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## **Research Interests**

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Cognitive Architectures, Cognitive Modeling, Knowledge Representation, Spatial/Diagrammatic Reasoning, Learning

## **Education**

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2000 – 2007: Ph. D. in Computer Science, Computer Science and Engineering, The Ohio State University, Columbus, OH, USA.  
Major: Artificial Intelligence  
Minors: Cognitive Science, Software Engineering  
Advisor: B. Chandrasekaran  
Committee: John Josephson, Computer Science & Engineering  
James Todd, Psychology

1995 – 2000: B. Tech in Computer Science and Engineering, Cochin University of Science and Technology, Kochi, Kerala, India.

## **Employment**

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2010 – 2012: Post-doctoral Researcher, Psychology, Carnegie Mellon University, Pittsburgh, PA.  
Advisor: Christian Lebiere  
2008 – 2010: Post-doctoral Researcher, Dept of Cognitive Science, Rensselaer Polytechnic Institute, Troy, NY. Advisor: Nicholas Cassimatis  
2001 – 2007: Research Assistant, Computer Science and Engineering, The Ohio State University, Columbus, OH  
2000 – 2001: Teaching Assistant, Computer Science and Engineering, The Ohio State University, Columbus, OH

## **Publications**

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### ***Thesis***

**Kurup, U.** (2007) Design and Use of a Bimodal Cognitive Architecture for Diagrammatic Reasoning and Cognitive Modeling, Dept of Computer Science and Engineering, The Ohio State University.  
Advisor: B. Chandrasekaran.

### ***Book Chapters***

Chandrasekaran, B., Banerjee, B., **Kurup, U.**, Josephson, J. R. and Winkler, R.  
(2009) Diagrammatic reasoning in army situation understanding and planning: Architecture for decision support and cognitive modeling, *Advanced Decision Architectures for the Warfighter: Foundations and Technology*, P. McDermott and L. Allender, Editors, Chapter 21, pp. 379-394

### ***In refereed Journals***

Chandrasekaran, B., Banerjee, B., **Kurup, U.** and Lele, O. (2011) Augmenting cognitive architectures to support diagrammatic imagination, *Topics in Cognitive Science: Special Issue on Modeling Spatial Cognition*. G. Gunzelmann, Editor, Cognitive Science Society.

**Kurup, U.**, Bignoli, P., Scally, J. R., Cassimatis, N. (2011). "An Architectural Framework for Complex Cognition". Cognitive Systems Research, Special Issue on Complex Cognition.

Cassimatis, N., Bignoli, P., Bugajska, M., Dugas, S., **Kurup, U.**, Murugesan, A., Bello, P. (2009). "An Architecture for Adaptive Algorithmic Hybrids." IEEE Trans Syst Man Cybern B Cybern.

### ***In refereed conferences***

**Kurup, U.**, Lebiere, C., Stentz, A. & Hebert, M. (under review). Predicting and Classifying Pedestrian Behavior Using an Integrated Cognitive Architecture. In *Proceedings of Behavior Representation and Modeling Conference (BRIMS)*. Amelia Island, FL.

**Kurup, U.**, Lebiere, C., Stentz, A. & Hebert, M. (2012). Connecting a Cognitive Architecture to Robotic Perception. In *Proceedings of the SPIE conference on Defense, Security and Sensing*. Volume 8387. Baltimore, MD.

Jentsch, F., Ososky, S., Schuster, D., Fiore, S. Shumaker, R., Lebiere, C., **Kurup, U.**, Oh, H., Stentz, A. (2012). The Importance of Shared Mental Models and Shared Situation Awareness for Transforming Robots from Tools to Teammates. In *Proceedings of the SPIE conference on Defense, Security and Sensing*. Volume 8387. Baltimore, MD.

**Kurup, U.**, Lebiere, C. & Stentz, A. (2011). Integrating Perception and Cognition for AGI. In *Proceedings of the fourth conference on Artificial General Intelligence*. Mountainview, CA.

**Kurup, U.**, Cassimatis, N. (2010). "Spatial Constraint Satisfaction Using SAT". In the Proceedings of SC-10: Spatial Cognition Conference, Portland, OR.

**Kurup, U.**, Cassimatis, N. (2010). "Integrating Constraint Satisfaction and Spatial Reasoning". In the Proceedings of AAAI-10: The 24<sup>th</sup> National Conference on Artificial Intelligence, Atlanta, GA.

**Kurup, U.**, Cassimatis, N. (2010). "Quantitative Spatial Reasoning for General Intelligence." In the Proceedings of the 3<sup>rd</sup> Artificial General Intelligence conference, Lugano, Switzerland.

**Kurup, U.**, Chandrasekaran, B. (2009). "A Cognitive Map for an Artificial Agent." Proceedings of the 2<sup>nd</sup> Artificial General Intelligence conference, Arlington, VA.

