

Dongkyu Choi

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University of Kansas

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Education:

PhD. (2010) Aeronautics and Astronautics, Stanford University, CA, USA
with minor in Computer Science
Dissertation: *Coordinated Execution and Goal Management
in a Reactive Cognitive Architecture*
Committee: Pat Langley, Stephen M. Rock, Nils Nilsson, Sanjay Lall

M.S. (2003) Aeronautics and Astronautics, Stanford University, CA, USA

B.Eng. (2001) Aerospace Engineering, Seoul National University, Korea

Professional Experience:

2012- Assistant Professor
Department of Aerospace Engineering, University of Kansas

2009-2011 Visiting Research Specialist / Postdoctoral Research Associate
Department of Psychology, University of Illinois at Chicago

2003-2009 Research Assistant
Computational Learning Laboratory, CSLI, Stanford University

2003-2009 Research Assistant
Institute for the Study of Learning and Expertise, Palo Alto, CA

2002 Student Coordinator in Europe
International Masters in Aerospace, Stanford University

1997-2000 Computer Systems Engineer / Bilingual Translator
Korean Augmentation to the United States Army, Korea

1997 Quality Inspection Engineer (summer intern)
Taesan LCD Inc., Korea

1996 CAD Engineer (summer intern)
Korea Aerospace Research Institute, Korea

Research Interests and Project Experience:

Focus of research cognitive architectures
 intelligent agent architectures
 artificial intelligence

2012-2014 Autonomous Discovery of Object Properties:
 Robots That Create Simple Machines
 Office of Naval Research [\$225,000 subcontract from ISLE]

Dr. Dongkyu Choi is a subcontractor on this project, working on architectural extensions to ICARUS, a cognitive architecture. The main goal is to enable artificial agents to infer and discover new ways to use objects around them. Dr. Choi will collaborate closely with Dr. Langley at ISLE and Dr. Stilman at Georgia Tech.

2012-2013 Robotics Challenge:
 Cognitive Robot for General Missions
 Defense Advanced Research Projects Agency [\$371,503]

Dr. Dongkyu Choi is the primary investigator on this team effort with Korea Institute of Science and Technology (KIST). The main goal is to perform the required mission set of DARPA's Robotics Challenge and win the competition using a humanoid robot. As a team in Track B, the KU-KIST collaboration will use a DARPA-supplied hardware and implement all the necessary software components.

2009-2011 Adaptation by Learning from Error in ICARUS
 Office of Naval Research [\$427,187]

Dr. Dongkyu Choi is a co-investigator on this project with Dr. Stellan Ohlsson. His role in the research is substantial, in that he co-designs the overall system and performs all implementations required to adapt multiple learning mechanisms in a cognitive architecture, ICARUS, on which he is an expert.

2008-2010 Learning Task Knowledge for Cognitive Robots
 Korea Institute of Science and Technology [~\$85,000]

During the last quarter of 2008, Dr. Dongkyu Choi performed a preliminary research to explore the possibility of using a cognitive architecture for controlling a humanoid robot. Based on the result of this work, a full-blown research contract began on 2009, for which Dr. Choi is a co-PI. The goal of the project during 2010 is to develop and demonstrate the ability of the integrated system performing more complex tasks like laying out multiple blocks in particular configurations using problem solving and learning capabilities.

2005-2009 Transfer Learning in Integrated Cognitive Systems
Defense Advanced Research Projects Agency [\$12,242,291]

The focus of this project is to develop and demonstrate the transfer of knowledge learned in one situation to another with different levels of similarity. Dongkyu Choi has mainly worked on the performance module, which translates and uses acquired knowledge as well as base knowledge about the given domain, and executes skills in the simulated world. As a senior PhD-level student, he coordinated project-related efforts at an intermediate position between project managers and other graduate students.

2003-2005 New Research Directions in Integrated Cognitive Architectures
National Science Foundation [\$99,271]

Using simulated urban driving domains in both 2-D and 3-D, Dongkyu Choi developed an intelligent agent that can drive around, deliver packages, and perform other related tasks. This project provided a great opportunity to improve his development skills, as well as a testbed he can work with both for other projects and his thesis work.

Journal Publications & Thesis:

Choi, D. (2011). Reactive goal management in a cognitive architecture. *Cognitive Systems Research*, 12, 293-308.

Choi, D. (2010). *Coordinated Execution and Goal Management in a Reactive Cognitive Architecture*. PhD thesis, Stanford University, Stanford, CA.

Langley, P., Choi, D., & Rogers, S. (2009). Acquisition of hierarchical reactive skills in a unified cognitive architecture. *Cognitive Systems Research*, 10(4), 316-332.

König, T., O'Rourke, P., Shapiro, D., Choi, D., Nejati, N., & Langley, P. (2009). Skill transfer through goal-driven representation mapping. *Cognitive Systems Research*, 10(3), 270-285.

Langley, P. & Choi, D. (2006). Learning recursive control programs from problem solving. *Journal of Machine Learning Research*, 7, 493-518.

Conference/Symposium Papers:

Choi, D., Kim, K., Kim, D., & You, B.-J. (2011). Problem solving and learning for a humanoid robot. In *Proceedings of the IEEE International Conference on Robotics and Biomimetics*, Phuket, Thailand: IEEE Press.

