

Program & Exhibit Guide

SIXTEENTH NATIONAL CONFERENCE ON
ARTIFICIAL INTELLIGENCE (AAAI-99)

ELEVENTH CONFERENCE ON INNOVATIVE APPLICATIONS
OF ARTIFICIAL INTELLIGENCE (IAAI-99)

July 18-22, 1999

Omni Rosen Hotel and Orange County Convention Center
Orlando, Florida

SPONSORED BY THE AMERICAN ASSOCIATION FOR ARTIFICIAL INTELLIGENCE
Cosponsored by NASA Ames Research Center, DARPA, Microsoft Corporation, Office of Naval Research,
Naval Research Laboratory, and the National Science Foundation.

Contents / Acknowledgments

Contents

Acknowledgments / 2
Awards / 3
Botball / 8
Conference at a Glance / 5
DC-99 / 4
Exhibition / 20-33
General Information / 35-38
IAAI-99 Program / 13-17
Intelligent Systems Demonstrations / 23-28
Invited Talks / 10-12
Maps / 33, 39
Registration / 34
Receptions / 4
Robot Building Laboratory / 7
Robot Competition and Exhibition / 28-33
Special Events and Programs / 3-4
Special Meetings / 4
Sponsoring Organizations / 2
Student Posters / 4
Technical Program Monday / 13
Technical Program Tuesday / 14-15
Technical Program Wednesday / 16-17
Technical Program Thursday / 18-19
Tutorial Forum / 6-7
Workshop Program / 8-9

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 Sixteenth National Conference on Artificial Intelligence and the Eleventh Conference on Innovative Applications of Artificial Intelligence.

- AAI-99 Program Cochairs
Jim Hendler, *University of Maryland & DARPA/ISO*
Devika Subramanian, *Rice University*
- AAI-99 Associate Program Cochairs
Henry Kautz, *AT&T Labs*
Bruce Porter, *University of Texas, Austin*
- AAI-99 Assistant Program Chair
Vibhu Mittal, *Just Research & Carnegie Mellon University*
- IAAI-99 Conference Chair
Ramasamy Uthrusamy,
General Motors Research
- IAAI-99 Conference Cochair
Barbara Hayes-Roth, *Extempo Systems, Inc.*
- Intelligent Systems Demonstrations Chair
George Ferguson, *University of Rochester*

- Mobile Robot Competition Chair
Alan C. Schultz, *Naval Research Lab*
- Robot Contest Subchair
Lisa Meeden, *Swarthmore College*
- Robot Exhibit Subchairs
Karen Zita Haigh, *Honeywell Technology*
Marc Böhlen, *Carnegie Mellon University*
- Robot Challenge Subchair
Tucker Balch, *Carnegie Mellon University*
- Robot Building Laboratory Chair
David Miller, *KISS Institute for Practical Robotics*
- SIGART/AAAI-99 Doctoral Consortium Chair
Janyce Wiebe, *New Mexico State University*
- Student Abstract and Poster Chair
Sven Koenig, *Georgia Institute of Technology*
- Student Volunteer Coordinator
Thomas Haynes, *Wichita State University*
- Tutorial Chair
Bart Selman, *Cornell University*
- Workshop Chair and Cochair
David Leake, *Indiana University*
Marie desJardins, *SRI International*

A complete listing of the AAI-99 and IAAI-99 Program Committee member appears in the conference proceedings.

Sponsoring Organizations

AAAI gratefully acknowledges the generous contributions of the following organizations to AAI-99:

- ACM/SIGART
- ActivMedia Robotics
- Ben Wegbreit
- Defense Advance Research Projects Agency
- Real World Interface, A Division of IS Robotics Inc.
- Microsoft Corporation
- NASA Ames Research Center
- National Science Foundation
- Naval Research Laboratory
- Office of Naval Research

AAAI Recognition Awards

AAAI is pleased to announce the recipients of two new awards, to be presented annually at the national conference: The AAAI Classic Paper Award and the AAAI Distinguished Service Award.

The AAAI Classic Paper Award

The 1999 AAAI Classic Paper Award will be given to the author of the most influential paper(s) from the First National Conference on Artificial Intelligence, held in 1980 at Stanford University, Stanford, California. The Awards Committee has selected John McDermott to receive this award for his paper, "R1: An Expert in the Computer Systems Domain." McDermott is being honored for seminal contributions to the development of knowledge-based systems and to the establishment of their commercial applicability.

The AAAI Distinguished Service Award

The AAAI Distinguished Service Award recognizes one individual each year for extraordinary service to the AI community. The AAAI Awards Committee is pleased to announce that the first recipient of this award will be Barbara J. Grosz, Gordon McKay Professor of Computer Science at Harvard University and a past president of AAAI. Grosz is being honored for her contributions to the field of artificial intelligence through sustained service in a multitude of academic, professional society, and government leadership roles, at the local, national and international levels, through which she has had a major effect on the field and on those working in it.

AAAI President David L. Waltz will present the awards on Wednesday, July 21, at 8:45 AM in Grand Ballroom C, Omni Rosen Hotel.

1999 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 1999:

- Harry G. Barrow, *Schlumberger Cambridge Research, UK*
- James A. Hendler, *University of Maryland and DARPA/ISO*
- Daniel S. Weld, *University of Washington*

The 1999 Fellows Recognition Dinner will be held Monday, July 19, from 7:30 - 10:00 PM in the Signature 1 Ballroom, first level, the Omni Rosen Hotel. A reception will begin at 7:30 PM, followed by dinner at 8:00 PM. (By invitation only).

AAAI-99 Outstanding Paper Award

This year, AAAI's National Conference on Artificial Intelligence honors one paper that exemplifies the highest standards in technical contribution and exposition. The winning paper is "PROVERB: The Probabilistic Cruciverbalist" by Greg A. Keim, Noam M. Shazeer, Michael L. Littman, Sushant Agarwal, Catherine M. Cheves, Joseph Fitzgerald, Jason Grosland, Fan Jiang, Shannon Pollard and Karl Weinmeister, Duke University

Program Cochairs Jim Hendler and Devika Subramanian will present the winners with their certificates on Tuesday, July 20 in Grand Ballroom C, Omni Rosen Hotel.

Program Committee Dinner

The AAAI-99 Program Committee Dinner will be held Tuesday, July 20, from 7:00 - 10:30 PM in the Signature 1 Ballroom, first level, the Omni Rosen Hotel to honor the contributions of all the members of the AAAI-99 and IAAI-99 Program Committees. (By invitation only.)

Receptions & Student Programs

Opening Reception

The AAAI-99 opening reception will be held in the Junior Ballroom of the Omni Rosen Hotel, Monday, July 19 from 5:30–7:00 PM. This event, which has moved to a new day, will provide the traditional opportunity for attendees to socialize at the beginning of the main technical conference. A variety of hors d'oeuvres and a no-host bar will be available. Admittance to the reception is free to AAAI-99 registrants. A \$15.00 per person fee (\$5.00 for children) will be charged for spouses and other nontechnical conference registrants. Guest tickets are available in onsite registration.

AI Festival

The AI Festival will be held in Exhibition Hall A1 of the Orange County Convention Center, Wednesday, July 21 from 6:00–10:00 PM. This event, which was very popular in 1998, will provide attendees the opportunity to stroll among numerous exciting events—the Mobile Robot Competition and Exhibition, the Intelligent Systems Demos, and the Student Posters—enlivened by informal supper and conversation. Admittance to the festival is free to AAAI-99 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 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 Exhibit Hall A1, Orange County Convention Center on Wednesday, July 21 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.

AAAI/SIGART Doctoral Consortium (DC-99)

The Fourth AAAI/SIGART Doctoral Consortium program will be held on Sunday and Monday, July 18–19, 1999 from 8:30–6:00 PM in Salon 12, Omni Rosen 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 21, from 6:00–10:00 PM during the AI Festival. All interested AAAI-99 student registrants are invited to observe the presentations and participate in discussions at the workshop. AAAI and ACM/SIGART gratefully acknowledge a grant from the National Science Foundation, Knowledge and Cognitive Systems Program for student travel to this event.

AAAI Annual Business Meeting

The AAAI Annual Business Meeting will be held Thursday, July 22, from 12:45–1:15 PM in Salon 3, second level, Omni Rosen Hotel.

Conference Committee Meeting

The AAAI Conference Committee Meeting will be held Thursday, July 22, from 7:30–9:00 AM in Salon 14, second level, Omni Rosen Hotel.

Executive Council Meeting

The AAAI Executive Council Meeting will be held Sunday, July 18, from 9:00 AM—5:00 PM in Signature 1 Ballroom, first level, Omni Rosen Hotel. Continental breakfast will be available at 8:30 AM.

Conference at a Glance

morning	afternoon	evening
<p><i>SUNDAY, JULY 18</i></p> <p>Registration Tutorial Forum Workshops AAAI/SIGART DC RBL-99</p>	<p>Registration Tutorial Forum Workshops AAAI/SIGART DC RBL-99</p>	<p>Special Java Tutorial SP4</p>
<p><i>Monday, July 19</i></p> <p>Registration IAAI-99 Tutorial Forum Workshops AAAI/SIGART DC RBL-99</p>	<p>Registration IAAI-99 Tutorial Forum Workshops AAAI/SIGART DC RBL-99</p>	<p>AAAI-99 Opening Reception Mentoring Tutorial MP4 1999 Fellows Dinner</p>
<p><i>TUESDAY, JULY 20</i></p> <p>Registration AAAI-99 & IAAI-99 Keynote & Invited Talks Exhibition/IS Demos Robot Program</p>	<p>Registration AAAI-99 & IAAI-99 Invited Presentations Exhibition/IS Demos Robot Program</p>	<p>Program Committee Dinner</p>
<p><i>WEDNESDAY, JULY 21</i></p> <p>Registration AAAI-99 & IAAI-99 Keynote & Invited Talks Exhibition & IS Demos Robot Program</p>	<p>Registration AAAI-99 & IAAI-99 Invited Presentations Exhibition & IS Demos Robot Program</p>	<p>AI Festival Student Poster Session Exhibition & IS Demos Robot Program</p>
<p><i>THURSDAY, JULY 22</i></p> <p>Registration AAAI-99 Keynote & Invited Talks</p>	<p>Registration AAAI-99 Invited Presentations</p>	

Tutorial Forum

Tutorial Forum

AAAI-99 Technical 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 Java Tutorial (SP4) and the Mentoring Tutorial (MP4) are open to all AAAI-99 and require no preregistration.

Session I: Sunday, July 18

9:00 AM – 1:00 PM

SA1: Knowledge-Based Scheduling

Steve Chien and Stephen Smith
Salon 3, Omni Rosen Hotel

SA2: Automatic Programming by Means of Genetic Programming

John Koza and Forrest Bennett
Salon 4, Omni Rosen Hotel

SA3: Robotic Soccer:

The Research Challenges and the Concrete Simulation and Real Robot Platforms

Peter Stone and Manuela Veloso
Salon 10, Omni Rosen Hotel

Session II: Sunday, July 18

2:00 – 6:00 PM

SP1: Economically Founded Multiagent Systems

Tuomas Sandholm
Salon 3, Omni Rosen Hotel

SP2: Markov Decision Processes and Planning under Uncertainty

Leslie Kaelbling and Michael Littman
Salon 4, Omni Rosen Hotel

SP3: Recent Progress in Machine Learning

Tom Mitchell and Andrew Moore
Salon 10, Omni Rosen Hotel

7:00 – 9:30 PM

SP4: Plenary Tutorial: Java for Lisp Programmers

Sean Luke
Salons 3 & 4, Omni Rosen Hotel

Session III: Monday, July 19

9:00 AM – 1:00 PM

MA1: Evaluating Machine Learning and Knowledge Discovery

David Jensen and Foster Provost
Salon 3, Omni Rosen Hotel

MA2: The Integration of Artificial Intelligence and Operations Research Techniques

Carla Gomes, Ken McAloon and Carol Tretkoff
Salon 4, Omni Rosen Hotel

MA3: Statistical Methods in Natural Language Processing

Lillian Lee and John Lafferty
Salon 10, Omni Rosen Hotel

Session IV: Monday, July 19

2:00 – 6:00 PM

MP1: Behavior-Based Robotics

Maja Mataric and Ronald Arkin
Salon 3, Omni Rosen Hotel

MP2: Advances in Reasoning and Search for Model-Based Autonomous Systems

Henry Kautz, Pandu Nayak, Bart Selman, and Brian Williams
Salon 4, Omni Rosen Hotel

MP3: Genetic Algorithms, Evolution Strategies and AI

Darrell Whitley and Thomas Baeck
Salon 10, Omni Rosen Hotel

7:00 – 8:30 PM

MP4: Mentoring Tutorial: How Not to Present a Paper

Eugene Freuder
Salons 3 & 4, Omni Rosen Hotel

Robot Building Lab

The Robot Building Laboratory will be held in Room 202 A/B, level two, Orange County Convention Center at the following times:

Sunday, July 18	9:00 AM – 9:00 PM
Monday, July 19	9:00 AM – 1:00 PM
Monday, July 19	3:00 PM – 5:30 PM (RBL-99 Contest/Exhibition)

Preregistration is required. AAAI-99 Robot Building Laboratory participants will spend two days seeing how easy or difficult it is to implement their favorite AI techniques on an actual robot. This year's kit will feature pneumatic actuators and a sonar range finder in addition to the traditional collection of DC motors and analog sensors. Participants will be grouped into small teams, each of which will build their own mobile robot. The AAAI-99 RBL will start with a quick tutorial on robot basics covering sensors, effectors and realtime 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)! Later in the conference, courageous volunteers from the RBL will have a chance to have their robots participate in an exhibition match with the National Finalists of the High School Botball Tournament. This tournament will be open to all the attendees of AAAI. 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.

Botball & Workshop Program

Botball National Tournament

Botball is a game played by autonomous mobile robots. The robots are designed, built and programmed by middle and high school students from across the country. Top teams from regionals in California, Virginia, Maryland, Florida, and Washington, DC will participate in the Botball National Tournament to be held in the Exhibition Hall. On Tuesday, July 20 seeding rounds for each of the teams will be played during the Exhibit Program. During seeding the robots play by themselves trying to get the best score by collecting their color ball and putting the balls into the goal. A double elimination tournament will be held on Wednesday, July 21 during the Exhibit Program. The teams will play two at a time until a champion robot has been determined. Come meet the AI students and researchers of tomorrow and witness the excitement of Botball, the only full-contact robot sport at the AAAI national conference. Botball is being organized by the KISS Institute for Practical Robotics (KIPR) for AAAI.

