AAAI-05
Invited Speakers

AAAI-05 Keynote Address
Internal Grounding, Reflection and the Illusion of Self-Consciousness
Marvin Minsky, *Massachusetts Institute of Technology.*

Minsky will present two apparently new kinds of theories about high-level cognitive processes that he predicts will lead to important new approaches to several old questions about the course of child development and about the phenomenology of subjective experience.

AAAI Presidential Address
(AA)AI: More than the Sum of its Parts
Ronald J. Brachman, *Corporation for National Research Initiatives*

Recent thinking has it that AI, once a vibrant, broadly-encompassing field with a grand shared vision of creating intelligent machines, has devolved into a loosely connected set of distinct specialty areas with little communication or mutual interest between them. To the extent that this is true, it is a disappointing development and leads one to wonder about the necessity and value of AAAI. But, Brachman argues, the consequences are actually far worse: because of the nature of intelligence when embedded in the real world, the centrifugal force on the field is likely to thwart the very mission that drives it. Brachman will wander through some thinking on the role of systems integration, the value and challenge of architecture, and some promising developments in large projects that are helping to increase the centripetal force on AI. He concludes by discussing why AAAI is more essential than ever.

Ron Brachman is the Director of the Information Processing Technology Office at the Defense Advanced Research Projects Agency (DARPA). In that capacity, he directs a large initiative in cognitive systems for the agency, covering science and technology in learning, reasoning, machine perception, robotics, natural language processing, cognitive architectures, and related areas. The office agenda also covers significant work in computing, including high-productivity computing systems and networking. Prior to joining DARPA, Dr. Brachman was a research vice president at AT&T Labs and prior to that, at Bell Labs. His laboratory performed research in IP communications services and supporting technologies, including secure systems, human-computer interaction, and artifi-

cial intelligence. Prior to joining Bell Labs in 1985, Dr. Brachman was instrumental in the design and implementation of several well-known knowledge representation systems, including KL-One, Krypton, and CLASSIC, and his work formed the basis for an entire subfield of research in AI (description logics). He received the B.S.E.E. degree from Princeton University (1971), and S.M. and Ph.D. degrees in applied mathematics from Harvard University (1972, 1977). Ronald Brachman is currently President of the American Association for Artificial Intelligence (AAAI). With Hector Levesque, he has recently published a textbook entitled *Knowledge Representation and Reasoning* (Morgan Kaufmann, 2004). He is a Founding Fellow of AAAI, and was inducted as a Fellow of the Association for Computing Machinery in 1999.

IAAI-05 Robert S. Engelmore Memorial Lecture
Knowledge as Power: A View from the Semantic Web
James Hendler, *University of Maryland*

The emerging semantic web focuses on bringing KR-like capabilities to Web applications in a Web-friendly way. The ability to put knowledge on the Web, share it, and reuse it through standard Web mechanisms provides new and interesting challenges to artificial intelligence. In this talk, Hendler explores the similarities and differences between the semantic web and traditional AI knowledge representation systems, and sees if he can validate the analogy "the semantic web is to KR as the Web is to hypertext."

Jim Hendler is a professor and director of the Joint Institute for Knowledge Discovery at the University of Maryland. One of the inventors of the semantic web, Hendler was the recipient of a 1995 Fulbright Foundation Fellowship, is a former member of the US Air Force Science Advisory Board, and is a Fellow of the American Association for Artificial Intelligence. He is also the former chief scientist of the Information Systems Office at the US Defense Advanced Research Projects Agency (DARPA), was awarded a US Air Force Exceptional Civilian Service Medal in 2002, and is a member of the World Wide Web Consortium's Semantic Web Coordination Group. He is the editor in chief of *IEEE Intelligent Systems* and is on the Board of Reviewing Editors for Science.

AAAI-05 Invited Talk:

**How Can AI and Robotics Help Us Understand
Social Animal Behavior?**

Tucker Balch, *Georgia Institute of Technology*

Animal behavior, especially social insect behavior, is a well-known, rich source of inspiration for intelligent system design. In this talk Balch asks the inverse question: "How can AI contribute to the understanding of social animal behavior?" He will present several successful examples, including work at his lab and elsewhere.

AAAI-05 Invited Talk:
From Knowledge to Intelligence — Building Blocks and Applications
Chitta Baral, *Arizona State University*

Acquiring knowledge and reasoning with knowledge is central to manifestation of intelligence. Thus from the early days of AI there has been a quest for developing knowledge representation formalisms and corresponding reasoning mechanisms. In this talk Baral will present recent advances in this front, in particular in the development of large support structures around some of the formalisms and their use in application domains such as space shuttles, molecular interaction in cells, and textual question answering.

AAAI-05 Invited Talk:
Multiagent Learning in Games
Amy Greenwald, *Brown University*

What is the outcome of multiagent learning in games? Convergence can be slippery: no-regret learning in repeated games converges only to a set of equilibria, while value iteration in Markov games can converge to a cycle. Greenwald will describe these findings and present the theory of stochastic stability as a means of characterizing the dynamics of multiagent learning in games.

