

# AAAI 1999 Spring Symposium Series

March 22-24, 1999 Stanford University, California

# Registration

Sponsored by the
American Association for Artificial Intelligence
445 Burgess Drive, Menlo Park, CA 94025
650-328-3123
650-321-4457 (Fax)
sss@aaai.org
www.aaai.org/Symposia/

The American Association for Artificial Intelligence, in cooperation with Stanford University's Department of Computer Science, presents the 1999 Spring Symposium Series, to be held Monday through Wednesday, March 22-24, 1999, at Stanford University. The topics of the eight symposia are:

- Agents with Adjustable Autonomy
- Artificial Intelligence and Computer Games
- Artificial Intelligence in Equipment Maintenance Service and Support
- Hybrid Systems & AI: Modeling, Analysis and Control of Discrete
   + Continuous Systems
- Intelligent Agents in Cyberspace
- Predictive Toxicology of Chemicals: Experiences and Impact of AI Tools
- Search Techniques for Problem Solving Under Uncertainty and Incomplete Information

The highlights of each symposium will be presented at a special plenary session. Working notes will be prepared and distributed to participants in each symposium, but will not otherwise be available unless published as an AAAI Technical Report or edited collection.

Each symposium will have limited attendance. Participants will be expected to attend a single symposium throughout the symposium series. In addition to participants selected by the program committee of the symposia, a limited number of other interested parties will be allowed to register in each symposium on a first-come, first-served basis. To register, please fill out the registration form, and send it along

with payment to:

1999 Spring Symposium Series AAAI, 445 Burgess Drive Menlo Park, CA 94025 Telephone: (650) 328-3123\* Fax: (650) 321-4457\*

Fax: (650) 321-445/\* E-mail: sss@aaai.org\*

\*Credit card orders only, please. Please note that there are security issues involved with the transmittal of credit card information over the internet. AAAI will not be held liable for any misuse of your credit card information during its transmittal to AAAI.

This document is also available at http://www.aaai.org/Symposia/Spring/1999/sssregistration-99.pdf.

# Tentative Program Schedule

(subject to change)

Monday, March 22

9:00 AM - 5:30 PM: Symposia sessions 6:00 PM - 7:00 PM: Reception

Tuesday, March 23

9:00 AM - 5:30 PM: Symposia sessions 6:00 PM - 7:00 PM: Plenary session

Wednesday, March 24

9:00 AM - 12:30 PM: Symposia sessions

Registration will be in the lobby of Tresidder Union at 520 Lagunita Drive on the Stanford University Campus.

# **Agents with Adjustable Autonomy**

Adjustable autonomy means dynamically adjusting the level of autonomy of an agent depending on the situation. For real-world teaming between humans and autonomous agents, the desired or optimal level of control may vary over time. Hence, effective autonomous agents will support adjustable autonomy. This contrasts with most work in autonomous systems, in which the style of interaction between the human and agent are fixed by design.

The adjustable autonomy concept includes the ability for humans to adjust the autonomy of agents, for agents to adjust their own autonomy, and for a group of agents to adjust the autonomy relationships within the group. Effective adjustable autonomy minimizes the necessity for human interaction, but maximizes the capability for humans to interact at whatever level of control is most appropriate for any situation at any time.

This symposium will bring together academic and industrial researchers from diverse fields such as classical and reactive planning, mixed-initiative systems, distributed AI, robotics, intelligent user interfaces, and multi-agent systems. The symposium will consist of a series of short presentations and structured discussion sessions investigating all aspects of adjustable autonomy, including theory, approaches, archi-

tectures, and applications. Specific topics include human-involved procedure execution; mixed-initiative planning; monitoring and situation awareness; anytime behavior modification of agents; maximizing effective collaboration between humans and agents; human-centered autonomous systems; understanding or controlling agents having adjustable autonomy; validation and verification of agents having adjustable autonomy; resource and constraint-based autonomy; levels of autonomy; safety and fault-tolerance; mission criticality; long-distance interaction; modeling and predicting behavior; reasoning about communication; prioritized tasking; case studies on problems in mixed human-machine operations; associate systems and overlapping competence; command-by-exception; flexible team organization between humans and agents

Further information can be obtained at http://tommy.jsc.nasa.gov/~korten/aaai-ss99/

## Organizing Committee

David Musliner (cochair), Honeywell Technology Center (musliner@htc.honeywell.com); Barney Pell (cochair), NASA Ames Research Center (pell@ptolemy.arc. nasa.gov); Gregory Dorais, NASA Ames Research Center; David Kortenkamp, Metrica Inc./TRACLabs; Nicola Muscettola, NASA Ames Research Center; Milind Tambe, USC/ISI.

