

SHIWALI MOHAN

Palo Alto Research Center, 3333 Coyote Hill road, Palo Alto, CA 94306
email: shiwali.mohan@parc.com

RESEARCH INTERESTS

Human-agent interaction & collaboration, cognitive architectures and agents

EDUCATION

2009-2015 Doctor of Philosophy, Computer Science & Engineering
University of Michigan, Ann Arbor

2008-2009 Master of Science & Engineering, Computer Science & Engineering
University of Michigan, Ann Arbor

2003-2007 Bachelor of Engineering, Instrumentation & Control Engineering
Netaji Subhas Institute of Technology, Delhi University, New Delhi

EMPLOYMENT

2019-present Senior Member of Research Staff, Palo Alto Research Center

2015-2019 Member of Research Staff, Palo Alto Research Center

2014-2015 Postdoctoral Researcher, Palo Alto Research Center

2007-2008 Software Engineer, Yahoo! Research & Development, India

AWARDS & HONORS

2018 Blue Sky Award, at the 32nd AAAI Conference on Artificial Intelligence

2014 HRI Pioneer

2008 Best Paper Award, at 9th International Conference on Computational linguistics and Intelligent Text Processing

FUNDING

2020-2024 Defense Advance Research Projects Agency (DARPA) - Science of Artificial Intelligence and Learning for Open-world Novelty (SAIL-ON) \$4,000,000
Key Personnel, *Hypothesis-Guided Model Revision over Multiple Aligned Representations (HYDRA)*, Principal Investigator: Matt Klenk, PARC

2019-2020 Defense Advance Research Projects Agency (DARPA) - Grounded Artificial Intelligence Language Acquisition (GAILA) \$1,000,000
Principal Investigator, *Advanced Cognitive Learning for Embodied Language (AILEEN)*

2018-2019 Air Force Office of Scientific Research (AFOSR) \$164,400
Co-Principal Investigator, *Levels of Learning in Natural and Artificial Agents*, Principal Investigator: John Laird, University of Michigan

2017-2018 Advanced Research Projects Agency-Energy (ARPA-E)
Key Personnel, *Collaborative Optimization and Planning for Transportation Energy Reduction (COPTR)*, Principal Investigator: Matt Klenk, PARC

INVITED TALKS, WORKSHOPS, & PANELS

October 2020 Technology and Society in the Next Generation: Growth, Security, and Well-Being

January 2020 Electronic Imaging 2020

May 2019 Machine Learning and User Experience + Ladies that UX meetup group

November 2017 NSF Workshop on Interactive Cognitive Assistants

| | |
|----------------|---|
| May 2017 | Ernst Strunngmann Forum on Interactive Task Learning |
| September 2015 | <i>On Designing a Programmable Cognitive Assistant</i> IBM Cognitive Systems Institute |
| December 2013 | <i>Learning Hierarchical Tasks with Situated Interactive Instruction</i> University of Southern California |

