



AAAI 2005 Spring Symposium Series

March 21-23, 2005
Stanford University, California

Call for Participation

Sponsored by the
American Association for Artificial Intelligence
445 Burgess Drive, Menlo Park, CA 94025
(650) 328-3123
sss05@aaai.org
www.aaai.org/Symposia/symposia.html

THE AMERICAN ASSOCIATION FOR ARTIFICIAL INTELLIGENCE, in cooperation with Stanford University's Computer Science Department, is pleased to present its 2005 Spring Symposium Series, to be held Monday through Wednesday, March 21–23, 2005 at Stanford University in Stanford, California. The topics of the eight symposia in this symposium series are:

- AI Technologies for Homeland Security
- Challenges to Decision Support in a Changing World
- Developmental Robotics
- Dialogical Robots: Verbal Interaction with Embodied Agents and Situated Devices
- Knowledge Collection from Volunteer Contributors (KCVC05)
- Metacognition in Computation
- Persistent Assistants: Living and Working with AI
- Reasoning with Mental and External Diagrams: Computational Modeling and Spatial Assistance

An informal reception will be held on Monday, March 21. A general plenary session, in which the highlights of each symposium will be presented, will be held on Tuesday, March 22. Symposia will be limited to between forty and sixty participants. Each participant will be expected to attend a single symposium. Working notes or AAAI technical reports will be prepared and distributed to participants in each symposium. In addition to invited participants, a limited number of interested parties will be able to register in each symposium on a first-come, first-served basis. Registration information will be available in December. To obtain registration information, write to:

AAAI Spring Symposium Series
445 Burgess Drive
Menlo Park, CA 94025-3442 USA
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Fax: 650-321-4457
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www.aaai.org/Symposia/symposia.html

Submission Dates

- Submissions for the symposia are due on October 8, 2004
- Notification of acceptance will be given by November 5, 2004
- Material to be included in the working notes or technical report of the symposium must be received by January 31, 2005

Please see the appropriate section in each symposium description for specific submission requirements.



AI Technologies for Homeland Security

AFTER SEPTEMBER 11, 2001, preempting terrorist acts, and providing for the security of citizens at home and abroad have become top priorities for the United States and many other nations around the globe. To achieve these goals, an overwhelming amount of information needs to be absorbed, processed, interpreted and analyzed in a timely fashion. Various AI technologies can be of great utility in addressing these challenges. For example, multiagent systems can support information sharing and collaboration among analysts, data mining techniques can discover and extract hidden patterns about terrorist activities buried in large data stores, social network analysis can help assess and predict terrorist intentions and behaviors, and knowledge representations and ontologies can facilitate information fusion, knowledge sharing and semantic understanding.

However, using AI technologies to provide for the security of citizens and the homeland raises many complex issues, for example:

- Can AI technologies augment the ability of human analysts to objectively analyze large quantities of complex, oftentimes ambiguous or contradictory data while simultaneously reducing the impact of their personal biases?
- Can AI technologies be used to enhance collaboration between human and robots in service of homeland security?
- Can AI technologies facilitate information/knowledge sharing and semantic understanding while avoiding cognitive overload?
- Can AI technologies be used in information sharing and data mining applications to improve security while yet also enhancing the privacy of citizens?

The purpose of this symposium is to provide a forum for discussing these and other issues related to AI for homeland security. The symposium will include one or more invited talks and multiple sessions. The invited talks will provide an overview about homeland security problems for which AI techniques and technologies can provide added value. The invited talks will be followed by multiple sessions, each of which focuses on a particular issue. Each session will consist of presentations (oral or poster) and conclude with a discussion facilitated by a moderator. The outcome of the discussion may range from a collection of ideas and/or technologies for addressing certain issues to a summary of arguments that support or reject a research hypothesis.

Submission Information

Potential participants should submit an extended abstract (2–4 pages) to AI4HS@ist.psu.edu. The extended abstract should clearly identify on the first page a known or perhaps a likely future homeland security issue it aims to address. Authors are encouraged to use one of the four issues listed above, whenever they are applicable. Further information (e.g., an extended issue list) about the symposium can be found at AI4HS.ist.psu.edu.

Organizing Committee

John Yen (chair), The Pennsylvania State University; Robert Popp (chair), DARPA; Jim Hendler, University of Maryland; Milind Tambe, USC; Katia Sycara, Carnegie Mellon University; Hsinchun Chen, University of Arizona; Robin Murphy, University of South Florida.



