



**Fifteenth National Conference on
Artificial Intelligence (AAAI-98)
Tenth Conference on Innovative Applications of
Artificial Intelligence (IAAI-98)**

July 26-30, 1998

Monona Terrace, Madison, Wisconsin

Sponsored by the American Association for Artificial Intelligence

**Cosponsored by DARPA, NASA Ames Research Center,
Microsoft Corporation, and the National Science Foundation**

In cooperation with the University of Wisconsin–Madison

Program & Exhibit Guide

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Acknowledgments

The American Association for Artificial Intelligence wishes to acknowledge and thank the following individuals for their generous contributions of time and energy to the successful creation and planning of the Fifteenth National Conference on Artificial Intelligence and the Tenth Conference on Innovative Applications of Artificial Intelligence.

- AAI-98 Program Cochairs
Jack Mostow, *Carnegie Mellon University*
Chuck Rich, *MERL – A Mitsubishi Electric Research Laboratory*
- IAAI-98 Conference Chair:
Bruce G. Buchanan, *University of Pittsburgh*
- IAAI-98 Conference Cochair
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- Hall of Champions Chair and Cochair
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Dana Nau, *University of Maryland*
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- Mobile Robot Competition Cochairs
Gregory Dudek, *McGill University*
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- Mobile Robot Exhibition Cochairs
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- Robot Building Laboratory, Chair
David Miller, *KISS Institute for Practical Robotics*
- SIGART/AAAI-98 Doctoral Consortium Chair
Janyce Wiebe, *New Mexico State University*
- Student Abstract and Poster Chair
Michael Littman, *Duke University*
- Tutorial Forum Cochairs
Padhraic Smyth, *University of California, Irvine*
Bart Selman, *Cornell University*
- Workshop Chair and Cochair
David Leake, *Indiana University*
Raymond C. Mooney, *University of Texas at Austin*

A complete listing of the AAI-98 and IAAI-98 Program Committee members appears in the conference proceedings.

Sponsoring Organizations

AAAI gratefully acknowledges the generous contributions of the following organizations to AAI-98:

- ACM/SIGART
- Defense Advance Research Projects Agency
- Microsoft Corporation
- NASA Ames Research Center
- National Science Foundation
- Office of Naval Research
- University of Wisconsin – Madison

1998 AAAI Fellows Recognition Dinner

Each year the American Association for Artificial Intelligence recognizes a small number of members who have made significant sustained contributions to the field of artificial intelligence, and who have attained unusual distinction in the profession. AAAI is pleased to announce the three newly elected Fellows for 1998:

- George A. Bekey, *University of Southern California*
- Steven Minton, *USC/Information Sciences Institute*
- Yoav Shoham, *Stanford University*
- David E. Wilkins, *SRI International*

The 1998 Fellows Recognition Dinner will be held Monday, July 27, from 7:00 – 10:00 PM in the Capitol Ballroom A, second floor, the Madison Concourse Hotel. A reception will begin at 7:00 PM followed by dinner at 8:00 PM. (By invitation only).

Program Committee Dinner

AAAI-98 Program Committee Dinner will be held Tuesday, July 28, from 7:00 – 10:30 PM in the Madison Ballroom, second floor, the Madison Concourse Hotel to honor the contributions of all the members of the AAAI-98 and IAAI-98 Program Committees. (By invitation only.)

Presidential Address

David L. Waltz, NEC Research Institute, will give the AAAI Presidential Address on “The Importance of Importance” on Tuesday, July 28, 9:00 AM in the Madison Ballroom, Monona Terrace Convention Center.

Outstanding Paper Session

The presentation of the three papers that have been recognized as the AAAI-98 Outstanding Papers will be combined into one special session in the invited talk track of the conference on Tuesday, July 28 from 4:30 – 6:00 PM.

AAAI-98 Rendezvous

The AAAI-98 Rendezvous will be held in the Grand Terrace of the Monona Terrace Convention Center on Monday, July 27, 1998 from 5:30 – 7:00 PM. This informal gathering will give attendees the opportunity to mingle in a relaxed atmosphere. Light snacks will be available. Susantha Herath, the Rendezvous Social Coordinator, will be organizing interested attendees into small groups to go out to dinner after the Rendezvous.

Opening Reception

The AAAI-98 opening reception will be held in the Grand Terrace of the Monona Terrace Convention Center, Tuesday, July 28 from 6:00 – 7:00 PM. This event will provide the traditional opportunity for attendees to socialize at the end of the first day of technical sessions. A variety of hors d'oeuvres and a no-host bar will be available. Admittance to the reception is free to AAAI-98 registrants. A \$15.00 per person fee (\$5.00 for children) will be charged for spouses and other non-technical conference registrants. Guest tickets are available in onsite registration. The AAAI-98 Opening Reception is sponsored in part by Microsoft Corporation. AAAI gratefully acknowledges Microsoft's generous contribution in support of this event.

AI Festival

The AI Festival will be held in the Exhibition Hall of the Monona Terrace Convention Center, Wednesday, July 29 from 6:00 – 10:00 PM. This event will provide you with the opportunity to stroll among numerous exciting events—the Mobile Robot Competition and Exhibition, the Hall of Champions, the Intelligent Systems Demos, and the Student Posters—enlivened by informal supper and conversation. Admittance to the reception is free to AAAI-98 registrants. A \$20.00 per person fee (\$5.00 for children) will be charged for spouses and other non-technical conference registrants. Guest tickets are available in onsite registration.

Student Programs & Meetings

Student Abstract Poster Program

Students whose abstracts were chosen for inclusion in the conference proceedings will display their work at the Student Abstract Poster Session in the Exhibition Hall, Monona Terrace Convention Center on Wednesday, July 29 from 6:00 – 10:00 PM in conjunction with the AI Festival. In addition, participants in the AAAI/SIGART Doctoral Consortium will display their poster presentations during this session. All students will be available for questions. The AAAI-98 Student Abstract Poster Program is sponsored by Microsoft Corporation. AAAI gratefully acknowledges Microsoft's generous contribution in support of this program.

AAAI/SIGART Doctoral Consortium (DC-98)

The Third AAAI/SIGART Doctoral Consortium program will be held on Sunday and Monday, July 26 – 27, 1998 from 8:30 – 6:00 PM in the Senate Room, Madison Concourse Hotel. The Doctoral Consortium provides an opportunity for a group of Ph.D students to discuss and explore their research interests and career objectives in an interdisciplinary workshop together with a panel of established researchers. The sixteen students accepted to participate in this program will also participate in the Student Poster program on Wednesday, July 29, from 6:00 – 10:00 PM during the AI Festival. All interested AAAI-98 student registrants are invited to observe the presentations and participate in discussions at the workshop. AAAI and ACM/SIGART gratefully acknowledge grants from the Office of Naval Research and Microsoft Corporation for student travel to this event.

Annual Business Meeting

The Annual Business Meeting will be held Thursday, July 30, from 12:45 – 1:15 PM in the Hall of Ideas E & F, Monona Terrace Convention Center.

Conference Committee Meeting

The AAAI Conference Committee Meeting will be held Wednesday, July 29, from 7:30 – 9:00 AM in the University Room A, second floor, Madison Concourse Hotel.

Executive Council Meeting

The AAAI Executive Council Meeting will be held Sunday, July 26, from 9:00 AM – 5:00 PM in the University Room A, second floor, Madison Concourse Hotel. Continental breakfast will be available at 8:30 AM.

AAAI Press Editorial Board Meeting

The AAAI Press Editorial Board Meeting will be held Wednesday, July 29, from 12:45 – 2:00 PM in the Wisconsin Room, second level, Monona Terrace Convention Center.

AAAI Publications Committee Meeting

The AAAI Publications Committee lunch meeting will be held Tuesday, July 28, from 12:45 – 2:00 PM in the Wisconsin Room, second level, Monona Terrace Convention Center.

AIJ Editorial Board Meeting

The *AIJ* Editorial Board lunch meeting will be held Monday, July 27, from 12:00 – 2:00 PM in the University Room A, second floor, Madison Concourse Hotel.

Conference at a Glance

MORNING	AFTERNOON	EVENING
<p>SUNDAY, JULY 26</p> <p>Registration Tutorial Forum Workshops AAAI/SIGART DC RBL-98</p>	<p>Registration Tutorial Forum Workshops AAAI/SIGART DC RBL-98</p>	
<p>Monday, July 27</p> <p>Registration Tutorial Forum Workshops IAAI-98 AAAI/SIGART DC RBL-98</p>	<p>Registration Tutorial Forum Workshops IAAI-98 AAAI/SIGART DC RBL-98</p>	<p>Rendezvous Special Tutorial MP5 1998 Fellows Dinner</p>
<p>TUESDAY, JULY 28</p> <p>Registration AAAI-98/IAAI-98 Presidential Address / Talks Exhibition/IS Demos Robot Program Hall of Champions</p>	<p>Registration AAAI-98/IAAI-98 Invited Talks Exhibition/IS Demos Robot Program Hall of Champions</p>	<p>Opening Reception Prog. Committee Dinner</p>
<p>WEDNESDAY, JULY 29</p> <p>Registration AAAI-98/IAAI-98 Invited Talks Exhibition/IS Demos Robot Program Hall of Champions</p>	<p>Registration AAAI-98/IAAI-98 Invited Talks Exhibition/IS Demos Robot Program Hall of Champions</p>	<p>AI Festival/Exhibition Hall Student Poster Session</p> <p>Exhibition/IS Demos Robot Program Hall of Champions</p>
<p>THURSDAY, JULY 30</p> <p>Registration AAAI-98 Invited Talks Exhibition/IS Demos Robot Program Hall of Champions</p>	<p>Registration AAAI-98</p> <p>Exhibition/IS Demos Robot Program Hall of Champions</p>	
<p>Friday, July 31</p> <p>Workshop W4</p>	<p>Workshop W4</p>	

Tutorial Forum

Tutorial Forum

Tutorial forum registration includes admission to up to four tutorials and the corresponding four tutorial syllabi. A maximum of four consecutive tutorials may be taken due to parallel schedules. Tutorial attendees may redeem their tutorial syllabi tickets at the tutorial rooms. Attendees who wish to obtain syllabi from other tutorials may purchase them separately for \$15.00 per syllabus in onsite registration. The Special Tutorial (MP5) is open to all AAAI-98 registrants for no additional fee.

Session I: Sunday, July 26

9:00 AM – 1:00 PM

SA1: Computational Molecular Biology and Artificial Intelligence: An Introduction

Rick Lathrop
Madison Ballroom C, Monona Terrace Convention Center

SA2: Economically Founded Multiagent Systems

Tuomas Sandholm
Madison Ballroom D, Monona Terrace Convention Center

SA3: Recent Advances in AI Planning

Craig Knoblock and Qiang Chung Yang
Hall of Ideas E & F, Monona Terrace Convention Center

SA4: Advanced Techniques for Information Access

Marti A. Hearst and Michael J. Pazzani
Hall of Ideas H & I, Monona Terrace Convention Center

Session II: Sunday, July 26

2:00 – 6:00 PM

SP1: Automatic Text Summarization

Udo Hahn and Inderjeet Mani
Madison Ballroom C, Monona Terrace Convention Center

SP2: Model-Based Autonomous Systems

Pandu Nayak and Brian Williams
Madison Ballroom D, Monona Terrace Convention Center

SP3: Principles and Strategies of Automated Inference: A Unifying View

Rina Dechter and Irina Rish
Hall of Ideas E & F, Monona Terrace Convention Center

SP4: Integration of Artificial Intelligence and Operations Research Techniques

Carla P. Gomes, Ken McAloon and Carol Tretkoff
Hall of Ideas H & I, Monona Terrace Convention Center

Session III: Monday, July 27

9:00 AM – 1:00 PM

MA1: Graphical Models and Variational Approximation

Michael I. Jordan
Madison Ballroom C, Monona Terrace Convention Center

MA2: Genetic Algorithms, Operations Research and AI

Darrell Whitley
Madison Ballroom D, Monona Terrace Convention Center

MA3: From Action Theories to Agent-Planning Control Strategies for Reactive Agents

Chitta Baral and Froduald Kabanza
Hall of Ideas E & F, Monona Terrace Convention Center

MA4: Statistical Methods in Natural Language Processing

John Lafferty and Lillian Lee
Hall of Ideas H & I, Monona Terrace Convention Center

Session IV: Monday, July 27

2:00 – 6:00 PM

MP1: Learning Bayesian Networks from Data

Nir Friedman and Moises Goldszmidt
Madison Ballroom C, Monona Terrace Convention Center

MP2: Intelligent Simulation

Feng Zhao and Chris Bailey-Kellog
Madison Ballroom D, Monona Terrace Convention Center

MP3: Support Vector Learning

Bernhard Schoelkopf
Hall of Ideas E & F, Monona Terrace Convention Center

MP4: Computational Aspects of Knowledge Representations

Marco Cadoli and Thomas Eiter
Hall of Ideas H & I, Monona Terrace Convention Center

7:00 – 8:30 PM

MP5: Getting that First Grant: A Young Scientist's Guide to (AI) Funding in America

Jim Hendler
Hall of Ideas E & F, Monona Terrace Convention Center

Robot Building Lab

The Robot Building Laboratory will be held Sunday and Monday, July 26 – 27, in the Madison and Wisconsin Ballrooms, Madison Concourse Hotel. Preregistration is required. AAAI-98 Robot Building Laboratory participants will spend the day seeing how easy or difficult it is to implement their favorite AI techniques on an actual robot. Participants will be grouped into small teams, each of which will build their own mobile robot. The RBL will start with a quick tutorial on robot basics covering sensors, effectors and real-time programming techniques. Participants will spend most of their time designing, building and programming their mobile robot. Throughout the laboratory there will be individual team tutorials covering specific aspects of robot design and programming. Demonstrations of other robot systems and technologies will also take place, and an extensive library of robot functions will be available. Some portions of the mobility system will be provided prebuilt, thereby assuring that all groups get a good start on a fully functional robot. There will be ample opportunity for individual design, creativity, testing and redesign. At the end of the session all the robots will participate in a double elimination tournament. Then we will see which robot has the right stuff to best accomplish the task (which will be specified at the beginning of the robot lab)! This tournament will be open to all the conference attendees. The lab is being organized and taught by the KISS Institute for Practical Robotics (KIPR) for AAAI. Instructors and assistants are from KIPR's trained staff. David Miller is the lead instructor.

Workshop Program

Workshop Program

Attendance at the workshops is limited, and participation is by invitation only. All workshop participants must register for the AAAI-98 technical program or, in the case of the four cosponsored workshops, must register for one of the cosponsoring conferences. (Exceptions to these rules will be required to pay a \$150.00 fee per workshop.) Registration onsite for a workshop is possible with the prior permission of the corresponding workshop organizer. All workshops will begin at 8:30 AM and conclude at 6:00 PM, unless otherwise noted below.

