluwer, 300-311.
31. Laird, J. E., Rosenbloom, P. S., Newell, A. (1986). Overgeneralization during knowledge compilation in Soar. *Workshop on Knowledge Compilation*, Oregon State University, Otter Crest, OR, 46-57.
32. Rosenbloom, P. S., Laird, J. E., Newell, A., Golding, A., Unruh, (1985). A. Current research on learning in Soar. *1985 Machine Learning Workshop*, Skytop, PA, 163-172.

*Letters, briefs, videos, posters, demonstrations, notes or other shorter communications*

1. Nuxoll, A., Laird, J. E., James, M. (2004). Comprehensive Working Memory Activation in Soar. Poster, *International Conference on Cognitive Modeling*.
2. van Lent, Laird, J. E., Buckman, J., Hartford, J., Houchard, S., Steinkraus, K., and Tedrake, R. (1999). Intelligent Agents in Computer Games, Demonstration, abstract, *National Conference on Artificial Intelligence*, Orlando, FL, pp. 929-930.
3. Huffman, S. B., Laird, J. E. (1993). Instructo-Soar: Learning from interactive natural language instructions, *National Conference on Artificial Intelligence*, Videotape, abstract.
4. Pearson, D. J., Jones, R. M., Laird, J. E. (1993). Air-Soar: Intelligent multi-level control. Videotape, abstract, *National Conference on Artificial Intelligence*.
5. Laird, J. E., Hucka, M., Huffman, S. B., Rosenbloom, P. S. (1991). An Analysis of Soar as an Integrated Architecture, in *SIGART Bulletin*, 2(4), 98-103, ACM Press.

## **MAJOR INVITED PRESENTATIONS**

- Keynote Speaker, “Intelligent Autonomy for Unmanned Vehicles”, Joint Unmanned Air Systems, Center of Excellence, Advisory Council Meeting, Tampa, FL, December, 2010.
- Keynote Speaker, “The Role of Production Rules in a General Cognitive Architecture, Rules Fest 2010, San Jose, CA, October 2010.
- Keynote Speaker, “Cognitive Architecture”, Decade of the Mind Conference, Jan, 2009
- Keynote Speaker, “The Future of Cognitive Architecture”, ACT-R Workshop, Carnegie Mellon University, June, 2008
- Invited Speaker, “The Future of Cognitive Architecture”, EECS Distinguished Seminar,

Northwestern University, April, 2008

- Keynote Speaker, “Is Cognitive Science the Right Method for AI”, Cognitive Science Conference, 2007
- Invited Speaker, “The TOSCA Cognitive Architecture”, The Eleventh International Conference on Cognitive and Neural Systems, May 2007, Boston University.
- Invited Plenary Speaker, “The Importance of Architecture for Achieving Human-level AI”, DARPA/IPTO Conference on Cognitive Systems, Washington D.C., May 2005.
- Keynote Speaker, “Cognitive Architecture and Architectures for Cognitive Systems”, Workshop on Research Directions in Architectures and Systems for Cognitive Processing, Cornell University, August 2005.
- Keynote Speaker, “Episodic Memory vs. Case-based Reasoning”, Workshop on Case-based Reasoning in Computer Games, DePaul University, August 2005
- Invited Speaker, “Building Complex Human-level Synthetic Characters”, EA Distinguished Speaker Series, EA Canada, Vancouver, CA, January 2005
- Invited Speaker, “Building Complex Human-Level Synthetic Characters”, Research Triangle Distinguished Lecture Series in Computer Science, April 26, 2004.
- Invited Plenary Speaker, “Artificial Intelligence and Character Development”, Game Technology Conference, Toronto, Canada, April 9, 2004.
- Invited Speaker, “Future Directions of AI in Interactive Entertainment”, Imagina, Monte Carlo, Monaco, February 2, 2004.
- Invited Speaker, “Computer Games”, Distinguished Lecture Series Distinguished Lecture in Cognitive Science, Rensselaer Polytechnic Institute, April 25, 2003.
- Invited Plenary Speaker, “Learning by Imitation for Human-level Knowledge-based Systems”, Second International Symposium on Imitation in Animals and Artifacts, AISB 2003.
- Invited Plenary Speaker, IBM EDGE Conference. “Artificial Intelligence for Computer Games: Beyond Bots”, April 9-10, 2002.
- Invited Speaker, “Developing Intelligent Synthetic Characters for Computer Games and Military Training”, Naval Research Laboratory AI Distinguished Speaker Series, 2001.
- Invited Speaker, “The Turing Test, Computer Generated Forces, Interactive Computer Games, and Unified Theories of Cognition” IBM, Conference on the Turing Test, 2001.
- Invited Plenary Speaker, “Interactive Computer Games: Human-level AI's Killer Application,” National Conference on Artificial Intelligence, AAAI, August 2000
- Invited Speaker, “Toward Human-level AI for Computer Games”, Distinguished Lecture Series, Middlesex University, England, June 2000
- Invited Speaker, Distinguished Lecture Series in Cognitive Science, A series of three lectures over three days, Stanford University, 1999
- Invited Plenary Speaker, “Toward Human-like AI”, Florida Artificial Intelligence Research Symposium, May 3-6, 1999.
- Invited Plenary Speaker, “Ascent of Soar”, National Conference on Artificial Intelligence, July, 27-31, 1997.
- Invited Keynote Speaker, Applications of Artificial Intelligence Conference, 1989
- Invited Keynote Speaker, Third Conference on Artificial Intelligence Applications, 1987
- Invited Keynote Speaker, Space Operations, Automation and Robotics 1987