

# Shiwali Mohan

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## CONTACT INFORMATION

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Computer Science and Engineering  
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## RESEARCH INTERESTS

Integrated intelligence, cognitive agents, situated language models for intelligent agents, natural language semantics, 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 generality and transferability of acquired knowledge and mixed-initiative learning.

*Situated language for embodied agents*  
Developing the Indexical models 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**<sup>\*</sup>, Aaron Mininger<sup>\*</sup>, James Kirk<sup>\*</sup>, 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.

### 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

### TEACHING EXPERIENCE

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

April 2014

	<b>University of Michigan, Ann Arbor, MI, USA</b> <i>Graduate Student Instructor</i> EECS 492: Introduction to Artificial Intelligence	January 2012 - April 2012
	<b>University of Michigan, Ann Arbor, MI, USA</b> <i>Student</i> EECS 580: Teaching Engineering	September 2011 - December 2011
ADVISING EXPERIENCE	<b>Bharati Vidyapeeth College of Engineering, New Delhi, India</b> Senior thesis: <i>Designing Soar agents for planet wars</i> Students: Anant Mittal, Anmol Gupta	September 2012 - Present
	<b>Visvesvaraya National Institute of Technology, Nagpur, India</b> Senior thesis: <i>Reinforcement learning agents for Infinite Mario</i> Students: Mandar Joshi, Rakesh Khobragade, Saurabh Sarda	September 2011 - May 2012
INDUSTRY EXPERIENCE	<b>Yahoo! Research and Development, Bangalore, India</b> <i>Software Engineer</i> with Strategic Data Services <b>Bharat Electronics Limited, Ghaziabad, India</b> <i>Software Intern</i> <b>Central Research Laboratory, Ghaziabad, India</b> <i>Software Intern</i>	July 2007 - July 2008  May 2006 - July 2006  May 2005 - July 2006
TALKS	<b>Learning Hierarchical Tasks with Situated Interactive Instruction</b> Center for Vision, Cognition, Learning, and Art, UCLA USC Institute for Creative Technologies. Interaction Lab, Computer Science and Engineering, USC Information Sciences Institute, Los Angeles	November 2013 November 2013 December 2013 December 2013
	<b>Acquiring grounded Representations of Words with Situated Interactive Instruction</b> AI Symposium, UM	April 2013
SERVICE	<i>Co-Chair</i> , Special Interest Group - Faculty, University of Michigan <i>Co-Chair</i> , Special Interest Group - Faculty, University of Michigan <i>Vice-President</i> , CSE Graduate Organization, University of Michigan <i>Social Chair</i> , Indian Students Association, University of Michigan <i>DCO Representative</i> , CSE Graduate Organization, University of Michigan <i>Social Chair</i> , Indian Students Association, University of Michigan	2013 2012 2011 2011 2010 2010
BACKGROUND	Citizenship: Indian Birth: December 24 <sup>th</sup> 1985, India Gender: Female	

## REFERENCES

- **John E. Laird**  
*John L. Tishman Professor of Engineering*  
Computer Science and Engineering  
University of Michigan  
2260 Hayward Street  
Ann Arbor, MI 48109  
[laird@umich.edu](mailto:laird@umich.edu)
- **Edwin Olson**  
*Assistant Professor*  
Computer Science and Engineering  
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Ann Arbor, MI 48109  
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- **Richard Lewis**  
*Professor of Psychology and Linguistics*  
Department of Psychology  
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- **Matthias Scheutz**  
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