Botball Teams

- Allan D. Nease High School, St. Augustine, FL
- Bishop Kenny High School, Jacksonville, FL
- Episcopal High School, Jacksonville, FL
- Flint Hill School, Oakton, VA
- Foothill High School, San Jose, CA
- Frank H. Peterson Academy, Jacksonville, FL
- La Canada High School, La Canada-Flintridge, CA
- Langley High School, McLean, VA
- Matthew Gilbert Middle School, Jacksonville, FL
- Menlo Atherton High School, Atherton, CA
- Oak Ridge High School, El Dorado Hills, CA
- Robert E. Lee High School, Springfield, VA
- South Lakes High School, Reston, VA
- Southern High School, Baltimore, MD
- Springbrook High School, Silver Spring, MD
- Tennyson High School, Hayward, CA

Workshop Program

Attendance at the workshops is limited, and participation is by invitation only. All workshop participants must register for the AAAI-99 technical program, or in the case of the jointly sponsored workshop (W6), must register for either AAAI-99 or GECCO-99. 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 18

W1: Artificial Intelligence for Electronic Commerce

Organizers: Tim Finin and Benjamin Groszof
Salon 2, Omni Rosen Hotel

W3: Artificial Intelligence for Distributed Information Networking

Organizers: Sue Abu-Hakima and Steven Willmott
Salon 11, Omni Rosen Hotel

W6: Data Mining with Evolutionary Algorithms: Research Directions (1/2 day workshop)

Jointly Sponsored by GECCO-99
Organizer: Alex A. Freitas
2:30 – 6:00 PM, Salon 5, Omni Rosen Hotel

Workshop Program

W7: Environmental Decision Support Systems and Artificial Intelligence

Organizers: Ulisés Cortes and Miquel Sánchez-Marrè
Salon 6, Omni Rosen Hotel

W8: Agents' Conflicts

Organizers: Catherine Tessier and Laurent Chaudron
Salon 7, Omni Rosen Hotel

W9: Intelligent Information Systems (2-day workshop)

Organizers: Kristian Hammond and Larry Birnbaum
Salon 8, Omni Rosen Hotel

W13: Mixed-Initiative Intelligence

Organizer: Michael T. Cox
Salon 13, Omni Rosen Hotel

W15: Ontology Management

Organizers: Adam Farquhar and Kilian Stoffel
Salon 14, Omni Rosen Hotel

Monday, July 19

W2: Agent-Based Systems in the Business Context

Organizer: Brian Drabble and Peter Jarvis
Salon 9, Omni Rosen Hotel

W4: Computation with Neural Systems

Organizer: Jim Austin
Salon 11, Omni Rosen Hotel

W5: Configuration

Organizers: Boi Faltings, Eugene C. Freuder, Gerhard Friedrich, and Alexander Felfernig
Salon 5, Omni Rosen Hotel

W9: Intelligent Information Systems (2-day workshop)

Organizers: Kristian Hammond and Larry Birnbaum
Salon 8, Omni Rosen Hotel

W10: Intelligent Software Engineering

Organizers: Aditya Ghose, Tim Menzies, and Ken Satoh
Salon 6, Omni Rosen Hotel

W11: Exploring Synergies of Knowledge Management and Case-Based Reasoning

Organizers: David W. Aha, Irma Becerra-Fernandez, Frank Maurer, and Hector Munoz-Avila
Salon 7, Omni Rosen Hotel

W12: Machine Learning for Information Extraction

Organizer: Mary Elaine Califf
Salon 13, Omni Rosen Hotel

W14: Negotiation: Settling Conflicts and Identifying Opportunities

Organizer: Sandip Sen
Salon 14, Omni Rosen Hotel

W16: Reasoning in Context for AI Applications

Organizers: Patrick Brézillon, Roy Turner, Jean-Charles Pomerol, and Elise Turner
Salon 15, Omni Rosen Hotel

Invited Talks

All AAAI-99/IAAI-99 invited presentations will be held in Grand Ballroom C, first level, Omni Rosen Hotel, unless otherwise noted.

Monday, July 19

9:00 – 10:00 AM

IAAI Invited Talk: What Does the Future Hold?

Howard E. Shrobe, MIT
Salon 1, Omni Rosen Hotel

In 1989, we began the IAAI conferences to highlight the successful application of AI technology. At that time, there was a serious question as to whether AI makes a difference. Ten years later, it's clear that the war has been won; AI technology is pervasive routine. But the world of computing is about to change: there are more processors embedded in physical devices than there are in computers; these pose new challenges and new opportunities. Can AI technology help make these devices robust and survivable? Can AI technology radically change the way we interact with and conceive of computing devices? Today's computers are meant to resemble our desktops; but wouldn't we really like them to resemble an administrative assistant? Can we get there? Shrobe thinks so. He'll outline the research agenda supporting this belief and sketch his vision of the applications we'll see at IAAI in 2009.

Tuesday, July 20

9:00 – 10:00 AM

Keynote Address: Why I Am Optimistic

Patrick Henry Winston, Artificial Intelligence Laboratory, Massachusetts Institute of Technology

From the engineering perspective, artificial intelligence is a grand success. Today, most big systems are built with elements that are readily traced to research done by the field's practitioners. From the scientific perspective, however, achievements have been small, and the goal of understanding human intelligence, from a computational point of view, remains elusive. Nevertheless, to an optimist, the current state of AI seems analogous to that of biology in 1950: on the engineering side, antibiotics had been discovered, developed, and applauded; on the science side, many prominent biologists said the field was dead, and little more of value could be done. But then, along came Watson and Crick, and their discovery of DNA's structure launched a fifty-year period of fantastic progress.

Is AI ready for its own analog to the discovery of DNA? Have we been looking under the wrong lampposts? Is there a new paradigm that will revitalize the field? Or must we resign ourselves to 300 years of slow progress? It is time to rekindle the original enthusiasm that actuated the pioneers. We should squarely, bravely, and optimistically confront the problems that block our understanding of human intelligence and prevent our construction of programs with human-level intelligence and beyond.

This time, however, we must exploit an abundance of neglected clues accumulating not only in AI, but also in allied fields, such as systems neuroscience and developmental psychology. These clues will help us to unlock the secrets of intelligence, and likely lead to the conclusion that our sophisticated vision and language faculties are not mere I/O channels. Instead, our vision and language faculties embody powerful computational and engineering ideas that account for much of our intelligence.

10:30 – 11:30 AM

Invited Talk: Decrypting the Human Genome

Jill P. Mesirov, Whitehead Institute/MIT Center for Genome Research

There has been a recent explosion in the need for computational support in molecular biology. This has been driven by new laboratory technologies, which generate biological data at a more rapid pace than ever before. The exploitation of this large amount of data by biologists and medical scientists requires contributions from many areas of computer science.

Mesirov will present a few key examples where computing has made a major impact in today's genomic research, and also point out some interesting opportunities for the future. The examples will be drawn both from structural genomics (determining the actual sequence of the genome) as well as functional genomics (decoding the sequence to understand gene function).

11:40 AM – 12:40 PM

Invited Talk: Making the AAAI Mobile Robot Competition and Exhibition More Responsive to the AI Community

*Alan C. Schultz, Naval Research Lab and
David Miller, KISS Institute for Practical Robotics*

The Chair of the 1999 Mobile Robot Competition and Exhibition will describe this year's event, and in particular, how the event has been evolving to better suit the needs of the AI community, including a new, "AI-Hard" Challenge task, awards for top contestants, and an award

Invited Talks

for the best integration of multiple AI techniques. The Botball and Robot Building Lab will also be described.

2:00 – 3:00 PM

Invited Talk:

Thinking on our Feet: Wearable Computing and Artificial Intelligence

Steven K. Feiner, Columbia University

As computers decrease in size and increase in power, they are beginning to move off our desks and onto our bodies. Feiner will describe research in developing wearable user interfaces that mix different displays and interaction devices, and discuss some of the ways that they can exploit AI techniques.

3:10 – 4:10 PM

AAAI / IAAI Invited Talk:

A Roadmap for Knowledge Management

Reid Smith, Schlumberger Limited

Enabling organizations to capture, share and use the overall experience and know-how of their people is seen as fundamental to competing in the knowledge economy. As a result, there has been a wave of enthusiasm and activity centered on knowledge management (KM). To make progress in this area, an ensemble of interwoven technology, process, and cultural issues must be addressed. In this presentation, the focus will be technology specifically, on ways in which AI technology could be applied in KM systems. The approach will be development of a roadmap for KM. It will begin with an assessment of the current state of the practice, using examples drawn from a number of organizations. It will sketch the possible evolution of technology and practice over a 10-year period.

4:30 – 6:00 PM

Invited Panel:

AI Spring

Organizer: Kristian J. Hammond, The Intelligent Information Laboratory, Northwestern Laboratory

Panelists: Lawrence Birnbaum, Northwestern University; Robin Burke, University of California, Irvine; Kurt Fenstermacher, University of Chicago; Henry Lieberman, Massachusetts Institute of Technology; and Ellen Spertus, Mills College

For better or worse, AI Winter is over and AI Spring is upon us. As with most times of rebirth, it brings with it two things: a set of new opportunities and the need to bury those that did not survive the cold. In this panel we'll look at both aspects of this new time in AI. We will look to the future and see how we have emerged as a leaner tougher field hardened by the chilly times of the past.

Wednesday, July 21

9:00 – 10:00 AM

Keynote Address:

IT**2: Information Technology Initiative for the Twenty-First Century

Ruzena Bajcsy, Assistant Director of CISE, National Science Foundation

This presentation has two parts: The first part explains what this initiative is all about. I will describe the history, how it evolved, what are the supporting arguments and what are its goals. The second part presents the NSF specific plan for this Initiative. I shall elaborate on the scientific content of this program, pose some open questions and outline the path of how we plan to achieve the goals. I shall discuss the identity of computer science as a scientific discipline and the consequences for funding. Finally, I shall speculate about the future of our discipline and the challenges stemming from it.

10:30 – 11:30 AM

Invited Talk:

AI and Space Exploration: Where No Machine Has Gone Before

Kenneth M. Ford, Institute for Human and Machine Cognition, University of West Florida, and NASA Ames Research Center

Humans are quintessentially explorers and makers of things. These traits, which identify us as a species and account for our survival, are reflected with particular clarity in the mission and methods of space exploration. This is an exciting time to be a computer scientist at NASA—our work is at the crossroads of these two human traits— we are making computational machines to extend human reach further than ever before.

11:40 AM – 12:40 PM

Invited Talk:

Game Playing: The Next Moves

Susan L. Epstein, Hunter College and The Graduate School of The City University of New York

As people do it, game playing addresses critical AI issues: learning, planning, resource allocation, and the integration of multiple streams of knowledge. This talk highlights recent developments in game playing, describes some cognitively-oriented work, and poses three new challenge problems for the AI community.

Invited Talks

2:00 – 3:00 PM

**AAAI / IAAI Invited Talk:
Real-Time Applications of Computer
Vision: Computer Assisted Neurosurgery
and Visual Monitoring of Activities**

*W. Eric L. Grimson, Artificial Intelligence Laboratory,
Massachusetts Institute of Technology*

Recent advances in computational power, coupled with constraints enforced by real-world applications, have led to two real-time vision systems: an image-guided neurosurgical system, now in daily use; and a monitoring system that learns common activity patterns by visual observation over extended periods, and automatically detects unusual events.

3:10 – 4:10 PM

**Invited Talk:
Quantum Computation & AI**

Lee Spector, Hampshire College

Recent research suggests that quantum mechanical computers will be able to outperform classical computers in dramatic ways. Spector will introduce quantum computation to the non-physicist and will illustrate connections between quantum computation and AI. AI is already helping to explore the power of quantum computation, and quantum computation may someday provide a new foundation for AI.

4:30 – 6:00 PM

**Invited Panel:
Intelligent Systems in
Biopharmaceutical R&D:
Challenges and Approaches**

Organizer: Chris Fields, PE Informatics

*Panelists: Susan Burgess, Structural Bioinformatics,
Inc., Craig Liddell, Paradigm Genetics, and Vijay Sikka,
PatternRx, Inc.*

The development of automated, high-throughput instrumentation and robotics has driven a transition in biopharmaceutical R&D toward bulk data acquisition followed by automated analysis and triage to identify molecular targets of opportunity. This new strategy raises challenges in AI domains including planning, intelligent control, multidimensional pattern recognition, and data fusion.

Thursday, July 22

9:00 – 10:00 AM

Keynote Address: AI Rising

Nils J. Nilsson, Robotics Laboratory, Stanford University

Serious work toward artificial intelligence began about fifty years ago. In this talk Nilsson reviews what he thinks are the major milestones of our first half-century and make some guesses about what might lie ahead. In the spirit of millennial appraisals, Nilsson will survey what he thinks are the most important things we have learned about AI in the last fifty years. Are these lessons sufficient to produce human-level artificial intelligence within the next fifty?

10:30 – 11:30 AM

**Invited Panel:
Ontologies: Expert Systems
All Over Again?**

*Organizer: Christopher A. Welty, Vassar College and
IBM*

*Panelists: David Fogel, Natural Selection, Inc.; Mark
Fox, University of Toronto; Nicola Guarino, LADSEB-
CNR; Doug Lenat, Cycorp; Debbie McGuinness, Stan-
ford Knowledge Systems Lab; and Mike Uschold, Boeing*

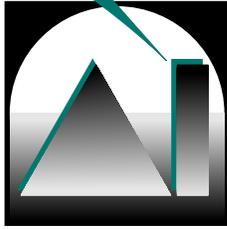
An increasing number of organizations are engaged in building “ontologies” to capture and re-use knowledge critical to their enterprise. There are many similarities between engineering and applying ontologies and the sort of knowledge engineering associated with building “expert systems”—a technology that is widely viewed as having been a failure. This panel will directly address the issue of whether “ontology” is merely a new name for an old thing, and cover some of the recent developments in engineering systems based on knowledge.