Kim, K., Choi, D., Lee, J.-Y., Park, J.-M., & You, B.-J. (2011). Controlling a humanoid robot in home environment with a cognitive architecture. In

Proceedings of the IEEE International Conference on Robotics and Biomimetics, Phuket, Thailand: IEEE Press.

Choi, D. & Ohlsson, S. (2011). Interoperating learning mechanisms in a cognitive architecture. In *Proceedings of the AAI 2011 Fall Symposium on Advances in Cognitive Systems*, Arlington, VA: AAI Press.

Choi, D. & Ohlsson, S. (2011). Effects of multiple learning mechanisms in a cognitive architecture. In *Proceedings of the 33rd Annual Meeting of the Cognitive Science Society*, pp. 3003-3008, Boston, MA: Cognitive Science Society, Inc.

Kim, K., Lee, J.-Y., Choi, D., Park, J.-M., & You, B.-J. (2010). Autonomous task execution of a humanoid robot using a cognitive model. In *Proceedings of the IEEE International Conference on Robotics and Biomimetics*, Tianjin, China: IEEE Press.

Choi, D. & Ohlsson, S. (2010). Learning from failures for cognitive flexibility. In *Proceedings of the 32nd Annual Meeting of the Cognitive Science Society*, Portland, OR: Cognitive Science Society, Inc.

Choi, D. (2010). Nomination and prioritization of goals in a cognitive architecture. In *Proceedings of the 10th International Conference on Cognitive Modeling*, Philadelphia, PA: Drexel University.

Choi, D. (2010). Reactive goal management in a cognitive architecture. In *Proceedings of the AAI-2010 Workshop on Goal-Directed Autonomy*, Atlanta, GA: AAI Press.

Choi, D. & Ohlsson, S. (2010). Cognitive flexibility through learning from constraint violations. In *Proceedings of the Nineteenth Annual Conference on Behavior Representation in Modeling Simulation*, Charleston, SC.

Choi, D., Kang, Y., Lim, H., & Yoo, B.-J. (2009). Knowledge-based control of a humanoid robot. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, St. Louis, MO: IEEE Press.

Choi, D. (2009). Concurrent execution in a cognitive architecture. In *Proceedings of the 31st Annual Meeting of the Cognitive Science Society*, Amsterdam, Netherlands: Cognitive Science Society, Inc.

Ali, K., Leung, K., Könik, T., Choi, D., & Shapiro, D. (2009). Knowledge-directed theory revision. In *Proceedings of the Seventeenth International Conference on Inductive Logic Programming*, Leuven, Belgium: Springer-Verlag.

Li, N., Choi, D., & Langley, P. (2007). Adding goal priorities to teleoreactive logic programs. In *Proceedings of the International Symposium on Skill Science*, Tokyo, Japan.

Park, C. & Choi, D. (2007). Managing resources through parallel skill execution. In *Proceedings of the International Symposium on Skill Science*, Tokyo, Japan.

Choi, D., Könik, T., Nejati, N., Park, C., & Langley, P. (2007). Structural transfer of cognitive skills. In *Proceedings of the Eighth International Conference on Cognitive Modeling*, Ann Arbor, MI.

Choi, D., Morgan, M., Park, C., & Langley, P. (2007). A testbed for evaluation of architectures for physical agents. In *Proceedings of the AAAI-2007 Workshop on Evaluating Architectures for Intelligence*, Vancouver, BC: AAAI Press.

Choi, D., Könik, T., Nejati, N., Park, C., & Langley, P. (2007). A believable agent for first-person shooter games. In *Proceedings of the Third Annual Artificial Intelligence and Interactive Digital Entertainment Conference*, Stanford, CA: AAAI Press.

Langley, P. & Choi, D. (2006). A unified cognitive architecture for physical agents. In *Proceedings of the Twenty-First National Conference on Artificial Intelligence*, Boston: AAAI Press.

Choi, D. & Langley, P. (2005). Learning teleoreactive logic programs from problem solving. In *Proceedings of the Fifteenth International Conference on Inductive Logic Programming*, pp. 51-68, Bonn: Springer-Verlag.

Choi, D., Kaufman, M., Langley, P., Nejati, N., & Shapiro, D. (2004). An architecture for persistent reactive behavior. In *Proceedings of the Third International Joint Conference on Autonomous Agents and Multi Agent Systems*, pp. 988-995, New York: ACM Press.

Professional Service:

Organizing Committee Member: CogSci 2010 – 2013

Program Committee Member: AAAI 2012

Journal Reviewer: Machines (2013)

Computational Intelligence (2011)

Cognitive Systems Research (2011)

Artificial General Intelligence (2011)

Conference Reviewer: IROS 2013, ICAR 2013, Humanoids 2012, CogSci 2012

ICRA 2011, CogSci 2011, BRiMS 2010, and others

Session Chair: IROS 2009

Certifications and Languages:

Microsoft Certified Professional (MCP) (1997-)

Microsoft Certified Systems Engineer (MCSE) (1997-2001)

Korean (native), English (fluent), Japanese (limited)