Sunday, July 26

W1: AI and Information Integration (1-1/2 day workshop)

Organizers: Craig Knoblock and Alon Levy
1:30 – 5:30 PM, University Room, Inn on the Park

W5: Integrating Artificial Intelligence and Assistive Technology

Organizer: Rich Simpson
Capitol Room West, Inn on the Park

W6: Knowledge Sharing across Biological and Medical Knowledge Based Systems

Organizer: Gary Merrill and Dhiraj Pathak
Board Room, Inn on the Park

W10: Recommender Systems

Organizer: Henry Kautz
Capitol Room East, Inn on the Park

W11: Representations for Multi-Modal Human-Computer Interaction (2-day workshop)

Organizers: Syed Ali and Susan McRoy
Lower Level #1, Inn on the Park

W12: Software Tools for Developing Agents

Organizers: Brian Logan and Jeremy Baxter
Madison Room, Inn on the Park

W13: Textual Case-Based Reasoning

Organizers: Mario Lenz and Kevin Ashley
Lower Level #2, Inn on the Park

W14: Using AI for Knowledge Management and Business Process Reengineering

Organizer: Rose Gamble
Lower Level #3, Inn on the Park

Monday, July 27

W1: AI and Information Integration (1-1/2 day workshop)

Organizers: Craig Knoblock and Alon Levy
8:30 AM – 5:30 PM, University Room, Inn on the Park

W2: Case-Based Reasoning Integrations

Organizers: David Aha and Jody Daniels
Madison Room, Inn on the Park

W3: Functional Modeling and Teleological Reasoning

Organizer: Jon Sticklen
Lower Level #2, Inn on the Park

W7: Learning for Text Categorization

Jointly Sponsored by the International Conference on Machine Learning

Organizer: Mehran Sahami

Capitol Room East, Inn on the Park

W8: The Methodology of Applying Machine Learning: Problem Definition, Task Decomposition and Technique Selection

Jointly Sponsored by the International Conference on Machine Learning

Organizer: Robert Engels

Board Room, Inn on the Park

W9: Predicting the Future: AI Approaches to Time-Series Analysis

Jointly Sponsored by the International Conference on Machine Learning

Organizer: Andrea Danyluk

Lower Level #3, Inn on the Park

W11: Representations for Multi-Modal Human-Computer Interaction (2-day workshop)

Organizers: Syed Ali and Susan McRoy

Lower Level #1, Inn on the Park

W15: Verification & Validation of Knowledge-Based Systems

Organizer: Daniel O’Leary and Alun Preece

Capitol Room West, Inn on the Park

Friday, July 31

W4: The Grounding of Word Meaning: Data and Models

Jointly Sponsored by the Cognitive Science Society

Organizer: Michael Gasser

Capitol Ballroom A, the Madison Concourse Hotel

AAAI-98/IAAI-98 Invited Talks

All AAAI-98/IAAI-98 invited presentations will be held in the Madison Ballroom, fourth level, Monona Terrace Convention Center, unless otherwise noted.

Tuesday, July 28

9:00 – 10:00 AM

AAAI/Presidential Address: The Importance of Importance

David L. Waltz, NEC Research Institute

Introduction by Randall Davis (Past President, AAAI), MIT AI Lab

Human intelligence is shaped by what we care most about—the things that cause ecstasy, despair, pleasure, pain, terror, security, satisfaction, and other intense emotions. Any system we would consider truly intelligent will depend critically on the ability to separate the important from among the unimportant. This ability underlies such faculties as attention, focusing, situation and outcome assessment, priority setting, judgment, taste, goal selection, credit assignment, the selection of relevant memories and precedents, assessment of meaning and significance; all of these are important in learning from experience. AI has for the most part focused on logic and reasoning in artificial situations where only relevant variables and operators are specified, and has paid insufficient attention to processes of reducing the richness and disorganization of the real world to a form where logical reasoning can be applied. This talk will discuss the role of importance in intelligence, provide some examples of research that makes use of

Invited Talks

- importance judgments, and offer suggestions for new mechanisms, architectures, applications and research directions for AI.
- 10:30 – 11:30 AM *Invited Panel: Eight Cool Things from the Collocated Conferences*
Organizer: Charles Rich (AAAI-98 Program Cochair), MERL—A Mitsubishi Electric Research Laboratory
- The following eight organizations have chosen to hold their meetings in Madison contiguous with AAAI-98 this year: ILP '98, GP-98, SGA-98, COLT '98, ICML '98, UAI-98, ST&D98, and CogSci98. In honor of this special occasion, we have invited a chairperson from each of these conferences to join a panel to answer the following question: "What is the most important recent result/experiment/discovery in the area of your conference that the general AI audience doesn't know or understand or appreciate, but should (and why)?"
- 11:40 AM – 12:40 PM *Invited Talk: Learning Sparse Representations: Machine Learning, Machine Vision and the Brain*
Tomaso Poggio, Massachusetts Institute of Technology
- Learning is becoming the central problem in trying to understand intelligence and in trying to develop intelligent machines. Poggio will outline some of the recent efforts in the domain of vision to develop machines that learn and to understand the brain mechanisms of learning.
- 3:10 – 4:10 PM *Invited Talk: Modeling Satisfaction and Satisfactory Modeling: Modeling Problems So Constraint Engines Can Solve Them*
Eugene C. Freuder, University of New Hampshire
Introduction by David Waltz, NEC Research Institute
- A wide variety of problems can be modeled as constraint satisfaction (or optimization) problems. Once they are so modeled, powerful search and inference methods can be brought to bear. Modeling itself, however, presents a series of challenges. The ultimate challenge is to automate the modeling process.
- 4:30 – 6:00 PM Special AAAI-98 Outstanding Paper Session
The presentation of the three papers that have been recognized as the AAAI-98 Outstanding Papers will be combined into one special session in the invited talk track of the conference. The papers, listed alphabetically by first author, are:
- Learning Evaluation Functions for Global Optimization and Boolean Satisfiability
Justin A. Boyan and Andrew W. Moore, Carnegie Mellon University
- The Interactive Museum Tour-Guide Robot
Wolfram Burgard, Armin B. Cremers, Dieter Fox and Dirk Haehnel, University of Bonn; Gerhard Lakemeyer, University of Aachen; Dirk Schulz and Walter Steiner, University of Bonn; Sebastian Thrun, Carnegie Mellon University
- Acceleration Methods for Numeric CSPs
Yahia Lebbah and Olivier Lhomme, Ecole des Mines de Nantes (France)
- 4:30 – 5:30 PM *AAAI-98 Invited Panel: Hall of Champions*
Lecture Hall, Level 4, Monona Terrace Convention Center
Organizer: Dana Nau, University of Maryland
Panelists: David Fotland, Hewlett Packard; Jonathan Schaeffer, University of Alberta, Gerald Tesauro, IBM Research; and David Wilkins, SRI International

Wednesday, July 29

- 9:00 – 10:00 AM *Invited Talk:* How People Treat Computers Like Real People: Experimental Evidence of a New Paradigm
Clifford Nass, Stanford University
Introduction by Howard E. Shrobe, Massachusetts Institute of Technology
- This talk will describe a series of experimental studies that demonstrate that people apply the same social rules and expectations to computers that they apply to people. Areas to be discussed include politeness, personality, reciprocity, adaptation, gender, voice input and output, humor, and computer-mediated communication versus human-computer interaction.
- 10:30 – 11:30 AM *Invited Talk:* Real-World Scheduling Applications—
A Valuable Mine Field Where Search Algorithm Is Less
Important Than Representation and Usability
Monte Zweben, Entrepreneur-in-Residence, Institutional Venture Partners
& Matrix Partners
Introduction by James Crawford, iz Technologies
- After six years of commercially developing, marketing, selling, and deploying manufacturing scheduling systems, we learned that scheduling was nearly impossible to do generically. Yet companies that attempted to model in excessive detail generally failed, and those that planned more abstractly succeeded. A project was only successful if the key decision criteria was captured in the representation—an obvious point that was extraordinarily hard to execute.
- 11:40 AM – 12:40 PM *Invited Talk:* Structured Probabilistic Models:
Bayesian Networks and Beyond
Daphne Koller, Stanford University
Introduction by Eric Horvitz, Microsoft Corporation
- In recent years, Bayesian networks have had significant impact on many areas in AI, including diagnosis, planning, and learning. Koller describes this technology, and analyzes the reasons behind its success, suggesting that the use of structured model-based representations is one crucial component. These insights lead to richer probabilistic representations that can model significantly more complex domains, involving many components that interact and evolve over time. Koller argues that these representations can help us build agents that reason and act in complex uncertain environments.
- 2:00 – 3:00 PM *Invited Talk:* AI in Medicine: The Spectrum of Challenges from Managed
Care to Molecular Medicine
Russ B. Altman, Stanford University
Introduction by Bruce G. Buchanan, University of Pittsburgh
- AI has embraced medical applications from its inception, and some of the earliest work in successful application of AI technology occurred in medical contexts. Medicine in the twenty first century will be very different than medicine in the late twentieth century. Fortunately, the technical challenges to AI that emerge are very similar, and the prospects for success are high.
- 3:10 – 4:10 PM *Invited Talk:* “Every Time I Fire a Linguist, My Performance Goes Up,” and
Other Myths of the Statistical Natural Language Processing Revolution
Julia Hirschberg, AT&T Labs — Research
Introduction by Martha Pollack, University of Pittsburgh

Invited Talks

In the past two decades, natural language processing has experienced a revolution, from rule-based symbolic approaches to statistical, corpus-based techniques—with remarkable success in applications such as machine translation, automatic speech recognition, and text-to-speech. But there are signs that this revolution may be finding its limits, signs this talk will explore.

4:30 – 6:00 PM

Invited Panel: Science Fiction Writers Read the Futures of AI

Organizer: David Miller, KISS Institute for Practical Robotics

Panelists: Greg Benford, University of California, Irvine; James Hogan; and Sarah Zettel

Visionary science fiction authors are the prophets of AI. Unencumbered by the burden of having to implement anything, they construct vivid images of where our work might lead—the good, bad, and ugly. They inspire and warn, challenge and scold, excite and lampoon, tickle and scare. They ask questions we need to think about.

In this panel, some science fiction authors will articulate their best hopes, worst fears, and most interesting predictions about AI and its role in (future?) society. The ensuing discussion will attempt to raise our consciousness by discussing future issues the field of AI will need to consider as AI advances in its capabilities and pervasiveness.

Thursday, July 30

9:00 – 10:00 AM

Invited Talk: When and Where Will AI Meet Robotics?

Issues in Representation

Ruzena Bajcsy, University of Pennsylvania

Introduction by Reid Simmons, Carnegie Mellon University

In the early days of AI, robotics was an integral part of our research effort. In the early 1970s, all major AI laboratories had research programs in robotics. However, by the late 1970s, robotics took its own course separate from the core activities of AI. In this presentation, Bajcsy explores the common issue that is pertinent to both AI and robotics, the issue of representation.

10:30 – 11:30 AM

Invited Talk: Experiments in Musical Intelligence

David Cope, University of California, Santa Cruz

Musical works contain code about the processes and influences that created them. The computer program Experiments in Musical Intelligence attempts to decipher this code and create new but stylistically-faithful music. Examples of output will be performed, followed by a discussion of how these principles can transfer to other media.

11:40 AM – 12:40 PM

Invited Panel: Evaluating Representations of Common Sense

Organizer: Douglas B. Lenat, CYCORP

Panelists: Ken Forbus, Northwestern University; Leora Morgenstern, IBM T.J. Watson Research Center; and Erik Mueller, Signiform

Everyone knows that horses have heads, babies want milk, unsupported objects fall, falling eggs break, and so forth. To use such knowledge, our programs manipulate representations of them. But by what criteria should we evaluate various representations of common sense knowledge? How should we evaluate the different contradictory criteria for evaluating representations.

Innovative Applications of Artificial Intelligence

All IAAI-98 sessions will be held in the Lecture Hall on the fourth level of the Monona Terrace Convention Center. Monday's schedule is listed below. The remainder of the papers will be presented in parallel with the AAAI-98 technical program on Tuesday, July 28 and Wednesday, July 29. Please refer to the daily schedule on the following pages for times.

(*D*): deployed application; (*E*): emerging application

- 8:45 – 9:00 AM Opening Remarks
Bruce Buchanan, IAAI-98 Conference Chair
- 9:00 – 10:00 AM Automated Intelligent Pilots for Combat Flight Simulation (*D*)
Randolph M. Jones, John E. Laird, and Paul E. Nielsen
- A New Technique Enables Dynamic Replanning and Rescheduling of
Aeromedical Evacuation (*D*)
Alexander Kott, Victor Saks and Albert Mercer
- 10:00 – 10:30 AM Coffee Break
- 10:30 – 11:30 AM Intelligent Control of Life Support Systems for Space Habitats (*E*)
Debra Schreckenghost, Daniel Ryan, Carroll Thronesbery, Peter Bonasso,
and Daniel Poirot
- Knowledge-Based Avoidance of Drug-Resistant HIV Mutants (*D*)
Richard H. Lathrop, Nicholas R. Steffen, Miriam P. Raphael, Sophia Deeds-
Rubin, Michael J. Pazzani, Paul J. Cimoch, Darryl M. See, and
Jeremiah G. Tilles
- 11:40 AM – 12:40 PM The NASD Regulation Advanced Detection Systems (ADS) (*D*)
J. Dale Kirkland, Ted E. Senator, James J. Hayden, Tom Dybala,
Henry G. Goldberg, and Ping Shyr
- Countrywide Automated Property Evaluation System—CAPES (*D*)
Ingemar A. E. Hulthage and Iain Stobic
- 12:40 – 2:00 PM Lunch Break
- 2:00 – 3:00 PM Success in Spades: Using AI Planning Techniques to Win the World
Championship of Computer Bridge (*D*)
Stephen J. J. Smith, Dana S. Nau, and Thomas A. Throop
- Control Strategies in HTN Planning: Theory Versus Practice (*E*)
Dana S. Nau, Stephen J.J. Smith, and Kutluhan Erol
- 3:10 – 4:10 PM Producing BT's Yellow Pages with Formation (*D*)
Gail Anderson, Andrew Casson-du Mont, Ann Macintosh, Robert Rae,
and Barry Gleeson
- ANSWER: Network Monitoring Using Object-Oriented Rules (*D*)
Gary M. Weiss, Johannes P. Ros, and Anoop Singhal
- 4:10 – 4:30 PM Coffee Break
- 4:30 – 5:30 PM Turbine Engine Diagnostics (TED): An Expert Diagnostic System
for the M1 Abrams Turbine Engine (*D*)
Richard Helfman, Ed Baur, John Dumer, Tim Hanratty, and
Holly Ingham
- Using Artificial Intelligence Planning to Automate SAR Image Processing
for Scientific Data Analysis (*D*)
Forest Fisher, Steve Chien, Edisanter Lo, and Ronald Greeley

7/28

8:45 - 10:00 AM

Madison Ballroom

Welcome and Opening Remarks
Jack Mostow and Charles Rich, AAI-98 Program Cochairs

Presidential Address
The Importance of Importance
David L. Waltz, NEC Research Institute
Introduction by Randall Davis

Madison Ballroom C



Madison Ballroom D

Hall of Ideas E & F

Hall of Ideas H & I

Lecture Hall

AAAI-98
 &
IAAI-98
Technical Sessions

Tuesday, July 28 10:00 - 10:30 Coffee Break

10:30 - 11:30 AM

Invited Panel
Eight Cool Things from the Collocated Conferences
Organizer: Charles Rich (AAAI-98 Program Cochair), MERL—A Mitsubishi Electric Research Laboratory