11:40 – 12:40 PM

**Invited Talk:
How Common Sense Might Work**

Kenneth D. Forbus, Northwestern University

This talk describes how a combination of analogical and first-principles reasoning, relying heavily on qualitative representations, might provide a computational model of common sense reasoning. Forbus discusses the psychological and computational support for this approach, and illustrates how it can be used in building new kinds of multimodal interfaces and educational software.



The Innovative Applications of Artificial Intelligence Conference

All IAAI-99 sessions will be held in Salon 1 on the second level of the Omni Rosen Hotel. Monday's schedule of deployed application papers is listed in the daily schedule on this page. The remainder of the papers will be presented in parallel with the AAAI-99 technical program on Tuesday, July 20 and Wednesday, July 21. Please refer to the daily schedule on the following pages for times.

Daily Technical Schedule

(Tutorial and Workshop schedules are located on pages 5-9.)

Monday, July 19th

7/19		8:45 – 10:00 AM	10:30 – 11:30 AM	11:40 – 12:40 PM	
Salon 1	IAAI-99 Opening Remarks <i>Ramasamy Uthurusamy, IAAI-99 Conference Chair</i>	IAAI-99 A New Basis for Spreadsheet Computing: Interval Solver™ for Microsoft® Excel <i>Eero Hyvönen and Stefano De Pascale</i>	IAAI-99 Last Minute Travel Application <i>André Hübner, Mario Lenz, Roman Borch, and Michael Posthoff</i>	Salon 1	IAAI-99 Ramp Activity Expert System for Scheduling and Co-ordination at an Airport <i>Geun-Sik Jo, Kang-Hee Lee, Hwi-Yoon Lee, and Sang-Ho Hyun</i>
	IAAI Invited Talk What Does the Future Hold? <i>Howard E. Shrobe, Massachusetts Institute of Technology</i>				HKIA SAS: A Constraint-Based Airport Stand Allocation System Developed with Software Components <i>Andy Hon Wai Chun, Steve Ho Chuen Chan, Francis Ming Fai Tang, and Dennis Wai Ming Yeung</i>
Salon 1	2:00 – 3:00 PM	IAAI-99 Using Intelligent Agents in Military Simulation or “Using Agents Intelligently” <i>Gil Tidhar, Clint Heinze, Simon Goss, Graeme Murray, Dino Appia, and Ian Lloyd</i>	3:10 – 4:00 PM	Jr. Ballroom	5:30 – 7:00 PM
	Automated Instructor Assistant for Ship Damage Control <i>Vadim V. Bulitko and David C. Wilkins</i>	IAAI-99 DLMS: Ten Years of AI for Vehicle Assembly Process Planning <i>Nestor Rychtycky</i>	AAAII-99 / IAAI-99 Opening Reception <i>Junior Ballroom, Omni Rosen Hotel</i>		

7/20	8:45 – 10:00 AM	10:30 – 11:30 AM	11:40 AM – 12:40 PM
Grand Ballroom C	<p>Welcome and Opening Remarks Presentation of Outstanding Paper Award <i>Jim Hendler and Devika Subramanian, AAAI-99 Program Cochairs</i></p> <p>Keynote Address Why I Am Optimistic <i>Patrick H. Winston, Massachusetts Institute of Technology</i> <i>Introduction by Jim Hendler</i></p>	<p>Invited Talk Decrypting the Human Genome <i>Jill P. Mesirov, Whitehead Institute/ MIT Center for Genome Research</i> <i>Introduction by David L. Waltz</i></p>	<p>Invited Talk Making the AAAI Mobile Robot Competition and Exhibition More Responsive to the AI Community <i>Alan C. Schultz, Naval Research Lab and David Miller, KISS Institute for Practical Robotics</i></p>
Salon 3	 <p style="text-align: center;">AAAI-99 & IAAI-99 Tuesday Technical Sessions</p>	<p>Learning 1 <i>Session Chair: David Aha</i> Selective Sampling for Nearest Neighbor Classifiers <i>Michael Lindenbaum, Shaul Markovitch and Dmitry Rusakov</i> Efficient Exploration for Optimizing Immediate Reward <i>Dale Schuurmans and Lloyd Greenwald</i></p>	<p>Model-Based Reasoning 1 <i>Session Chair: Pandu Nayak</i> Qualifying the Expressivity/Efficiency Tradeoff: Reformation-Based Diagnosis <i>Helmut Prendinger and Mitsuru Ishizuka</i> Model-Based Support for Mutable Parametric Design Optimization <i>Ravi Kapadia and Gautam Biswas</i></p>
Salon 4		<p>Planning 1 <i>Session Chair: Nicola Muscettola</i> Fast Planning through Greedy Action Graphs <i>Alfonso Gerevini and Ivan Serina</i> Exploiting Symmetry in the Planning Graph via Explanation-Guided Search <i>Terry Zimmerman and Subbarao Kambhampati</i></p>	<p>Learning 2 <i>Session Chair: Foster Provost</i> A Simple, Fast, and Effective Rule Learner <i>William W. Cohen and Yoram Singer</i> Relational Learning of Pattern-Match Rules for Information Extraction <i>Mary Elaine Califf and Raymond J. Mooney</i></p>
Salon 9		<p>AI & the World Wide Web 1 <i>Session Chair: Robert Holte</i> Navigational Plans for Data Integration <i>Marc Friedman, Alon Levy and Todd Millstein</i> A Knowledge-Based Approach to Organizing Retrieved Documents <i>Wanda Pratt, Marti A. Hearst, and Lawrence M. Fagan</i></p>	<p>Planning 2 <i>Session Chair: Bart Selman</i> CPlan: A Constraint Programming Approach to Planning <i>Peter van Beek and Xinguang Chen</i> State-Space Planning by Integer Optimization <i>Henry Kautz and Joachim P. Walser</i></p>
Salon 10		<p>GECCO-99 <i>Session Chair: TBA</i> <i>Speaker TBA</i></p>	<p>AI & the World Wide Web 2 <i>Session Chair: Mark Craven</i> Recognizing Structure in Web Pages Using Similarity Queries <i>William W. Cohen</i> Regression Testing for Wrapper Maintenance <i>Nicholas Kushmerick</i></p>
Salon 1			<p>IAAI-99 Using Artificial Intelligence Planning to Generate Antenna Tracking Plans <i>Forest Fisher, Tara Estlin, Darren Mutz and Steve Chien</i> CMUnited-98: A Team of Robotic Soccer Agents <i>Manuela Veloso, Michael Bowling, Sorin Achim, Kwun Han and Peter Stone</i></p>
		10:00 – 10:30 Coffee Break	
Tuesday, July 20			

2:00 – 3:00 PM

Invited Talk

Thinking on our Feet: Wearable Computing and Artificial Intelligence
Steven K. Feiner, Columbia University
 Introduction by *Jim Hendler*

Model-Based Reasoning 2

Session Chair: Gautam Biswas

Towards Diagram Processing: A Diagrammatic Information System
Michael Anderson

Influence-Based Model Decomposition
Christopher J. Bailey-Kellogg and Feng Zhao

Learning 3

Session Chair: Dale Schuurmans

Estimating Generalization Error Using Out-of-Bag Estimates
Tom Bylander and Dennis Hanzlik

Feature Selection for Ensembles
David W. Opitz

Planning 3

Session Chair: Steve Chien

Cooperative Plan Identification: Constructing Concise and Effective Plan Descriptions
R. Michael Young

A Framework for Recognizing Multi-Agent Action from Visual Evidence
Stephen S. Intille and Aaron F. Bobick

AI & the World Wide Web 3

Session Chair: Nicholas Kushmerick

A Limitation of the Generalized Vickrey Auction in Electronic Commerce: Robustness against False-Name Bids
Yuko Sakurai, Makoto Yokoo and Shigeo Matsubara

Hybrid Neural Plausibility Networks for News Agents
Stefan Wermter, Christo Panchev and Garen Arnavian

IAAI-99

In-Time Agent-Based Vehicle Routing with a Stochastic Improvement Heuristic
Robert Kohout and Kutluhan Erol

A Multi-Agent System for Mating out Influence in an Intelligent Environment
M. V. Nagendra Prasad and Joseph F. McCarthy

3:10 – 4:10 PM

AAAI-99/IAAI-99 Invited Talk

A Roadmap for Knowledge Management
Reid Smith, Schlumberger Limited

Search 1

Session Chair: Devika Subramanian

Using Probabilistic Knowledge and Simulation to Play Poker
Darse Billings, Lourdes Peña, Jonathan Schaeffer and Duane Szafron

AAAI-99 Outstanding Paper

PROVERB: The Probabilistic Cruciverbalist
Greg A. Keim, Noam M. Shazeer, Michael L. Littman, Sushant Agarwal, Catherine M. Cheves, Joseph Fitzgerald, Jason Grosland, Fan Jiang, Shannon Pollard, and Karl Weinmeister

Learning 4

Session Chair: Carla Brodley

Detecting Feature Interactions from Accuracies of Random Feature Subsets
Thomas R. Joerger

Toward a Theoretical Understanding of Why and When Decision Tree Pruning Algorithms Fail
Tim Oates and David Jensen

Planning 4

Session Chair: Henry Kautz

Control Knowledge in Planning: Benefits and Tradeoffs
Yi-Cheng Huang, Bart Selman, and Henry Kautz

Using Planning Graphs for Solving HTN Planning Problems
Amnon Lotem, Dana S. Nau and James A. Hender

Cognitive Systems 1

Session Chair: Ken Forbus

Delivering Hints in a Dialogue-Based Intelligent Tutoring System
Yujian Zhou, Reva Freedman, Michael Glass, Joel A. Michael, Allen A. Rovick, and Martha W. Evens

Student-Sensitive Multimodal Explanation Generation for 3D Learning Environments
Brent H. Daniel, William H. Bares, Charles B. Callaway and James C. Lester

4:30 – 6:00 PM

Invited Panel**AI Spring**

Organized by Kristian J. Hammond, The Intelligent Information Laboratory, Northwestern University

Panelists: Lawrence Birnbaum, Northwestern University; Robin Burke, University of California, Irvine; Kurt Fenstermacher, University of Chicago; Henry Lieberman, Massachusetts Institute of Technology; and Ellen Spertus, Mills College

Search 2

Session Chair: Eric Hansen

Transposition Table Driven Work Scheduling in Distributed Search
John W. Romein, Aske Plaata, Henri E. Bal, and Jonathan Schaeffer

Value-Update Rules for Real-Time Search
Sven Koenig and Boleslaw Szymanski

A Space-Time Tradeoff for Memory-Based Heuristics
Robert C. Holte and István T. Hernádvölgyi

Learning 5

Session Chair: Marek Druzel

Monte Carlo Localization: Efficient Position Estimation for Mobile Robots
Dieter Fox, Wolfram Burgard, Frank Dellaert and Sebastian Thrun

Exploiting the Architecture of Dynamic Systems
Xavier Boyen and Daphne Koller

Simulation-Based Inference for Plan Monitoring
Neal Lesh and James Allen

Planning 5

Session Chair: Martha Pollack

Total Order Planning Is More Efficient than We Thought
Vincent Vidal and Pierre Régnier

On the Utility of Plan-Space (Causal) Encodings
Amol D. Mali and Subbarao Kambhampati

Generating Qualitatively Different Plans through Metatheoretic Biases
Karen L. Myers and Thomas J. Lee

Cognitive Systems 2

Session Chair: Lee Spector

What Are Contentful Mental States? Dretske's Theory of Mental Content Viewed in the Light of Robot Learning and Planning Algorithms
Paul Cohen and Mary Litch

Moving Right Along: A Computational Model of Metaphoric Reasoning about Events
Srinivas Narayanan

Cognitive Classification
Janet Aisbett and Greg Gibbon

7/21	8:45 – 10:00 AM	10:30 – 11:30 AM	11:40 AM – 12:40 PM
Grand Ballroom C	<p>AAAI Classic Paper Award <i>John McDermott, ellora.com</i></p> <p>AAAI Distinguished Service Award <i>Barbara Grosz, Harvard University</i> <i>Presented by David L. Waltz, AAAI President</i></p> <p>Keynote Address: IT**2: Information Technology Initiative for the Twenty-First Century <i>Ruzena Bajcsy, Assistant Director of CISE, National Science Foundation</i> <i>Introduction by Devika Subramanian</i></p>	<p>Invited Talk AI and Space Exploration: Where No Machine Has Gone Before <i>Kenneth M. Ford, Institute for Human and Machine Cognition, University of West Florida, and NASA Ames Research Center</i> <i>Introduction by Patrick Hayes</i></p>	<p>Invited Talk Game Playing: The Next Moves <i>Susan L. Epstein, Hunter College and The Graduate School of The City University of New York</i> <i>Introduction by Jack Gelfand</i></p>
Salon 3	 <p style="text-align: center;">AAAI-99 & IAAI-99 Wednesday Technical Sessions</p>	<p>Natural Language and Information Retrieval 1 <i>Session Chair: Claire Cardie</i></p> <p>Application-Embedded Retrieval from Distributed Free-Text Collections <i>Vladimir A. Kulyukin</i></p> <p>Feature Selection in SVM Text Categorization <i>Hiroto Taira and Masahiko Haruno</i></p>	<p>Natural Language and Information Retrieval 2 <i>Session Chair: Dayne Freitag</i></p> <p>An Automatic Method for Generating Sense Tagged Corpora <i>Rada Mihalcea and Dan I. Moldovan</i></p> <p>The Role of Lexicalization and Pruning for Base Noun Phrase Grammars <i>Claire Cardie and David Pierce</i></p>
Salon 4		<p>Hybrid Methods 1 <i>Session Chair: TBA</i></p> <p>Implicative and Conjunctive Fuzzy Rules—A Tool for Reasoning from Knowledge and Examples <i>Laurent Ughetto, Didier Dubois and Henri Prade</i></p> <p>A Neural Network Model of Dynamically Fluctuating Perception of Necker Cube as well as Dot Patterns <i>Hiroaki Kudo, Tsuyoshi Yamamura, Noboru Ohnishi, Shin Kobayashi and Noboru Sugie</i></p>	<p>Hybrid Methods 2 <i>Session Chair: TBA</i></p> <p>What's in a Fuzzy Set? <i>Marco Piastra</i></p> <p>Initializing RBF-Networks with Small Subsets of Training Examples <i>Miroslav Kubat and Martin Cooperson, Jr.</i></p>
Salon 9		<p>Planning 6 <i>Session Chair: Karen Myers</i></p> <p>Anytime Coordination for Progressive Planning Agents <i>Abdel-Ilah Mouaddib</i></p> <p>Theory for Coordinating Concurrent Hierarchical Planning Agents using Summary Information <i>Bradley J. Clement and Edmund H. Durfee</i></p>	<p>Scheduling <i>Session Chair: James Crawford</i></p> <p>Scheduling Alternative Activities <i>J. Christopher Beck and Mark S. Fox</i></p> <p>Algorithm Performance and Problem Structure for Flow-Shop Scheduling <i>Jean-Paul Watson, Laura Barbulescu, Adele E. Howe and L. Darrell Whitley</i></p>
Salon 10		<p>Robotics 1 <i>Session Chair: Maja Mataric</i></p> <p>Continuous Categories for a Mobile Robot <i>Michael T. Rosenstein and Paul R. Cohen</i></p> <p>Integrated Natural Spoken Dialogue System of Jijo-2 Mobile Robot for Office Services <i>Toshihiro Matsui, Hideki Asoh, John S. Fry, Youichi Motomura, Futoshi Asano, Takio Kurita, Isao Hara, and Nobuyuki Otsu</i></p>	<p>Robotics 2 <i>Session Chair: David Kortenkamp</i></p> <p>An Integrated System for Multi-Rover Scientific Exploration <i>Tara Estlin, Alexander Gray, Tobias Mann, Gregg Rabideau, Rebecca Castaño, Steve Chien, and Eric Mjølness</i></p> <p>Gesture-Based Interaction with a Pet Robot <i>Milyn C. Moy</i></p>
Salon 1		<p>IAAI-99</p> <p>Automated Capture of Rationale for the Detailed Design Process <i>Karen L. Myers, Nina B. Zumel and Pablo Garcia</i></p> <p>Nurse Scheduling Using Constraint Logic Programming <i>Slim Abdennadher and Hans Schlenker</i></p>	<p>IAAI-99</p> <p>The Wasabi Personal Shopper: A Case-Based Recommender System <i>Robin Burke</i></p> <p>HICAP: An Interactive Case-Based Planning Architecture and its Application to Noncombatant Evacuation Operations <i>Héctor Muñoz-Avila, David W. Aha, Len Breslow, and Dana Nau</i></p>