PUBLICATIONS

| | |
|------------------|--|
| Dissertation | [D1] Shiwali Mohan . From Verbs to Tasks: An Integrated Account of Task Learning from Situated Interactive Instruction. <i>University of Michigan, Ann Arbor</i> , 2015. |
| Book Chapters | [B1] John Laird, Shiwali Mohan , James Kirk, Aaron Mininger. The Learning Problem in Interactive Task Learning. <i>Ernst Strunngman Forum - Interactive Task Learning Agents, Robots, and Humans and Acquiring New Tasks through Natural Interaction</i> . Eds. Kevin Gluck and John Laird. 2019. [B2] Dario Salvucci, John Laird, Fredrick Chang, Kenneth Forbus, Parisa Kordjamshidi, Tom Mitchell, Shiwali Mohan , Michael Spranger, S Stevenson, Andrea Stocco, Gregory Trafton. Learning in Interactive Task Learning. <i>Ernst Strunngman Forum - Interactive Task Learning Agents, Robots, and Humans and Acquiring New Tasks through Natural Interaction</i> . Eds. Kevin Gluck and John Laird. 2019. |
| Journal Articles | [J1] Shiwali Mohan , Matt Klenk, Matthew Shreve, John Maxwell, Aaron Ang. Characterizing a Concept Memory for Newellian Cognitive Architectures. (<i>in preparation</i>). 2020. [J2] Shiwali Mohan . Exploring the Role of Common Model of Cognition in Designing Adaptive Coaching Interactions for Health Behavior Change (<i>in press</i>). 2019. [J3] Shiwali Mohan , Anusha Venkatakrishnan, Andrea Hartzler. Observations from Deploying an Intelligent Interactive Health Coach to Promote Aerobic Exercise. <i>ACM Transactions on Interactive Intelligent Systems</i> (<i>in press</i>). 2019. [J4] Shiwali Mohan , Hesham Rakha, Matthew Klenk. Acceptable Planning: Influencing Individual Behavior to Reduce Transportation Energy Expenditure of a City. <i>Journal of Artificial Intelligence Research</i> . 2019. [J5] Aaron Springer, Anusha Venkatakrishnan, Shiwali Mohan , Les Nelson, Michael Silva, Peter Pirolli. Leveraging Self-Affirmation to Increase mHealth Behavior Change. <i>Journal of Medical Information Research</i> . 2018. [J6] Peter Pirolli, Shiwali Mohan , Anusha Venkatakrishnan, Len Nelson, Michael Silva, Aaron Springer. <i>Journal of Medical Information Research</i> . 2017. [J7] John E Laird, Kevin Gluck, John Anderson, Kenneth D Forbus, Odest Chadwicke Jenkins, Christian Lebiere, Dario Salvucci, Matthias Scheutz, Andrea Thomaz, Greg Trafton, Robert E Wray, Shiwali Mohan , James R Kirk. Interactive Task Learning. <i>IEEE Intelligent Systems</i> , Volume 32, Issue 4, IEEE 2017. [J8] Shiwali Mohan , Aaron Mininger, and John Laird. Towards an Indexical model of Situated Comprehension for Real-World Cognitive Agents. <i>Advances in Cognitive Systems 3</i> , ACS 2014. [J9] John Laird and Shiwali Mohan . A Case Study of Knowledge Integration Across Multiple Memories in Soar. <i>Biologically Inspired Cognitive Architectures</i> (invited), BICA 2014. [J10] Shiwali Mohan , Aaron Mininger, James Kirk, and John Laird. Acquiring Grounded Representations of Words with Situated Interactive Instruction. <i>Advances in Cognitive Systems 2</i> , ACS 2012. |
| Conference | [C1] Shiwali Mohan , Frances Yan, Victoria Bellotti, Hesham Rakha, Matthew Klenk, On Influencing Individual Behavior for Reducing Transportation Energy Expenditure in a Large Population. <i>In Proceedings of the 2nd AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society</i> . AIES 2019. [C2] John Laird and Shiwali Mohan . Learning Fast and Slow: Levels of Learning in General Autonomous Intelligent Agents. <i>In Proceedings of the 32nd AAAI Conference on Artificial Intelligence</i> . AAAI 2018. |

- [C3] **Shiwali Mohan**, Anusha Venkatakrisnan, Michael Silva, and Peter Pirolli. On Designing a Social Coach to Promote Regular Aerobic Exercise. *In the Proceedings of the 29th Annual Conference on Innovative Applications of Artificial Intelligence/AAAI*, IAAI 2017.
- [C4] Justin Li, Steven Jones, **Shiwali Mohan**, and Nate Derbinksy. Architectural Mechanisms for Mitigating Uncertainty during Long-Term Declarative Knowledge Access. *In the Proceedings of the 4th Conference on Advances in Cognitive Systems*, ACS 2016.
- [C5] Andrea L Hartzler*, Anusha Venkatakrisnan*, **Shiwali Mohan**, Michael Silva, Paula Lozano, James D Ralston, Evette Ludman, Dori Rosenberg, Katherine M Newton, Lester Nelson, Peter Pirolli. Acceptability of a Team-Based Mobile Health (mHealth) Application for Lifestyle Self-Management in Individuals with Chronic Illnesses. *In 38th Annual International Conference of the Engineering in Medicine and Biology Society (EMBC)*, IEEE. 2016.
- [C6] **Shiwali Mohan** and John Laird. Learning Goal-Oriented Hierarchical Tasks from Situated Interactive Instruction. *In the Proceedings of the 28th AAAI Conference*, AAAI 2014.
- [C7] **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.
- [C8] 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.
- [C9] **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.
- [C10] 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.
- [C11] 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.