# Artificial Intelligence and Computer Games

The gaming industry has always been, and continues to be, an early adopter of AI techniques. The explosion of power in home computers has dramatically increased the potential for the use of AI techniques in computer games. Thus it would be useful for the gaming industry to be more directly tapped into the AI research community. Conversely, as an application area, entertainment provides new challenges for the AI research community. Increased communication could therefore benefit both communities.

This Spring Symposium is intended to bring together AI researchers and professionals from the entertainment software industry. It will provide a forum to explore mutual interests, including (but not limited to) new AI techniques for entertainment software, research avenues that might benefit the entertainment industry, and ways to more easily transfer technology. Activities will include presentations on products and research as well as moderated discussions.

We will see a variety of game-related AI topics addressed, including:

■ The role of AI in computer games: How is AI used in current computer games? What are the parameters of the problems that need to be solved? What will be the next AI-intensive area of gaming?

- AI experiences: In solving AI problems in your research or commercial product, what were your experiences with this research or product? How did it succeed and what were the pitfalls along the way?
- Building long-term plans for technology transfer: How can we integrate research projects into current and future computer games? What are some examples of transferable technology? What kinds of communication networks or publications can contribute to this? What kinds of common tools would allow these two groups to share both code and ideas?

Send questions to wolff@cs. nwu.edu. More information is available at: www.cs.nwu. edu/~wolff/ AAAI-symposium.html

### Organizing Committee

Wolff Dobson, Northwestern University (cochair); Ken Forbus, Northwestern University (cochair); John Laird, University of Michigan (cochair); Mike van Lent, University of Michigan; Ernest Adams, Electronic Arts; Andrew Stern, PF. Magic

# Al in Equipment Maintenance Service and Support

In a recent paradigm shift, manufacturing companies who experience a reduction of profit margins in their traditional businesses try to maintain and grow their market share by offering their customers novel and aggressive service contracts. In these new offerings the old parts and labor billing model is replaced by guaranteed uptime. This in turn places the motivation to maintain equipment in working order on the servicing company. As a result there is a strong and renewed emphasis on AI technologies that can be used to monitor products and processes, detect incipient failures, identify possible faults (in various stages of development), determine preventive or corrective action, generate a cost-efficient repair plan, and monitor its execution. The service market delivered will include manufacturing (such as aircraft engines, appliances, locomotives, etc.) and non-manufacturing (such as financial systems, medical systems, etc.) based businesses.

Characteristics of typical challenges for AI in monitoring and diagnosis (M&D) service can be categorized into input, model, and output. In particular, input questions try to deal with real-time data streams resulting from on-line monitoring equipment. They are required to handle: throughput constraints; noise; nonstationary systems (due to linear drifts or chaotic behavior); er-

roneous data; data compression and information extraction. Process and product modeling tasks attempt to tackle issues involving non-stationary systems which require constant model update (adaptation, learning). In addition, the signature identification in time-series leading to fault detection and identification needs to be addressed. Moreover, the detection of new (unaccounted for) faults/ anomalies/state changes has to be dealt with.