10:00 – 10:30 Coffee Break

Wednesday, July 21

2:00 – 3:00 PM

AAAI-99/IAAI-99 Invited Talk

Real-Time Applications of Computer Vision: Computer Assisted Neurosurgery and Visual Monitoring of Activities
W. Eric L. Grimson, Artificial Intelligence Laboratory, Massachusetts Institute of Technology
Introduction by Devika Subramanian

Natural Language and Information Retrieval 3

Session Chair: Vibhu Mittal
Automatic Construction of Semantic Lexicons for Learning Natural Language Interfaces
Cynthia A. Thompson and Raymond J. Mooney
Learning Dictionaries for Information Extraction by Multi-Level Bootstrapping
Ellen Riloff and Rosie Jones

Hybrid Methods 3

Session Chair: TBA
ARGUS: An Automated Multi-Agent Visitor Identification System
Rahul Sukthankar and Robert G. Stockton
An Evolvable Hardware Chip and Its Application as a Multi-Function Prosthetic Hand Controller
Isamu Kajitani, Tsutomu Hoshino, Nobuki Kajihara, Masaya Iwata and Tetsuya Higuchi

Agents 1

Session Chair: Moshe Tennenholtz
Verifying that Agents Implement a Communication Language
Michael Wooldridge
Time-Quality Tradeoffs in Reallocation Negotiation with Combinatorial Contract Types
Martin Andersson and Tuomas Sandholm

Vision

Session Chair: Ian Horswill
Content-Based Retrieval from Medical Image Databases: A Synergy of Human Interaction, Machine Learning and Computer Vision
C. Brodley, A. Kak, C. Shyu, J. Dy, L. Broderick, and A. M. Aisen
Using Vision to Improve Sound Source Separation
Yukiko Nakagawa, Hiroshi G. Okuno, and Hiroaki Kitano

3:10 – 4:10 PM

Invited Talk

Quantum Computation and AI
Lee Spector, Hampshire College
Introduction by Matthew Evett

Natural Language and Information Retrieval 4

Session Chair: Ellen Riloff
Two Dimensional Generalization in Information Extraction
Joyce Yue Chai, Alan W. Biermann, and Curry I. Guinn
Combining Collaborative Filtering with Personal Agents for Better Recommendations
Nathaniel Good, J. Ben Schafer, Joseph A. Konstan, Al Borchers, Badrul Sarwar, Jon Herlocker and John Riedl

Knowledge Acquisition

Session Chair: David Wilkins
Deriving Expectations to Guide Knowledge Base Creation
Jihie Kim and Yolanda Gil
Representing Problem-Solving for Knowledge Refinement
Susan Crow and Robin Boswell

Agents 2

Session Chair: Michael Wooldridge
Combatting Maelstroms in Networks of Communicating Agents
James E. Hanson and Jeffrey O. Kephart
Evolutionary Economic Agents
Fergus Nolan, Jarek Wilkiewicz, Dipankar Dasgupta and Stan Franklin

Constraint Satisfaction Problems 1

Session Chair: TBA
Solving Crossword Puzzles as Probabilistic Constraint Satisfaction
Noam M. Shazeer, Michael L. Littman and Greg A. Keim
A Constraint-Based Model for Cooperative Response Generation in Information Dialogues
Yan Qu and Steve Beale

IAAI-99

The Use of Word Sense Disambiguation in an Information Extraction System
Joyce Yue Chai and Alan W. Biermann
IAAI-99 Closing Remarks
Ramasamy Uthrusamy, IAAI-99 Conference Chair

4:30 – 6:00 PM

Invited Panel

Intelligent Systems in Biopharmaceutical R&D: Challenges and Approaches
Organized by Chris Fields, PE Informatics
Panelists: Susan Burgess, Structural Bioinformatics, Inc., Craig Liddell, Paradigm Genetics, and Vijay Sikka, PatternRx, Inc.

Natural Language and Information Retrieval 5

Session Chair: Susan McRoy
Selecting Text Spans for Document Summaries: Heuristics and Metrics
Vibhu Mittal, Mark Kantrowitz, Jade Goldstein, and Jaime Carbonell
Towards Multidocument Summarization by Reformulation: Progress and Prospects
Kathleen R. McKeown, Judith L. Klavans, Vasileios Hatzivassiloglou, Regina Barzilay and Eleazar Eskin

Knowledge Acquisition 2

Session Chair: Bruce Porter
Does Prior Knowledge Facilitate the Development of Knowledge-Based Systems?
Paul Cohen, Vinay Chaudhri, Adam Pease, and Robert Schrag
An Integrated Shell and Methodology for Rapid Development of KB Agents
Gheorghe Tecuci, Mihai Boicu, Kathryn Wright, Seok Won Lee, Dorin Marcu and Michael Bowman
Designing Scripts to Guide Users in Modifying Knowledge-Based Systems
Marcelo Tallis and Yolanda Gil

Planning 7

Session Chair: Leslie Kaelbling
Contingent Planning under Uncertainty via Stochastic Satisfiability
Stephen M. Majercik and Michael L. Littman
Conditional, Probabilistic Planning: A Unifying Algorithm and Effective Search Control Mechanisms
Nilufer Onder and Martha E. Pollack
On the Undecidability of Probabilistic Planning and Infinite-Horizon Partially Observable Markov Decision Problems
Omid Madani, Steve Hanks, Anne Condon

Constraint Satisfaction Problems 2

Session Chair: Peter Van Beek
On Integrating Constraint Propagation and Linear Programming for Combinatorial Optimization
John N. Hooker, Greger Ottosson, Erlendur S. Thorsteinsson and Hak-Jin Kim
Functional Elimination and 0/1/All Constraints
Yuanlin Zhang, Roland H.C. Yap and Joxan Jaffar
Encodings of Non-Binary Constraint Satisfaction Problems
Kostas Stergiou and Toby Walsh

7/22	9:00 – 10:00 AM	10:30 – 11:30 AM	11:40 AM – 12:40 PM
Grand Ballroom C	<p>Keynote Address: AI Rising <i>Nils J. Nilsson, Robotics Laboratory, Stanford University</i> <i>Introduction by Bruce Buchanan</i></p>	<p>Invited Panel Ontologies: Expert Systems All Over Again? <i>Organizer: Christopher A. Welty, Vassar College and IBM</i> <i>Panelists: David Fogel, Natural Selection, Inc.; Mark Fox, University of Toronto; Nicola Guarino, LADSEB-CNR; Doug Lenat, Cycorp; Debbie McGuinness, Stanford Knowledge Systems Lab; and Mike Uschold, Boeing</i></p>	<p>Invited Talk How Common Sense Might Work <i>Kenneth D. Forbus, Northwestern University</i> <i>Introduction by Kristian J. Hammond</i></p>
Salon 3	 <p style="text-align: center;">AAAI-99 Thursday Technical Sessions</p>	<p>Knowledge Representation 1 <i>Session Chair: Benjamin Grosz</i> Constraint-Based Integrity Checking in Abductive and Non-monotonic Extensions of Constraint Logic Programming <i>Aditya K. Ghose and Srinivas Padmanabhuni</i> A Semantic Decomposition of Defeasible Logics <i>M. J. Maher and G. Governatori</i></p>	<p>Knowledge Representation 2 <i>Session Chair: Leora Morgenstern</i> Verbalization of High-Level Formal Proofs <i>Amanda M. Holland-Minkley, Regina Barzilay, Robert L. Constable</i> A Policy Description Language <i>Jorge Lobo, Randeep Bhatia and Shamim Naqvi</i></p>
Salon 4		<p>Agents 3 <i>Session Chair: Tuomas Sandholm</i> Distributed Games: From Mechanisms to Protocols <i>Dov Monderer and Moshe Tennenholtz</i> Learning Quantitative Knowledge for Multiagent Coordination <i>David Jensen, Michael Atighetchi, Regis Vincent and Victor Lesser</i></p>	<p>Agents 4 <i>Session Chair: David Jensen</i> Power, Dependence and Stability in Multiagent Plans <i>Sviatoslav Bratnov and Tuomas Sandholm</i> Bargaining with Deadlines <i>Tuomas Sandholm and Nir Vulkan</i></p>
Salon 9		<p>Constraint Satisfaction Problems 3 <i>Session Chair: Yves Lesperance</i> Hierarchical Constraint Satisfaction in Spatial Databases <i>Dimitris Papadias, Panos Kalnis and Nikos Mamoulis</i> A Generic Customizable Framework for Inverse Local Consistency <i>Gérard Verfaillie, David Martinez, and Christian Bessière</i></p>	<p>Satisfiability 1 <i>Session Chair: Carla Gomes</i> Beyond NP: The QSAT Phase Transition <i>Ian P. Gent and Toby Walsh</i> Morphing: Combining Structure and Randomness <i>Ian P. Gent, Holger H. Hoos, Patrick Prosser and Toby Walsh</i></p>

10:00 – 10:30 Coffee Break

Thursday, July 22

12:40 – 2:00 Lunch Break

Thursday, July 22

12:45 – 1:15 AAAI Annual Business Meeting

2:00 – 3:00 PM

3:10 – 4:10 PM

Knowledge Representation 3

Session Chair: TBA

Sacre: A Constraint Satisfaction Problem Based Theorem Prover
Jean-Michel Richer and Jean-Jacques Chabrier

On Criteria for Formal Theory Building: Applying Logic and Automated Reasoning Tools to the Social Sciences
Jaap Kamps

Knowledge Representation 4

Session Chair: Johann DeKleer

Partonomic Reasoning as Taxonomic Reasoning in Medicine
Udo Hahn, Stefan Schulz and Martin Romacker

A New Method for Consequence Finding and Compilation in Restricted Languages
Alvaro del Val

Tractable Reasoning 1

Session Chair: TBA

Querying Temporal Constraint Networks in PTIME
Manolis Koubarakis and Spiros Skiadopoulos

Point-Based Approaches to Qualitative Temporal Reasoning
J. Delgrande, A. Gupta, and T. Van Allen

Tractable Reasoning 2

Session Chair: James Delgrande

Polarity Guided Tractable Reasoning
Zbigniew Stachniak

A Sequential Reversible Belief Revision Method Based on Polynomials
Salem Benferhat, Didier Dubois, and Odile Papini

Satisfiability 2

Session Chair: Benjamin Wah

Initial Experiments in Stochastic Satisfiability
Michael L. Littman

DISTANCE-SAT: Complexity and Algorithms
Olivier Bailleux and Pierre Marquis

Satisfiability 3

Session Chair: Toby Walsh

On the Run-Time Behaviour of Stochastic Local Search Algorithms for SAT
Holger H. Hoos

Trap Escaping Strategies in Discrete Lagrangian Methods for Solving Hard Satisfiability and Maximum Satisfiability Problems
Zhe Wu and Benjamin W. Wah

Exhibit Program

Exhibition

The exhibition will be held in Exhibit Hall A1 on the second level of the Orange County Convention Center, Tuesday, July 20 and Wednesday, July 21. The Convention Center is located adjacent to the Omni Rosen Hotel. Admittance is restricted to badged conference attendees. Vendor-issued guest passes must be redeemed at the Exhibitor Registration Desk, in front of the Grand Ballroom, on the first level of the Omni Rosen Hotel. Further information regarding access to the Exhibition can be obtained from the Exhibitor Registration Desk. Guest tickets to the AI Festival can be purchased for \$20.00 per person (\$5.00 for children) at onsite registration.

Exhibit Hours

Tuesday, July 20	10:00 AM–6:00 PM
Wednesday, July 21	10:00 AM–3:00 PM
AI Festival:	6:00–10:00 PM

Exhibitors

- AAI Press
- ACM
- ActivMedia Robotics
- Franz, Inc.
- Institute for Human & Machine Cognition
- KISS Institute for Practical Robotics
- Kluwer Academic Publishers
- The MIT Press
- Morgan Kaufmann Publishers
- NASA Ames Research Center
- *PC AI Magazine*
- Prentice Hall
- Real World Interface, A Division of IS Robotics Inc.
- Springer-Verlag
- Stottler Henke Associates (SHAI)

Booth #104

AAAI Press

445 Burgess Drive
Menlo Park, CA 94025
Tel: (650) 328-3123
Fax: (650) 321-4457
Email: info@aaai.org
Online Catalog: www.aaai.org/Press/press.html

Booth #101

ACM

1515 Broadway, 17th Floor
New York, NY 10036
Tel: (212) 626-0685
Fax: (212) 869-0481
Web: www.acm.org

ACM, the Association for Computing Machinery, is an international scientific and educational organization dedicated to advancing the arts, sciences, and applications of information technology. With a worldwide membership of 80,000, ACM functions as a locus for computing professionals and students working in the various fields of Information Technology.