Panelists: David Page (ILP), John Koza (GP), David Goldberg (SGA), Peter Bartlett (COLT), Jude Shavlik (ICML), Greg Cooper (UAI), Arthur Graesser (ST&D), and Sharon Derry (COG SCI)

Integrated AI Systems: Planning and Problem Solving
Session Chair: Milind Tambe

TRIPS: An Integrated Intelligent Problem-Solving Assistant
George Ferguson and James F. Allen

Integrating AI Components for a Military Planning Application
Marie A. Bienkowski and Louis J. Hoebel

Learning
Session Chair: Lars Asker

Iterated Phantom Induction: A Little Knowledge Can Go a Long Way
Mark Brodie and Gerald DeJong

SUSTAIN: A Model of Human Category Learning
Bradley C. Love and Douglas L. Medin

KR for Robotics
Session Chair: Wolfram Burgard

A Formal Methodology for Verifying Situated Agents
Phan Minh Dung

An Algebra for Cyclic Ordering of 2D Orientations
Amar Isli and Anthony G. Cohn

Plan Recognition
Session Chair: Diane Litman

Needles in a Haystack: Plan Recognition in Large Spatial Domains Involving Multiple Agents
Mark Devaney and Ashwin Ram

Acquisition of Abstract Plan Descriptions for Plan Recognition
Mathias Bauer

11:40 AM - 12:40 PM

Invited Talk
Learning Sparse Representations: Machine Learning, Machine Vision and the Brain
Tomaso Poggio, Massachusetts Institute of Technology

Modeling the Web
Session Chair: Shlomo Zilberstein

What Can Knowledge Representation Do for Semi-Structured Data?
Diego Calvanese, Giuseppe De Giacomo and Maurizio Lenzerini

Modeling Web Sources for Information Integration
Craig A. Knoblock, Steven Minton, Jose Luis Ambite, Naveen Ashish, Pragnesh Jay Modi, Ion Muslea, Andrew G. Philpot, and Sheila Tejada

Parallel AI / Agents and Representation
Session Chair: Matthew Evett

Natural Language Multiprocessing: A Case Study
Enrico Pontelli, Gopal Gupta, Janyce Wiebe and David Farwell

Metacognition in Software Agents Using Classifier Systems
Zhaohua Zhang, Stan Franklin and Dipankar Dasgupta

Integrated AI Systems/ Evolvable Hardware
Session Chair: Justinian Rosca

BIG: A Resource-Bounded Information Gathering Agent
Victor Lesser, Bryan Horling, Frank Klausner, Anita Raja, Thomas Wagner and Shelley XQ. Zhang

Evolvable Hardware Chip for High Precision Printer Image Compression
Hidenori Sakanashi, Mehrdad Salami, Masaya Iwata, Shogo Nakaya, Tsukasa Yamauchi, Takeshi Inuo, Nobuki Kajihara, and Tetsuya Higuchi

Graph Plan
Session Chair: Jim Blythe

Conformant Graphplan
David E. Smith and Daniel S. Weld

Extending Graphplan to Handle Uncertainty & Sensing Actions
Daniel S. Weld, Corin R. Anderson, and David E. Smith

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Hybrid Knowledge Based System for Automatic Classification of B-scan Images from Ultrasonic Rail Inspection (E)
J. Jarmulak, E. J. H. Kerckhoffs, and P. P. van't Veer

Expert System Technology for Nondestructive Waste Assay (E)
J. C. Determan and G. K. Becker

2:00 – 3:00 PM

Invited Talk

To be Announced

**Integrated AI Systems:
Intelligent Environments**

Session Chair: Pandurang Nayak

Design Principles for Intelligent Environments
Michael H. Coen

Cooperating with People: The Intelligent Classroom
David Franklin

Planning

Session Chair: Craig Boutilier

Improving Big Plans
Neal Lesb, Nathaniel Martin and James Allen

Controlling Communication in Distributed Planning Using Irrelevance Reasoning
Michael Wolverton and Marie desJardins

Information Extraction I

Session Chair: Marti Hearst

Answering Questions for an Organization Online
Vladimir A. Kulyukin, Kristian J. Hammond and Robin D. Burke

Towards Text Knowledge Engineering
Udo Hahn and Klemens Schmattinger

Fuzzy Logic

Session Chair: John Yen

Logical Representation and Computation of Optimal Decisions in a Qualitative Setting
Didier Dubois, Daniel Le Berre, Henri Prade, and Régis Sabbadin

A Fuzzy Description Logic
Umberto Straccia

3:10 – 4:10 PM

Invited Talk

Modeling Satisfaction and Satisfactory Modeling: Modeling Problems So Constraint Engines Can Solve Them

*Eugene C. Freuder, University of New Hampshire
Introduction by David L. Waltz*

Intelligent Tutoring

Session Chair: Eric Horvitz

Generating Coordinated Natural Language and 3D Animations for Complex Spatial Explanations

Stuart G. Towns, Charles B. Callaway and James C. Lester

Procedural Help in Andes: Generating Hints Using a Bayesian Network Student Model
Abigail S. Gertner, Cristina Conati and Kurt Van-Lehn

Reinforcement Learning

Session Chair: Sven Koenig

Applying Online Search Techniques to Continuous-State Reinforcement Learning
Scott Davies, Andrew Y. Ng, and Andrew Moore

Bayesian Q-Learning
Richard Dearden, Nir Friedman and Stuart Russell

Information Extraction II

Session Chair: Nicholas Kushmerick

Learning to Extract Symbolic Knowledge from the World Wide Web
Mark Craven, Dan DiPasquo, Dayne Freitag, Andrew McCallum, Tom Mitchell, Kamal Nigam and Seán Slattery

Information Extraction from HTML: Application of a General Machine Learning Approach
Dayne Freitag

Nonmonotonic Reasoning

Session Chair: Leora Morgenstern

Fixpoint 3-Valued Semantics for Autoepistemic Logic
Marc Denecker, Victor Marek and Miroslaw Truszczyński

Reducing Query Answering to Satisfiability in Nonmonotonic Logics
Riccardo Rosati

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A Prototype Application of Fuzzy Logic and Expert Systems in Education Assessment (E)
James R. Nolan

Bayesian Network Models for Generation of Crisis Management Training Scenarios (E)
Eugene Grois, William H. Hsu, Mikhail Voloshin and David C. Wilkins

4:30 – 6:00 PM

AAAI-98 Outstanding Paper Session

Session Chair: Jack Mostow

Learning Evaluation Functions for Global Optimization and Boolean Satisfiability
Justin A. Boyan and Andrew W. Moore

The Interactive Museum Tour-Guide Robot
Wolfram Burgard, Armin B. Cremers, Dieter Fox, Dirk Häbnel, Gerhard Lakemeyer, Dirk Schulz, Walter Steiner, and Sebastian Thrun

Acceleration Methods for Numeric CSPs
Yahia Lebbah and Olivier Hlhomme

Graphical Probabilistic Models

Session Chair: Peter Haddawy

Structured Representation of Complex Stochastic Systems
Nir Friedman, Daphne Koller and Avi Pfeffer

Solving Very Large Weakly Coupled Markov Decision Processes
N. Meuleau, M. Hauskrecht, K. Kim, L. Peshkin, L. Kaelbling, T. Dean, and C. Boutilier

Speech Recognition with Dynamic Bayesian Networks
Geoffrey Zweig and Stuart Russell

KR: KB Design

Session Chair: Mukesh Dalal

Usability Issues in KR Systems
Deborah L. McGuinness and Peter Patel-Schneider

Representing Scientific Experiments: Implications for Ontology Design and Knowledge Sharing
Natalya Fridman Noy and Carole D. Hafner

OKBC: A Programmatic Foundation for Knowledge Base Interoperability
Vinay K. Chaudhri, Adam Farquhar, Richard Fikes, Peter D. Karp and James P. Rice

Model Construction and Analysis

Session Chair: Gautam Biswas

Multimodal Reasoning for Automatic Model Construction
Reinhard Stolle and Elizabeth Bradley

Discovering Admissible Simultaneous Equations of Large Scale Systems
Takashi Washio and Hiroshi Motoda

Decompositional, Model-Based Learning and its Analogy to Diagnosis
Brian C. Williams and William Millar

Theorem Proving

Session Chair: Neelakantan Kartha

An Algorithm to Evaluate Quantified Boolean Formulae
Marco Cadoli, Andrea Giovanardi and Marco Schaerf

Two Forms of Dependence in Propositional Logic: Controllability and Definability
Jérôme Lang and Pierre Marquis

Anytime Approximate Modal Reasoning
Fabio Massacci

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Hall of Champions Panel: AI Game-Playing Techniques: Are They Useful for Anything Other than Games?

*Organizer: Dana Nau, University of Maryland
Panelists: David Fotland, Hewlett Packard; Jonathan Schaeffer, University of Alberta; Gerald Tesauro, IBM Research; and David Wilkins, SRI International*

7/29	9:00 – 10:00 AM	10:30 – 11:30 AM	11:40 ⁷ / ₈ – 12:40 PM
Madison Ballroom A & B	Invited Talk How People Treat Computers Like Real People: Experimental Evidence of a New Paradigm <i>Clifford Nass, Stanford University</i> <i>Introduction by Howard E. Shrobe</i>	Invited Talk Real-World Scheduling Applications—A Valuable Mine Field Where Search Algorithm Is Less Important Than Representation and Usability <i>Monte Zueben, Entrepreneur-in-Residence, Institutional Venture Partners & Matrix Partners</i> <i>Introduction by James Crawford</i>	Invited Talk Structured Probabilistic Models: Bayesian Networks and Beyond <i>Daphne Koller, Stanford University</i> <i>Introduction by Eric Horvitz</i>
Madison Ballroom C	Agent Interaction <i>Session Chair: Tuomas Sandholm</i> Optimal Auctions Revisited <i>Dov Monderer and Moshe Tennenholtz</i> Minimal Social Laws <i>David Fitoussi and Moshe Tennenholtz</i>	Natural Language Generation — Argumentation <i>Session Chair: James Lester</i> Hermes: Supporting Argumentative Discourse in Multi-Agent Decision Making <i>Nikos Karacapilidis and Dimitris Papadias</i> Bayesian Reasoning in an Abductive Mechanism for Argument Generation and Analysis <i>Ingrid Zukerman, Richard McConachy and Kevin B. Korb</i>	Natural Language Generation <i>Session Chair: Daniel Marcu</i> Generating Inference-Rich Discourse through Revisions of RST-Trees <i>Helmut Horacek</i> Machine Learning of Generic and User-Focused Summarization <i>Inderjeet Mani and Eric Bloedorn</i>
Madison Ballroom D	Reinforcement Learning <i>Session Chair: Tom Dietterich</i> The Dynamics of Reinforcement Learning in Cooperative Multiagent Systems <i>Caroline Claus and Craig Boutilier</i> Tree Based Discretization for Continuous State Space Reinforcement Learning <i>William R. B. Uther and Manuela M. Veloso</i>	Learning from Sequences <i>Session Chair: Andrea Danyluk</i> Feature Generation for Sequence Categorization <i>Daniel Kuzenko and Haym Hirsh</i> Concepts from Time Series <i>Michael T. Rosenstein and Paul R. Cohen</i>	Time and Representation <i>Session Chair: Takashi Washio</i> The Temporal Analysis of Chisholm's Paradox <i>Leendert W. N. van der Torre and Yao-Hua Tan</i> Temporal Reasoning with Qualitative and Quantitative Information about Points and Durations <i>Rattana Wetprasit and Abdul Sattar</i>
Hall of Ideas E & F	Plan Efficiency <i>Session Chair: David Wilkins</i> Inferring State Constraints for Domain-Independent Planning <i>Alfonso Gerevini and Lenhart Schubert</i> Analyzing External Conditions to Improve the Efficiency of HTN Planning <i>Reiko Tsuneto, James Hendler and Dana Nau</i>	Analysis of Search <i>Session Chair: Brian Drabble</i> The Branching Factor of Regular Search Spaces <i>Siefan Edelkamp and Richard E. Korf</i> Complexity Analysis of Admissible Heuristic Search <i>Richard E. Korf and Michael Reid</i>	Random Approaches to Search <i>Session Chair: Robert Schrag</i> Boosting Combinatorial Search through Randomization <i>Carla P. Gomes, Bart Selman and Henry Kautz</i> Which Search Problems Are Random? <i>Tad Hogg</i>
Hall of Ideas H & I	Constraint Satisfaction Problems <i>Session Chair: Eugene Freuder</i> "Squeaky Wheel" Optimization <i>David E. Joslin and David P. Clements</i> Reversible DAC and Other Improvements for Solving Max-CSP <i>Javier Larrosa, Pedro Meseguer, Thomas Schiex, and Gérard Verfaillie</i>	Frameworks for Plan Generation <i>Session Chair: Reid Simmons</i> Automatic OBDD-Based Generation of Universal Plans in Non-Deterministic Domains <i>Alessandro Cimatti, Marco Roveri and Paolo Traverso</i> Hybrid Planning for Partially Hierarchical Domains <i>Subbarao Kambhampati, Amol Mali and Biplav Srivastava</i>	Planning as Satisfiability <i>Session Chair: Subbarao Kambhampati</i> Act, and the Rest Will Follow: Exploiting Determinism in Planning as Satisfiability <i>Enrico Giunchiglia, Alessandro Massarotto, and Roberto Sebastiani</i> Using Caching to Solve Larger Probabilistic Planning Problems <i>Stephen M. Majercik and Michael L. Littman</i>
Lecture Hall			IAAI-98 Multi Machine Scheduling: An Agent-Based Approach (D) <i>Rama Akkinaju, Pinar Keskinocak, Sesh Murthy and Frederick Wu</i> Realtime Constraint-Based Cinematography for Complex Interactive 3D Worlds (E) <i>William H. Bares, Joël P. Grégoire and James C. Lester</i>

10:00 – 10:30 Coffee Break
 Wednesday, July 29

2:00 – 3:00 PM

Invited Talk

AI in Medicine: The Spectrum of Challenges from Managed Care to Molecular Medicine
Russ B. Altman, Stanford University
Introduction by Bruce G. Buchanan

Grammar and Language

Session Chair: Eric Brill
A Sampling-Based Heuristic for Tree Search Applied to Grammar Induction
Hugues Juillé and Jordan B. Pollack
Ambiguity and Constraint in Mathematical Expression Recognition
Erik G. Miller and Paul A. Viola

Qualitative Reasoning Techniques

Session Chair: Richard Doyle
Qualitative Analysis of Distributed Physical Systems with Applications to Control Synthesis
Christopher Bailey-Kellogg and Feng Zhao
Qualitative Simulation as a Temporally-Extended Constraint Satisfaction Problem
Daniel J. Clancy and Benjamin J. Kuipers

Uncertainty Search and Optimization

Session Chair: Nir Friedman
Fast Probabilistic Modeling for Combinatorial Optimization
Shumeet Baluja and Scott Davies
Highest Utility First Search Across Multiple Levels of Stochastic Design
Louis Steinberg, J. Storrs Hall and Brian D. Davison

Constraint Satisfaction Problems — Understanding Intractability

Session Chair: Tad Hogg
Hard Problems for CSP Algorithms
David G. Mitchell
The Constrainedness Knife-Edge
Toby Walsh

