Shiwali Mohan

Contact Information

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Research Interests

Cognitive systems and agents, situated language for agents, learning with human-agent interaction, natural language semantics, knowledge representation and reasoning, interactive knowledge acquisition, cognitive robotics.

Education

University of Michigan, Ann Arbor, MI USA
Ph.D., Computer Science and Engineering — 2008 - 2014 (expected)
Thesis (in progress): *Learning Tasks and Verbs from Situated Interactive Instruction*
Thesis Advisor: John Laird
Thesis Committee: Edmund Durfee, Richard Lewis, Edwin Olson, Andrea Thomaz

University of Michigan, Ann Arbor, MI USA
M.S.E., Computer Science and Engineering — 2008 - 2009

University of Delhi, New Delhi, India
Netaji Subhas Institute of Technology
B.E., Instrumentation and Control Engineering — 2003 - 2007
Senior Thesis: *Extraction-based Single Document Summarization*

Research Experience

University of Michigan, Ann Arbor, MI USA
Graduate Student Research Assistant to John E. Laird — August 2010 - present
Learning tasks with situated interactive instruction
Studying task representations and knowledge-intensive learning algorithms that are useful in learning novel tasks from task-oriented dialog. The work addresses on general, transferable, comprehensive, and mixed-initiative learning.

Situated language for embodied agents
Developing the Indexical model of situated comprehension that translates abstract linguistic symbols to grounded perceptual, spatial, and task knowledge for robots. The work investigates the role of situated context arising from perceptions, intentions, goals and dialog in comprehension.

University of Michigan, Ann Arbor, MI USA
Graduate Student Research Assistant to John E. Laird — January 2009 - August 2010
Reinforcement learning in Soar cognitive architecture
Designed, implemented, and analyzed reinforcement learning agents for Infinite Mario. Formulated and implemented modular reinforcement learning for the Soar cognitive architecture to simultaneously learning multiple markov decision processes.

Indian Institute of Technology, New Delhi, India
Research Assistant to Niladri Chatterjee — May 2007 - July 2007

Sense disambiguation, distributional semantics
Developed and analyzed a Random Indexing based algorithm for sense disambiguation of homonyms.

University of Delhi, New Delhi, India
Thesis with Shampa Chakravarty, Niladri Chatterjee December 2006 - May 2007
Single document summarization, distributional semantics
Developed and analyzed an algorithm for single-document summarization using PageRank and Random Indexing.

Publications

Journal Articles

[J1] **Shiwali Mohan**, Aaron Mininger, and John Laird. Towards an indexical model of situated comprehension for real-world cognitive agents. *Advances in Cognitive Systems 3* (accepted, under revision), ACS 2014.

[J2] John Laird and **Shiwali Mohan**. A case study of knowledge integration across multiple memories in Soar. *Biologically Inspired Cognitive Architectures* (invited, in print), BICA 2014.

[J3] **Shiwali Mohan**, Aaron Mininger, James Kirk, and John Laird. Acquiring grounded representations of words with situated interactive instruction. *Advances in Cognitive Systems 2*, ACS 2012.

Conference Proceedings

[C1] **Shiwali Mohan** and John Laird. Learning goal-oriented hierarchical tasks from situated interactive instruction. *To appear in the Proceedings of the 28th AAAI Conference*, AAAI 2014.

[C2] **Shiwali Mohan**, Aaron Mininger, and John Laird. Towards an indexical model of situated comprehension for real-world cognitive agents. *In Proceedings of the 2nd Conference on Advances in Cognitive Systems*, ACS 2013.

[C3] **Shiwali Mohan**, James Kirk, and John Laird. A computational model of situated task learning with interactive instruction. *In Proceedings of the 17th International Conference on Computational Modeling*, ICCM 2013.

[C4] Mandar Joshi, Rakesh Khobragade, Saurabh Sarda, Umesh Deshpande, and **Shiwali Mohan**. Object-oriented representation and hierarchical reinforcement learning in Infinite Mario. *In Proceedings of the 24th IEEE International Conference on Tools with Artificial Intelligence*, ICTAI 2012.

[C5] **Shiwali Mohan** and John Laird. An Object-Oriented approach to reinforcement learning in an action game. *In Proceedings of the 7th Artificial Intelligence for Interactive Digital Entertainment Conference*, AIIDE 2011.

[C6] Niladri Chatterjee and **Shiwali Mohan**. Discovering word senses from text using random indexing. *In Proceedings of the 9th International Conference on Computational linguistics and Intelligent Text Processing*, CICLing 2008. Best Paper Award.

[C7] Niladri Chatterjee and **Shiwali Mohan**. Extraction-based single-document summarization using random indexing. *In Proceeding of the 19th IEEE International Conference on Tools with Artificial Intelligence*, ICTAI 2007.