ACM publishes and distributes books, magazines, and peer reviewed journals targeted to particular computing fields, as well as the monthly magazine *Communications of the ACM*, the most cited publication in computing.

ACM has 38 Special Interest Groups that focus on different computing disciplines including artificial intelligence. Stop by our booth for more information or visit ACM on the web at <http://www.acm.org/>.

Booth #120

ActivMedia Robotics

44-46 Concord Street
Peterborough, NH 03458
Tel: (603) 924-9100
Email: robots@activmedia.com
Web: www.activrobots.com

New Pioneer 2 mobile robots lead the price-performance revolution with best payload, surface traversability and power available in a lab-sized platform. New 360-degree sonar and onboard computer options, our wide selection of integrated accessories let you focus on your research goals instead of writing drivers and soldering wires: pan-tilt-zoom camera, vision, surveillance, stereocam, laser, gripper, and more..., plus integrated user I/O bus for custom additions. Saphira software provides navigation and map-building libraries, transparent to C / C++. Ethernet messaging systems, including Ayllu software, jump-start multi-agent projects. Come see our monster Pioneer 2-AT climb! Multi-agent Ayllu demos, too!

Booth #100

Franz, Inc.

1995 University Avenue
Berkeley, CA 94704
Tel: 1-888-CLOS-NOW or (510) 548-3600
Email: info@franz.com

Franz Inc. produces Allegro CL 5.0, a dynamic object-oriented development environment based in Common Lisp and CLOS. Ideal for complex, mission-critical projects requiring flexibility, scalability and speed; Allegro CL enables developers to reduce development time by creating, designing and evolving applications simultaneously; increase productivity with built-in automatic memory management; substantial cost savings

through ability to debug and patch software while system is running; and eliminate developer downtime, with incremental compilation that allows you to compile and load new code at runtime. Allegro CL is COM/OLE and CORBA enabled. Available on Unix, Linux and Windows.

Booth #108

Institute for Human & Machine Cognition

11000 University Parkway
Pensacola, Florida 32514
Tel: (850) 474-3068
Fax: (850) 474-3023
www.coginst.uwf.edu

The Institute for the Interdisciplinary Study of Human & Machine Cognition (IHMC) was founded by the Florida legislature in 1989 as an interdisciplinary research unit. Since that time, IHMC has grown into a well-respected research institute with over 60 researchers investigating a broad range of topics related to understanding cognition in both humans and machines with a particular emphasis on building cognitive prostheses to leverage and amplify human intellectual capacities. Current research areas include: computational and philosophical foundations of AI, haptic displays to mitigate spatial disorientation, nonalphanumeric pilot displays, computer-mediated communication and collaboration, computer mediated learning systems, performance support systems, pedagogically-motivated browsers, human/machine interfaces, neural networks, software agent mobility and security, spatial and temporal reasoning, diagnostic systems, the nature and modeling of expertise, situated cognition, pattern recognition, and other related areas. IHMC researchers receive funding from a wide range of federal, state, and private sources.

Booth #119

KISS Institute for Practical Robotics

10719 Midsummer Drive
Reston, VA 20191-5101
Tel: (703) 620-0551
Fax: (703) 860-1802
www.kipr.org/dpm

KISS Institute for Practical Robotics is the nation's leading supplier of high quality educational intelligent robotics products and programs. KISS Institute has programs for K-12, research robots for universities and professional development classes for everyone else. Stop by our booth and see how robotics education has changed since you were in school and don't miss our "How Many Robots Can You Get in a Pickle Jar" interactive display!

Booth #112

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

Booth #102

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

The MIT Press publishes trade and academic books in the areas of artificial intelligence, artificial life, machine learning, computer-human interaction, computer science and distributes a selection of titles published by the AAAI Press, including annual conference proceedings.

Booth #113

Morgan Kaufmann Publishers

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

Morgan Kaufmann publishes distinguished books for artificial intelligence researchers and students, including graduate and undergraduate level texts, collected volumes, and conference proceedings. We believe strongly in seeking out the most authoritative, expert authors. Many of our books are considered to be the definitive works in their fields and often represent the wisdom gained from years of research, development, and teaching, such as Nils J. Nilsson's, *Artificial Intelligence: A New Synthesis*, John R. Koza et. al, *Genetic Programming III: Darwinian Invention and Problem Solving*, and Peter J. Bentley's, *Evolutionary Design By Computer*.

Booth #21

NASA Ames Research Center

Contact: Michael Goldman
Caelum Research Corporation
NASA/Ames Research Center
Mail Stop 269-1
Moffett Field, CA 94035
Tel: (650) 604-4162

NASA's bold missions in space exploration and aeronautics for the 21st Century will be enabled by the world-class research in computer science and artificial intelligence currently underway at Ames Research Center, NASA's Center of Excellence in Information Technology, located in the

Exhibitors

heart of California's Silicon Valley. 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; to make the development of new and more complex software faster, less expensive and more reliable; and to develop intelligent, self monitoring, and adaptive systems to enhance aerospace safety and efficiency.

Booth #110

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 #114

Prentice Hall

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

Booth #105

Real World Interface

A Division of IS Robotics, Inc.
32 Fitzgerald Drive
Post Office Box 375
Jaffrey, NH 03452
Tel: (603) 532-6900
Fax: (603) 532-6901
Web: www.rwii.com
Email: info@rwii.com

RWI's innovative engineers, software developers and production staff, led by robotics pioneer and visionary Grinnell More, employ cutting-edge technology to design and build a growing family of versatile, rugged, fully-integrated mobile robot systems. The revolutionary Mobility™ Robot

Integration Software and rFLEX™ Robot Control System underline RWI's commitment to developing flexible, highly capable hardware, software, development tools and interfaces to support advanced robotics research and commercial and military robotics applications.

Booth #107

Springer-Verlag

175 Fifth Avenue
New York, NY 10010
Tel: 1-800-SPRINGER
Fax: (201) 348-4505
Email: custserv@springer-ny.com
Web: www.springer-ny.com

Springer-Verlag is an international publisher of books, journals, and the renowned series "Lecture Notes in Artificial Intelligence." Stop by the booth for a sample journal and for a 20% discount on all books, including titles in fuzzy logic, agents, neural networks, evolutionary computing, and a variety of general interest topics. Featured titles include Hayzelden/Bigham's *Software Agents for Future Communication Systems*; Klusch's *Intelligent Information Agents*; Muller/Singh/Rao's *Intelligent Agents V (ATAL 98)*; Williams/Clearwater's *Ultimate Zero and One: Computing at the Quantum Frontier*; Jensen's *Introduction to Bayesian Networks*; Jennings/Wooldridge's *Agent Technology*; and Zobel's *Writing for Computer Science*.

Booth #116

Stottler Henke Associates (SHAI)

1660 South Amphlett Blvd., Suite 350
San Mateo, Ca 94402
(650) 655-7242 FAX (650) 655-7243
www.shai.com

SHAI is actively hiring AI software *project managers*, engineers, and programmers; business development interest is appreciated. We have been leaders 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 both 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 predictions. Key to our continuing success and growth is our extensive knowledge and experience with AI and software development techniques, our strong commitment toward development of operational systems, and our ability to remain on the cutting edge of new technology.

Intelligent Systems Demonstrations

The Intelligent Systems Demonstrations will be held in Exhibit Hall A1 on the second level of the Orange County Convention Center, and will be open to registered conference attendees during exhibit hours. The Intelligent Systems Demonstration program returns to AAAI-99 after its inauguration last year. This program showcases state of the art AI implementations, with the system builders on hand to present their work and answer audience questions. Audience interaction with the systems is encouraged wherever possible.

The program includes a wide variety of intelligent systems representing the diversity of AI research. Some of this year's demonstrations include: game-playing systems, ranging from computer soccer to human crossword puzzles to competitive 3D video games; several systems that understand spoken language, including a conversational planning assistant and a school-room reading tutor; several demonstrations of systems for knowledge base development and use; and several demonstrations of agent-based systems, including various forms of agent behavior for such applications as simulation, email, e-commerce, and agent development. All demonstrations will be available during the AI Festival on Wednesday evening, and individual demonstrations are tentatively scheduled as follows.

Demonstrations Schedule

Tuesday, July 20

- 11:00 AM: DIPLOMAT: Compiling Prioritized Default Rules into Ordinary Logic Programs, for E-Commerce Applications
- 11:30 AM: Demonstration of Rational Communicative Behavior in Coordinated Defense
- 12:00 PM: Authoring New Material in a Reading Tutor that Listens
- 12:30 PM: TRIPS: The Rochester Interactive Planning System
- 2:00 PM: GeNIe: A Development Environment for Graphical Decision-Theoretic Models and SMILE: Structural Modeling, Inference, and Learning Engine
- 2:30 PM: Sensible Agents: Demonstration of Dynamic Configuration of Agent Organizations for Responsive Planning Operations
- 3:00 PM: Worldwide Aeronautical Route

Planner

- 3:30 PM: ISAAC: ISI Soccer Automated Assistant Coach
- 4:00 PM: A Natural-Language Speech Interface Constructed Entirely as a Set of Executable Specifications
- 4:30 PM: eMediator: A Next Generation Electronic Commerce Server
- 5:00 PM: Solving Crosswords with Proverb
- 5:30 PM: The Disciple Integrated Shell for Rapid Development of Knowledge-Based Agents

Wednesday, July 21

- 11:00 AM: eCommitter: A Leveled Commitment Contract Optimizer
- 11:30 AM: MailCat: An Intelligent Assistant for Organizing E-Mail
- 12:00 PM: HPKB Integrated Knowledge Environment (HIKE)
- 12:30 PM: Intelligent Agents in Computer Games
- 2:00 PM: Knowledge Base Discovery Tool
- 2:30 PM: A System for the Semantic Interpretation of Unrestricted Domains Using WordNet
- 6:00 PM-10:00 PM: : AI Festival: *All demos available.*

Booth #D12

Authoring New Material in a Reading Tutor that Listens

Jack Mostow and Gregory Aist
 Project LISTEN
 4910 Forbes Ave., LTI
 Carnegie Mellon University
 Pittsburgh, Pennsylvania 15213
 mostow@cs.cmu.edu

Project LISTEN's Reading Tutor helps children learn to read by providing assisted practice in reading connected text. A key goal is to provide assistance for reading any text entered by students or adults. Previous mechanisms for authoring interactive reading experiences require trained designers. The Reading Tutor is designed to let teachers, parents, and even children add stories, using their recorded voices to help generate expert assistance for future readers. This live demonstration shows how the Reading Tutor helps users enter and narrate stories, and then helps children read them. We will follow the authoring steps described in the paper and shown in the video: (1) Type in a short story consisting of a few sentences composed on the spot by the audience; (2) Narrate the story, preferably using a volunteer reader unaffiliated with our project; (3) Read the story in student mode to illustrate the Reading Tutor's respons-

Intelligent Systems Demos

es. Finally we will address audience questions about Reading Tutor behavior by real-time demonstration.

Booth #D10

Demonstration of Rational Communicative Behavior in Coordinated Defense

Sanguk Noh and Piotr J. Gmytrasiewicz
Department of Computer Science and Engineering
University of Texas at Arlington
Arlington, TX 76019, Box 19015
{noh,piotr}@cse.uta.edu

The primary goal of our demonstration is to show results we obtained on communication among artificial and human agents interacting in a simulated air defense domain. Since the communication bandwidth is usually limited in a battlefield environment, it is more valuable for a defending agent to be selective as to what messages should be sent to other agents. For artificial agents, we advocate a decision-theoretic message selection mechanism, which maximizes the expected utility of the communicative acts. Thus, the agents compute the expected utility of alternative communicative behaviors, and execute the one with the highest value. Our demonstration consists of our RMM and human agents interacting in three different air defense scenarios in cases when communication is, and is not, available. We will show how communication can benefit the agents in coordination tasks, and compare performance of RMM and human agents.

Booth #D07

Diplomat: Compiling Prioritized Default Rules into Ordinary Logic Programs, for E-Commerce Applications

Benjamin Grosz
IBM T.J. Watson Research Center
groszof@us.ibm.com
www.research.ibm.com/people/g/groszof

DIPLOMAT is a Java library that embodies a new approach to the implementation of prioritized default rules: to compile them into ordinary logic programs (LP's) cf. pure Prolog. We apply the approach to a newly generalized version of courteous LP's, a semantically attractive and computationally tractable form of prioritized default rules. Compilation enables courteous LP's functionality to be added modularly to ordinary LP rule engines, via a pre-processor, with tractable computational overhead. We give in the demo storyboard an automated example e-commerce application scenario: inferencing in a 70-rule courteous LP that represents personalized pricing and promotions on a bookstore's

Web storefront.

Booth #D16

The Disciple Integrated Shell for Rapid Development of Knowledge-Based Agents

M. Boicu, K. Wright, D. Marcu, S. W. Lee, M. Bowman and G. Tecuci

Learning Agents Laboratory
Computer Science Department
George Mason University
Fairfax, VA 22030

The Disciple learning agent shell illustrates a new class of tools for rapid development of knowledge-based agents, by domain experts, with limited assistance from knowledge engineers. It consists of a learning and knowledge acquisition engine as well as an inference engine and supports building an agent with a knowledge base consisting of an ontology and a set of problem-solving rules. The development of an agent relies on importing ontologies from existing repositories of knowledge, and on teaching the agent how to perform its tasks, in a way that resembles how an expert would teach a human apprentice when solving problems in cooperation. We demonstrate the development of a critiquer for military courses of action, and a planner for working around damages to bridges, both developed in the HPKB program, with support from AFOSR and DARPA. The Disciple shell shows a practical integration of knowledge representation, knowledge acquisition, learning and problem-solving.

