Dongkyu Choi

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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:

2015-	Co-founder Powered Boomerang, LLC, Overland Park, KS
2012-	Assistant Professor Department of Aerospace Engineering, University of Kansas
2016, 2017	Summer Faculty Fellow Naval Research Laboratory, Washington, DC
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
1997-2000	Computer Systems Engineer / Bilingual Translator Korean Augmentation to the United States Army, Korea

Teaching Interests and Experience:

teaching interests	autonomy, cognitive/agent architectures cognitive robotics, unmanned aerial systems
Aircraft Dynamics:	Fall 2014, 2015, & 2016
Rule-based Control Systems:	Fall 2013 & 2017
Introduction to Robotics:	Spring 2014, 2015, & 2016
Computing for Engineers:	Fall/Spring 2012, 2013, & 2015; Spring 2014, 2016, 2017, & 2018

Research Interests and Project Experience:

Focus of research	autonomy, artificial intelligence cognitive architectures, cognitive robotics unmanned aerial systems

2017-2018 Architectures for Elaborative Goal Reasoning
Naval Research Laboratory [$70,000]

Dr. Dongkyu Choi is the primary investigator for this sole source contract. His research team interacts with the Navy Center for Applied Research on Artificial Intelligence to develop a complex goal reasoning capability in an intelligent architecture.

2012-2015 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:

Xu, W., Choi, D., & Wang, G. (in press). Direct Visual-Inertial Odometry with Semi-Dense Mapping. *Computers and Electrical Engineering*.

Choi, D., & Langley, P. (2018). Evolution of the ICARUS Cognitive Architecture. *Cognitive Systems Research*, *48*, 25 – 38.

Kim, E., & Choi, D. (2016). A UWB Positioning Network for Autonomous Landing of Unmanned Aircraft Systems. *Aerospace Science and Technology*.

Kim, E., & Choi, D. (2016). Planning of UWB Indoor Positioning Network Using Binary Integer Linear Programming. *International Journal of Ultra Wideband Communications and Systems*.

Kim, E. & Choi, D. (2015). A 3D Ad Hoc Localization System using Aerial Sensor Nodes. *Journal of IEEE – Sensors*, *15*, 3716 – 3723.

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

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

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

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

Recent Conference/Symposium Papers:

Choi, D., Langley, P., & To, S. T. (in press). Creating and Using Tools in a Hybrid Cognitive Architecture. In *Proceedings of the AAAI 2018 Spring Symposium on Integrating Representation, Reasoning, Learning, and Execution for Goal Directed Autonomy, Palo Alto, CA*.

Menager, D., Choi, D., Roberts, M., & Aha, D. W. (in press). Learning Planning Operators from Episodic Traces. In *Proceedings of the AAAI 2018 Spring Symposium on Integrating Representation, Reasoning, Learning, and Execution for Goal Directed Autonomy, Palo Alto, CA*.

Langley, P., Meadows, B., Sridharan, M., & Choi, D. (2017). Explainable Agency for Intelligent Autonomous Systems. In *Proceedings of the Twenty-Ninth Annual Conference on Innovative Applications of Artificial Intelligence*.

Menager, D., Choi, D., Floyd, M. W., Task, C., & Aha, D. W. (2017). Dynamic Goal Recognition using Windowed Action Sequences. In *Proceedings of the AAAI-2017 Workshop on Plan, Activity, and Intent Recognition*.

Xu, W., & Choi, D. (2016). Direct Visual-Inertial Odometry and Mapping for Unmanned Vehicle. *Lecture Notes in Computer Science*: *Proceedings of 12th International Symposium on Visual Computing*, Springer-Verlag.

Roberts, M., Hiatt, L. M., Coman, A., Choi, D., Johnson, B., & Aha, D. W. (2016). ActorSim: A Toolkit for Studying Cross-Disciplinary Challenges in

Autonomous Systems. In *Proceedings of the AAAI 2016 Fall Symposium on Cross-Disciplinary Challenges in Autonomous Systems, Arlington, VA*.

Menager, D. H., & Choi, D. (2016). A Robust Implementation of Episodic Memory in a Cognitive Architecture. *Proceedings of the 38th Annual Meeting of the Cognitive Science Society*, Philadelphia, PA.

Langley, P., Barley, M., Meadows, B., Choi, D., & Katz, E. P (2016). Goals, utilities, and mental simulation in continuous planning. *Proceedings of the Fourth Annual Conference on Cognitive Systems,* Evanston, IL.

Kim, J. & Choi, D. (2016). Design and Control of a Novel Tiltrotor Platform. In *Proceedings of AIAA Infotech @ Aerospace, AIAA Science and Technology Forum and Exposition*, San Diego, CA.

To, S. T., Langley, P., & Choi, D. (2015). A Unified Framework for Knowledge-Lean and Knowledge-Rich Planning. In *Proceedings of the Third Annual Conference on Advances in Cognitive Systems*, Atlanta, GA.

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 AAAI 2011 Fall Symposium on Advances in Cognitive Systems*, Arlington, VA: AAAI 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 AAAI-2010 Workshop on Goal-Directed Autonomy*, Atlanta, GA: AAAI 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.

* See http://www.dongkyu.com for papers published before 2009.

Professional Service:

Organizing Committee Member: CogSci 2010 – 2014
Senior Program Committee Member: AAAI 2018
Program Committee Member: AAAI 2012 & 2017; ACS 2013
Journal Reviewer: Artificial Intelligence (2013); Machines (2013); Computational Intelligence (2011); CSR (2011); AGI (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)