3:10 – 4:10 PM

Invited Talk

“Every Time I Fire a Linguist, My Performance Goes Up,” and Other Myths of the Statistical Natural Language Processing Revolution
Julia Hirschberg, AT&T Labs – Research
Introduction by Martha Pollack

Robot Navigation

Session Chair: Leslie Kaelbling
Position Estimation for Mobile Robots in Dynamic Environments
Dieter Fox, Wolfram Burgard, Sebastian Thrun, and Armin B. Cremers
Integrating Topological and Metric Maps for Mobile Robot Navigation: A Statistical Approach
Sebastian Thrun, Jens-Steffen Gutmann, Dieter Fox, Wolfram Burgard and Benjamin J. Kuipers

Qualitative Modeling

Session Chair: Dan Clancy
An Ontology for Transitions in Physical Dynamic Systems
Pieter J. Mosterman, Feng Zhao, and Gautam Biswas
A New Architecture for Automated Modelling
Neil Smith

Search and Limited Resources

Session Chair: Sven Koenig
A* with Bounded Costs
Brian Logan and Natasha Alechina
Stochastic Node Caching for Memory-Bounded Search
Terubisa Miura and Toru Ishida

Constraint Satisfaction Problems

Session Chair: David Smith
Generalizing Partial Order and Dynamic Backtracking
Christian Bliet
Supermodels and Robustness
Matthew L. Ginsberg, Andrew J. Parkes and Amitabha Roy

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An Expert System for Alarm System Planning (E)
Akira Tsurushima, Kenji Urushima, Daigo Sakata, Hiroyuki Date, Masatomo Nakata, Yoshinobu Adachi and Kazuhisa Takahashi
Warfighter’s Information Packager (E)
Yigal Arens, Weixiong Zhang, Yongwon Lee, Jon Dukes-Schlossberg, and Marc Zev

4:30 – 6:00 PM

Invited Panel

Science Fiction Writers Read the Futures of AI
Organizer: David Miller, KISS Institute for Practical Robotics
Panelists: Greg Benford, University of California, Irvine; James Hogen; and Sarah Zettel

Temporal Reasoning

Session Chair: James Crawford
Backtracking Algorithms for Disjunctions of Temporal Constraints
Kostas Stergiou and Manolis Koubarakis
Fast Transformation of Temporal Plans for Efficient Execution
Ioannis Tsamardinou, Nicola Muscettola and Paul Morris

Understanding Sound

Session Chair: Ian Horswill
The Role of Data Reprocessing in Complex Acoustic Environments
Frank Klassner, Victor Lesser, and Hamid Nawab
Sound Ontology for Computational Auditory Scene Analysis
Tomohiro Nakatani and Hiroshi G. Okuno

GA Applications

Session Chair: Richard Belew
Optimal 2D Model Matching Using a Messy Genetic Algorithm
J. Ross Beveridge
Learning Cooperative Lane Selection Strategies for Highways
David E. Moriarty and Pat Langley

Belief Revision and Inconsistency

Session Chair: David Poole
Reasoning under Inconsistency Based on Implicitly-Specified Partial Qualitative Probability Relations: A Unified Framework
S. Benferhat, D. Dubois, J. Lang, H. Prade, A. Saffiotti and P. Smets
Belief Revision with Unreliable Observations
Craig Boutilier, Nir Friedman, and Joseph Y. Halpern

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Split Up: The Use of an Argument Based Knowledge Representation to Meet Expectations of Different Users for Discretionary Decision Making (E)
Andrew Stranieri and John Zelezniuk
Conversation Machines for Transaction Processing (E)
Wlodek Zadrozny, Catherine Wolf, Nanda Kambhatla and Yiming Ye

7/30	9:00 – 10:00 AM		10:30 – 11:30 AM	
Madison Ballroom A & B	Invited Talk When and Where Will AI Meet Robotics? Issues in Representation <i>Ruzena Bajcsy, University of Pennsylvania</i> <i>Introduction by Reid Simmons</i>	Invited Talk Experiments in Musical Intelligence <i>David Cope, University of California, Santa Cruz</i>	Invited Panel Evaluating Representations of Common Sense <i>Organizer: Douglas B. Lenat, CYCORP</i> <i>Panelists: Ken Forbus, Northwestern University; Leora Morgenstern, IBM T.J. Watson Research Center; and Erik Mueller, Signiform</i>	
	Madison Ballroom C		Heuristic Search <i>Session Chair: Foster Provost</i> Heuristic Search in Cyclic AND / OR Graphs <i>Eric A. Hansen and Shlomo Zilberstein</i> Single-Agent Search in the Presence of Deadlocks <i>Andreas Junghanns and Jonathan Schaeffer</i> Complete Anytime Beam Search <i>Weixiong Zhang</i>	
Madison Ballroom D	Formal Models of Agents' Commitments <i>Session Chair: Jonathan Gratch</i> Leveled Commitment Contracts with Myopic and Strategic Agents <i>Martin R. Andersson and Tuomas W. Sandholm</i> Anytime Coalition Structure Generation with Worst Case Guarantees <i>Tuomas Sandholm, Kate Larson, Martin Andersson, Onn Shehory, and Fernando Tohmé</i>	Social Agents <i>Session Chair: Tuomas Sandholm</i> Agents that Work in Harmony by Knowing and Fulfilling their Obligations <i>Mihai Barbucaanu</i> What Is Wrong With Us? Improving Robustness through Social Diagnosis <i>Gal A. Kaminka and Milind Tambe</i>	Agents: Motivation and Emotion <i>Session Chair: Pete Bonasso</i> A Motivational System for Regulating Human-Robot Interaction <i>Cynthia Breazeal (Ferrell)</i> Emotion Model for Life-Like Agent and Its Evaluation <i>Hirohide Ushida, Yuji Hirayama and Hiroshi Nakajima</i> When Robots Weep: Emotional Memories and Decision-Making <i>Juan D. Velásquez</i>	
Hall of Ideas E & F	Plan Execution <i>Session Chair: Jeff Rickel</i> Managing Multiple Tasks in Complex, Dynamic Environments <i>Michael Freed</i> Maintaining Consistency in Hierarchical Reasoning <i>Robert E. Wray, III and John Laird</i>	Representation of Action <i>Session Chair: Neelakantan Kartha</i> An Action Language Based on Causal Explanation: Preliminary Report <i>Enrico Giunchiglia and Vladimir Lifschitz</i> Abductive Planning with Sensing <i>Matthew Stone</i>	Design and Diagnosis <i>Session Chair: Ethan Scarl</i> Toward Design as Collaboration <i>Susan L. Epstein</i> An Architecture for Exploring Large Design Spaces <i>John R. Josephson, B. Chandrasekaran, Mark Carroll, Naresh Iyer, Bryon Wasacz, Giorgio Rizzoni, Qingyuan Li, and David A. Erb</i> Constructing the Correct Diagnosis When Symptoms Disappear <i>Nancy E. Reed</i>	
Hall of Ideas H & I	Game Playing <i>Session Chair: Susan Epstein</i> Opponent Modeling in Poker <i>Darse Billings, Denis Papp, Jonathan Schaeffer and Duane Szafron</i> Finding Optimal Strategies for Imperfect Information Games <i>Ian Frank, David Basin, and Hitoshi Matsubara</i>	Constraint Satisfaction Problems <i>Session Chair: David Etherington</i> Using Arc Weights to Improve Iterative Repair <i>John Thornton and Abdul Sattar</i> Extending GENET to Solve Fuzzy Constraint Satisfaction Problems <i>Jason H. Y. Wong and Ho-fung Leung</i>	Constraint Satisfaction Problems <i>Session Chair: Stephen Smith</i> Branch and Bound Algorithm Selection by Performance Prediction <i>Lionel Lobjois and Michel Lemaître</i> An Integer Local Search Method with Application to Capacitated Production Planning <i>Joachim P. Walsler, Ramesh Iyer and Narayan Venkatasubramanian</i>	
Lecture Hall	Constraint Satisfaction Problems — Local Search <i>Session Chair: Russell Greiner</i> Local Search for Statistical Counting <i>Olivier Bailleur</i> A Tractable Walsh Analysis of SAT and Its Implications for Genetic Algorithms <i>Sonaya Rana, Robert B. Heckendorn and Darrell Whitley</i>	Search Control in Theorem Proving <i>Session Chair: Eric Horvitz</i> A Feature-Based Learning Method for Theorem Proving <i>Matthias Fuchs</i> Learning Investment Functions for Controlling the Utility of Control Knowledge <i>Oleg Ledeniov and Shaull Markovitch</i>	Learning in Natural Language <i>Session Chair: Andy Kehler</i> Learning to Classify Text from Labeled and Unlabeled Documents <i>Kamal Nigam, Andrew McCallum, Sebastian Thrun and Tom Mitchell</i> Knowledge Lean Word—Sense Disambiguation <i>Ted Pedersen and Rebecca Bruce</i> Learning to Resolve Natural Language Ambiguities: A Unified Approach <i>Dan Roth</i>	

10:00 – 10:30 Coffee Break
 Thursday, July 30

1:10 – 2:00 Lunch Break

Thursday, July 30

12:45 – 1:15 AAAI Annual Business Meeting

2:00 – 3:30 PM

3:30 – 3:45 PM

Closing Remarks

Jack Mostow and Charles Rich,
AAAI-98 Program Cochairs

Inductive Learning

Session Chair: Mebran Sahami

Boosting in the Limit: Maximizing the Margin
of Learned Ensembles

Adam J. Grove and Dale Schuurmans

Boosting Classifiers Regionally

Richard Maclin

Robust Classification Systems for Imprecise
Environments

Foster Provost and Tom Fawcett

Tractable Inference

Session Chair: Peter F. Patel-Schneider

Algorithms for Propositional KB

Approximation

Yacine Boufekhad

A Non-Deterministic Semantics for Tractable
Inference

James M. Crawford and David W. Etherington

Computing Intersections of Horn Theories for
Reasoning with Models

Thomas Eiter, Toshibide Ibaraki, and Kazuhisa
Makino

Human-Robot Interaction

Session Chair: Ken Forbus

Alternative Essences of Intelligence

R. Brooks, C. Breazeal, R. Irie, C. Kemp, M. Mar-
janovic, B. Scassellati and M. Williamson

Eye Finding Via Face Detection for a Foveated
Active Vision System

Brian Scassellati

Template-Based Recognition of Pose and
Motion Gestures on a Mobile Robot

S. Waldherr, S. Thrun, R. Romero and
D. Margaritis

Constraint Satisfaction Problems

Session Chair: Thomas Schiex

On the Conversion between Non-Binary and
Binary Constraint Satisfaction Problems

Fabien Bacchus and Peter van Beek

On the Computation of Local
Interchangeability in Discrete Constraint
Satisfaction Problems

Berthe Y. Choueiry and Guevara Noubir

A Fast Algorithm for the Bound Consistency
of AllDiff Constraints

Jean-Francois Puget

Learning about People

Session Chair: Michael Wolverton

Recommendation as Classification: Using
Social and Content-Based Information in
Recommendation

Chumki Basu, Haym Hirsh, and William Cohen

Learning to Predict User Operations for Adap-
tive Scheduling

Melinda T. Gervasio, Wayne Iba and Pat Langley

Adaptive Web Sites: Automatically Synthesiz-
ing Web Pages

Mike Perkowitz and Oren Etzioni

Exhibit Program

Exhibition

The exhibition will be held in the Exhibit Hall on the first level of the Monona Terrace Convention Center, Tuesday, July 28 through Thursday, July 30. Admittance is restricted to badged conference attendees. Vendor-issued guest passes must be redeemed at the Exhibitor Registration Counter, at Lakeside Commons in the foyer of the exhibit hall, on the first level of the Monona Terrace Convention Center. Further information regarding access to the Exhibition can be obtained from the Exhibitor Registration Desk.

Exhibit Hours

Tuesday, July 28	10:00 AM – 6:00 PM
Wednesday, July 29	12:00 PM – 4:00 PM 6:00 PM – 10:00 PM
Thursday, July 30	10:00 AM – 2:00 PM

Exhibitors

- AAAI Press
- ACM
- ActivMedia Robotics
- Brightware, Inc.
- Elsevier Science
- Franz, Inc.
- Harlequin Inc.
- IEEE Computer Society
- Kluwer Academic Publishers
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- Numan Intelligence
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Booth #401

AAAI Press

445 Burgess Drive
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Tel: (650) 328-3123
Fax: (650) 321-4457
Email: info@aaai.org

Booth #306

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Booth #107

ActivMedia Robotics

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Pioneer Robots will be plentiful at AAAI-98. Visit ActivMedia Robotics to learn more about the craftsmanship, accessories, software, docs and support that make these platforms such a popular base for AI research. Come see the Pioneer AT climb mountains! See the classy new PTZ Robotic Camera in action—plus a sneak preview of what's in the pipeline for Pioneer this fall! Oh, yes, and there will be more of the ever-popular Pioneer T-shirts.

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Booth #102

Elsevier Science

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Visit the Elsevier Science booth for an online demonstration of the journal *Artificial Intelligence's* electronic features—including the *new* mega index—and see how easily you can access the latest research results in the field. Of course, you can also browse through a wide range of our books and journals on display. Collect free sample copies of the journals of your choice or take

advantage of the special 20% discount on all book titles! Our staff will be happy to assist you and we look forward to meeting you there.

Booth #300

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Booth # 206

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Harlequin will be demonstrating our complete line of advanced software development tools. Our Common Lisp solutions are unsurpassed, including LispWorks for the Windows operating system, LispWorks for workstations, and Liquid Common Lisp (formerly Lucid Common Lisp). New CORBA interfaces support Lisp development of components for distributed environments. Harlequin will also be showing Harlequin Dylan, the new dynamic object-oriented language for the Windows Platform, as well as MLWorks, the commercial implementation of Standard ML for UNIX and Windows.

Booth #203

IEEE Computer Society

10662 Los Vaqueros Circle
Los Alamitos, CA 90720
Tel: (714) 821-8380

IEEE Computer Society, one of the most prestigious professional associations in the world, serves its members through numerous publications, conferences, and workshops. Membership information and complimentary copies of *Computer and IEEE Intelligent Systems* (formerly *IEEE Expert*) magazines will be available. Some of our latest book releases, including *The Pattern Recognition Basis of Artificial Intelligence*, by Donald Tsveter; *Mathematical Methods in Artificial Intelligence*, by Edward Bender; and *Stiquito: Advanced Experiments with a Simple and Inexpensive Robot*, by James M. Conrad and Jonathan W. Mills (book includes robot kit) are on sale. We will have live demonstrations of Stiquito each day.

Booth #207

Kluwer Academic Publishers

101 Philip Drive
Norwell, MA 02061
Tel: (617) 871-6600
Fax: (617) 871-6528
Email: kluwer@wkap.com
On-line Catalog: www.wkap.nl

Kluwer Academic Publishers invites you to visit our display of the premier journals in the Artificial Intelligence area. We are proud to announce the inaugural issue of our new journal *Autonomous Agents and Multi-agent Systems* edited by Nicholas Jennings, Katia Sycara, and Michael Georgeff. Free sample copies of all journals are available.

Booth #106

MacroVu, Inc.