Booth #D15

eMediator: A Next Generation Electronic Commerce Server eCommitter: A Leveled Commitment Contract Optimizer

Thomas Sandholm
Washington University
Department of Computer Science
One Brookings Drive
St. Louis, MO 63130-4899
sandholm@cs.wustl.edu

eMediator is a next generation electronic commerce server that demonstrates some ways in which AI, algorithmic support, game theoretic incentive engineering, and GUI design can jointly improve the efficiency of e-commerce. This demonstration focuses on the auction component of Mediator, called eAuctionHouse. It is a configurable auction house that supports a large variety of parameterizable auction types. It supports novel generalized combinatorial auctions that lead to more efficient outcomes than traditional auctions because bidders can express

complementarities. The server uses new algorithms for determining the winners in such settings. It also allows bidding via graphically drawn price-quantity graphs. It has an expert system for helping the user decide which auction type to use. Finally, it supports mobile software agents that bid optimally on the user's behalf based on game theoretic analyses. This puts novice participants on a level playing field with expert bidders for ecommerce.

In automated negotiation systems consisting of self-interested agents, contracts have traditionally been binding. Leveled commitment contracts—i.e. contracts where each party can decommit by paying a predetermined penalty—were recently shown to improve Pareto efficiency even if agents rationally decommit in Nash equilibrium using inflated thresholds on how good their outside offers must be before they decommit. eCommitter is a prototype service offered on the web for helping human and computational agents use leveled commitment contracts efficiently. For any given contract price and decommitting penalties, it solves the Nash equilibrium thresholds that the agents should use for decommitting, and it derives the decommitting probabilities. Furthermore, it is able to optimize the contract price and decommitment penalties themselves given probability distributions of outside offers. This analysis takes into account the fact that rational agents will decommit manipulatively.

Booth #D14

GeNIe: A Development Environment for Graphical Decision-Theoretic Mod- els and SMILE: Structural Modeling, Inference, and Learning Engine

Marek Druzdzal

Decision Systems Laboratory
School of Information Sciences
University of Pittsburgh
Pittsburgh, PA 15260
marek@sis.pitt.edu

SMILE (Structural Modeling, Inference, and Learning Engine) is a fully portable library of C++ classes implementing graphical decision-theoretic methods, such as Bayesian networks and influence diagrams, directly amenable to inclusion in intelligent systems. Its Windows user interface, GeNIe is a versatile and user-friendly development environment for graphical decision-theoretic models. Both modules, developed at the Decision Systems Laboratory, University of Pittsburgh, have been made available to the community in July 1998 (the download

site is <http://www2.sis.pitt.edu/~genie>) and have over 1,000 users worldwide (as of February 1999).

Booth #D11

HIKE (HPKB Integrated Knowledge Environment)—A Query Interface and Integrated Knowledge Environ- ment for HPKB (High Performance Knowledge Bases)

Barbara H. Starr, Science Applications International Corporation; *Vinay K. Chaudhri*, Artificial Intelligence Center SRI International; *Boris Katz*, Massachusetts Institute of Technology Artificial Intelligence Laboratory; *Benjamin Good*, Science Applications International Corporation

The HPKB Integrated Knowledge Environment (HIKE) demonstration will be demonstrated by Barbara Starr from Science Applications International (SAIC). This demonstration illustrates a web based interface to the knowledge based systems and theorem provers involved in DARPA's High Performance Knowledge Bases (HPKB) program. In particular, it illustrates how a query is constructed, formalized and then submitted to a theorem prover, SNARK (SRI's New Automated Reasoning Kit), from SAIC's web based GUI interface HIKE. The answer is obtained from the theorem prover and displayed as an HTML page. The same query is then submitted in natural language form from the MIT Infolab's START (Syntactic Analysis with Reverse Transformations) system, converted to an interim formalization and then submitted to SNARK. The proof and answer are then displayed.

Booth #D06

Intelligent Agents in Computer Games

Mike van Lent, *John Laird*, *Josh Buckman*, *Joe Hartford*, *Steve Houchard*, *Kurt Steinkraus*, *Russ Tedrake*, Artificial Intelligence Lab, University of Michigan

As computer games become more complex and consumers demand more sophisticated agents, game developers are required to place a greater emphasis on the artificial intelligence aspects of their games. Research in areas such as agent architectures, knowledge representation, goal-directed behavior and knowledge reusability are all relevant to improving the intelligent agents in games. The Soar/Games project at the University of Michigan Artificial Intelligence Lab has developed an interface between Soar and the commercial games Quake II and Descent 3. Our presentation will demonstrate the application of artificial intelligence research to intelli-

Intelligent Systems Demos

gent agents in computer games in two ways. First, a poster presentation will describe the architecture used to implement the agents and highlight each area of research in that architecture. Second, the audience will play each computer game against opponents that utilize AI techniques. In addition to understanding how the research concepts are used, the audience will also evaluate the effectiveness of the concepts by playing the games.

Booth #D05

ISAAC: ISI Soccer Automated Assistant Coach

Taylor Raines, Milind Tambe, and Stacy Marsella, Information Sciences Institute, University of Southern California

ISAAC is a web-based agent created for analyzing and improving synthetic teams. The agent is built in a bottom-up fashion using little specific domain knowledge. In lieu of extensive domain knowledge, data mining and inductive learning techniques are used in an attempt to isolate the key issues determining the successes and failures of these teams. This approach has been applied to the RoboCup domain, with a current focus on analyzing shots on goal. ISAAC reviews traces of synthetic soccer games and analyzes the actions and contexts which cause shots on goal to succeed or fail. The agent then extracts prototypical cases of this analysis for the user to peruse graphically. ISAAC also allows the user to view perturbations of these contexts to see which changes would prove most beneficial. Users are also encouraged to upload their own team's traces for ISAAC to analyze.

Booth #D08

Knowledge Base Discovery Tool

Erik Eilerts, Kathleen Lossau, and Christopher York
Austin Info Systems, Inc.
303 Camp Craft Road
Austin, TX 78746
(512) 329-6661
{eilerts, lossau, yorkc}@ausinfo.com

The Knowledge Base Discovery Tool (KBDT) is a suite of tools and components to improve the indexing of and search for documents. KBDT extracts and displays content from documents and builds knowledge indexes based on meaning, rather than keywords. KBDT uses the indexes to perform more intelligent searches. It also includes visualization technology to display relevant results using multi-media, rather than plain text. This prototype demonstration focuses on two tools that use the components to search, extract, and display requested information. The tools are the Knowledge Base Editor

and the Intelligent Information Retrieval Engine.

Booth #D13

MailCat: An Intelligent Assistant for Organizing E-Mail

Richard B. Segal and Jeffrey O. Kephart
IBM Thomas J. Watson Research Center
Yorktown Heights, NY 10598
rsegal@watson.ibm.com, kephart@watson.ibm.com

While most mail reader applications allow users to file messages into folders, in practice this task tends to be tedious. For each message, the user must first decide which folder is most appropriate. Then, the user must inform the mail reader of that choice by selecting the appropriate icon or menu item from among what is typically a set of several dozen choices. The combined effort of choosing a folder and conveying that choice to the application often discourages users from filing their mail, resulting in unmanageable inboxes that contain hundreds or even thousands of unfiled messages. MailCat encourages users to file their mail by simplifying the task. Using an adaptive classifier, it predicts the three folders that are most likely to be appropriate for a given message, and provides shortcut buttons that permit the user to file it into a predicted folder effortlessly. For typical users, MailCat's predictions are accurate over 80% or 90% of the time, resulting in a substantial reduction in the time and cognitive burden required to file messages.

Booth #D03

A Natural-Language Speech Interface Constructed Entirely as a Set of Executable Specifications

R. A. Frost, Department of Computer Science, University of Windsor, Canada

The demonstration shows a text-based natural-language interface to a database system accessible through the web, and also a speech-based version of the same interface accessible through telnet. The interfaces are not sophisticated from a natural-language processing point of view, but are interesting in that they have been constructed entirely as executable specifications. The executable specifications are completely declarative and highly modular. Use of this approach facilitates interface construction, modification and re-use. The speech-interface is being re-engineered using IBM's off-the-shelf Via Voice Gold technology and the Java speech APIs. This will enable applications to be accessed through speech interfaces running on standard laptops, and will also permit on-the-fly modification of the speech. This re-engineering will be complete

for the AAAI demonstration. Syntax specification files resulting in higher recognition accuracy, and more sophisticated interfaces.

Booth #D09

Sensible Agents: Demonstration of Dynamic Configuration of Agent Organizations for Responsive Planning Operations

K. S. Barber, A. Goel, D. Han, J. Kim, T. H. Liu, C. E. Martin, and R. McKay

The Laboratory for Intelligent Processes and Systems
Department of Electrical and Computer Engineering,
ENS 240

University of Texas at Austin

Austin, TX

78712-1084

barber@mail.utexas.edu

The Sensible Agent Testbed allows users to perform controlled and repeatable experiments on the performance of Sensible Agents in a distributed simulation environment. The testbed uses CORBA® and IDL™ to connect modules running in C++, ModSim, Java and Lisp on WindowsNT and Linux platforms. The user can perform initialization, monitoring, and logging of the environment or individual Sensible Agent performance as the simulation progresses. Several different scenarios are presented to demonstrate the capabilities of Sensible Agents in a Naval Radar Frequency Management domain. Sensible Agents can use Dynamic Adaptive Autonomy (DAA) to adapt the structure of their problem-solving organizations in order to handle the complex and dynamic nature of this domain. Users can view this adaptation and monitor related system and agent performance variables as the simulation runs. This technology has the potential to provide advanced multi-agent capabilities to legacy planners with a minimal recoding effort.

Booth #D7

Solving Crosswords with Proverb

Michael L. Littman, Greg A. Keim, and Noam M. Shazeer, Department of Computer Science, Duke University

We attacked the problem of solving crossword puzzles by computer: Given a set of clues and a crossword grid, try to maximize the number of words correctly filled in. Proverb, the probabilistic cruciverbalist, separates the problem into two, more familiar subproblems: candidate generation and grid filling. In candidate generation, each clue is treated as a type of query to an information retrieval system, and relevant words of the correct length are returned along with confidence scores. In grid filling, the candidate

words are fit into the puzzle grid to maximize an overall confidence score using a combination of ideas from belief network inference and constraint satisfaction. For our demonstration, we will have an interactive version of the candidate generation process available via the web, and will also give people an opportunity to go head-to-head against Proverb in solving complete puzzles.

Booth #D04

A System for the Semantic Interpretation of Unrestricted Domains Using WordNet

Fernando Gomez and Carlos Segami

School of Computer Science

University of Central Florida

Orlando, FL 32816

In this demonstration, we show an algorithm for the semantic interpretation of unrestricted domains. The algorithm presents a solution for the following semantic interpretation problems: determination of the meaning of the verb, identification of thematic roles and adjuncts, and attachments of prepositions. The algorithm uses WordNet as its lexical knowledge-base. Predicates have been defined for WordNet verb classes, linking selectional restrictions to the WordNet ontology and to syntactic relations. In the demonstration, we will show how the algorithm works by illustrating it with some sentences, and then, we will let the audience try sentences in the system.

Booth #D01

TRIPS: The Rochester Interactive Planning System

George Ferguson and James Allen

Dept. of Computer Science

University of Rochester

Rochester, NY, 14627

{ferguson,james}@cs.rochester.edu

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

Robot Programs

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.

Booth #D02

Worldwide Aeronautical Route Planner

Charles B. McVey, David P. Clements, and Andrew J. Parkes, University of Oregon CIRL

We consider the common problem of calculating routes from a starting point to a destination through a given space. This process typically involves discretizing the navigational space into individual waypoints linked together through transitions, then searching for a solution that fits desired criteria. Our work in this area focuses on the rapid determination of minimal fuel routes for aircraft to fly between any source and destination points on the earth. The Worldwide Aeronautical Route Planner (WARP) is our prototype demonstration of optimal real-time (under one minute per route) flight planning technology. WARP uses high-fidelity aircraft flight models, official flight operation procedures, actual time-dependent worldwide weather data, and a multi-pass variant of A* which retains completeness and optimality properties. WARP typically discovers the minimal-fuel flight plan in under thirty seconds, with fuel savings of one to eight percent compared to great circle (minimum distance) routes.

Eighth Annual AAAI Mobile Robot Competition and Exhibition

The Robot Competition and Exhibition will be held in Exhibit Hall A1 on the second level of the Orange County Convention Center, and will be open to registered conference attendees during exhibit hours. This series of events brings together teams from universities and other research laboratories to compete, and also to demonstrate cutting edge research in robotics and artificial intelligence.

The Mobile Robot Competition and Exhibition serves AI-robotics researchers, and the larger AI community by promoting innovative research through events that appeal to media and sponsors, while conducting these events in a format that facilitates comparison of approaches and integration of multiple AI methodologies. Our goals are to foster the sharing of research and technology, allow research groups to showcase their achievements, encourage students to enter robotics and artificial intelligence fields at both the undergraduate and graduate levels, and increase awareness of the field. This year, the Competition and Exhibition is comprised of three separate events and a workshop:

Contest

The contest allows teams to show off their best attempts at solving common tasks in a competitive environment. Teams compete for place awards as well as for technical innovation awards, which reward particularly interesting solutions to problems. There will be two contest events this year, "Hors d'Oeuvres Anyone?" and "Scavenger Hunt." In each of these events, a first, second and third place award will be given for performance, as well as technical innovation awards that will highlight research achievements.

Hors d'Oeuvres Anyone? Robot Interaction Event

This event will take place during the AI Festival on Wednesday evening in the exhibit hall. The objective of this competition is to act as service robots, serving hors d'oeuvres to attendees at the reception. Each contestant is encouraged to explicitly and unambiguously demonstrate interaction with the spectators. In keeping with the IJCAI panel on "The Next Big Thing," more natural modes of communication are nec-

Robot Programs

essary for society's acceptance of robots. Furthermore, this helps distinguish the AAAI competition from other competitions.

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.

Scavenger Hunt

Each contestant will be given a list of items to find. These items will depend on a variety of sensors, including auditory, range finding, and vision. The environment will not be engineered for the event, except that the density of people will be relatively low. For instance, crowding around a robot will not be allowed. There will be no penned area as in previous competitions. Furniture and other structures will be natural and may not be marked or altered for the sake of the robots. The objects will be located within a fixed radius from the starting point. The exact radius will be determined at the competition but expect it to be on the order of 25-50 yards. Robots must clearly report the location of the scavenger hunt items found. This report may be in the form of a natural language utterance, a map of the environment showing the location of items, or if the item can be manipulated, by picking up the object and returning it to the starting point.