Challenges to Decision Support in a Changing World

ONE OF THE MOST DAUNTING CHALLENGES faced by decision support systems is a perpetual change in their environment. Existing decision support methodologies, tools, and frameworks are often difficult to scale up and adapt to changing knowledge, workflow, and operational setting. Systems that have to cope with change need to include methodologies that go outside single theories. For example, systems that are based on probabilistic or decision-theoretic principles will be typically unable to cope with change by themselves, as neither probability theory nor decision theory say much about how decision models are constructed, let alone how they should be modified. The general AI concepts of perception, learning, control, abstraction, and personalization must be inherently designed into the methodological, architectural, and operational aspects of adaptive systems, from application design through software and hardware infrastructure support.

This symposium aims at bringing together researchers with experience or interest in building adaptive decision support systems. Since some domains, such as biomedicine, deal with numerous modes of reasoning, this symposium aims at providing a coherent forum that will highlight various issues involved and will facilitate cross-disciplinary diffusion of methods in reasoning about and adapting to change. The central themes for the symposium are: (1) practical fielding of adaptive decision support systems, and (2) crucial technologies for successful adaptive decision support systems. We encourage submissions that address (but are not limited to) relevant issues in the domains of biomedicine, finance and business, and military/government/homeland security. In particular, we welcome submissions that address the challenges faced and the solutions involved, what worked, what did not, and why. We also welcome contributions that chart out new research agendas and identify specific crucial issues.

Submission Information

The symposium will consist of paper presentations, as well as panel and discussion sessions. Potential participants are invited to submit either a 6-page full paper (5,000 words maximum) or a 1–2 page extended abstract (1,500 words maximum) outlining their relevant research activities and how they see their contribution to the symposium. Please submit papers in PDF format to the coauthors Marek Druzdzel (marek@sis.pitt.edu) or Tze-Yun Leong (leongty@comp.nus.edu.sg). Please direct all correspondences to the coauthors as well.

Organizing Committee

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Developmental Robotics

DEVELOPMENTAL ROBOTICS IS A NEW APPROACH that focuses on the autonomous self-organization of general-purpose control systems. It takes its inspiration from developmental psychology and developmental neuroscience. Developmental robotics is a move away from task-specific methodologies where a robot is designed to solve a particular pre-defined task (such as path planning to a goal location). This new approach explores the kinds of behaviors that a robot can discover through self-motivated actions based on its own physical morphology and the dynamic structure of its environment. Initially a developmental system might bootstrap itself with some innate knowledge, but with experience could create more complex representations and behaviors. Developmental robotics is different from many learning and evolutionary systems in that the reinforcement signal, teacher target, or fitness function comes from within the system. In this manner, these systems are designed to rely more on mechanisms such as self-motivation, homeostasis, or “emotions.”

This emerging field has been interdisciplinary from its inception, including researchers from psychology, neuroscience, and cognitive science. However, developmental robotics is not as well known within the AI community. One purpose of this symposium is to create a forum for introducing AI researchers who have worked on related topics to the field. Such related topics include life-long learning, evolutionary robotics, reinforcement learning, and symbol grounding. In addition, this symposium can help define the emerging discipline of Developmental Robotics by incorporating the AI perspective.

We invite contributions on architectures for developmental robotics, examples of developmental behavior in robots, as well as features or mechanisms of developmental processing including, but not limited to: self-organization, self-exploration, self-motivation, categorization, artificial emotional systems, value systems, and anticipation-driven learning.

Submission Information

The symposium will consist of paper presentations and panel discussions. Papers or extended abstracts on current research as well as position papers are welcome. Submissions should be 2–6 pages in length. E-mail submissions in PDF format to Douglas Blank (dblank@cs.brynmawr.edu). Themes for panel discussions will be identified based on the submissions. See www.cs.brynmawr.edu/DevRob05/ for additional information.