This symposium aims to address relevant AI technologies which address segmentation, classification, prediction, and decision making in particular in remote monitoring and diagnosis tasks; knowledge extraction from symptom and databases and fault logs; warranty and maintenance decision making; automated rule generation for unsupervised maintenance; web-based diagnostics; distributed monitoring and diagnosis; diagnostic modeling; and soft computing techniques for diagnostics and prognostics. More information about this particular symposium can found at http:// best.me.berkeley.edu/~goebel/ss99/ aies.html

# Organizing Committee

Alice Agogino, UC Berkeley; Piero Bonissone, GE; Kai Goebel, GE; George Vachtsevanos, Georgia Institute of Technology

# Hybrid Systems and AI: Modeling Analysis and Control of Discrete + Continuous Systems

The use of digital computers to control continuous, dynamic processes has led to the development of hybrid (discrete + continuous) systems. The cross-disciplinary hybrid systems community combines discrete event and continuous systems modeling techniques with control theory for analysis and verification of embedded systems and synthesis of controller actions. Hybrid behavior is generally described as intervals of piecewise continuous behaviors (modes) interspersed with discrete transitions (mode transitions) that occur at points in time. Examples of hybrid systems include robots, air traffic control systems, chemical plants, autonomous spacecraft control, smart buildings and automated multi-vehicle highway systems.

The growing field of hybrid systems has seen a great deal of activity in the last few years often focusing on synthesis, verification and stability analysis of controllers for hybrid systems. Interestingly, a number of the problems addressed by this community are shared by AI researchers studying robotics, planning, simulation, verification, execution monitoring, decision analysis, reasoning about action, diagnosis, modeling and analysis of physical systems, and perception. This symposium aims to bring together these different communities to explore opportunities for exploiting AI representation and reasoning techniques for hybrid system modeling and analysis, and for integrating techniques from hybrid systems into current AI research.

To accommodate the diverse background of the symposium participants, we will design the symposium to facilitate interaction and discourse among the participants. The format will include invited talks by researchers Tom Henzinger, Alan Mackworth, Shankar Sastry, and Brian Williams; theme-based presentations in the areas of knowledge representation, reasoning and analysis, computation models, and integrated systems architectures, followed by facilitated discussion; panel sessions to discuss common problems; and an opportunity for post-symposium online discussion of ongoing issues sponsored by Electronic Transactions on Artificial Intelligence (ETAI) with assistance from Erik Sandewall.

Further details are available at www.ksl.stanford.edu/springsymp99/

## Organizing Committee

Gautam Biswas (cochair), Vanderbilt; Sheila McIlraith (cochair), Stanford Univ.; Craig Boutillier, Univ. of British Columbia; Dan Clancy, NASA Ames; Vineet Gupta, NASA Ames; Illah Nourbakhsh, Carnegie Mellon Univ.; Erik Sandewall, Linkoping Univ.; Henny Sipma, Stanford Univ.; Claire Tomlin, Stanford Univ.; Howard Wong-Toi, Cadence Berkeley Labs; Feng Zhao, Xerox PARC and Ohio State Univ.

# **Intelligent Agents in Cyberspace**

Cyberspace, in the shape of the Internet, intranets, extranets, and the World Wide Web, has grown phenomenally in recent years. Cyberspace now contains enormous amounts of information and is also being increasingly exploited for a number business and other applications. Electronic commerce is using cyberspace to open new markets. However, effective use of cyberspace and of the information in it is becoming increasingly difficult because of the sheer size of the web and its diversity of resources.

There is now growing interest in deploying intelligent software agents for effectively using cyberspace in a wide variety of applications. Software agents can act as smart personal assistants, roam cyberspace to collect required information on behalf of the users and conduct a variety of business transactions and functions online. They could also collectively perform complex, collaborative tasks. They allow personalization of the web and many of its resources.

To make significant progress in this area, however, we need to: 1) identify and explore opportunities for intelligent agents in cyberspace; 2) develop new, innovative applications; and 3) devise integrated, comprehensive approaches for their widespread deployment in cyberspace.

This symposium aims to bring to-

gether researchers and developers in the areas of intelligent agents, information retrieval, electronic business and the Internet and Web to have focussed discussions on the current status of research and applications of intelligent agents in cyberspace and to explore directions for further work.

For further information, see http://btwebsh.macarthur.uws.edu.au/san/iac.