Contestants may enter a team of robots and will be more favorably judged if they demonstrate some form of cooperation.

Challenge

In addition to the contest and exhibit, we are adding a new aspect this year—the Robot Challenge. In this event, a particularly challenging task is defined, which is well beyond current capabilities, will require multiple years to solve, and should encourage larger teams and collaborative efforts. The challenge task is defined by a long-term committee of researchers. Currently the task is for a robot to be dropped off at the front door of the conference venue, register itself as a student volunteer, perform various tasks as assigned, and talk at a session. The challenge will require integration of many areas of artificial intelligence as well as robotics. Teams will be in the main conference areas attempting to solve parts of this problem.

Awards for the challenge will be given for technical innovations in various AI technology areas, but no place awards will be given. In particular, awards for integration of AI techniques will be awarded.

Awards

This year, in addition to certificates, we will have awards of mobile robots for several categories. In each of the two competition events, a robot will be awarded to the first and second place teams' home institutions. In addition, an award will be given for the best integration across multiple AI techniques, the Ben Wegbreit Award for Integrative Technologies. Teams from both the contest and the challenge are eligible for this award. The awards consist of ATRV-Mini and Megallex mobile robots (Real World Interface), and Pioneer mobile robots (ActivMedia).

Exhibition

The exhibition gives researchers an opportunity to demonstrate state-of-the-art research in a less structured environment. Exhibits are scheduled throughout normal exhibit hall hours. In addition to live exhibits, a video proceedings will be shown.

Robot Event Judges & Chairs

- General Chair
Alan C. Schultz, Naval Research Laboratory
- Competition Cochair
Lisa Meeden, Swarthmore College
- Challenge Cochair
Tucker Balch, Carnegie Mellon University
- Exhibition Cochairs
Karen Zita Haigh, Honeywell Technology Center and Marc Böhlen, Carnegie Mellon University
- Steering Committee Chair
David Kortenkamp, Metrick Trac Labs

Mobile Robot Competition Workshop

Organizer: Alan C. Schultz

Thursday, July 22

9:00 AM – 3:00 PM

Salon 1, Omni Rosen Hotel

Robot Teams

Robot Competition and Exhibition Teams

Exhibitor

Carnegie Mellon University

Robot: Babycakes

Team Leader: Ercan Acar

Team Members: Michael Rosenblat and Morgan Simmons

Exhibitor

Carnegie Mellon University

Robot: Minnow

Team Leader: Tucker Balch

Team Members: Sorin Achim, Jim Bruce, Anna Reali, and Manuela Veloso

Minnow is the prototype for a class of inexpensive yet high performance robots based on the TeamBots control system (formerly called JavaBots). The mechanical platform is based on a commercially available radio-controlled tank. The primary sensor is a color camera, with all vision processing (30Hz) and control onboard. Onboard processing is provided by a Pentium-based PC-104 main board running Linux and Java. Information on the TeamBots system is available at <http://www.cs.cmu.edu/~trb/TeamBots/>.

Challenge Competitor

Carnegie Mellon University Robotics Institute

Robot: OfficeBoy 2000

Advisor: Illah R. Nourbakhsh

Team Leader: Rahul Bhargava

Team Members: Dan Robinson and Chris Quirk

OfficeBoy 2000 is the playful instantiation of research we have conducted in creating a highly interactive, learning robotic assistant. The robot takes natural language as its input from untrained human users and parses the commands using case frames. If the resulting goals are achievable given the state of the robots knowledge base, it will then invoke a planner and execute the resulting plan. If, however, further information is required, OfficeBoy will request that information from nearby humans.

OfficeBoy is unusual in that it will interact with humans opportunistically throughout execution of its tasks, requesting and often receiving help from humans who have never interacted with a robot before. It navigates by virtue of a topological map using a simple, radial ring of sonar sensors. During AAAI-99, OfficeBoy will demonstrate its ability to satisfy a portion of the requirements for the Robotics Grand Challenge.

Exhibitor

Carnegie Mellon University Robotics Institute

Robot: Robot Improv

Sponsor: Illah R. Nourbakhsh

Team Leader: Allison Bruce

Team Members: Brian Magerko and Sam Listopad

Robot Improv is the result of ongoing research on mobile robots displaying believable dramatic behavior. The goal is to develop a robot architecture that allows the robot pair to perform all of the acting exercises taught in an Introductory Acting course. A further goal is that the robots, though non-human in appearance and motion, should exhibit believable, human-like behavior within the context of a dramatic situation. Finally, the robots behavior will be in part decided by an internally defined, dynamic emotional model.

We have designed a robot architecture using a class hierarchy, including abstract classes for the play, for each actor (including an emotional model), for the venue and, finally, for the available actions.

During the actual performance, there is a serial process in which each robot, in turn, chooses and performs its next line in the play. There are no conventional scripts that the robots are following. Based on their own goals, their emotional state, the perceived position and emotional state of the other agent and the results of planning episodes, the robots wholly improvise every play. Every play is unique, with the outcome varying dramatically at times.

The robots are Nomad Scout robots, with all software running under Java 1.1.

Exhibitor

Georgia Institute of Technology

Robot: Learning Tasks from Demonstration

Team Advisor: Christopher Atkeson

Team Leader: Darrin Bentivegna

Humans can begin to learn a task by observing the task being performed. This can provide a jump-start to becoming proficient at the task. Can robots also learn to do a task by observing someone or something perform the task? This research explores ways for agents to use observed data to reduce the learning time needed to perform a task. A variety of domains and computer learning methods are being considered.

A virtual air-hockey player has been created that learns to play by observing a human player. The human plays against the cyber-player using the mouse to control the paddle. After the human has played for a while, the data can be

given to the cyber-player. The cyber-player will analyze the data and use it to learn how to play. When the cyber player uses the data from a particular human player, the cyber-player will exhibit some characteristics of that player.

Another domain that will be demonstrated in a 3D environment and also on hardware is the Labyrinth game, a game where a player controls the movement of a marble by tilting the platform using two knobs. The object of the game is to move the marble through a maze that contains holes into which the marble can fall. An actual Labyrinth game has been equipped with servomotors, allowing a computer to operate the game like a human player. Sensors are installed on the playing board so its attitude can be measured. A computer vision system allows the computer to observe the movement of the ball.

Competitor

Kansas State University

Robot: Willie

Team Advisor: David A. Gustafson

Team Leader: Frank Blecha

Team Members: Tim Beese, Jonathan Cameron, and Damon Kuntz

The robot, Willie, is a Nomad 200 mobile robot, a commercial system designed and built by Nomadic Technologies Inc. (Mountain View, CA). The Nomad consists of a base unit, capable of translation and steering motions, and a moveable turret, also capable of rotation, on which all sensors are mounted. An array of sixteen ultrasonic range sensors are mounted along the turret's circumference. There are three CCD cameras mounted on top of the robot's turret; one is color, the other two are monochrome. A microphone is available for sensing sound. All processing is carried out on an Intel-based Pentium 233MHz single board computer, which is equipped with 128 megabytes of main memory, and a wireless Ethernet interface.

This year's team is using a model-based approach to object recognition, while using a subsumption navigation scheme to guide the robot around obstacles and through the environment. The code is object-oriented and is written in C++.

Exhibitor

Naval Research Laboratory

Robot: Coyote

Team Advisor: Alan C. Schultz

Team Leader: William Adams

Team Members: Dennis Perzanowski and Colleen McCarthy

We will exhibit our research in two areas: a natural interface for interacting with the robot, and

an integrated system for navigating in previously unknown environments.

The natural interface combines natural language and gestures which complement each other in daily communication. Our interface also allows the processing of fragmentary commands by using "context predicates" to track verbal predicates and goals. A discourse component determines to what extent each goal was achieved and the robot can continue to work toward unaccomplished goals without explicit re-statement by the user.

We will also exhibit our integrated system for exploration, map building, localization, path planning and navigation. Built around a common representation, this integrated system includes our own components and components from the wider robotics community. Maps are adaptive to changes in real time, allowing robust navigation in dynamic environments. As a result, the robot can enter an unknown environment, map it while remaining confident of its position, and robustly plan and navigate within the environment in real time. The interface to this integrated system is a wireless Palm Pilot, which can control the robot at several levels of abstraction. Coyote, a Nomad 200 robot, will be used to demonstrate these two systems.

Exhibitor

Probotics, Inc.

Robot: Cyé

Team Advisor: Tucker Balch

Team Leader: Henry Thorne

Team Members: Raymond Russell and Joseph Papp

Cyé is an easy robot to set up and use that offers state of the art ded-reckoning and a powerful and extendible GUI. You simply plug Cyé's charger in and place it against a wall, plug Cyé's radio pod in and plug it into a COM port on your PC, load the software and your off and running.

The Map-N-Zap software that comes with Cyé shows a plan view of Cyé in his grey world. You can simply click on Cyé and pull him around. As he moves he maps free space to white and obstacles to black. You can edit the map directly using drawing tools as well as add objects to the map. Using these objects you can then set up where you want Cyé to go when using the Zap programming tool. Zap is simply a drag and drop list of tasks for Cyé.

Cyé is extremely extendible. The software comes with an OCX that you can load into your VB or VC++ programming environment and access the entire low level command set for Cyé right from your own program. There are 17 properties, 38 methods, and 16 events. Cyé has a

Robot Teams

central mounting post on which accessories can be mounted like the available Wagon and Vacuum Attachment. In front of the post hole there is an RJ45 connector providing power, an input, an output, and the radio link.

Exhibitor

Quest NSF REU

Robots: Silver Bullet and Bujold
Team Advisor: Robin R. Murphy
Team Leader: Jenn Casper
Team Members: Michelle Ausmus, Magda Bugajska, Tanya Ellis, Tonia Johnson, Nia Kelley, and Jodi Kiefer

The members of the Quest team represent four universities and three majors working on a two-year NSF Research Experience for Undergraduates site grant at the University of South Florida entitled "Multiple Autonomous Mobile Robots for Search and Rescue." The women will demonstrate advances in the hardware and software for Silver Bullet and Bujold for use in Urban Search and Rescue.

Silver Bullet and Bujold are a "marsupial" team, where the custom-built Silver Bullet actually carries a miniature chemical inspection robot, Bujold, to a site. Silver Bullet is based on a children's battery powered jeep and has vision, sonars, thermal sensing, inclinometers, GPS, microphones, and radio ethernet. She is fully autonomous with an onboard K6 450MHz processor and two Matrox Meteor framegrabbers. Bujold is a Inuktun tracked rover with a camera and microphone. She is tethered to Silver Bullet and can be controlled either by Silver Bullet directly or through teleoperation. The team recently won a \$1,000 Robotic Industries Association scholarship for their work in automating control of the team.

Exhibitor

Real World Interface/IS Robotics

Robot: ATRV, Urban Robot ("Urbie")
Team Members: Grinnell More, Laura Woodbury, and Todd Pack

Exhibitor

Science Applications International Corporation (SAIC)

Robot: Subot
Team Members: Jennifer Herron and John Spofford

Competitor

Swarthmore College

Robot: Swatbot
Team Leader: Bruce A. Maxwell

Competitor

University of Arkansas

Robot: Mobile Robotics Research Group
Team Leader: Douglas Blank

Competitor

University of North Dakota

Robot: Rusty the BEAR II
Team Advisor: Henry Hexmoor
Team Leader: Michael Trosen
Team Members: Michael Trosen, Matt LaFary, Tim Thompson, Craig Eshenko, and David Giese
We are using a Pioneer 2 Dx robot with full vision and speech recognition as a continuance of our first-place entry in AAAI-98. This year's Rusty uses a blend of behaviors included with the Pioneer 2 Operating system and our own enhanced behaviors for successful navigation and serving.

Exhibitor

University of North Dakota

Robot: RoboNanny
Team Leader: Henry Hexmoor

Competitor and Exhibitor

University of South Florida

Robots: Butler and Leguin
Team Advisor: Robin R. Murphy
Team Leader: Mark Micire and Brian Sjoberg
Team Members: Jenn Casper, Mark Eichenberg, Aaron Gage, Jeff Hyams, Brian Minten, Mark Powell, and Min Shin

The USF entry in the Hors d'Oeuvres Anyone? event will demonstrate (1) dynamic allocation of sensors as the robots engage in a complex script of behaviors, (2) robust object and face detection using the SCT color space and sensor fusion, (3) cooperation between two robots where one robot transports refills, and (4) colorful interactions with the audience. The two platforms, Butler and Leguin, are Nomad 200 robots with heterogeneous sensing capabilities. Butler will use vision and thermal sensing to make eye contact with people and Leguin, and to identify VIP's. She will also use her laser to determine when the tray is almost empty and radio Leguin for a refill. Leguin will navigate to Butler using a shared common map, recognize Butler, and interact with her, then return to the refill station. The robots will exhibit Florida "personalities" (a Borg shark and a Puffer fish), and will interact with the audience through multi-media designed by the USF Art department, including inflatable sculptures. Portions of this entry were made possible through grants from NSF and ONR.