321 High School Road Box 366
Bainbridge Island, WA 98110
Tel: (415) 775-7377
Fax: (415) 775-7377

Can Computers Think? The Issue Map Series: Seven large, full-color argumentation maps visually present the history of the 50-year machine intelligence debate. The maps summarize each contribution (more than 800 major moves from 385 AI research scientists and philosophers worldwide); rebuttals and counter rebuttals are linked in threads of dispute. These maps can save students entering the field hundreds of hours trying to comprehend the overall context and history of the debate's 50 issue subtopics and the several contending "camps" of protagonists. The maps provide the current frontiers of the arguments and a chronological intellectual history. Project Director Robert Horn, a visiting scholar at Stanford University, will present at the booth.

Exhibitors

Booth #401

The MIT Press

Five Cambridge Center
Cambridge, MA 02142
Tel: (800) 356-0343
Fax: (617) 253-1709
Email: mitpress-orders@mit.edu
Web: mitpress.mit.edu

Publisher of academic books and journals in artificial intelligence and computer science. Stop by our booth to see *Behavior-Based Robotics* by Ronald C. Arkin, *Reinforcement Learning* by Richard S. Sutton and Andrew G. Barto and other new publications from MIT Press & AAAI Press.

Booth #100

Morgan Kaufmann Publishers

340 Pine Street, Sixth Floor
San Francisco, CA 94101
Tel: (415) 392-2665 or (800) 745-7323
Email: orders@mkp.com
Web: www.mkp.com

Morgan Kaufmann publishes the finest information resources for artificial intelligence researchers and students, including graduate and undergraduate texts, monographs, collected volumes, and conference proceedings. We believe strongly in seeking out the most authoritative, expert authors. Our family of authors and series editors includes many of the world's most respected computer scientists and engineers and their books often represent the wisdom gained from years of research, development, and teaching. Recently published in this area are Banzhaf, et al: *Genetic Programming—An Introduction*, Nils J. Nilsson: *Artificial Intelligence—A New Synthesis*, and Michael N. Huhns and Munindar P. Singh: *Readings in Agents*. Please visit us at our booth.

Booth #400

NASA Ames Research Center

Contact: Michael Goldman
Caelum Research Corporation
NASA/Ames Research Center
Mail Stop 269-3
Moffett Field, CA 94035
Tel: (650) 604-4162

NASA's bold missions in space exploration and aeronautics depend on world-class research in computer science and artificial intelligence. Toward this end, Ames Research Center, located in the heart of Silicon Valley, has been designated the NASA Center of Excellence in Information Technology. NASA is seeking ways to put an unprecedented level of intelligence into the vehicles we send out to explore the universe for us, to expand human capabilities through research in human-centered computing and to

develop intelligent, self-monitoring, and adaptive systems to enhance aerospace safety and efficiency. These information technologies will provide a catalyst for a new generation of embedded systems that promise profound social and economic impact. NASA has been a long-term supporter of the AAAI and is pleased to exhibit some of our latest AI developments and demonstrations at this year's conference.

Booth # 307

Numan Intelligence, Inc.

1343 Cobblestone Drive
Troy, MI 48098
Tel: (248) 619-0388
Fax: (248) 619-0393
Email: info@numan.com
Web: www.numan.com

Numan Intelligence, Inc. will unveil a revolutionary breakthrough in artificial intelligence at AAAI-98: NuIntelligence and Human-Computer Intelligence. NuIntelligence is an embodiment of the elementary operational components of heuristic search, genetic algorithms, neural networks, optimization, and other artificial intelligence techniques. NuIntelligence can be used to implement any of these techniques as well as hybridization's and combinations of them. NuIntelligence's companion problem solving methodology, Human-Computer Intelligence, enables the reduction of problem complexity from exponential to linear. NuIntelligence seamlessly integrates with a broad base of applications across many problem domains through DDE, DDE-OLE and Internet Socket interfaces.

Booth #402

PC AI Magazine

Post Office Box 30130
Phoenix, AZ 85046
Tel: (602) 971-1869
Fax: (602) 971-2321
Email: info@pcai.com
Web: www.pcai.com/pcai/

PC AI Magazine provides the information necessary to help managers, programmers, executives, and other professionals understand the quickly unfolding realm of artificial intelligence (AI) and intelligent applications (IA). *PC AI* addresses the entire range of personal computers including the Mac, IBM, PC, NeXT, Apollo, and more. *PC AI* is an application-oriented magazine designed to give readers useful "hands-on" information. *PC AI* features developments in expert systems, neural networks, object oriented development, and all other areas of artificial intelligence. Feature articles, product reviews, real-world application stories, and a Buyer's Guide present a wide range of topics in each issue.

Booth #200

Prentice Hall

One Lake Street
Upper Saddle River, NJ 07458
Tel: (201) 236-7283
Fax: (201) 236-7210

Prentice Hall is proud to present information about the forthcoming second edition of the leading introductory AI textbook, *Artificial Intelligence: A Modern Approach* by Stuart Russell and Peter Norvig.

Please stop by our booth to obtain information on this and other quality books, such as; *The Widely Used Common Lisp* by Paul Graham, and books on a variety of subjects ranging from *Data Mining to Java*. We are also accepting proposals for the Prentice Hall AI (and related subjects) book series, Stuart Russell and Peter Norvig, Series Editors.

Booth #407

Real World Interface, Inc.

32 Fitzgerald Drive
Post Office Box 375
Jaffrey, NH 03452
Tel: (603) 532-6900
Fax: (603) 532-6901
Web: www.rwii.com

Real World Interface, Inc. (RWII), an established leader in indoor mobile research robots, is pleased to announce their second All Terrain Robot Vehicle—The ATRV-2. The ATRV-2 is designed to provide the robotics researchers and scientists who are pioneering tomorrow's rovers with a vehicle capable of supporting demanding missions including security, de-mining, reconnaissance, surveillance and hazmat. RWII also provides application specific mobile robot development services for industrial, entertainment, and research customers. For further information, visit the RWII at booth #407 or view our family of indoor and all terrain mobile robots at: <http://www.rwii.com>.

Booth #304

Register Machine Learning Technologies, Inc.

360 Grand Avenue
Oakland, CA 94610
Tel: (510) 834-7191

AIM Learning Technologies™ is a suite of tools to create extremely fast and memory efficient learning systems. AIM technology is ideally suited for large induction and optimization tasks and for embedded applications. At AAAI-98, Register Machine Learning Technologies, Inc.™ will announce the availability of custom learning applications and tools based on AIM

Learning Technology™. It will also demonstrate Discipulus™ for Windows 95/98/NT. Discipulus™ is the first commercial product based on AIM Learning Technology™. Discipulus™ is very fast program induction software, ideally suited for tasks such as data mining, forecasting, function fitting, and classification.

Booth #101

Springer-Verlag

175 Fifth Avenue
New York, NY 10010
Tel: 1-800-SPRINGER
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Springer-Verlag is an international publisher of books, journals, software, and the renowned series "Lecture Notes in Artificial Intelligence." Stop by the booth for a special 20% AAAI discount on all AI titles, plus related books on fuzzy logic, neural networks, evolutionary computing, and a wide selection of general interest topics.

Featured titles include: Jennings and Wooldridge's *Agent Technology*, Adami's *Introduction to Artificial Life*, Munakata's *Fundamentals of the New Artificial Intelligence*, Michalewicz's *Genetic Algorithms + Data Structures = Evolution Programs*, Schaeffer's *One Jump Ahead: Challenging Human Supremacy in Checkers*, and Grillmeyer's *Exploring Computer Science with Scheme*.

Booth #406

Stottler Henke Associates, Inc. (SHAI)

1660 South Amphlett Blvd., Suite 350
San Mateo, CA 94402
Tel: (650) 655-7242
Fax: (650) 655-7243
Email: alexander@shai.com
Web: www.shai.com

SHAI is looking for highly motivated individuals who want interesting, challenging work on a variety of AI research and development projects. We currently have job openings for programmers/software engineers and artificial intelligence programmers/software engineers. SHAI has been a leader in AI research and intelligent solutions development since our inception in 1988. We are results-oriented problem solvers with practical experience gained in over 50 AI projects for commercial and government clients. We have developed and fielded hundreds of operational systems in daily use in domains as varied as space station planning and scheduling, intelligent tutoring systems, and retail sales prediction.

Intelligent Systems Demonstrations

AAAI-98 Intelligent Systems Demonstrations

The Intelligent Systems Demonstrations will be held in the Exhibit Hall on the first level of the Monona Terrace Convention Center, and will be open to registered conference attendees during exhibit hours. The Intelligent Systems Demonstrations showcase state of the art AI implementations. System builders will be on hand to present their work, and audience interaction will be encouraged where possible.

Demonstrations Schedule

Tuesday, July 28

- 10:30 AM: Distributed Coaching for an Intelligent Learning Environment
- 11:00 AM: Cyclepad: An Articulate Virtual Laboratory for Engineering Thermodynamics
- 11:40 AM: PowerConstructor: A Belief Network Learning Tool
- 12:10 PM: TRIPS: The Rochester Interactive Planning System
- 2:00 PM: Interactive Pet Robot with Emotion Model
- 2:30 PM: ARIADNE: A System for Integrating Information from the Web
- 3:10 PM: KANSEI: Image Retrieval Simulating the Human Preference
- 3:40 PM: The Intelligent Classroom
- 4:30 PM: Answering Questions for an Organization Online
- 5:00 PM: CiteSeer: Autonomous Citation Indexing
- 5:30 PM: Realtime Gesture-Speech Human Interface on Notebook Size Personal Computer

Wednesday, July 29

- 12:10 PM: "Squeaky Wheel" Optimization Demonstration
- 2:00 PM: TacAir-Soar: Generating Autonomous Behaviour for a Distributed Military Training Environment
- 2:30 PM : A Description Logic-based Configurator for the Web
- 3:10 PM: STEVE: A Pedagogical Agent for Virtual Reality
- 3:40 PM: Self-Explanatory Simulators for Education
- 6:00 PM – 10:00 PM: AI Festival: All demos available

Thursday, July 30

- 10:30 AM: Presenting Web Site Search Results in Context

- 11:00 AM: CAPES: Countrywide Automated Property Evaluation System
- 11:40 AM: Virtual Mattie Activity Monitor
- 12:10 PM: Sensible Agents Operating under Dynamic Adaptive Autonomy
- 12:40 PM: FindUR: A Web-based Environment for Conceptual Retrieval
- 1:10 PM: Interactive Characters with Tactile Interface

Answering Questions for an Organization Online

Vladimir A. Kulyukin, Kristian J. Hammond, and Robin D. Burke, *Intelligent Information Laboratory, University of Chicago*

The World Wide Web continues to challenge organizations to make online access to their expertise convenient for their clients. One means of expertise access that many clients find convenient in everyday life is asking natural language questions of the organization. To support it online, we developed an approach to building organization-embedded question-answering intermediaries, called "information exchange systems." These systems use their knowledge of the organization's structure to answer the clients' questions and to acquire new expertise from the organization's experts. Our approach uses techniques of hierarchical and predictive indexing, combined term weighting, abstraction-based retrieval, and negative evidence acquisition. We will demonstrate these techniques with the Chicago Information Exchange system, an information exchange application embedded in the University of Chicago's computer science department.

ARIADNE: A System for Integrating Information from the Web

Craig A. Knoblock, Steven Minton, Jose Luis Ambite, Naveen Ashish, Greg Barish, Pragnesh Jay Modi, Ion Muslea, Andrew G. Philpot, and Sheila Tejada, *Information Sciences Institute, Integrated Media Systems Center, and Department of Computer Science, University of Southern California*

The Web is based on a browsing paradigm that makes it difficult to retrieve and integrate data from multiple sites. Today, the only way to do this is to build specialized applications, which are time-consuming to develop and difficult to maintain. We are addressing this problem by creating the technology and tools for rapidly constructing information agents that extract, query, and integrate data from web sources. We will demonstrate a system called Ariadne for rapidly building agents to integrate Web sources. Our system makes it fast and easy

to build new information agents that access existing Web sources. In this demo, we will show how we can query and integrate data from multiple web sources in several different domains. Also, we will show the kind of data models built, examples of information gathering plans, how wrappers are generated for individual Web sources, and how selected information is stored locally to improve performance.

CiteSeer: Autonomous Citation Indexing

Steve Lawrence, C. Lee Giles, Kurt D. Bollacker, *NEC Research Institute*

This demo presents CiteSeer, an autonomous citation indexing system. CiteSeer autonomously locates and processes research articles on the Web in PostScript form. CiteSeer automatically extracts information from the articles including the header, abstract, individual citations to other papers, and the context of the citations. CiteSeer organizes the literature, and allows the location of papers using keyword search, citation links, and citation co-occurrence. Citations to any given paper can be made in many different formats, and CiteSeer uses AI methods in order to cluster identical citations. This allows CiteSeer to rank the cited articles according to the number of citations. CiteSeer can also group together and display the context of multiple citations to a given paper. The context of citations can be very useful for literature search and evaluation, e.g. subsequent articles may review a given article, highlight limitations, or present follow up work.

Countrywide Automated Property Evaluation System—CAPES

Ingemar A.E. Hulthage and Iain Stobie, *Artificial Intelligence Division, Countrywide Home Loans*

The purpose of CAPES is to estimate the market value of residential properties in order to assess the collateral on Countrywide loans. CAPES estimates market value by comparison of the subject property to other similar nearby properties, for which recent sales information is available. Characteristics of the subject and comparable properties, such as the living area and number of bedrooms, are used to the extent available. In some cases price indices describing the change in property values over time are also used. In addition to the estimated market value, CAPES produces a measure of the uncertainty in the result. Its accuracy has been validated extensively on batches of properties by comparing its results to known sales prices. CAPES was de-

signed to support a range of uses, from an interactive appraiser's assistant in which its internal operations can be controlled by an expert user to a fully automatic mode suitable for less knowledgeable users or batch runs. It has several models, including heuristics derived from company-specific business rules, and uses both commercial and proprietary property databases.

CyclePad, an Articulate Virtual Laboratory for Engineering Thermodynamics

Kenneth D. Forbus, Leo Ureel, Julie Baher, and Sven E. Kuehne, *Institute for the Learning Sciences, Northwestern University*; John Everett, *Xerox Palo Alto Research Center*, and Mike Brokowski, *Department of Mechanical Engineering, Northwestern University*

CyclePad is an articulate virtual laboratory (AVL) for learning engineering thermodynamics by design. Design tasks are highly motivating, and tie classroom learning to real-world concerns. Students using CyclePad can design power plants, refrigerators, engines, cryogenic systems, and other types of thermodynamic cycles. Currently CyclePad is used by over 180 students per year, and is available for download via the web. In this demonstration you will see how students create designs, including helping work with modeling assumptions and make appropriate choices of parameter values. You will also get a look under the hood at how CyclePad's analysis and explanation systems work, the underlying knowledge base, and some of the subtleties involved in reasoning about thermodynamics.

A Description Logic-Based Configurator for the Web

Deborah L. McGuinness and Lori Alperin Resnick, *AT&T Labs – Research*; Charles Isbell, *MIT*; Matt Parker and Chris Welty, *Vassar College*; and Peter Patel-Schneider, *Bell Labs Research*. Corresponding Author: Deborah McGuinness, *AT&T Labs – Research*

Description logics have a history of success in configuration applications in major companies including AT&T, Lucent, and the Ford Motor Company. While our platform has produced over 17 deployed commercial configurators, we find a demonstration application to be the best expository tool for describing how description logics can be best leveraged in tasks such as configuration. We have developed a demonstration system that was designed to contain reasoning processes analogous to those in our deployed systems, yet works in the everyday domain of configuring home stereo systems. The system is built using the CLASSIC knowledge

Intelligent Systems Demonstrations

representation system and has recently been ported to a multi-user web platform. Our demonstration contains, among other things, examples of configurations from partial specifications, contradiction detection, explanation of reasoning, automatic completion, alternative exploration, parts list examination, and configuration from an example library.

