

# Jivko Sinapov

Postdoctoral Fellow / Clinical Assistant Professor  
University of Texas at Austin

## Office address

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## Education

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- Ph.D., Computer Science and Human-Computer Interaction, Iowa State University, Ames, IA, USA (December 2013)
- B.Sc., Computer Science, University of Rochester, NY, USA (May 2005)

## Research Interests

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Developmental Robotics, Computational Perception, Robotic Manipulation, Machine Learning, Human-Robot and Human-Computer Interaction, Artificial Intelligence, Bioinformatics

## Publications and Research Reports

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### Ph.D. Dissertation:

**Sinapov, J.**, “Behavior-grounded multi-sensory object perception and exploration by a humanoid robot”, Ph.D. dissertation, Iowa State University, December 2013.

### Journal Papers:

1. Blessing, S.B., Devasani, S., Gilbert, S.G., and **Sinapov, J.** “Using ConceptGrid as an Easy Authoring Technique to Check Natural Language Responses”, *International Journal of Learning Technology*, Vol 10, No 1, pp. 50-70, May 2015.
2. Schenck, C., **Sinapov, J.**, Johnston, D., and Stoytchev, A. “Which Object Fits Best? Solving Matrix Completion Tasks with a Humanoid Robot”, *IEEE Transactions on Autonomous Mental Development*, Vol 6, No 3, pp. 226-240, Sep. 2014.
3. Hoffmann, H., Chen, Z., Earl, D., Mitchell, D., Salemi, B., and **Sinapov, J.** “Adaptive Robotic Tool Use Under Variable Grasps”, *Robotics and Autonomous Systems*, Vol. 62, No. 6, pp. 833-846, Jun. 2014.
4. **Sinapov, J.**, Schenck, C., Staley, K., Sukhoy, V., and Stoytchev, A. “Grounding Semantic Categories in Behavioral Interactions: Experiments with 100 Objects”, *Robotics and Autonomous Systems*, 62(5), pp. 617-706, May. 2014.

5. Schenck, C., **Sinapov, J.**, and Stoytchev, A. “Which Object Comes Next? Grounded Order Completion by a Humanoid Robot”, *Cybernetics and Information Technologies*, 12(3), pp. 5-16, Sep. 2012.
6. Griffith, S., **Sinapov, J.**, Sukhoy, V., and Stoytchev, A. “A Behavior-Grounded Approach to Forming Object Categories: Separating Containers from Non-Containers”, *IEEE Transactions on Autonomous Mental Development*, 4(1), pp. 54-69, Mar. 2012.
7. **Sinapov, J.**, Bergquist, T., Schenck, C., Ohiri, U., Griffith, S., and Stoytchev, A. “Interactive Object Recognition Using Proprioceptive and Auditory Feedback”, *International Journal of Robotics Research*, 30(10), pp. 1250-1262, Sep. 2011.
8. **Sinapov, J.**, Sukhoy, V., Sahai, R., and Stoytchev, A. “Vibrotactile Recognition and Categorization of Surfaces by a Humanoid Robot”, *IEEE Transactions on Robotics*, 27(3), pp. 488-497, Jun. 2011.
9. Caragea, C., **Sinapov, J.**, Dobbs, D., and Honavar, V. “Mixture of Experts Models to Exploit Global Sequence Similarity on Bimolecular Sequence Labeling”, *BMC Bioinformatics*, 10(S4), Apr. 2009.
10. Caragea, C., **Sinapov, J.**, Silvescu, A., Dobbs, D., and Honavar, V. “Glycosylation Site Prediction Using Ensembles of Support Vector Machine Classifiers”, *BMC Bioinformatics*, 8:438, Nov. 2007.