Competitor

University of Southern California Robotics Lab

Robots: Cartman, Stan, Kyle, & Kenny

Team Advisor: Maja J. Mataric

Team Leader: Barry Werger

Team Members: Brian Gerkey, Dani Goldberg, Monica Nicolescu, Paolo Pirjanian, Stergios Roumeliotis, Stefan Weber, and Barry Werger

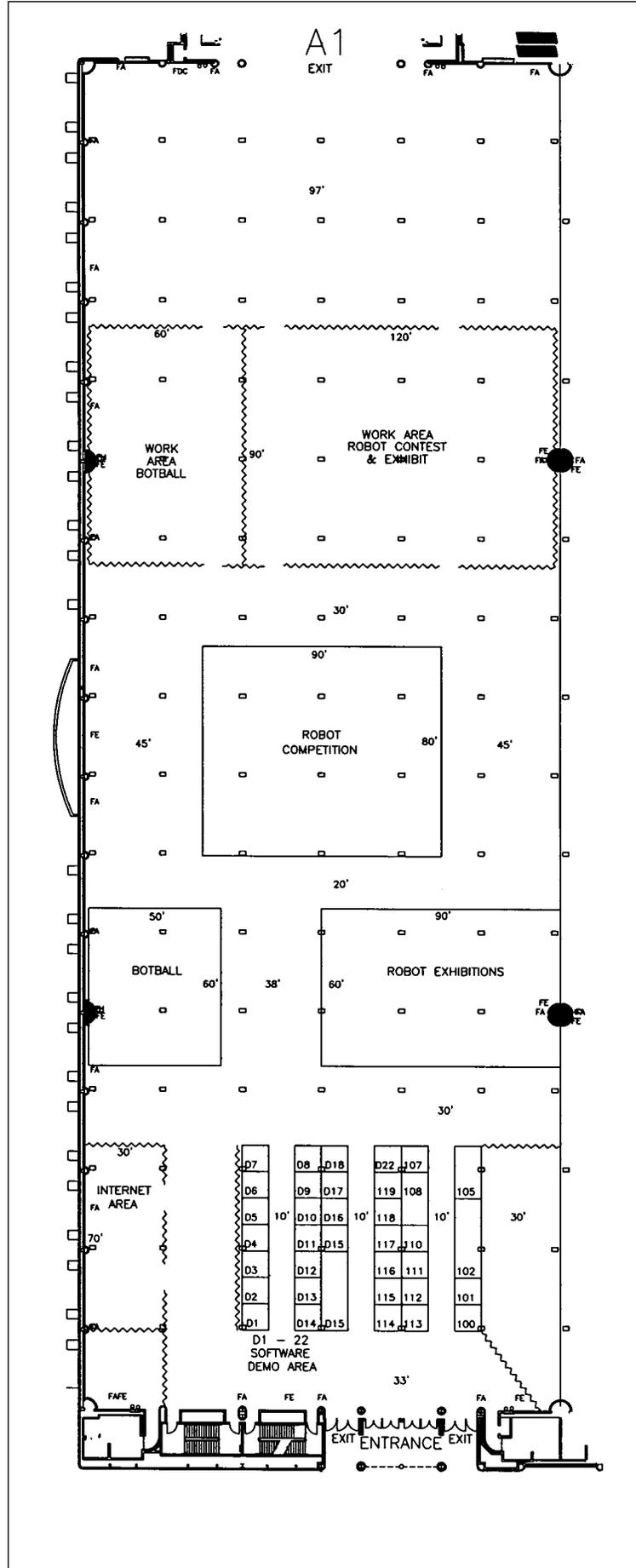
Showcasing the USC Robotics Lab emphasis on truly distributed control for multiple agents, the robots on our team will compete simultaneously and cooperatively with no explicit centralized coordination. In order to illustrate robot-robot and robot-human interactions, our contestants are endowed with personalities (befitting their names: Cartman, Stan, Kyle, and Kenny) that evolve over time via emotional responses to their individual and collective experiences (don't be too surprised if you elicit a vocal response from our robots). Specifically, robot-human interactions are facilitated by a gesture-based visual interface which allows the robots to complete their tasks with human help. During the competition, the robots will also rely on other sensor modalities, but with a clear focus on lightweight vision and laser ranging.

Exhibitor

Utah State University

Robot: Web-Based Robot Simulator

Team Leader: Dan Stormont



Robot Teams / Exhibit Map

Registration

Registration

Conference registration will take place outside the Grand Ballroom, on the first level of the Omni Rosen Hotel, beginning Sunday, July 18. Registration hours are:

Sunday, July 18	7:30 AM – 6:00 PM
Monday, July 19	7:30 AM – 6:00 PM
Tuesday, July 20	8:00 AM – 6:00 PM
Wednesday, July 21	8:00 AM – 6:00 PM
Thursday, July 22	8:30 AM – 2:00 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

The AAAI-99/IAAI-99 technical program registration fee includes admission to all technical paper sessions, invited talks and panels, the Exhibition Program, the Intelligent Systems Demos, the Robot Competition and Exhibition, the Student Abstract Poster Session, the Tutorial Forum (including SP4 and MP4), the Workshop Program (by invitation only), the opening reception, the AI Festival, and the AAAI-99/IAAI-99 Conference *Proceedings*. Tutorial Forum attendees may register for up to four consecutive tutorials, and will receive the corresponding syllabi. 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

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-99 technical program, or in the case of the jointly sponsored workshop (W6), must register for either AAAI-99 or GECCO-99. Registration onsite for a workshop is possible with the prior permission of the corresponding workshop organizer.

Robot Building Lab

The robot building lab registration 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 required.

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 two-day pass, or \$30.00 for a two-day pass plus the AI Festival on Wednesday evening. Exhibit hall programs include vendor exhibits, 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.

AAAI-99 / IAAI-99 CD-ROM

Each registrant for the AAAI-99/IAAI-99 technical program will receive a ticket with the registration materials for one copy of the conference CD-ROM. During registration hours on Sunday, July 18, Monday, July 19 and until 10:00 AM on Tuesday, July 20, CD-ROM tickets can be redeemed at the AAAI Press desk, located in AAAI onsite registration on the first level of the Omni Rosen Hotel. After 10:00 AM on Tuesday, the AAAI-99/IAAI-99 CD tickets may be redeemed at the AAAI Press booth #104, located in the Exhibition Hall A1 of the Orange County Convention Center, during exhibit hours.

Extra CDs may be purchased at onsite registration or by mail from the AAAI Press. Thursday, July 22, will be the last day to purchase extra copies of the CD-ROM on site.

AAAI-99 T-Shirts

AAAI-99 t-shirts will be for sale during registration hours at the registration desk, on the first level of the Omni Rosen Hotel. Supplies are limited. Price: \$10.00 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. Tutorial attendees must present syllabi tickets to receive syllabi. 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 Orange County Convention Center. Please check your luggage with the bellman at your hotel after you have checked out. Neither the AAAI, the Orange County Convention Center, the Omni Rosen Hotel, the Days Inn Convention Center/Sea World, nor the Red Roof Inn accept liability for the loss or theft of any suitcase, briefcase, or other personal belongings brought to the site of AAAI-99/IAAI-99.

Banking

The closest bank and automated teller machine (ATM) are located at NationsBank. The ATM networks available are Discover, MasterCard, Visa, Cirrus, Honor and Plus. NationsBank can also exchange all major foreign currencies.

NationsBank, 7220 Sand Lake Road

Orlando, FL 32819

Telephone: (407) 351-4220

Monday–Thursday: 9:00 AM–4:00 PM

Friday: 9:00 AM – 6:00 PM

Closed Saturdays and Sundays

There are also automated teller machines (ATMs) located in the lobby of the Omni Rosen Hotel and the 7-11, which is adjacent to the hotel.

Business Centers

Business Centers are available at the following locations:

Xerox Business Center

Level One, Omni Rosen Hotel

Hours: Monday – Friday: 7:30 AM – 6:30 PM;

Saturday: 8:00 AM – 12:00 noon

Kinko's Business Center

Level Two, Outside Hall C, Orange County Convention Center

Hours: 8:00 AM–5:00 PM daily

Services include fax, copies, laser printing, and other general office services. The Omni Rosen offers shipping by Airborne Express, DHL, 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 Grand Ballroom, on the first level of the Omni Rosen Hotel. 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 Anny's Nanny's at 407-370-4577. (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.)

General Information

Coffee Breaks

Coffee will be served in the Grand Terrace, level two, Omni Rosen Hotel from 10:00–10:30 AM and 4:10–4:30 PM each day. Coffee breaks at the Orange County Convention Center are scheduled for Tuesday, July 20 from 10:00 – 10:30 AM and 4:10 – 4:30 PM and Wednesday, July 21 from 10:00–10:30 AM.

Copy Services

Copy services are available at:

Kinko's – South Orlando
7200 South Orange Blossom Trail
Orlando, FL 32809
Telephone: 407-858-4254
Fax: 407-240-0052
Hours: 24 hours per day

Copy service is also available at the Xerox Business Center in the Omni Rosen Hotel and at the Kinko's Business Center in the Orange County Convention Center for smaller print jobs.

Dining

Orlando dining information is available in the Orlando Visitors Guide Booklet, which has been included with your registration materials. The following restaurants will be open in the Omni Rosen Hotel during the conference: Café Gauguin, Reds Market and Deli, and the Everglades Restaurant. Concessions will be open, directly across from Exhibit Hall A1, on the second level of the Orange County Convention Center from, Sunday, July 18 – Thursday, July 22.

Handicapped Facilities

The Orange County Convention Center, the Omni Rosen Hotel, the Days Inn Convention Center/Sea World, and the Red Roof Inn are all equipped with handicapped facilities.

Housing

For information regarding hotel reservations, please contact the hotels directly. For student housing, please contact the Days Inn Convention Center/Sea World at 1-800-224-5055 or the Red Roof Inn at 407-352-1507.

Information Desk

An information desk/message desk will be staffed during registration hours, Sunday through Thursday, July 18–22. It is located near the registration area, on the first level of the Omni Rosen Hotel. Messages will be posted on the message boards adjacent to the desk. The telephone number for leaving messages only is (407) 996-9840, extension 4521. Paging attendees is not possible.

Internet

AAAI, in cooperation with Microsoft, will be providing internet access in Exhibition Hall A1 of the Orange County Convention Center. The internet room will be open Sunday and Monday 8:00 AM – 5:00 PM; Tuesday 8:00 AM – 6:00 PM; Wednesday, 8:00 AM – 10:00 PM; and Thursday 8:00 – 3:00 PM. As a courtesy, please limit your access time to 5-10 minutes if others are waiting to use the service.

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 Omni Rosen Hotel. Attendee lists will not be distributed.

Message Center

See Information Desk

Parking

The Omni Rosen Hotel provides a complimentary covered parking garage.

Press

All members of the media are requested to register in the Press Room, on the second level of the Omni Rosen Hotel, Salon 19. Press badges will only be issued to individuals with approved credentials. The Press Room will be open during the following hours.

Monday, July 19	8:00 AM–5:00 PM
Tuesday, July 20	8:00 AM–5:00 PM
Wednesday, July 21	8:00 AM–5:00 PM
Thursday, July 22	8:00 AM–12:00 PM

An AAAI-99 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 in the registration area on the first level of the Omni Rosen Hotel.

Proceedings

Each registrant for the AAAI-99/IAAI-99 technical program will receive a ticket with the registration materials for one copy of the conference *Proceedings*. During registration hours on Sunday, July 18, Monday, July 19 and until 10:00 AM on Tuesday, July 20, *Proceedings* tickets can be redeemed at the AAAI Press *Proceedings* desk, located in AAAI onsite registration on the first level of the Omni Rosen Hotel. After 10:00 AM on Tuesday, the AAAI-99/IAAI-99 *Proceedings* ticket may be redeemed at the MIT Press booth #102, located in the Exhibition Hall A1 of the Orange County Convention Center, during exhibit hours.

Extra *Proceedings* (book only—not the CD) may be purchased at the conference site at the above locations. Thursday, July 22, will be the last day to purchase extra copies of the *Proceedings* on site.

The AAAI-99/IAAI-99 *Proceedings* (book only—not the CD) 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; for orders outside USA: \$25.00 surface or \$55.00 for airmail.

Proceedings Shipping

Proceedings may be shipped through the Xerox Business Center, level one, Omni Rosen Hotel via Airborne Express, DHL, Federal Express and UPS. The hours of operation are Monday – Friday: 7:30 AM – 6:30 PM, Saturday: 8:00 AM – 12:00 noon.

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 on the first level of the Omni Rosen Hotel. A representative from Audio Archives will be available to take your order during registration hours, beginning on Tuesday, July 20. 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 Salon 17 on the second level of the Omni Rosen Hotel. 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 18–Thursday, July 22.

Invited speakers are asked to come to Salon 17 one day prior to their speech. Representatives from AV Headquarters will be available from 8:00 AM–5:00 PM, Sunday, July 18–Thursday, July 22 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 Delta Airlines as the official co-carriers and Avis Rent A Car as the official car rental agency for AAAI-99/IAAI-99. 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

General Information

Taxi

Taxis are available at Orlando International Airport. Approximate fare from the airport to downtown Orlando is \$25.

Bus

Greyhound Bus—For information on fares and scheduling, call 800-231-2222.

City Transit System

I-Ride trackless trolley service provides transportation along International Drive from the Belz Factory Outlet to Sea World. I-Ride operates seven days a week from 7 a.m. to midnight, every 15 minutes. The fare is \$.75 per person per trip, and free for children 12 and under. An unlimited pass is available in one, three, five and seven day increments. For information call 407-354-5656. In addition, Lynx is a citywide bus transit service for the greater metropolitan Orlando area. The fare is \$.85 per person per trip; hours vary. For information call 407-841-8240.

Tutorial Syllabi

Extra copies of AAAI-99 tutorial syllabi will be available for purchase in AAAI onsite registration in the Omni Rosen Hotel, beginning Tuesday, July 20. Supplies are limited. Cost is \$15.00 per syllabus. Preregistration tutorial syllabi tickets may be redeemed in the tutorial rooms.

Volunteer Room

The volunteer room is located in Salon 18 on the second level of the Omni Rosen Hotel. Hours are 8:00 AM–5:00 PM, Sunday, July 18–Wednesday, July 21 and 8:00 AM–2:00 PM, Thursday, July 22. 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 17 at 4:00 PM in Salon 9 of the Omni Rosen Hotel.

Disclaimer

In offering American Airlines, Anny's Nanny's, Avis Rent A Car, Conventions in America, the Days Inn Convention Center/Sea World, Delta Airlines, GES, Omni Rosen Hotel, the Orange County Convention Center, the Red Roof Inn, and all other service providers (hereinafter referred to as "Supplier(s)" for the National Conference on Artificial Intelligence and the Innovative Applications Conference), AAAI acts only in the capacity of agent for the Suppliers, which are the providers of the service. Because AAAI has no control over the personnel, equipment, or operations of providers of accommodations or other services included as part of the AAAI-99 / IAAI-99 program, AAAI assumes no responsibility for and will not be liable for any personal delay, inconveniences or other damage suffered by conference participants which may arise by reason of (1) any wrongful or negligent acts or omissions on the part of any Supplier or its employees, (2) any defect in or failure of any vehicle, equipment or instrumentality owned, operated or otherwise used by any Supplier, or (3) any wrongful or negligent acts or omissions on the part of any other party not under the control, direct or otherwise, of AAAI.

Facilities Map