## Organizing Committee

Elisabeth Andre, DFKI Gmbh, Germany; Janet Bruten, HP Labs, UK; Yogesh Deshpande, University of Western Sydney, Macarthur, Australia; Athula Ginige. University of Western Sydney. Macarthur, Australia; Christian Lemaitre Leon, Laboratorio National de Informatica Avanzada, Mexico; Steve Hansen, University of Western Sydney, Macarthur, Australia; Michael Huhns, University of South Carolina, USA; Mark Maybury, MITRE Corp., USA; San Murugesan, University of Western Sydney, Macarthur, Australia (Cochair); Daniel E. O'Leary, University of Southern California, USA (Cochair); Radhakrishnan, Concordia University, Canada; Munindar P. Singh, North Carolina State University, USA; Katia Sycara, Carnegie Mellon University, USA

# Predictive Toxicology of Chemicals: Experiences and Impact of AI Tools

AI and related techniques play a major role in toxicity prediction. The goal of computational toxicity prediction is to describe the relationship between chemical properties, on the one hand, and biological and toxicological processes, on the other. This symposium will highlight the potential of different AI approaches, either individually and combined, for computational toxicity prediction.

Success in this research depends on the contribution of experts from different areas, and we invite participation from researchers in all related fields. We welcome AI researchers who have applied learning techniques to domains outside toxicity prediction and are in search of new areas. Some of the questions to be addressed in the symposium follow.

How do we represent chemical information? Several methods have been proposed. Are they equivalent and useful for toxicity prediction? How do we evaluate them? Are results from different experiments reproducible? A tutorial on this topic will be hold. A series of possibilities will be illustrated in different presentations.

How can machine learning techniques be used? AI tools have yet to be fully evaluated in this domain. Which techniques are better for toxicity prediction, especially given our changing understanding of tox-

icology? Are hybrid approaches better? A tutorial on the state-of-the-art of computer-based methods will be held. ILP, argumentation, ANN, Bayesian methods, fuzzy logic, mathematical and statistical methods, such as discriminant analysis, lattice theory and hybrid systems will be presented and discussed in many communications.

Are current experimental data sets sufficient for AI techniques? Do they have sufficient accuracy? How do we take advantage of existing data sets? Can we use techniques from data mining and reasoning under uncertainty?

Experiences from international projects will be presented. Needs and future trends will be discussed, giving voice to end-users of these software systems to achieve an integration of research and real-world applications. Further information is available at www.elet. polimi.it/AAAI-PT

# Organizing Committee

Giuseppina C. Gini (chair), Politecnico di Milano, Italy (gini@elet.polimi.it); Alan R. Katritzky (cochair), Univ. of Florida, Gainesville; Emilio Benfenati, Instituto Mario Negri, Milan; Daniel L. Boley, Univ. of Minnesota, Minneapolis; Adolf Grauel, Univ. of Paderborn, Germany; Marco Valtorta, Univ. of South Carolina, Columbia; Yin-tak Woo, EPA, Washington, DC.

# Search Techniques for Problem Solving Under Uncertainty and Incomplete Information

To build practical AI systems, one has to address issues related to uncertainty and incomplete information, which can result from various sources, including actuator and sensor noise, reasoning with approximate models, limited communication bandwidth, and insufficient domain understanding.

This symposium will focus on the selection of search strategies for problem solving under uncertainty and incomplete information, where the large number of contingencies can create large search spaces. Using appropriate search strategies can significantly increase system performance by exploiting problem-specific knowledge and restricting the search to the right regions of the search spaces to find satisfactory solutions quickly.

The primary purpose of the symposium is to bring together researchers and practitioners from areas such as planning, heuristic search, robotics, constraint satisfaction, game playing, and information gathering. We want to discuss when and how traditional search techniques (such as state-space search and local search) should be applied; how uncertain and incomplete information can be exploited to control search processes; whether there is a difference in principle between reasoning with deterministic and probabilistic representations of uncertain and incomplete information (for example, with constraint networks or belief networks); how the level of uncertainty affects problem complexity; how different search paradigms (such as heuristic search and dynamic programming) can be combined to provide additional pruning power; and how the structure of search spaces can be exploited to speed up search. We also intend to explore how these search strategies can be applied across domains and application areas, and speculate on promising future search strategies.