#### Refereed Conference Papers:

1. **Sinapov, J.**, Khante, P., Svetlik, M., and Stone, P. “Learning to Order Objects using Haptic and Proprioceptive Exploratory Behaviors”, *In proceedings of the 2016 International Joint Conference on Artificial Intelligence (IJCAI), New York City, NY, July 9-15, 2016.*
2. Thomason, J., **Sinapov, J.**, Svetlik, M., Stone, P., and Mooney, R. “Learning Multi-Modal Grounded Linguistic Semantics by Playing I, Spy”, *In proceedings of the 2016 International Joint Conference on Artificial Intelligence (IJCAI), New York City, NY, July 9-15, 2016.*
3. Narvekar, D., **Sinapov, J.**, Leonetti, M., and Stone, P. “Source Task Creation for Curriculum Learning ”, *In proceedings of the 2016 ACM Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), 2016.*
4. Gori, I., **Sinapov, J.**, Khante, P., Stone, P., and Aggarwal, J. K. “Robot-centric activity recognition in the wild”, *In proceedings of the 2015 International Conference on Social Robotics (ICSR), Paris, France, Oct 24-30, 2015.*
5. **Sinapov, J.**, Narvekar, D., Leonetti, M., and Stone, P. “Learning Inter-Task Transferability in the Absence of Target Task Samples”, *In proceedings of the 2015 ACM Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), Istanbul, Turkey, May 4-8, 2015.*

6. **Sinapov, J.**, Schenck, C., and Stoytchev, A. “Learning Relational Object Categories Using Behavioral Exploration and Multimodal Perception”, *In proceedings of the 2014 IEEE International Conference on Robotics and Automation (ICRA), Hong Kong, China, May 31-Jun. 5, 2014.*
7. **Sinapov, J.**, and Stoytchev, A. “Grounded Object Individuation by a Humanoid Robot”, *In Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Karlsruhe, Germany, May 6-10, 2013.*
8. **Sinapov, J.**, and Stoytchev, A. “Object Category Recognition by a Humanoid Robot Using Behavior-Grounded Relational Learning”, *In Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Shanghai, China, May 9-13, pp. 184-190, 2011.*
9. **Sinapov, J.**, and Stoytchev, A. “The Odd One Out Task: Toward an Intelligence Test for Robots”, *In Proceedings of the IEEE International Conference on Development and Learning (ICDL), Ann Arbor, MI, Aug. 18-21, pp. 126-131, 2010.*  
(Best Student Paper Award)
10. Sukhoy, V., **Sinapov, J.**, Wu, L., and Stoytchev, A. “Learning to Press Doorbell Buttons”, *In Proceedings of the IEEE International Conf. on Development and Learning (ICDL), Ann Arbor, MI, Aug. 18-21, pp. 132-139, 2010.*
11. **Sinapov, J.**, and Stoytchev, A. “The Boosting Effect of Exploratory Behaviors”, *In Proceedings of the 24<sup>th</sup> National Conference on Artificial Intelligence (AAAI), Atlanta, GA, Jul. 11-15, pp. 1613-1618, 2010.*  
(Nominated for Best Paper Award by a reviewer)
12. Griffith, S., **Sinapov, J.**, Sukhoy, V., and Stoytchev, A. “How to Separate Containers from Non-Containers? A Behavior-Grounded Approach to Acoustic Object Categorization”, *In Proceedings of the IEEE International Conf. on Robotics and Automation (ICRA), Anchorage, AK, May 3-8, pp. 1852-1859, 2010.*
13. **Sinapov, J.**, Weimer, M., and Stoytchev, A. “Interactive Learning of the Acoustic Properties of Household Objects”, *In Proceedings of the IEEE International Conf. on Robotics and Automation (ICRA), Kobe, Japan, May 12-17, pp. 2518-2524, 2009.*
14. Griffith, S., **Sinapov, J.**, Miller, M., and Stoytchev, A. “Toward Interactive Learning of Object Categories by a Robot: A Case Study with Container and Non-Container Objects”, *In Proceedings of the IEEE International Conference on Development and Learning (ICDL), Shanghai, China, Jun. 4-7, 2009.*
15. **Sinapov, J.**, and Stoytchev, A. “Detecting the Functional Similarities Between Tools Using a Hierarchical Representation of Outcomes”, *In Proc. of the IEEE International Conf. on Development and Learning (ICDL), Monterey, CA, Aug. 9-12, 2008.*
16. Caragea, C., **Sinapov, J.**, Dobbs, D., and Honavar, V. “Using Global Sequence Similarity to Enhance Biological Sequence Labeling”, *In Proceedings of the IEEE Conf. on Bioinformatics and Biomedicine, Philadelphia, PA, Nov. 3-5, 2008.*
17. **Sinapov, J.**, and Stoytchev, A. “Learning and Generalization of Behavior-Grounded Tool Affordances”, *In Proceedings of the IEEE International Conference on Development and Learning (ICDL), London, UK, Jul. 11-13, 2007.*