Distributed Coaching for an Intelligent Learning Environment

Kenneth D. Forbus, Leo Ureel, Julie Baher and, Sven E. Kuehne, *Institute for the Learning Sciences, Northwestern University*; John Everett, *Xerox Palo Alto Research Center*, and Mike Brokowski, *Department of Mechanical Engineering, Northwestern University*

We are demonstrating a distributed coaching system for CyclePad, a deployed intelligent learning environment in engineering thermodynamics. Part of the coach resides on the student's computer, with the rest on a server accessed via email. The on-board coach uses Bayesian reasoning about teleology to make suggestions about parameter values, and helps students debug contradictions. The email coach provides additional analysis help and uses analogy for design coaching, providing step-by-step advice on how principles in a web-based library can be applied to a student's particular design. We demonstrate how the on-board coaching works and how the RoboTA agent colony handles email interactions. We show how MAC/FAC retrieves cases from a design library and how SME is used to generate concrete advice about how to apply the principles of a case to the student's design problem. Our case compiler, which takes expert-prepared materials and produces cases, will also be shown.

FindUR: A Web-Based Environment for Conceptual Retrieval

Deborah L. McGuinness, and Lori Alperin Resnick, *AT&T Labs – Research*; Thomas W. Beattie and Steve Solomon, *AT&T Labs*; and Harley Manning, *Dow Jones Markets*. Corresponding Author: Deborah McGuinness, *AT&T Labs – Research*

When documents contain few conceptually related words, recall for naturally occurring queries can drop below acceptable levels. We analyzed a number of web sites and found that up to 100 percent of the relevant retrievals were missed. We devised and implemented a system architecture that improves search performance using query expansion from description logic-maintained ontologies. Our work has been deployed on ten corporate and community web

sites. Usage logs from the last 18 months and user studies show improved recall with little negative impact on precision. The knowledge base of background information is also used to support query formation that is semantically richer than what is typically available from web search engines. The demonstration systems show conceptual search in sites covering electronic yellow pages, community calendars, and competitive intelligence applications. Our system also includes a distributed description logic-supported environment for generating and maintaining background knowledge ontologies.

The Intelligent Classroom

David Franklin and Joshua Flachsbar, *University of Chicago*

People frequently complain that it is too difficult to figure out how to get computers to do what they want. However, with a computer system that actually tries to understand what its users are doing, people can interact in ways that are more natural to them. We have been developing a system, the Intelligent Classroom, that does exactly this. The Intelligent Classroom uses cameras and microphones to sense a speaker's actions and then infers his intentions from those actions. Finally, it uses these intentions to decide what to do to best cooperate with the speaker. (The Classroom can play videotapes, show slides, and also produce a video of the presentation.) In the Intelligent Classroom, the speaker need not worry about how to operate the Classroom; he may simply go about his lecture and trust the Classroom to assist him at the appropriate moments.

Interactive Characters with Tactile Interface

Hirohide Ushida, Yuji Hirayama, and Hiroshi Nakajima

This demonstration shows interactive characters which communicate with their users. The characters are able to express emotions and personalities. A behavior generation model is used to generate life-like behaviors of the characters. The model consists of reactive and deliberative mechanisms. In the reactive mechanism, tactile sensors are used to realize physical interactions with the users. The characters can feel the user's touch and react instantaneously. On the other hand, the deliberative mechanism generates goal-oriented behavior as the result of interactions between cognitive and emotional processes. This mechanism is based on a psychological theory, called the cog-

nitive appraisal theory. The model also has a learning mechanism to improve behavioral patterns. The behaviors are represented by computer animation with sound. The results obtained from experiments showed that the model is effective to give the users illusion of life.

Interactive Pet Robot with Emotion Model

Toshihiro Tashima, Toshimi Kudo, Sachihiko Saito and Masaharu Osumi, *Fuzzy Technology and Business Promotion Division, OMRON Corporation*

We propose a Pet Robot that interacts with users and exhibits lifelike behavior based on its emotion model. The Pet Robot can percept the stimuli from users or environment by using some tactile and auditory sensors. The Emotion Model generates emotions and desires by the stimuli. It consists of a reactive mechanism, which is based on subsumption architecture, and a deliberative mechanism, which is based on a psychological theory. The Pet Robot behaves reactively and emotionally and its behaviors always changes as the emotion and desires change. The Pet Robot wears a cat costume and behaves like a cat. For example, she wags her tail delightedly if she is stroked, and she turns or looks around if she hears a big sound. She gets sleepy when she feels satisfied, and she meows when she feels lonely. This robot is designed to supply users with peace and enrichment of mind, and we will evaluate it.

KANSEI Image Retrieval Simulating the Human Preference

Hideyuki Kobayashi, Yoriyuki Okouchi, and Shunji Ota, *Information Technology Research Center, OMRON Corporation*

We have developed an image retrieval system using KANSEI (feeling, impression or sensibility) features. This system can search the same sensuous image from a large image storage not using text or word but an image. Therefore it doesn't need indexing on each image for preparing image retrieval. Our system extracts the KANSEI features from each image, and sets adequate weights for combining those features. In combining procedure, we introduce a new value called "adaptability." It judges how much the features are extracted from the image. As a result, adaptability makes it possible to make a KANSEI model depending on each image and to calculate similarity between images. As color image contents of our current system, Japanese stamp, national flag and butterfly images are

provided. If a user picks up one of those as a key image, similar images in the database can be retrieved simulating the human preferences.

PowerConstructor: A Belief Network Learning Tool

Jie Cheng, *University of Ulster at Jordanstown*

PowerConstructor is an efficient and handy belief network learning tool, which includes a wizard interface and a construction engine. Our system is currently available on 32-bit Windows platforms (Windows 95, 98, NT). It takes a database table as input and constructs the belief network structure as output. Our system has a number of main features. *User-friendly interface:* It gathers input information through 5 simple steps and there is online help for each step. *Accessibility:* It supports most of the popular desktop database and spreadsheet formats. It also supports remote database servers through ODBC. *Reusability:* The construction engine is an independent ActiveX code component so that it can be easily integrated into other belief network, data mining, knowledge base, and decision support systems for Windows. *Efficiency:* The system is based on our information theoretic dependency analysis algorithm, which requires conditional independence test $O(N^4)$ times for the general case and $O(N^2)$ times when the node ordering is known. Other kinds of domain knowledge can also be used in the learning process. PowerConstructor 1.0 is now available for download from <http://infosys.susqu.edu/bnpl/>.

Presenting Web Site Search Results in Context

Michael Chen and Marti Hearst, *Computer Science Department and School of Information Management & Systems, University of California, Berkeley*

We address search over large, heterogeneous web sites such as those found at universities and within corporate intranets. The goal is to make use of structure implicit within the site to provide context for the retrieved documents, even for those sites for which there is no centralized organization. Most web search engines simply list titles, urls, and abstracts, and thus do not place the results in context. We will demonstrate our alternative: a simple but novel approach to organizing and presenting the results of search over the pages of a large, heterogeneous web site. The main idea is to show, for each page matching the query, the path of web links that a user would follow from a root page to the search hit. The result is a hierarchical characterization of

the search results that both shows the context in which the hits appear and educates the user about the structure of the web site.

Realtime Gesture-Speech Human Interface on Notebook Size Personal Computer

Ryuichi Oka, Hironobu Takahashi, Toshiro Mukai, Takuichi Nishimura, Takashi Endou, Masayuki Nakazawa, Shigeki Nagaya, and Hiroshi Matumura, *Real World Computing Partnership*

Four application programs are demonstrated using so-called multi-modal personal computer of notebook size (MMPC) with a microphone and a CCD camera. The programs are as follows: (1) House design based on realtime spotting recognition of spontaneous speech and gesture. A user can talk with an agent and share the present status of the task displayed by CG. (2) Speech summary based on automatic segmentation of topic from spontaneous speech. The output of the summary is a sequence of speech segments. The program is language free. (3) Mutual retrieval between speech and video image of TV news data based on self-organized databases and spotting retrieval. The query is an endless stream of speech or video image. (4) Flexible realtime gesture recognition based on a new spotting matching method. About 30 categories of gesture are recognized allowing variations such as stopping or reverse motions.

Self-Explanatory Simulators for Education: A Demonstration

Kenneth D. Forbus, Mike Oltmans, and George Lee, *The Institute for the Learning Sciences, Northwestern University*

Creating new kinds of educational software has been one motivation for qualitative physics. Self-explanatory simulators combine the precision of numerical models with qualitative representations to provide both numerical data and conceptual, causal explanations. This demonstration shows how we are using self-explanatory simulators in a new architecture for educational software, active illustrations, that provides stand-alone simulation laboratories and a new type of media for hypermedia systems. We will demonstrate several examples of self-explanatory simulators for education, including the Evaporation Laboratory, an atmosphere simulation, and space-related simulations. We will explain how the SIMGEN self-explanatory simulation compiler works, and the authoring environment we have developed for creating

and customizing self-explanatory simulators. Going under the hood, we will show how the runtime architecture works, focusing on the structured explanation system, and the structure and organization of domain theories that fuel the simulation compiler.

Sensible Agents Operating Under Dynamic Adaptive Autonomy

K. Suzanne Barber, *The University of Texas-Austin*

The practical deployment of distributed agent-based systems mandates that each agent behave sensibly, incorporating an understanding of both global system goals and their own local goals. The Sensible Agent research seeks to prove: The operational level of agent autonomy (i.e. types of roles an agent plays in its interactions with other agents) is key to an agent's ability to respond to dynamic situational context, (i.e. the states, events, and goals that exist in a multi-agent system), conflicting goals, and constraints on behavior. Levels of autonomy are defined along a spectrum ranging from command-driven (agent executes commands from another agent), to consensus (agents work together to meet goals), to locally autonomous (agent can initiate its own thread of execution), to master (agent controls other agents). The Sensible Agent architecture and capabilities for each SA constituent module (action planner, self agent modeler, external agent modeler, conflict resolution advisor, and autonomy reasoner) will be demonstrated for the domain problem of radar frequency management among distributed naval ships.

"Squeaky Wheel" Optimization Demonstration

David E. Joslin, *iz Technologies*, and David P. Clements, *University of Oregon*

This demonstration shows how squeaky wheel optimization (SWO) has been applied to a scheduling domain. For other possible domains and a detailed description of SWO see the proceedings. The core of SWO is the construct/analyze/prioritize cycle. On each iteration a solution is constructed by a greedy algorithm, making decisions in an order determined by priorities assigned to the elements of the problem. That solution is then analyzed to find the elements of the problem that are handled poorly in that solution. The priorities of those elements are then increased, causing the greedy constructor to deal with them sooner on the next iteration. ("The squeaky wheel gets the grease.") This cycle continues until some termination

condition occurs. The construction, analysis and prioritization are all in terms of the elements that define a problem domain. In the scheduling problems shown in the demo, those elements are the orders to schedule.

STEVE: A Pedagogical Agent for Virtual Reality

Jeff Rickel and W. Lewis Johnson, *Information Sciences Institute & Computer Science Department, University of Southern California*

To master complex tasks, such as operating machinery, people need hands-on experience facing a wide range of situations. Since it is often impractical to provide such training on real equipment, we are exploring the use of virtual reality instead; training takes place in a 3D, interactive, simulated mock-up of the student's work environment. Since mentors and teammates are often unavailable, we are developing an autonomous, animated agent, Steve, that cohabits the virtual world with students to play these roles. Steve can demonstrate tasks as well as monitor students while they practice tasks, providing assistance when needed. Steve integrates many AI techniques: it can generate and recognize speech; demonstrate actions; use gaze and gestures; answer questions; construct, execute, and revise plans; and discuss past actions based on an episodic memory. Steve has been tested on a variety of naval operating procedures, and can provide instruction in a new domain given only the appropriate declarative knowledge.

TacAir-Soar: Generating Autonomous Behavior for a Distributed Military Training Environment

Randolph M. Jones, John E. Laird, Paul E. Nielsen, Karen Coulter, Frank Koss, and Patrick Kenny, *Artificial Intelligence Laboratory, University of Michigan*

TacAir-Soar is a software system that generates complex, intelligent behavior in real time, to support military training by simulation. It is a large (5,200 rules) rule-based system, which controls synthetic models of US military fixed-wing aircraft. It autonomously performs all of the missions typically performed aboard fixed-wing aircraft, including defensive and offensive counter-air, close-air support, suppression of enemy air defense, strategic attack, escort, airborne early warning, reconnaissance, mid-air tanking, and forward air control. TacAir-Soar is implemented within the Soar architecture for cognition, which contains state-of-the-art technology for real-time pattern matching. This

demonstration will highlight the system's ability to perform air-to-air combat, and to interact with human controllers.

TRIPS: The Rochester Interactive Planning System

George Ferguson and James Allen, *University of Rochester*

This demonstration showcases TRIPS, The Rochester Interactive Planning System, an intelligent, collaborative, conversational planning assistant. TRIPS collaborates with its user using both spoken dialogue and graphical displays to solve problems in a transportation logistics domain. The system understands the interaction as a dialogue between it and the human. The dialogue provides the context for interpreting human utterances and actions, and provides the structure for deciding what to do in response. A variety of AI technologies, including planning, scheduling, and simulation, are integrated by TRIPS to produce solutions in response to human guidance. With the human in the loop, they and the system together can solve harder problems faster than either could solve alone. In our demonstrations, users are encouraged to sit down and try the system, with only rudimentary guidance from us. Further information is available in our AAAI-98 paper "TRIPS: An Integrated Intelligent Problem-Solving Assistant."

Virtual Mattie Activity Monitor

Scott Dodson, *University of Memphis*

Virtual Mattie (VMattie) is a clerical software agent that is capable of actively gathering information from humans, composing announcements of seminars, and distributing the announcements without human intervention. VMattie sends and receives information in the form of natural language, freeform email messages. It must maintain the necessary distribution lists, send announcements in a timely manner, and will remind organizers to send information if needed. VMattie is a multi-agent system which embodies and extends several AI architectures including Maes' behavior net, Hofstadter and Mitchell's Copycat architecture, a blackboard, and a neural network. It is written completely in Java. The VMattie Activity Monitor is a system used to test, monitor, and demonstrate the capabilities of VMattie. It includes a client application which is capable of executing as an applet (strictly in a web browser), and uses publish/subscribe, or "push," technology to receive real-time updates from VMattie.

Hall of Champions

Hall of Champions

Man versus machine — who is better? In artificial intelligence, this battle is usually carried out by playing a game. In the short lifespan of computing science and artificial intelligence, considerable effort has been devoted to creating game-playing programs capable of meeting and exceeding human abilities. A scorecard of computer accomplishments in this area might read as follows:

- *Solved*—Computers can play some games perfectly (Connect-4 and Go Moku, for example).
- *Computer Champions*—Computers are indisputably better than all humans in games such as Checkers and Othello.
- *Undecided*—It is not clear whether man or machine is better in games such as Backgammon, Chess, and Scrabble.
- *Emerging*—Great strides have been made recently in Bridge and Poker, with the prospects of a computer program being a worthy challenger to the human world champion only a few years away.
- *Human dominance*—Some games have been resistant to progress. For example, research into achieving high-performance Go programs is still in its infancy.