Organizing Committee

Douglas Blank (cochair), Computer Science, Bryn Mawr College; Lisa Meeden (cochair), Computer Science, Swarthmore College; Stan Franklin, Institute for Intelligent Systems, The University of Memphis; Olaf Sporns, Psychology, Indiana University; and John Weng, Computer Science and Engineering, Michigan State University

Program Committee

Deepak Kumar, Computer Science, Bryn Mawr College; Jim Marshall, Computer Science, Pomona College



Dialogical Robots: Verbal Interaction with Embodied Agents and Situated Devices

THIS SYMPOSIUM CONCERNS INTELLIGENT DEVICES that engage humans in dialog. Updating the 2000 AAAI Spring Symposium “My Dinner with R2D2: Natural Dialogs with Practical Robotic Devices,” the goal of this working symposium is to share insights from ongoing research and to propose future directions for improving community understanding of humans and machines as agents who use dialog to accomplish tasks in the physical world. The intended scope encompasses machines that deliberate, sense, and react to their physical environment; interpret and respond to communication from humans; and convey to humans information from their unique perspective on the physical world.

- ❑ What justifies the modality of speech, the expressive power, ambiguity, and computational cost of spontaneous human language, and/or the complex dialog skills required for mixed initiative interaction or the cognitive integration of sensory and communicative contexts?
- ❑ How does the dialog change when robots are too small, too numerous, or too remote for teleoperation or direct manipulation control?
- ❑ What about personal robots as prosthetic or lifestyle aids for impaired users; can the single-user assumption be exploited in a private language that is more narrowly optimized than the generic dialog required for a public kiosk device or ATM?
- ❑ What can we say about the interplay between verbal and emotional robot-human communication? How will affective computing change human-robot dialog?
- ❑ How intelligent must the dialog-enabled device be? Which capabilities are essential?
- ❑ What social and/or economic changes can disrupt the underlying assumptions affecting robot dialog design?

The symposium will involve guided discussions and breakout sessions plus an invited presentation by Professor Herb Clark of the Department of Psychology at Stanford University entitled “Dialogs with Fictional Agents” (<http://www-psych.stanford.edu/~herb>).

Submission Information

Prospective participants may submit a position paper (up to two pages) describing the point of view they propose to advocate at the symposium, or a research report (eight pages or less) describing work in progress to be presented for reactions from the community. All papers are to be submitted in PDF format to Luperfoy@stottlerhenke.com by 8 October 2004. Submissions will be judged on technical merit and on potential to provoke active discussion on dialog with physically situated devices. For more information visit <http://itsresource.com/stottlerhenke/aaai-s2005>

Organizing Committee

Susann Luperfoy (cochair) Stottler Henke Associates (luperfoy@stottlerhenke.com); Nicholas Cassimatis (cochair) Rensselaer Polytechnic Institute (nlc@media.mit.edu); Cynthia Breazeal MIT Media Laboratory (breazeal@mit.edu); David Miller University of Oklahoma & KIPR (dmiller@kipr.org)



Knowledge Collection from Volunteer Contributors (KVC05)

THIS SYMPOSIUM IS CENTERED AROUND THE IDEA of collecting knowledge from large groups of volunteer contributors in a distributed environment.

Many AI tasks depend on having large amounts of knowledge and data. There are knowledge bases to be constructed, corpora to be tagged, long training sessions, and so forth. Such resources are critical to our success, but building them can be difficult and time-consuming. What if we could farm out most of that work to thousands of volunteers on the internet?

Collecting knowledge from volunteer contributors (unstructured or with contributors organized into tiers and classes) can potentially both enable new, more knowledge intensive approaches to the current open problems in many subfields of AI and allow the field to tackle new challenges.

We emphasize applications collecting semantic data—from knowledge that aids reasoning about everyday world to linguistically annotated corpora to bring knowledge-rich processing to NLP applications. Additional emphasis is on applications that benefit from having such knowledge available—including both aspects of their construction and their role as motivator and validator of users' contributions.

There are many open challenges in turning to the general public for help. On one hand, the systems need to collect useful knowledge (often, knowledge usable with current reasoning methods, sufficiently unambiguous and cross-validated, of useful breadth and depth). On the other, collection needs to have some payoff to the user that exceeds the effort of providing the knowledge. Collection needs to be fun and engaging to attract enough volunteers, by, among other things decomposing hard problems into “bite-sized” chunks that the average person could solve quickly.

