

Dongkyu Choi

Artificial Intelligence Initiative
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Education:

- Ph.D. (2010) Aeronautics and Astronautics, Stanford University, Stanford, 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, Stanford, CA, USA
- B.S. (2001) Aerospace Engineering, Seoul National University, Seoul, Korea

Professional Experience:

- 2019 – Senior Scientist
Agency for Science, Technology, and Research (A*STAR), Singapore
- 2015 – Co-founder
Powered Boomerang, LLC, Overland Park, KS, USA
- 2018 – 2019 Researcher
Center for Design Research, University of Kansas, Lawrence, KS, USA
- 2012 – 2019 Assistant Professor
Dept. of Aerospace Engineering, University of Kansas, Lawrence, KS, USA
- 2016, 2017 Summer Faculty Fellow
US Naval Research Laboratory, Washington, DC, USA
- 2009 – 2011 Visiting Research Specialist / Postdoctoral Research Associate
Dept. of Psychology, University of Illinois at Chicago, Chicago, IL, USA
- 2003 – 2009 Research Assistant
Computational Learning Laboratory, CSLI, Stanford University, CA, USA
- 2003 – 2009 Research Assistant
Institute for the Study of Learning and Expertise, Palo Alto, CA, USA
- 1997 – 2000 Computer Systems Engineer / Bilingual Translator
Korean Augmentation to the United States Army, Korea

Teaching Interests and Experience:

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| Topics of Interest: | autonomy, cognitive/agent architectures cognitive robotics, unmanned systems |
| Aircraft Dynamics: | Fall 2014 – 2016 |
| Introduction to Robotics: | Spring 2014 – 2018 |
| Rule-based Control Systems: | Fall 2013 & 2017 |
| Computing for Engineers: | 11 semesters during 2012 – 2018 |

Research Interests and Project Experience:

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|--------------------|---|
| Focus of Research: | autonomy, symbolic artificial intelligence, cognitive architectures cognitive robotics, unmanned aerial systems |
| 2019 – | Human-Robot Collaborative AI for Advanced Manufacturing and Engineering Science and Engineering Research Council, A*STAR [SG\$21,634,800] |
| 2017 – 2018 | Architectures for Elaborate Goal Reasoning US Naval Research Laboratory [PI; US\$70,000] |
| 2012 – 2015 | Autonomous Discovery of Object Properties: Robots That Create Simple Machines Office of Naval Research [Subcontract; US\$225,000] |
| 2012 – 2012 | Robotics Challenge: Cognitive Robot for General Missions Defense Advanced Research Projects Agency [PI; US\$371,503] |
| 2009 – 2011 | Adaptation by Learning from Error in ICARUS Office of Naval Research [US\$427,187] |
| 2008 – 2010 | Learning Task Knowledge for Cognitive Robots Korea Institute of Science and Technology [PI; ~US\$85,000] |
| 2005 – 2009 | Transfer Learning in Integrated Cognitive Systems Defense Advanced Research Projects Agency [US\$12,242,291] |
| 2003 – 2005 | New Research Directions in Integrated Cognitive Architectures National Science Foundation [US\$99,271] |

Journal Publications:

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

Xu, W., Choi, D., & Wang, G. (2018). Direct visual-inertial odometry with semi-dense mapping. *Computers & Electrical Engineering*, 67, 761 – 775.

Kim, E., & Choi, D. (2016). A UWB positioning network enabling unmanned aircraft systems auto land. *Aerospace Science and Technology*, 58, 418 – 426.

Kim, E., & Choi, D. (2016). Planning of UWB indoor positioning network using binary integer linear programming. *International Journal of Ultra Wideband Communications and Systems*, 3, 166 – 176.

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.

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, 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. (2018). 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*. Stanford, CA: AAAI Press.

Menager, D. H., Choi, D., Roberts, M., & Aha, D. W. (2018). 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*. Stanford, CA: AAAI Press.

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* (pp. 4762 – 4763). San Francisco: AAAI Press.

Menager, D. H., 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. In *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. In *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 AAI 2011 Fall Symposium on Advanced 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., & You, 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.

* For papers published before 2009, see <http://www.dongkyu.com/>.

Professional Service:

Program Co-chair: ACS 2018

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); Cognitive Systems Research (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)