The Hall of Champions presents several game-playing exhibitions. Competitions between evenly matched opponents offer the most interest, as evidence by last year's chess match between Garry Kasparov and IBM's Deep Blue. This year, AAAI is highlighting two undecided games: Backgammon and Scrabble. Who is better at Backgammon? Gerry Tesauro's TD-Gammon or world champion Malcolm Davis? Who is better at Scrabble? Brian Sheppard's Maven or Grandmaster Adam Logan? Both matches will be played over several days, allowing for enough games to be played to get more insight into whether man or machine is the better player.

The Hall of Champions also features exhibitions in the emerging games of Bridge and Poker, as well as in Go.

AAAI-98 attendees will be able to interact with these game-playing programs in a variety of ways. First, attendees can watch the competitions. All games will have commentary provided by both the game programmer and the human opponent. Second, most of the programs will be available during the conference for attendees to play against them. Finally, the programs' authors will be available to discuss both the technical issues involved in creating the programs and the social issues involved in intro-

ducing world-class computer players into tournament play.

The Hall of Champions includes two spectators' areas where AAAI attendees can view matches as they progress. The Hall of Champions will be open during exhibit hours (see schedule below). Admittance to the Hall of Champions is included in the technical program registration fee or the onsite exhibits-only registration fee. High School students are welcome and will be admitted without fee upon presentation of a valid high school student ID card. Children under 12 will also be admitted without fee, but must be accompanied by an adult conference registrant.

Disclaimer

This is an educational exhibition, not a competition. The programs and humans participating in the Hall of Champions are all outstanding; each participant may or may not be the human or computer champion of the game. The persons or programs currently holding championships are determined by the governing organizations of the various games. Participation in the AAAI Hall of Champions has been determined primarily by excellence of play, but also by suitability for our educational mission and by the scheduling constraints of the event.

Expert Players Schedule

Tuesday, July 28

- 10:00 AM – 12:00 PM: *Bridge*: GIB vs Zia Mahmoud & Michael Rosenberg
- 10:00 AM – 6:00 PM: *Backgammon*: TD Gammon vs Malcolm Davis
- 12:00 PM – 6:00 PM: *Scrabble*: Maven vs Adam Logan
- 4:30 PM – 5:30 PM: Panel Discussion, "AI Game-Playing Techniques: Are They Useful for Anything Other than Games?"

Wednesday, July 29

- 12:00 PM – 4:00 PM: *Backgammon*: TD Gammon vs Malcolm Davis
- *Go*: Many Faces of Go vs James Kerwin
- 6:00 PM – 10:00 PM: *Scrabble*: Maven vs Adam Logan
- *Bridge*: Bridge Baron

Thursday, July 30

- 10:00 AM – 2:00 PM: *Scrabble*: Maven vs Adam Logan
- 10:00 AM – 12:00 PM: *Poker*: Loki

Seventh Annual Mobile Robot Competition & Exhibition

The Robot Competition and Exhibition will be held in the Exhibit Hall of the Monona Terrace Convention Center, and will be open to registered conference attendees during exhibit hours.

Following in a long tradition of popular mobile robot competitions, this year's event will provide conference attendees with a first hand look at the progress in the fields of artificial intelligence and robotics. The competition will consist of two events which will focus on detecting signs of past and current life on Mars and testing the robots ability to safely serve refreshments and interact with guests. The exhibition will showcase current research in robotics that does not fit into the competition tasks.

AAAI gratefully acknowledge grants from DARPA and the National Science Foundation for student travel to this event.

Event I: Find Life on Mars

Mission Objective: The goal of the Find Life on Mars event is to seek out new life forms, collect them, categorize them, and return them back safely to the Mars Lander.

Scenario: The robot has just landed on Mars. It is an inhospitable place: polished cement ground, large black rocks, danger zones, and other obstacles jutting from the Martian landscape. Behind the robot sits the Mars Lander. It is the capsule that the robot rode for many weeks to get here. It has two access doors on its narrow ends. This is where the robot will deposit life forms.

Time is of the essence: The robot only has five to ten minutes to carry out its mission. As the robot boldly goes where no robot has gone before, it sees nothing but the desolate Martian rock and obstructed landscape. But wait, there it was again. A small colorful object about the size of a tennis ball. The robot races to the Martian, picks it up, carries it back to the Lander and places it carefully into one of the two access doors, and off it goes again.

Spirit of the Games: The purpose of the Find Life on Mars event is threefold: Promote new research and innovative ideas in robotics. Encourage robust, real-world solutions. Enhance information exchange between researchers.

This year awards will be given for technical innovation, as well as performance. We hope

that we can highlight innovative research along with the more robust systems. To this end, there will be rounds of differing challenge. Also, human participants will be required to attend a post-competition workshop where they will describe and discuss their techniques.

Event 2: Hors d'Oeuvres Anyone? Robot Interaction Event

This event will take place during the AI Festival on Wednesday evening in the exhibit hall. Robots may either be in a penned area, or free to mingle with all attendees.

Objective: The objective of this competition is to act as service robots, serving hors d'oeuvres to attendees at the reception, and handing out flyers and making announcements between regular conference sessions. This year, each contestant is required to explicitly and unambiguously demonstrate interaction with the spectators. In keeping with the IJCAI panel "The Next Big Thing," more natural modes of communication are necessary for society's acceptance of robots. Furthermore, this helps distinguish the AAAI competition from other competitions.

Also different from last year, robots will be allowed to touch attendees! Specifically, in their attempt to serve food, a robot may "nudge" a person in order to get through a crowd and serve food to other groups of people. In addition to emphasizing interaction with attendees, manipulation is encouraged, either by refilling serving trays autonomously, or in physically handing out the food or flyers to the attendees.

Awards: Of greatest importance this year will be a series of Technical Innovation Awards that will be given for specific accomplishments. These will highlight entries that have some noteworthy innovation regardless of how well the entry performed in the competition, and will be awarded in such areas as: distinguishing humans from inanimate things (they don't offer cookies to tables!), gesture recognition, nudging using a manipulator, personality, enabling two-way conversations with a human being, use of vision-based sensing, recognizing VIP's by ribbons on badges and addressing them differently, and best integration effort.

In addition to the Technical Innovation Awards, the reception event will have a first, second, and third place award for technical merit, based on the judges' scores from the Qualification/Safety Round and from the performance in the reception event. In order to determine these prizes, robots will actually be scored based on

Robot Teams

reaching various levels of competency. Some of these competencies are binary, and others involve some scoring function. The reception event will also have a popular vote for the attendees favorite robot.

Robot Event Judges & Chairs

Robot Competition Cochairs

Gregory Dudek, McGill University; Robin Murphy, Colorado School of Mines; and David Kortenkamp, NASA/Ames Research

Robot Exhibition Cochairs

Tucker Balch, Georgia Institute of Technology and Karen Zita Haigh, Carnegie Mellon University

Robot Competition Judges

- Find Life on Mars: Maria Gini, University of Minnesota; Lisa Meeden; Douglas S. Blank, University of Arkansas; Nicola Ferrier
- Hors d'Oeuvres Anyone?: Alan Schultz, Naval Research Lab; Illah Nourbaksh; Holly Yanko, Massachusetts Institute of Technology
- Technical Merit Awards: Vladimir Lumelsky and S.W. Zucker, Yale University

Mobile Robot Competition Workshop

- *Organizers:* Gregory Dudek, Robin Murphy and David Kortenkamp
Thursday, July 30
9:00 AM – 3:00 PM
Hall of Ideas J, Monona Terrace

Robot Competition and Exhibition Teams

Exhibitor and Competitor

Carnegie Mellon University

Robot: Nomad
Team Members: Mark Maimone, Reid Simmons, and Dimi Apostolopoulos

Exhibitor

Carnegie Mellon University

Robot: Office Plant #1
Team: Michael Mateas and Marc Boehlen

Walk into a typical, high tech office environment, and, among the snaking network wires, glowing monitors, and clicking keyboards, you are likely to see a plant. In this cyborg environ-

ment, the silent presence of the plant fills an emotional niche. Unfortunately, this plant is often dying; it is not adapted to the fluorescent lighting, lack of water, and climate controlled air of the office. Office Plant #1 (OP#1) is an exploration of a technological object, adapted to the office ecology, which fills the same social and emotional niche as a plant. OP#1 monitors the ambient sound and light level, and, employing text classification techniques, also monitors its owner's email activity. Its robotic, sculptural body, reminiscent of a plant form, responds in slow, rhythmic movements to express a mood generated by the monitored activity. In addition, low, quiet, ambient sound is generated to express this mood; the combination of slow movement and ambient sound thus produces a sense of presence, responsive to the changing activity of the office. OP#1 is a new instantiation of our notion of *intimate technology*, that is, technologies which address human needs and desires as opposed to technologies which meet exclusively functional task specifications.

Exhibitor

Georgia Institute of Technology

Robot: JavaBots
Team: Tucker Balch

JavaBots is a freely-distributable software system for developing and running multi-robot control systems on mobile robots and in simulation. The system was used by Georgia Tech to control their winning multi-robot entry in the AAAI-97 Mobile Robot Competition. JavaBots is also used in a number of other laboratories in ongoing research. At AAAI-98 we will demonstrate the simulation capabilities of JavaBots as well as a videotape of robots using the system.

Exhibitor and Competitor

Georgia Institute of Technology

Robot: Pepe
Team: Alexander Stoytchev and Rawesak Tanawong-suwan

Competitor

McGill University

Robot Name: Invader
Advisor: Greg Dudek
Team Leader: Francois Belair
Team Members: Francois Belair, Scott Burlington, Robert Sim, Eric Bourque, Andrew Ladd, and Guillaume Marceau

Invader is a Nomad 200 built by Nomadic Technologies equipped with 16 sonar sensors and a monocular color camera for external sensing. Last years "Mars Mission" was a big success for Invader, it is looking forward to this years challenge.

When Invader wakes on the foreign planet, it will use all the information that it can attain to help it on its quest. Combining all this information by way of an extended Kalman filter, Invader will begin searching for aliens, every step of the way incorporating acquired information with the information that it already has compiled, in a global map. This map will help Invader track down all the aliens that it comes across for identification and the acquisition of interesting samples from the environment.

Invader will identify some of its targets by their color, others by their shape. Color segmentation is fed to a principle components analysis mechanism to help differentiate among all of the potential targets. Shape recognition is done by comparing edge, corner and curve information against all the shapes that Invader knows about. Invader will use natural language to convey its findings, and of course can supplement that by downloading a global map for later reference. Invader is looking forward to this years journey.

Competitor

MIT Artificial Intelligence Lab

Robot: Cog
Team Leader: Brian Scassellati

Competitor

Naval Research Lab

Robot: Coyote and Roadrunner
Team Leader: Alan Schultz

Exhibitor and Competitor

Northwestern University

Robot: Kludge
Team Advisor: Ian Horswill
Team Leader: Dac Le
Team Members: Lars Bergstron, Robert Zubek, Mark DePristo, Matt Brandyberry, Shashi Buluswar, Dac Le, and Ian Horswill

Kludge is a low-cost robot that incorporates real-time vision with a novel cognitive architecture. Kludge can track up to three objects simultaneously, avoid obstacles using vision, follow simple instructions, play ball and chase games, etc. It's simplified architecture consists of a set of sensory-motor systems, a logic-based problem solver, a Society-of-Mind-like frame system, and a simple finite-state parser. The problem solver can perform forward-chaining inference on a subset of modal logic involving single-place predicates and single-level quantification. Axioms are compiled into a TMS-like feed-forward network, allowing the system to recompute all inferences from scratch on every cycle of the sense-decide-act loop (5-10Hz on

our current 25 MIP processor). Rather than using a single, centralized symbolic world model, working memory is distributed amongst a number of different sensory-motor and memory subsystems, each of which supports representations that are tailored to a particular common task. Variable binding is also performed by and distributed through these peripheral systems.

Exhibitor

SRI International/ Rochester University

Robot: Realtime Stereo and People-Tracking
Team Members: Kurt Konolige and Chris Eveland

SRI's Small Vision System performs realtime stereo analysis using standard PC hardware. We will demonstrate this system in a people-tracking application.

Exhibitor and Competitor

University of British Columbia

Robot: Jose and/or Spinoza
Team Members: Don Murray, Jim Little, Rod Barma, Cullen Jennings, and Stewart Kingdon

Exhibitor

University of Minnesota

Robot: TBMin and new (yet to be named) robots
Team: Maria Gini and Paul Rybski

Competitor

University of New Mexico

Robot: Nomadic Scout
Team Advisor: Dr. Greg Heileman
Team Members: Traci Vanek, Maureen Ballas, Melody Romero, Jane Canulette, Liz Kurens, and Rhonda Arkana

One of the University of New Mexico's entries is the Nomadic Scout. The Nomadic Scout was purchased by the UNM student branch of the IEEE Computer Society to enhance the existing robotics program. It is the first commercial robot purchased by the school. In preparation for the Mars Explorer phase of the competition, the Scout was equipped with a vision system for object identification. This vision system is comprised of a Newton Labs Cognachrome board utilizing the ARC development system along with a CCD color camera. An onboard Gateway portable computer running a Pentium II processor on a Linux platform will handle all high level control of the entire system.

Competitor

University of New Mexico

Robot: Lobotomous
Advisor: Dr. Greg Heileman
Team Members: Traci Vanek, Maureen Ballas,

Robot Teams

Melody Romero, Jane Canulette, Liz Kurens, Rhonda Arkana, and Dan Stormont

One of the University of New Mexico's entries in this year's AAAI Mobile Robot competition is Lobotomous. Lobotomous will be entered in the human interaction portion of the event, and this will be its third consecutive appearance at this contest.

Lobotomous was designed and constructed by UNM students in a senior level design class in preparation for the 1996 AAAI competition. Sandia National Labs is a major contributor to the development of Lobotomous and has provided much of the hardware used for the project. Since 1996, students in the EECE department for competitions and departmental projects have continued development. In 1997 Lobotomous won first place in the AAAI vacuuming competition and competed in the hors d'oeuvres phase.

Exhibitor and Competitor

University of North Dakota

Robot: Rusty the B.E.A.R

Team Advisors: Sven Anderson, Henry Hexmoor and Bruce Maxwell

Team Leader: Bret Reese

Team Members: Elizabeth Gordon, Daniel Ibanez-Gomez, Brett Reese, Tim Thompson, Aron Tomson, Matt Lafaray, and Mike Trosen

We have worked on sensory interpretation and fusion of sonar, infrared, and vision. For the competition, we have developed intuitive navigation algorithms that detect mobile objects with human skin-color. The sensory detection is done by a low-quality/low-cost vision system. Our vision system detects skin-color and motion at about 3Hz rate. One of our software modules captures sonar data and detects artifacts in sonar occupancy grids. This software is also used as an offline analysis tool. It uses stored sonar data from previous runs to allow users to generate sonar occupancy grids over different spans of time. Detection algorithms are run on this software for debugging before they are loaded onto the robot. We are extending this software to be a general testbed for other sensory data such as vision and infrared.