18. Caragea, C., **Sinapov, J.**, Dobbs, D., and Honavar, V. “Assessing the Performance of Macromolecular Sequence Classifiers”, *In Proceedings of the IEEE Conference on Bioinformatics and Bioengineering (BIBE), Boston, MA, Oct. 14-17, 2007.*

#### **Refereed Workshop Papers:**

1. Sukhoy, V., Sahai, R., **Sinapov, J.**, and Stoytchev, A. “Vibrotactile Recognition of Surface Textures by a Humanoid Robot”, *In Proceedings of the 2009 Humanoids Workshop: Tactile Sensing in Humanoids - Tactile Sensors and Beyond, Paris, France, Dec. 7, pp. 57-60, 2009.*
2. Bergquist, T., Schenck, C., Ohiri, U., **Sinapov, J.**, Griffith S., and Stoytchev, A. “Interactive Object Recognition Using Proprioceptive Feedback”, *In Proceedings of the IROS Workshop: Semantic Perception for Mobile Manipulation, St. Louis, MO, Oct. 15, 2009.*
3. **Sinapov, J.**, and Stoytchev, A. “From Acoustic Object Recognition to Object Categorization by a Humanoid Robot”, *In Proceedings of the RSS Workshop: Mobile Manipulation in Human Environments, Seattle, WA, Jun. 28, 2009.*
4. **Sinapov, J.**, Weimer, M., and Stoytchev, A. “Interactive Learning of the Acoustic Properties of Objects by a Robot”, *In Proceedings of the RSS Workshop: Robot Manipulation: Intelligence in Human Environments, Zurich, Switzerland, Jun. 28, 2008.*

#### **Refereed Short Papers and Posters:**

1. **Sinapov, J.**, Earl, D., Mitchell, D., and Hoffmann, H. “Interactive Audio-Tactile Annotation of 3D Point Clouds for Robotic Manipulation”, *In Proceedings of the ICRA Mobile Manipulation Workshop on Interactive Perception, Karlsruhe, Germany, May 6, 2013.*
2. Griffith, S., **Sinapov, J.** and Stoytchev, A. “Toward Learning to Detect and Use Containers”, *Poster abstract at the 7th IEEE International Conference on Development and Learning (ICDL), Monterey, CA, Aug. 9-12, 2008.*
3. **Sinapov, J.**, Stoytchev, A. “Toward Autonomous Learning of an Ontology of Tool Affordances by a Robot”, *In Proceedings of the 23rd National Conference on Artificial Intelligence (AAAI), Chicago, IL, Jul. 13-17, 2008.*
4. **Sinapov, J.**, Caragea, C., Dobbs, D., and Honavar, V. “Using Global Sequence Similarity Improves Biological Site-Specific Classifiers”, *In Proceedings of the 16th Annual International Conference On Intelligent Systems For Molecular Biology (ISMB) Poster Program, Toronto, Canada, Jul. 17-23, 2008.*
5. **Sinapov, J.**, Stoytchev, A. “Learning Behavior-Grounded Tool Affordances with Generalization Across Different Tools”, *In Proceedings of the RSS Manipulation Workshop: Sensing and Adapting to the Real World, Atlanta, GA, Jun. 30, 2007.*

## Creative Works:

1. Griffith, S., **Sinapov, J.**, Miller, M., and Stoytchev, A. “Toward Interactive Learning of Container and Non-Container Objects”, *Research Video, International Joint Conference on Artificial Intelligence (IJCAI) AI Video Competition (a.k.a., AI Oscars)*, Jul. 14, 2009. **(Nominated for Best Narration)**

## Patents:

1. Hoffmann, H., and **Sinapov, J.**, “Device and method to identify functional parts of tools for robotic manipulation”, Publication Number: US9144905 B1. Filed on Jan. 21, 2014.