We encourage submissions, which address any of the following issues (for fuller list, see <http://teach-computers.org/kvc05.html>): What kinds of knowledge can and cannot be gathered from volunteer contributors? What knowledge is particularly suitable for collection from volunteers? Which collection tasks can be successfully tackled by massive, distributed (loose) collaboration? What knowledge can be collected implicitly, as a side effect to user's activities, e.g. searching or using the web? (focus on concrete proposals and specific applications). How to allocate effort between collection of new knowledge and validation of collected knowledge? How to collect most relevant additional knowledge (e.g. active learning techniques)? What are the design principles of interfaces that attract volunteers and increase contributor retention (incentive systems, gamelike environments, engaging contributors in debugging knowledge, showing contributors improvement on some tasks given their input)?

Submission Information

Please see <http://teach-computers.org/kvc05.html> for up-to date information. Please send either full papers (6 to 8 pages) or extended abstracts (up to 3 pages) in PDF or PostScript in AAAI format (see <http://www.aaai.org/Symposia/symposia.html>) to timc@isi.edu. Please contact us if you do not receive confirmation of receipt. Please contact timc@isi.edu with any questions.

Organizing Committee

Timothy Chklovski, (USC/ISI), Pedro Domingos, (University of Washington), Henry Lieberman, (MIT), Rada Mihalcea, (Univ. North Texas), Push Singh (MIT)



Metacognition in Computation

THE IMPORTANCE OF METACOGNITION IN human thinking, learning, and problem solving is well established. Humans use metacognitive monitoring and control to choose goals, assess their own progress, and, if necessary, adopt new strategies for achieving those goals, or even abandon a goal entirely. For instance, students preparing for an examination will make judgments about the relative difficulty of the material, and use this to choose study strategies. Since in such cases accuracy of metacognitive judgments correlates with academic performance, understanding human metacognition has been an important part of work on automated tutoring systems, and has led to the use of computer assistants that help improve human metacognition.

However, there has also been growing interest in trying to create, and investigate the potential benefits of, intelligent systems which are themselves metacognitive. It is thought that systems that monitor themselves, and proactively respond to problems, can perform better, for longer, with less need for (expensive) human intervention. Thus has IBM widely publicized their “autonomic computing” initiative, aimed at developing computers which are (in their words) self-aware, self-configuring, self-optimizing, self-healing, self-protecting, and self-adapting. More ambitiously, it is hypothesized that metacognitive awareness may be one of the keys to developing truly intelligent artificial systems. DARPA’s recent Cognitive Information Processing Technology initiative, for instance, foregrounds reflection (along with reaction and deliberation) as one of the three pillars required for flexible, robust AI systems.

On the other side of the coin, it has also been established that metacognition can actually interfere with performance. Metacognition is no panacea, and therefore one of the issues that require further inquiry is the scope and limits of its usefulness.

The symposium is intended to bring together researchers from various disciplines interested in exploring the possibility of implementing metacognition in AI systems. Possible topics include reports on implemented metacognitive systems; computationally tractable models of human metacognition; the relation of recent work on metacognition in computation to work on, e.g. reflection, control of reasoning, and allocation of computational resources; methods for evaluating metacognitive systems; methods for implementing metacognition in heterogeneous systems; evaluation of different architectures for implementing metacognition; domains and/or problems for which metacognition is useful/essential; formal and/or knowledge-representation issues in metacognition; and the limits of metacognition (including cost/benefit analyses).

Submission Information

The symposium will include both presentations and organized discussions of central and foundational issues. Potential participants should check <http://www.cs.umd.edu/~anderson/ASSMC> for submission instructions.

Organizing Committee

Mike Anderson (cochair), University of Maryland, College Park ([anderson\(at\)cs.umd.edu](mailto:anderson(at)cs.umd.edu)); Tim Oates (cochair), University of Maryland, Baltimore County ([oates\(at\)csee.umbc.edu](mailto:oates(at)csee.umbc.edu)); Michael Cox, Wright State University ([mcox\(at\)cs.wright.edu](mailto:mcox(at)cs.wright.edu)); John Dunlosky, University of North Carolina, Greensboro ([j_dunlos\(at\)uncg.edu](mailto:j_dunlos(at)uncg.edu)); Don Perlis, University of Maryland, College Park ([perlis\(at\)cs.umd.edu](mailto:perlis(at)cs.umd.edu))



Persistent Assistants: Living and Working with AI

CONSIDER A FUTURE IN WHICH INTELLIGENT AGENTS play a significant role in our personal and professional lives: smart houses will anticipate our actions and needs while personalized agents will tailor our entertainment to our preferences, purchase goods for us on-line, monitor our health, and even drive us to the store. At work, agents will assist us in tasks ranging from organizing meetings to ensuring safety in complicated and stressful situations like operating nuclear power plants or conducting space missions. The agents might be robotic or be software processes, and they might act individually or in collections. Despite this breadth, these examples have two unifying features: they call on us to delegate decisions or actions to agents whose behavior will materially affect our interests or well-being, and they require a close partnership between users and agents over an extended period of time in order to get the job done.