Refereed Symposia/Workshop Proceedings

[W1]: John E. Laird and **Shiwali Mohan**. A case study of knowledge integration across multiple memories in Soar. *In Papers from the AAAI Fall Symposium Series on Integrated Cognition*, 2013.

[W2]: **Shiwali Mohan***, Aaron Mininger*, James Kirk*, and John Laird. Learning grounded language through situated interactive instruction. *In Papers from the AAAI Fall Symposium Series on Robots Learning Interactively from Human Teachers*, 2012.

[W3]: John Laird, Keegan Kinkade, **Shiwali Mohan**, and Joseph Xu. Cognitive robotics using the soar cognitive architecture. *In Proceedings of the 8th International Cognitive Robotics Workshop*, 2012.

[W4]: **Shiwali Mohan** and John Laird. Situated comprehension of imperative sentences in embodied, cognitive agents. *In Papers from the AAAI Workshop on Grounding Language for Physical Systems*, 2012.

[W5]: **Shiwali Mohan** and John Laird. Towards situated, interactive, instructable agents in a cognitive architecture. *In Papers from the AAAI Fall Symposium Series on Advances in Cognitive Systems*, 2011.

Refereed Extended Abstracts

[A1] **Shiwali Mohan**, and John E. Laird. Learning new tasks for situated interactive instruction. *In the 2014 HRI Pioneers Workshop at Human-Robot Interaction*, 2014.

[A2] Mandar Joshi, Rakesh Khobragade, Saurabh Sarda, Umesh Deshpande, and **Shiwali Mohan**. Hierarchical action selection for reinforcement learning in Infinite Mario. *In Proceedings of the 6th Starting Artificial Intelligence Research Symposium at European Conference on Artificial Intelligence*, STAIRS 2012.

[A3] **Shiwali Mohan** and John Laird. Learning actions and action verbs from human-agent interaction. *In Proceedings of the 26th AAAI Conference on Artificial Intelligence*, AAAI 2012.

[A4] **Shiwali Mohan** and John Laird. Exploring mixed-initiative interaction for learning with situated instruction in cognitive agents. *In Proceedings of the 26th AAAI Conference on Artificial Intelligence*, AAAI 2012.

[A5] **Shiwali Mohan** and John Laird. Relational reinforcement learning in Infinite Mario. *In Proceedings of the 24th AAAI Conference on Artificial Intelligence*, AAAI 2010.

Teaching Experience

University of Michigan, Ann Arbor, MI, USA
Guest Lecturer: Cognition and Interactive Systems — April 2014
EECS 498: Intelligent Interactive Systems

University of Michigan, Ann Arbor, MI, USA
Graduate Student Instructor — January 2012 - April 2012
EECS 492: Introduction to Artificial Intelligence

University of Michigan, Ann Arbor, MI, USA
Student — September 2011 - December 2011
EECS 580: Teaching Engineering

Advising Experience

Bharati Vidyapeeth College of Engineering, New Delhi, India
Senior thesis: *Designing Soar agents for planet wars* — September 2012 - Present
Students: Anant Mittal, Anmol Gupta

Visvesvaraya National Institute of Technology, Nagpur, India
Senior thesis: *Reinforcement learning agents for Infinite Mario* — September 2011 - May 2012

Students: Mandar Joshi, Rakesh Khobragade, Saurabh Sarda

Talks

Learning Hierarchical Tasks with Situated Interactive Instruction
Center for Vision, Cognition, Learning, and Art, UCLA — November 2013
USC Institute for Creative Technologies. — November 2013
Interaction Lab, Computer Science and Engineering, USC — December 2013
Information Sciences Institute, Los Angeles — December 2013

Service

Co-Chair, Special Interest Group - Faculty, University of Michigan — 2013
Co-Chair, Special Interest Group - Faculty, University of Michigan — 2012
Vice-President, CSE Graduate Organization, University of Michigan — 2011
Social Chair, Indian Students Association, University of Michigan — 2011
DCO Representative, CSE Graduate Organization, University of Michigan — 2010
Social Chair, Indian Students Association, University of Michigan — 2010

Honors and Awards

HRI Pioneers Scholarship, 2014
AAAI Travel Grant, AAAI Fall Symposium Series: 2013
Doctoral Consortium Scholarship, AAAI: 2012
Rackham Travel Grant: 2011, 2012, 2013
Best Paper Award, CICLing: 2008
Scholarship for Academic Excellence at the University of Delhi: 2003 - 2007

Skills

Experience in intelligent agent design and cognitive architectures - Soar, ACT-R
Experience in Java, C/C++, Perl, Python

Industry Experience

Yahoo! Research and Development, Bangalore, India
Software Engineer with Strategic Data Services — July 2007 - July 2008
Bharat Electronics Limited, Ghaziabad, India
Software Intern — May 2006 - July 2006
Central Research Laboratory, Ghaziabad, India
Software Intern — May 2005 - July 2006