## Honors and Awards

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- Teaching Excellence Award from the Graduate Program in Human Computer Interaction, Iowa State University, Spring 2013.
- Best Student Paper Award at the 9th IEEE International Conference on Development and Learning (ICDL), Ann Arbor, MI, Aug. 18-21, 2010.
- Iowa State University Professional Advancement Grant (multiple awards, 2009-2013)

## Employment History

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### Clinical Assistant Professor

The Texas Institute for Discovery Education in Science (College of Natural Sciences)  
The University of Texas at Austin *Spring 2016-*

### Postdoctoral Fellow

Department of Computer Science  
The University of Texas at Austin *Summer 2014-Fall 2015*

### Lecturer

Graduate Program in Human Computer Interaction  
Iowa State University *Spring 2014*

### Graduate Teaching Assistant

Graduate Program in Human Computer Interaction  
Iowa State University *Fall 2012-Fall 2013*

### Graduate Teaching Assistant

Department of Computer Science  
Iowa State University *Spring 2012*

### Research Intern

*Developed software for robotic perception and manipulation  
for DARPA’s ARM-S Manipulation Challenge*  
HRL Laboratories, Malibu, CA *Summer-Fall 2011*

### **Graduate Teaching Assistant**

Graduate Program in Human Computer Interaction  
Iowa State University

*Spring 2011*

### **Research Intern**

*Developed software for proprioceptive perception for the PR2 robot*  
Willow Garage, Menlo Park, CA

*Summer 2010*

### **Graduate Research Assistant**

Virtual Reality Applications Center (VRAC)  
Iowa State University

*Summer 2006-Spring 2010*

## **Invited Talks and Guest Lectures**

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1. “Curriculum Development for Reinforcement Learning Agents”, research presentation at the 2014 Machine Intelligence for Mission-Focused Autonomy PI meeting at the Air Force Research Lab, Rome, NY, Dec. 2, 2014.
2. “Grounding Object Concepts in Exploratory Behaviors”, invited talk at the 2014 Humanoids Workshop: “Active Learning in Robotics: Exploration Strategies in Complex Environments”, Madrid, Spain, Nov. 18, 2014.
3. “Behavior-Grounded Multisensory Object Perception and Exploration by a Humanoid Robot”, invited talk at UT Austin Computer Science Department Forum on Artificial Intelligence (FAI), Austin, TX, Sep. 19, 2014.
4. “Grounded Object Individuation by a Humanoid Robot”, guest lecture for CprE/HCI/ComS 575: Computational Perception, Iowa State University, Ames, IA, Apr. 18, 2013.
5. “Grounding Object Categories and Relations in Sensorimotor Experience”, guest lecture for CprE/HCI 585X: Developmental Robotics, Iowa State University, Ames, IA, Mar. 23, 2011.
6. “Computational Perception of Natural Sound”, guest lecture for CprE/HCI/ComS 575: Computational Perception, Iowa State University, Ames, IA, Mar. 3, 2010.
7. “Robots that Learn and Develop”, invited talk at the Computer Seminar Series at Simpson College, Indianola, IA, Mar. 3, 2009.