Exhibitor

University of Southern California

Robot: Ullanta Theater Troupe

Team: Barry Brian Werger

Competitor

University of Texas at Arlington

Robot: Pioneer 2

Team Advisor: Dr. Bill Carroll

Team Leader: James Poole

Team Members: Kiyoko Fujita, Brandon Hennegan, Cary Pillers, Priyath Sandanayake, and Michael Tran

Team pioneer is a senior design project at the University of Texas at Arlington in Arlington, Texas. Our robot is a Pioneer mobile robot with a gripper package and Fast Track vision system installed. The goal of our project is to gain knowledge and experience in the field of robotics and artificial intelligence.

Exhibitor and Competitor

VUB AI Lab

Robot: Babu and Pi

Team: Paul Vogt

Exhibitor and Competitor

Independent

Robot: Beast and Snake

Team Leader: Laurent Chabin

Registration

Conference registration will take place outside the Exhibition Hall, Lakeside Commons, on the first level of the Monona Terrace Convention Center, beginning Sunday, July 26. Registration hours are:

Sunday, July 26	7:30 AM – 6:00 PM	Wednesday, July 29	8:00 AM – 6:00 PM
Monday, July 27	7:30 AM – 6:00 PM	Thursday, July 30	8:30 AM – 2:00 PM
Tuesday, July 28	8:00 AM – 6:00 PM		

Only checks drawn on US banks, VISA, MasterCard, American Express, government purchase orders, traveler's checks, and US currency will be accepted. We cannot accept foreign currency or checks drawn on foreign banks.

Registration Fees

AAAI-98/IAAI-98 Technical Program

Your AAAI-98/IAAI-98 technical program registration fee includes admission to all technical paper sessions, invited talks and panels, exhibitions, the Student Abstract Poster Session, the opening reception, the AI Festival, AAAI-98/IAAI-98 Conference Proceedings and the Special Tutorial MP5. Note: Students must present proof of full-time student status to qualify for student rate. Onsite technical program fees are:

Regular Member	\$495	Regular Nonmember	\$575
Student Member	\$170	Student Nonmember	\$235

Tutorial Forum

The tutorial forum registration includes admission to no more than four consecutive tutorials and the corresponding four tutorial syllabi. Extra syllabi from the other tutorials may be purchased separately for \$15.00 each. The tutorial forum registration also includes admission to all exhibit hall programs. Please note that you need not register for the Tutorial Forum to attend the Special Tutorial MP5 on Monday, July 27. Onsite Tutorial Forum fees are:

Regular Member	\$230	Regular Nonmember	\$300
Student Member	\$125	Student Nonmember	\$155

Special Second-Day (Monday, July 27 only) Tutorial Forum Registration fee for COLT / ICML / UAI attendees only: Regular attendees may deduct \$60.00 and students \$25.00 from the fees listed above.

Workshop Program

Workshop registration is limited to those active participants determined by the organizer prior to the conference. All workshop participants must register for the AAAI-98 technical program or, in the case of the four cosponsored workshops, must register for one of the cosponsoring conferences. (Exceptions to these rules will be required to pay a \$150.00 fee per workshop.) Registration onsite for a workshop is possible with the prior permission of the corresponding workshop organizer.

Robot Building Lab

The robot building lab registration fee includes admission to the robot building lab and the exhibition program. Fees are \$150.00 for members or nonmembers, and \$75.00 for students. Attendance is limited and preregistration is recommended. Check for availability onsite.

Exhibition

Admission to the exhibition hall programs is included in all other types of registration. For individuals interested in admittance to the exhibit hall only, an exhibits only registration is available in onsite registration. The fee is \$10.00 for a one-day pass, and \$25.00 for a three-day pass. Exhibit hall programs include vendor exhibits, the Hall of Champions, the Intelligent Systems Demonstrations, and the Robot Competition and Exhibition. High-school students are welcome and will be admitted without fee upon presentation of a valid high-school student ID. Children under 12 will also be admitted without fee, but must be accompanied by an adult conference registrant. Please note: The AI Festival, which will be held in the exhibit hall, is included in the technical registration fee only. All other attendees must pay an additional fee.

General Information

AAAI Logo Shirts

Polo shirts with the AAAI logo will be for sale during registration hours outside the Exhibition Hall, Lakeside Commons, on the first level of the Monona Terrace Convention Center. Supplies are limited. Price \$20.00 each onsite.

Admission

Each conference attendee will receive a name badge upon registration. This badge is required for admittance to the technical, tutorial, exhibit, IAAI and workshop programs. Workshop attendees will also be checked off a master registration list at individual rooms. Smoking, drinking and eating are not allowed in any of the technical, tutorial, workshop, IAAI, or exhibit sessions.

Baggage Holding

There is no baggage holding area at the Monona Terrace Convention Center. Please check your luggage with the bellman at your hotel after you have checked out. Neither the AAAI, the Monona Terrace Convention Center, the Madison Concourse Hotel, the Best Western Inn on the Park, nor the Sheraton Madison Hotel accept liability for the loss or theft of any suitcase, briefcase, or other personal belongings brought to the site of AAAI-98/IAAI-98.

Banking

The closest bank and automated teller machine (ATM) are located at the M & I Bank at 1 West Main Street. The ATM networks available are American Express, MasterCard, Visa, Cirrus, Plus and Money Network. The M & I Bank can also exchange all major foreign currencies.

- The M & I Bank
1 West Main Street
Madison, WI 53703
Telephone: (608) 252-5800
Monday – Friday: 9:00 AM- 5:00 PM
Closed Saturdays and Sundays

Business Centers

Business Centers are available at the following locations:

- Lobby of the Madison Concourse Hotel
Hours: 24 hours per day

- Seventh floor, Sheraton Madison Hotel

Hours: 8:00 AM – 5:00 PM daily

Services include fax, copies, laser printing, and other general office services. The Madison Concourse, and the Sheraton Madison Hotel offer shipping by Federal Express and UPS.

Career Information

A bulletin board for job opportunities in the artificial intelligence industry will be made available in the registration area, outside the Exhibition Hall, on the first level of the Monona Terrace Convention Center. Attendees are welcome to post job descriptions of openings at their company or institution.

Child Care Services

For information about child care services, you may contact Be My Nanny at 877-277-8282. The agency requests forty-eight hours notice. (This information is provided for your convenience and does not represent an endorsement of this agency by AAAI. Responsibility for all child care arrangements must be assumed by the parents.)

Coffee Breaks

Coffee will be served in the Grand Terrace, level four, Monona Terrace Convention Center; in the foyer space, second floor, Madison Concourse Hotel; and in the mezzanine and pool terrace, second level, Inn on the Park. Coffee breaks in the Monona Terrace Convention Center and the Inn on the Park are scheduled for 10:00 – 10:30 AM and 4:10 – 4:30 PM each day. Coffee breaks in the Madison Concourse Hotel are scheduled for 10:15 – 10:45 AM and 3:15 – 3:45 PM during events in the hotel.

Copy Services

Copy services are available at:

- Econo Print
Contact: Mark Kamplin
27 South Pinckney Street
Madison, Wisconsin 53703
Telephone: 608-251-3520
Hours: 8:00 AM – 5:00 PM, Monday – Friday
Copy service is also available at the Business Centers in the conference hotels.

Dining

Madison dining information is available at the Visitor Information Booth, near the main entrance on the fourth level of the Monona Terrace Convention Center. Concessions will be open on the Rooftop Terrace and on the fourth level of the Monona Terrace Convention center from, July 26 – 30.

Handicapped Facilities

The Monona Terrace Convention Center, the Madison Concourse Hotel, the Best Western Inn on the Park and the Sheraton Madison Hotel are all equipped with handicapped facilities.

Housing

For information regarding hotel reservations, please contact the hotels directly. For student housing reservations assistance, please contact the University of Wisconsin – Madison Conference Groups Office, University Housing at 608-262-5576, 7:45 AM – 4:30 PM, Monday – Friday. Students requiring assistance after hours should refer to the contact information provided in the student housing confirmation letter.

Information Desk

An information desk/message desk will be staffed during registration hours, Sunday through Thursday, July 26 – 30. It is located near the main entrance, on the fourth level of the Monona Terrace Convention Center. Messages will be posted on the message boards adjacent to the desk. The telephone number for leaving messages only is (608) 261-4162. Paging attendees is not possible.

Internet

Internet access in Hall of Ideas G on the fourth level of the Monona Terrace Convention Center. The internet room will be open during registration hours. As a courtesy, please limit your access time to 5-10 minutes if others are waiting to use the service. The AAAI-98 Internet Room is sponsored by Microsoft Corporation. AAAI gratefully acknowledges Microsoft's generous contribution that makes this service available.

List of Attendees

A list of preregistered attendees of the conference will be available for review at the AAAI Desk in the registration area on the first level of the Monona Terrace Convention Center. Attendee lists will not be distributed.

Message Center

See Information Desk

Parking

Parking is available at the Monona Terrace Convention Center. The maximum daily rate is \$10.50.

Press

All members of the media are requested to register in the Press Room on the fourth level of the Monona Terrace Convention Center, Meeting Room N. Press badges will only be issued to individuals with approved credentials. The Press Room will be open during the following hours:

Monday, July 27	8:00 AM – 5:00 PM
Tuesday, July 28	8:00 AM – 5:00 PM
Wednesday, July 29	8:00 AM – 5:00 PM
Thursday, July 30	8:00 AM – 12:00 PM

An AAAI-98 volunteer will be on duty during press room hours to assist the members of the press and media.

Printed Materials

Display tables for the distribution of promotional and informational materials of interest to conference attendees will be located outside the Exhibition Hall on the first level of the Monona Terrace Convention Center.

Proceedings

Each registrant for the AAAI-98 technical program and IAAI-98 will receive a ticket with the registration materials for one copy of the conference *Proceedings*. During registration hours on Sunday, July 26, Monday, July 27 and until 10:00 AM on Tuesday, July 28. Proceedings tickets can be redeemed at the AAAI Press Proceedings desk, located near the main entrance on the fourth level of the Monona Terrace Convention Center.

General Information

After 10:00 AM on Tuesday, the *AAAI-98/IAAI-98 Proceedings* ticket may be redeemed at the MIT Press booth # 401, located in the Exhibition Hall, during exhibit hours.

Extra Proceedings may be purchased at the conference site at the above locations. Thursday, July 30, will be the last day to purchase extra copies of the Proceedings onsite.

The *AAAI-98/IAAI-98 Proceedings* can also be redeemed by mailing the ticket with your name, shipping address and e-mail to:

- Exhibits
The MIT Press
5 Cambridge Center
Cambridge, MA 02142

Postage must be prepaid with a check or MasterCard/Visa and expiration date. USA: \$10.50; Outside USA: \$25.00 surface or \$55.00 airmail.

Proceedings Shipping

A *Mail Boxes Etc.* booth will be located outside the Exhibition Hall, Lakeside Commons, on the first level of the Monona Terrace Convention Center. The booth will be open on Tuesday, July 28 and Wednesday, July 29 from 8:00 AM – 6:00 PM and on Thursday, July 30 from 8:30 – 2:00 PM.

Recording

No audio or video recording is allowed in the Tutorial Forum. Audiotapes of the plenary sessions, invited talks and panels, and the IAAI sessions will be for sale near the main entrance on the fourth level of the Monona Terrace Convention Center. A representative from Audio Archives will be available to take your order during registration hours, beginning on Tuesday, July 28. Order forms are included with registration materials. Tapes may also be ordered by mail from:

- Audio Archives International, Inc.
3043 Foothill Blvd., Suite 2
La Crescenta, CA 91214
Telephone: 818-957-0874
Fax: 818-957-0876

Speaker Ready Room

The Speaker Ready Room will be located in Meeting Room K on the fourth level of the Monona Terrace Convention Center. This room has audio-visual equipment to assist speakers with their preparations. It is important that

speakers visit this room to organize their materials. The room will be open from 8:00 AM – 5:00 PM Sunday, July 26 through Wednesday, July 29 and from 8:00 AM – 2:00 PM, Thursday, July 30.

Invited speakers are asked to come to Meeting Room K one day prior to their speech. Representatives from AV Headquarters will be available from 9:00 AM – 5:00 PM Sunday, July 26 through Wednesday, July 29 and from 9:00 AM – 2:00 PM, Thursday, July 30 to confirm your audiovisual needs, and assist with the preparation of your materials, if necessary.

Transportation

The following information provided is the best available at press time. Please confirm fares when making reservations.

Airlines and Rental Cars

The American Association for Artificial Intelligence has selected American Airlines and United Airlines as the official co-carriers and Avis Rent A Car as the official car rental agency for *AAAI-98/IAAI-98*. If you need to change your airline or car rental reservations, please call Conventions in America, our official travel agency at 800-929-4242 and ask for Group #428. E-mail: flycia@scitravel.com

Airport Shuttles

Complimentary Hotel Airport Shuttles: The Madison Concourse Hotel, the Best Western Inn on the Park and the Sheraton Madison Hotel.

Taxi

Taxis are available at Dane County Regional Airport. Approximate fare from the airport to downtown Madison is \$10.00.

Bus

Van Galder Bus Lines—Downtown Chicago, O'Hare Airport. The depot is located at the University of Wisconsin-Madison Memorial Union. For information on fares and scheduling, call 800-747-0994.

Badger Bus Lines—Mitchell Field, Milwaukee Airport provides service to the University of Wisconsin – Madison campus and the Madison Badger Bus Depot at 2 South Bedford Street, Madison, WI 53703. For information, call 608-255-6771.

City Transit System

Madison Metro Transit System is a citywide bus transit system. Schedules are available in the Monona Terrace Convention Center. Basic local fare is \$1.25. You may buy a booklet of ten rides

for \$8.50. There is a Free Fare Zone from 10:00 AM – 3:00 PM around the center of Madison. For general information, call 608-266-4466.

Tutorial Syllabi

Extra copies of AAAI-98 tutorial syllabi will be available for purchase in the registration area, outside the Exhibition Hall, Lakeside Commons, on the first level of the Monona Terrace Convention Center. Supplies are limited. Cost is \$15.00 per syllabus. Preregistration tutorial syllabi tickets may be redeemed in the tutorial rooms.

Visitor Information

The Monona Terrace Convention Center will have a Visitor Information desk near the main entrance on the fourth level of the Monona Terrace Convention Center. Maps and brochures with information on shopping, restaurants, outdoor activities, parks, and tours will be available. Hours are 7:30 – 6:00 PM, Sunday, July 26 – Monday, July 27; 8:00 – 6:00 PM, Tuesday, July 28 – Wednesday, July 29; 8:00 – 2:00 PM, Thursday, July 30.

Volunteer Room

The volunteer room is located in Meeting Room R of the fourth level of the Monona Terrace Convention Center. Hours are 8:00 AM – 5:00 PM, Sunday, July 26 – Wednesday, July 29 and 8:00 AM – 2:00 PM, Thursday, July 30. Extra volunteer instructions and schedules will be available. All volunteers should check in with Josette Mausisa, AAAI Registrar, in the registration area prior to their shifts. The volunteer meeting will be held Saturday, July 25 at 4:00 PM in Hall of Ideas E&F of the Monona Terrace Convention Center.

Disclaimer

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