What will it take to enable this future? Effective assistants will need significant new capabilities to interact with and understand people in ways that we don't yet fully understand. Moreover, the attempt to construct such persistent assistants will raise several broad questions at the intersection of the fields of autonomous systems and human centered computing: How does the context of persistent assistance shape user-agent interaction? What requirements do particular tasks and user populations impose? How can people and assistants communicate changing intentions, goals, and tasks to each other? How is trust developed and maintained? What is the tradeoff between predictable behavior and adjustable autonomy? How will persistent assistants affect people's social and interpersonal relations? How should mixed teams of many people and many agents interact?

This symposium will consider these and related questions by bringing together practitioners of artificial intelligence, human-computer interaction, cognitive modeling, robotics, assistive technologies, and fields that consider complex socio-technical systems. We hope to foster interactions among this highly interdisciplinary set of participants by including presentations from distinct perspectives and by allocating ample time for discussions. This symposium continues and extends the topics of the very successful AAAI 2003 Spring Symposium on Human Interaction with Autonomous Systems in Complex Environments and the AAAI 2004 Spring Symposium on Human Interaction with Autonomous Systems over Extended Operations.

Submission Information

Papers should focus on the technical challenges of assisting people with ongoing tasks, and/or on problem domains that require persistent assistants. They can describe completed work or work in progress. The organizing committee will carefully review all papers.

Submissions should be in AAAI format and no more than 8 pages in length. Please send them by email (PDF preferred) to Daniel Shapiro (dgs@stanford.edu). The deadline for submissions is October 8, 2004.

Organizing Committee

Daniel Shapiro (Chair), ISLE/Stanford University (dgs@stanford.edu); Pauline Berry (cochair), SRI (berry@ai.sri.com); John Gersh (cochair), Johns Hopkins University (john.gersh@jhuapl.edu); Nathan Schurr (cochair), University of Southern California (schurr@usc.edu); David Kortenkamp, NASA Johnson Space Center/Metrica Inc. ([kortenk@traclabs.com](mailto:korten@traclabs.com)); Barney Pell, NASA Ames Research Center (barneypell@yahoo.com); Richard Simpson, University of Pittsburgh (ris20@pitt.edu)



Reasoning with Mental and External Diagrams: Computational Modeling and Spatial Assistance

THE ROLE OF DIAGRAMMATIC REPRESENTATIONS in reasoning processes has been investigated from three different interdisciplinary perspectives: from computational modeling, from spatial assistance, and with respect to the interplay of cognitive processes and external diagrams. All three fields have different foci of interest; however, the fields are closely related to each other.

The primary goal of this symposium is to bring together researchers to explore the role of diagrams in supporting intelligent reasoning processes in humans and technical systems, as well as in human-machine interaction. Participants are asked to provide thoughts on the integration of the three perspectives rather than just presenting specific results from one of the fields. Sample questions of interest are:

- How do mental representations and external diagrams influence each other while solving spatial problems?
- How can computational cognitive models be used to better assess a user's cognitive needs in performing a spatial task?
- How does knowledge about human imagery inform the process of designing and understanding external depictions?
- What is the role of pictorial space as a representational medium for dealing with problems on various scales?
- How does inspection of diagrammatic representations assist mental model building by novices and by experts?
- How are dynamic aspects of spatial information conveyed in diagrams and how are they processed in mental images?

Besides examining the fundamental issues outlined above, we also aim to discuss practical scenarios and fields of application, such as in urban planning or architectural design, with respect to location-based services, or in instruction and education.

The symposium will be scheduled to provide extensive discussion time and group interactions. There will be a series of presentations with significant question-and-answer time, as well as topic-oriented group discussion sessions.

Submission Information

Please email submissions of 3–6 pages (preferably in AAAI format as PDF) to barkowsky@sfbtr8.uni-bremen.de. Submissions can be position statements, work in progress, or completed work. For more information see www.sfbtr8.uni-bremen.de/remedi.

Organizing Committee

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