AAAI-05 Invited Talk:
Faceted Metadata in Search Interfaces
Marti Hearst, *University of California Berkeley*
School of Information Management and Systems

In the feverish debate about how to improve search, the flexible use of metadata has been winning advocates. In this talk Hearst will describe the advantages and pitfalls of using faceted metadata for integrated browsing and search of large information collections. This opens up an exciting opportunity for AI techniques to truly help improve search, since methods are needed for automated creation of categories and their labels, and assignment of items to categories, for a wide range of media types including text, audio, images, and video.

AAAI-05 Invited Talk:
Representation Policy Iteration: A Unified Framework
for Learning Behavior and Representation
Sridhar Mahadevan, *University of Massachusetts, Amherst*

Mahadevan discusses a longstanding intellectual puzzle in AI: How can agents bootstrap the learning of novel representations from experience, freeing the human designer from having to specify this knowledge? He describes a novel class of adaptive planning algorithms—representation policy iteration—which can simultaneously learn representations and value functions.

AAAI-05 Invited Talk:
 May All Your Plans Succeed!
Dana S. Nau, *University of Maryland*

Automated planning technology has become mature enough to be useful in applications that range from game-playing to control of space vehicles. In this talk, Nau will discuss where automated-planning research has been, where it is likely to go, some directions to aspire to, and some major challenges.

IAAI-05 Invited Talk:
From AI Winter to AI Spring: Can a New Theory of Neocortex
Lead to Truly Intelligent Machines?
Jeff Hawkins, *Founder, Numenta, Inc.*

In his recent book *On Intelligence,* Hawkins proposed that the neocortex can be understood as a hierarchical sequence memory. Since the book was written, the theory has been formalized as a modified belief propagation network. Prototype implementations can solve previously intractable vision recognition problems. However the theory is not a theory of "vision" but a theory of cortex and therefore is applicable to many difficult AI problems. Hawkins will describe the basics of the theory, demonstrate a working prototype, and discuss its potential impact on the AI community. In February Hawkins formed a new company, Numenta, Inc. to promote and develop this technology.

Jeff Hawkins is the architect of many computer products including the PalmPilot, Visor, and Treo families of handheld computers and smartphones. He co-founded Palm Computing and Handspring Inc., and currently serves as chief technology officer at palmOne, Inc., the company created through the merger of Palm and Handspring. In 2002, Hawkins created the Redwood Neuroscience Institute (RNI) to pursue his lifelong passion to learn how the brain works. Hawkins continues to serve as a director of RNI. In February 2005, Hawkins formed a new company, Numenta, Inc.. The Numenta technology, called Hierarchical Temporal Memory (HTM), is based on a theory of the neocortex described in Hawkins' book *On Intelligence* (with coauthor Sandra Blakeslee). Hawkins

holds a B.S. in electrical engineering from Cornell University, is a member of the scientific board of directors at Cold Spring Harbor Labs, one of the world's leading biological research laboratories, and was elected to the National Academy of Engineering in 2003.

IAAI-05 Invited Talk:

Real World Applications of Genetic Programming: Circuits, Optics, Dynamic System Control

Martin A. Keane, *vice-president at Genetic Programming Inc.*

Genetic programming has delivered a progression of qualitatively more substantial results in synchrony with five approximately order-of-magnitude increases in the expenditure of computer time. In this talk Keane will discuss the most recent results: real world results in the use of genetic programming in the design of electronic circuits, optical systems and controllers for dynamic systems including examples in each field of the functional replication of recently patented inventions.

Martin A. Keane is vice president at Genetic Programming Inc. and a consultant to various computer-related and gaming-related companies. His research interests include applying genetic programming to the design of controllers for non linear dynamic systems. He received a Ph.D. in mathematics from Northwestern University.

IAAI-05 Invited Talk:
AI Meets Web 2.0: Building The Web of Tomorrow Today
Jay M. Tenenbaum, *Chairman, CommerceNet*

Imagine an Internet-scale knowledge system where people and intelligent agents can collaborate on solving complex problems in business, engineering, science, medicine, and other endeavors. Its resources include semantically tagged Web sites, wikis and blogs, as well as social networks, vertical search engines and a vast array of Web services from business processes to AI planners and domain models. Research prototypes of decentralized knowledge systems have been demonstrated for years, but now, thanks to the Web and Moore's law, they appear ready for prime time. Tenenbaum will introduce the architectural concepts for incrementally growing an Internet-scale knowledge system, and describe early commercial deployments in manufacturing and healthcare.

Marty Tenenbaum spent the 1970s at SRI's AI Center leading vision research, the 1980s at Schlumberger managing AI Labs, and the 1990s founding a string of successful Internet commerce companies, ultimately serving as chief scientist of Commerce One. He now splits his time between two Internet healthcare startups—Webify Solutions and Medstory—and nonprofit CommerceNet, where he's returning to his AI roots, helping others pursue bold visions for making the Web more useful and intelligent.