The symposium will consist of one or two invited talks, followed by short presentations and longer discussions, in an atmosphere that encourages the interaction of researchers with different backgrounds. Further detailed information will be posted at www.isi.edu/isd/zhang/SearchStrategies.html

## Organizing Committee

Weixiong Zhang (Cochair), USC/ISI, (zhang@isi.edu); Sven Koenig (Cochair), Georgia Tech, (skoenig@cc.gatech.edu); Tom Dean, Brown; Rina Dechter, Univ. of California Irvine; Subbarao Kambhampati, Arizona State; Craig Knoblock, USC/ISI; Lydia Kavraki, Rice; Shlomo Zilberstein, Univ. Massachusetts.

# **Registration and General Information**

ALL ATTENDEES MUST PREREGISTER. Each symposium has a limited attendance, with priority given to invited attendees. All accepted authors, symposium participants, and other invited attendees must register by February 11, 1999. After that period, registration will be opened up to the general membership of AAAI and other interested parties. All registrations must be postmarked by February 25, 1999.

Your registration fee covers your attendance at the symposium, a copy of the working notes for your symposium, and the reception.

Checks (drawn on US bank) or international money orders should be made out to AAAI. VISA, Master-Card and American Express are also accepted. Please fill out the attached registration form and mail it with your fee to:

AAAI 1999 Spring Symposium Series 445 Burgess Drive Menlo Park, CA 94025

If you are paying by credit card, you may e-mail the form to sss@aaai.org or fax it to 650-321-4457. Registration forms are also available on AAAI's web page: www.aaai.org/Symposia/Spring/spring-regform.html or spring-regform.pdf.

Please note: All refund requests must be in writing and postmarked by March 5, 1999. No refunds will be granted after this date. A \$25.00 processing fee will be levied on all refunds granted.

When you arrive at Stanford, please pick up your complete registration packet in the lobby of the Tresidder Union.

Registration hours will be:

Monday, March 22 8:00 AM - 5:00 PM

Tuesday, March 23 8:30 AM - 5:00 PM

Wednesday, March 24 8:45 AM - 12:00 PM

Please call AAAI at 650-328-3123 for further information.

# **Parking**

Parking will be available on the Stanford Campus from March 22-24 for a total of \$5.00 for the three days. An application for a parking permit is included on the attached registration form. The permits will be mailed to you with your registration receipt, along with a map and directions to the assigned parking areas.

### **Accommodations**

For your convenience, AAAI has reserved a block of rooms at the hotels listed below. Symposium attendees must contact the hotels directly. Please identify yourself as an AAAI Spring Symposium Series attendee to qualify for the reduced

#### rates.

#### Creekside Inn

3400 El Camino Real Palo Alto, CA 94306 Phone: 650-493-2411 or 1-800-49-CREEK Fax: 650-493-6787 Marguerite shuttle pick-up: 0.5 mile Rates: \$125-\$185 (S) or (D) Reserve before February 21, 1999

### **Sheraton Palo Alto**

625 El Camino Real Palo Alto, CA 94301 Phone: 650-328-2800 or 800-874-3516 Fax: 650-327-7362 Marguerite shuttle stop nearby Rate: \$159 (S) or (D) Reserve before February 26, 1999

#### Stanford Terrace Inn

531 Stanford Ave Palo Alto, CA 94306 Phone: 650-857-0333 Fax: 650-857-0343 Stanford Terrace Shuttle available with advance notice. Marguerite Marguerite shuttle stop nearby Rates: \$115 (S), \$125 (D) Reserve before February 21, 1999

#### Other Hotels

(Available only on a first-come, first served basis; all prices are subject to changes without notice).

#### Best Western Riviera

15 El Camino Real Menlo Park, CA 94025 Phone: 650-321-8772 Fax: 650-321-2137 Rates: \$139 (S), \$145 (D)

### The Cardinal Hotel

235 Hamilton Avenue Palo Alto, CA 94301 Phone: 650-323-5101 Fax: 650-325-6086

Marguerite shuttle stop nearby

Rates: \$125 (S) or (D)

#### Hotel California

2431 Ash Street Palo Alto, CA 94306 *Phone:* 650-322-7666 *Fax:* 650-321-7358 Marguerite shuttle stop nearby *Rates:* \$68-\$75 (S), \$71-\$78 (D)