Symposia, Workshops

- [W1] **Shiwali Mohan**, Matthew Klenk, Victoria Belloti. Exploring How to Personalize Travel Mode Recommendations For Urban Transportation. *In Joint Proceedings of the ACM IUI 2019 Workshops - Workshop on Theory-Informed User Modeling for Tailoring and Personalizing Interfaces (HUMANIZE)*. 2019.
- [W2] **Shiwali Mohan**, Kalai Ramea, Bob Price, Matthew Shreve, Hoda Eldardiry. Building JARVIS: A Learner-Aware Conversational Trainer. *In Joint Proceedings of the ACM IUI 2019 Workshops - Workshop on User-Aware Conversational Agents (user2agent)*. 2019.
- [W3] Filip Dvorak, **Shiwali Mohan**, Victoria Bellotti, Matthew Klenk. Collaborative Optimization and Planning for Transportation Energy Reduction. *ICAPS Proceedings of the 6th Workshop on Distributed and Multi-Agent Planning*. 2018.
- [W4] **Shiwali Mohan**, Anusha Venkatakrisnan, Daniel Bobrow, Peter Pirolli. Health Behavior Change: A Motivating Domain for Human-Aware AI Research. *In Proceeding of the AAAI 2017 Workshops*. AAAI 2017.
- [W5] Matthew Klenk, **Shiwali Mohan**, Johan de Kleer, Daniel Bobrow, Tom Hinrichs, Ken Forbus. Collaborative Autonomy Through Analogical Comic Graphs. *In Proceedings of AAAI 2017 Workshops*. AAAI 2017.
- [W6] **Shiwali Mohan**, James Kirk, Aaron Mininger, John Laird. Agent Requirements for Effective and Efficient Task-Oriented Dialog. *In Papers from the AAAI Fall Symposium Series on Artificial Intelligence for Human-Robot Interaction*, 2015.
- [W7] 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.

- [W8] **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.
- [W9] 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.
- [W10] **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.
- [W11] **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.

Extended Abstracts

- [A1] Peter Pirolli, **Shiwali Mohan**, Rong Yang, Anusha Venkatakrishnan, Michael Silva, Michael Youngblood, Ashwin Ram and Les Nelson. User Modeling and Planning for Improving Self-efficacy and Goal Adherence in mHealth. *Frontiers Public Health. Conference Abstract: 2nd Behaviour Change Conference: Digital Health and Wellbeing.*, 2016.
- [A2] **Shiwali Mohan**, and John E. Laird. Learning New Tasks for Situated Interactive Instruction. In *the 2014 HRI Pioneers Workshop at Human-Robot Interaction*, 2014.
- [A3] 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*.
- [A4] **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*.
- [A5] **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*.
- [A6] **Shiwali Mohan** and John Laird. Relational Reinforcement Learning in Infinite Mario. In *Proceedings of the 24th AAAI Conference on Artificial Intelligence, AAAI 2010*.

PATENTS

- 2018, USA Robert Price, Shiwali Mohan, *Rule-based Augmentation Of Perceptions To Augment And Filter Perceptions Of Observed Systems*. Filing date: 2018/12/31
- 2018, USA Matthew Klenk, Shiwali Mohan, Victoria Bellotti, *Transportation Behavior Influence*. Application number 16/181152. Filing date: 2018/11/05.
- 2016, European Ashwin Ram, Gregory Michael Youngblood, Lester D Nelson, Anusha Venkatakrishnan, Peter L Pirolli, Michael K Silva, Shiwali Mohan. *System and Method to Create, Monitor, and Adapt Individualized Multidimensional Health Programs*. Application number: 17165632.5 Publication date: 2017/04/07.
- 2016, USA Ashwin Ram, Gregory Michael Youngblood, Lester D Nelson, Anusha Venkatakrishnan, Peter L Pirolli, Michael K Silva, Shiwali Mohan. *System and Method to Create, Monitor, and Adapt Individualized Multidimensional Health Programs*. Application number: 15/130,770. Publication date: 2016/4/15.

MEDIA

- 2017 *Could a Bot Coach You to a New PR? Artificial intelligence is making its way into fitness apps*. Interview. Outside magazine

SERVICE

- 2020 *Chair/Co-chair: AAAI-DC, ACS; Program Committee: AAAI, IUI*

| | |
|------|---|
| 2019 | <i>Program Committee:</i> IUI, AAAI, AAAI Doctoral Consortium; <i>Reviewer:</i> Transactions of Intelligent Interactive Systems |
| 2018 | <i>Program Committee:</i> ICRA, HRI, IUI, AAAI, AAAI Doctoral Consortium; <i>Reviewer:</i> Autonomous Robots |
| 2017 | <i>Program Committee:</i> AAAI, AAAI Doctoral Consortium |
| 2016 | <i>Program Committee:</i> IJCAI, AAAI |
| 2015 | <i>Program Committee:</i> AI-HRI AAAI Fall Symposium Series |
| 2015 | <i>Organizing Committee:</i> Students of Cognitive Systems at ACS |

February 13, 2020