**Kurup, U.**, Chandrasekaran, B. (2007). "Modeling Memories of Large-Scale Space Using a Bimodal Cognitive Architecture." 8<sup>th</sup> International Conference on Cognitive Modeling, Ann Arbor, MI.

**Kurup, U.**, Chandrasekaran, B. (2006). "Multi-modal cognitive architectures: A partial solution to the frame problem." Paper presented at the 28th Annual Conference of the Cognitive Science Society, Vancouver, BC.

Chandrasekaran, B., **Kurup, U.**, Banerjee, B. (2004). Representational and inferential requirements for diagrammatic reasoning in the entity re-identification task. Paper presented at the 24<sup>th</sup> Army Science Conference, Orlando, Florida.

Chandrasekaran B., **Kurup U.**, Banerjee B., Josephson J. R. and Winkler R. (2004). "An Architecture for Problem Solving with Diagrams", *Diagrams 2004 - Third International Conference on the Theory and Application of Diagrams*, University of Cambridge, UK, March 22-24, 2004.

Appears in Diagrammatic Representation and Inference, Alan Blackwell, Kim Marriott and Atsushi Shimojima, Editors, Lecture Notes in Artificial Intelligence 2980, Berlin: Springer-Verlag, pp.151-165.

Chandrasekaran, B., Josephson, J.R., Banerjee, B., **Kurup, U.**, Winkler, R. (2002). Diagrammatic reasoning in support of situation understanding and planning. Paper presented at the Proc. 23rd Army Science Conference, FL.

### **Workshops & Symposiums**

**Kurup, U.**, Chandrasekaran, B. (2009) "Multi-modal Systems as Multi-representational Systems." In Multi-representational Architectures for Human-level Intelligence. AAAI Fall Symposium, Arlington, VA, 2009.

**Kurup, U.**, Chandrasekaran, B. (2007) "Modeling Memories of Large-Scale Space", Soar Workshop, Ann Arbor, MI.

Chandrasekaran, B., **Kurup, U.** (2007). A bimodal cognitive architecture: Explorations in architectural explanation of spatial reasoning. Paper presented at the AAAI Spring Symposium, Control Mechanisms for Spatial Knowledge Processing in Cognitive / Intelligent Systems.

Chandrasekaran, B., **Kurup, U.**, & Banerjee, B. (2005). A diagrammatic reasoning architecture: Design, implementation and experiments. Paper presented at the AAAI Spring Symposium Reasoning with Mental and External Diagrams: Computational Modeling and Spatial Assistance.

### **Posters**

**Kurup, U.**, Chandrasekaran, B. (2008) "Spatial Modeling Using a Bimodal Cognitive Architecture", CogSci, Washington, D. C.

**Kurup, U.** (2007) "Bimodal Cognitive Architectures: Learning and Memory in Spatial Reasoning", Graduate Student Presentation, OSU.

**Kurup, U.** (2007) "Planning in a Dynamic World: Relevance, Salience and Multi-modal Architectures", Cogfest 07, OSU.

**Kurup, U.** (2003) "Interaction between Problem Solving and Information Extraction from a Diagrammatic Representation", Cogfest 03, OSU.

**Kurup, U.**, Chandrasekaran, B. and Josephson, J. (2002) "Recognition and Characterization of Battlefield Maneuvers using Diagrammatic Reasoning", Army Research Laboratory, Collaborative Technology Alliance on Advanced Decision Architectures, Springfield, VA.

Chandrasekaran, B., Josephson, J. Banerjee, B., and **Kurup, U.** (2002) "Visual Inference and Diagrammatic Reasoning", Army Research Laboratory, Collaborative Technology Alliance on Advanced Decision Architectures, Springfield, VA.

### **Invited Presentations**

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**Kurup, U.** (2009) "Some Differences Between Internal and External Diagrams", Panel on Diagrammatic Representations and Cognitive Architectures, BRIMS conference, Sundance, UT.

### **Administrative/Organizational Activities**

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Program/Organization Committee, Diagrams 2010.

Chair, AAAI Fall 09 Symposium on Multi-representational Architectures for Human-level Intelligence

## **Teaching Experience**

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2000 – 2001: CIS201 – Elementary programming using Java. 3+1 hours. Computer Science and Engineering, The Ohio State University

## **Affiliations**

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Cognitive Science Society (CogSci)  
American Association for Artificial Intelligence (AAAI)

## **Reviewer**

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Cognitive Science Conference, AGI, IEEE Transactions on Systems, Man and Cybernetics, BRIMS, Cognitive Systems Research.

## **Service**

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**Graduate Steering Committee**, Dept of Computer Science & Engineering, OSU (2005-2007) – Organizing committee for electing and appointing student representatives to the various graduate level committees

**Faculty Search Committee**, Dept of Computer Science & Engineering, OSU (2006-2007) – Student Member

**Computer Committee**, Dept of Computer Science & Engineering, OSU (2005-2006) – Student Member

**Council of Graduate Students**, OSU (2001-2003) – Student Representative from the Dept of Computer Science & Engineering