#### Mermaid Inn

727 El Camino Real Menlo Park, CA 94025 *Phone:* 650-323-9481 *Fax:* 650-323-0662 *Rates:* \$56 (S), \$66 (D)

# Air Transportation and Car Rental

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Reservation hours: M-F 6:30 AM - 5:00 PM PDT. Outside U.S. and Canada, call 619-232-4298 / Fax 619-232-6497. E-mail: flycia@scitravel.com. Web: www.scitravel.com (use #428). If you call direct or use your own agency, refer to these codes:

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# **Ground Transportation**

This information is the best available at time of printing. Fares and routes change frequently. Please check by telephoning the appropriate numbers below for the most upto-date information.

### Supershuttle

24 hour van service to and from San Francisco or San Jose Airport to Palo Alto. The fare from San Francisco Airport to Palo Alto is \$23 per person one way. The fare from San Jose Airport to Palo Alto is \$65 one way. Cash or major credit cards only. For reservations call 415-558-8500 or 1-800-258-3826 (outside California).

#### Airport Connection

Van service is \$47 for one person one way from San Francisco Airport to Palo Alto. The fare from San Jose Airport to Palo Alto is \$62. Cash, major credit cards, or checks accepted. Call 1-888-990-5466 for reservations. White courtesy telephone available at San Francisco Airport.

## South Bay Shuttle

Van service from San Francisco Airport to Palo Alto is \$18 for one person one way. The fare from San Jose Airport to Palo Alto \$19 per person. Cash or checks only. For reservations call 408-559-9477 or 1-800-548-4664.

#### Stanford Shuttle

The Stanford University Marguerite Shuttle Bus service provides service from several points along El Camino Real, the train station, and other surrounding locations to the Stanford Oval as well as transportation around the Stanford Campus.

#### Train

CalTrain runs between San Francisco and Palo Alto station starting at 5:15 am with the last train leaving San Francisco at 10:00 PM (weekdays), 12:00 midnight (Friday and Saturday nights). The fare is \$7.50 round trip for same-day travel, or \$3.75 one way. For up-to-date fare information and time tables, call toll free 800-660-4287.

# Registration Form—1999 AAAI Spring Symposium Series

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A Please complete in full and return to AAAI, postmarked by February 11, 1999 (invited attendees), or by February 25, 1999 (general registration). Please print or type. FIRST NAME \_\_\_\_\_ LAST NAME \_\_\_\_\_ COMPANY OR AFFILIATION \_\_\_\_\_ \_\_\_\_\_ Home  $\square$  or Business  $\square$ State \_\_\_\_ ZIP OR POSTAL CODE \_\_\_\_\_\_ COUNTRY \_\_\_\_\_ Daytime telephone \_\_\_\_\_ E-mail \_\_\_\_ Symposium (Please check only one) ☐ 1. Agents with Adjustable Autonomy ☐ 2. Artificial Intelligence and Computer Games ☐ 3. Artificial Intelligence in Equipment Maintenance Service and Support ☐ 4. Hybrid Systems and AI ... ☐ 5. Intelligent Agents in Cyberspace ☐ 6. Predictive Toxicology of Chemicals: Experiences and Impact of AI Tools ☐ 7. Search Techniques for Problem Solving ... Fee ☐ Member: \$ 220.00 ☐ Nonmember: \$ 280.00 ☐ Student Member: \$ 100.00 ☐ Student nonmember: \$ 125.00 (students must send legible proof of full-time student status) ☐ Temporary Stanford University parking permit, March 22–24 (\$5.00) TOTAL FEE (Please enter correct amount) \$\_\_\_\_ Method of Payment (please circle one) (All e-mail and fax registrations must be accompanied by credit card information. Prepayment is required. No PO's will be accepted.) VISA Check MasterCard American Express Credit card account number \_\_\_\_\_ Expiration date \_\_\_\_\_ Name (as it appears on card) Please mail or fax completed form with your payment to AAAI, SSS-99 • 445 Burgess Drive • Menlo Park, California 94025 • 650-321-4457 Please Note: Requests for refunds must be received in writing by March 5, 1999 A \$25.00 processing fee will be levied on all refunds granted. Thank you for your registration! For Office Use Only

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