## **Teaching and Mentoring Experience**

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### **Instructor**

CS 378: Autonomous Intelligent Robots  
CprE/HCI/ComS 575: Computational Perception  
HCI 573X: UI Implementation for Web Applications

*Spring 2016 and Fall 2016*

*Spring 2014*

*Summer 2013 and Spring 2014*

### **Graduate Teaching Assistant**

HCI 521: Cognitive Psychology of HCI	<i>Fall 2012 and Fall 2013</i>
HCI 574: Computation Implementation and Prototyping in HCI	<i>Spring 2013</i>
CprE/HCI/ComS 575: Computational Perception	<i>Spring 2012 and Spring 2013</i>
ComS 330: Discrete Computational Structures	<i>Spring 2012</i>
CprE/HCI 585X: Developmental Robotics	<i>Spring 2011</i>

### **Mentor for the NSF Research Experience for Undergraduates (REU) Program**

Mentored a team of three undergraduates *Summer 2008 and Summer 2009*

### **Undergraduate Teaching Assistant (University of Rochester)**

CSC 171 and CSC 172 *Fall 2004 and Spring 2005*

### **Professional Activities**

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#### **Program Committee Member:**

- 2016 ACM Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), Singapore, May 9-13, 2016.
- The Thirtieth AAAI Conference on Artificial Intelligence (AAAI), Phoenix, AZ, Feb. 12-17, 2016.
- 2016 AAAI/SIGART Doctoral Consortium, February 12-13, 2016, Phoenix, Arizona, USA
- Humanoids Workshop on Developmental Robotics, Osaka, Japan, Nov. 29, 2012.
- IEEE International Conference on Development and Learning (ICDL), Ann Arbor, MI, Aug 18-21, 2010.
- RSS Workshop: Strategies and Evaluation for Mobile Manipulation in Household Environments, Zaragoza, Spain, Jun. 27, 2010.

#### **Reviewer:**

- IEEE Transactions on Autonomous Mental Development (TAMD 2015)
- IEEE International Conference on Robotics and Automation (ICRA 2011, 2012, 2013, 2014, 2015)
- IEEE-RAS International Conference on Humanoid Robotics (Humanoids 2015)
- International Conf. on Human-Robot Interaction (HRI 2013, 2014)
- Frontiers Journal in Neurorobotics (2012)
- IEEE/RSJ International Conf. on Intelligent Robots and Systems (IROS 2012, 2013, 2014)
- IEEE International Conf. on Development and Learning (2010, 2011, 2012, 2015)
- 3<sup>rd</sup> Indian International Conf. on Artificial Intelligence (2007)

**Volunteering and Service:**

- Judge at the Computational Thinking Challenge, Ames, IA (2013)
- Judge at First Lego League State Championships, Ames, IA (2010, 2011, 2013)
- Student volunteer at the Human-Robot Interaction conference (HRI 2009)
- Student volunteer at the 24<sup>th</sup> National Conference on Artificial Intelligence (AAAI 2008)



## References

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### Reference 1:

Peter Stone  
Professor, Department of Computer Science  
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### Reference 2:

Alexander Stoytchev  
Associate Professor, Department of Electrical and Computer Engineering  
Iowa State University  
  
Phone: (515) 294-5904                      Email: alexs@iastate.edu  
URL: <http://www.ece.iastate.edu/~alexs/>

### Reference 3:

Stephen Gilbert  
Associate Director, Virtual Reality Application Center and HCI Program  
Assistant Professor, Industrial and Manufacturing Systems Engineering  
Iowa State University  
  
Phone: (515) 294-6782                      Email: gilbert@iastate.edu  
URL: <http://public.vrac.iastate.edu/~gilbert/>

### Reference 4:

Yan-Bin Jia  
Associate Professor, Department of Computer Science  
Director, Robotics Laboratory  
Iowa State University  
  
Phone: (515) 294-2577                      Email: jia@iastate.edu  
URL: <http://www.cs.iastate.edu/~jia/>

### Reference 5:

Jonathan Kelly  
Associate Professor, Department of Psychology  
Iowa State University  
  
Phone: (515) 294-2322                      Email: jonkelly@iastate.edu  
URL: <https://navlab.psych.iastate.edu/>