Kate Fu

Assistant Professor
Industrial Design and Mechanical Engineering (joint)

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Dr. Kate Fu is an Assistant Professor with a joint appointment in the School of Industrial Design and the George W. Woodruff School of Mechanical Engineering. Her research focuses on early stage design processes, studying them from a cognitive perspective to inform the development of theory, methods, and tools to facilitate a more innovative, inspired, efficient design process. She also studies design research at a meta-level, working to understand how to improve the way we study, measure, and formalize design.

Teaching/Research

Assistant Professor, Georgia Institute of Technology, Atlanta, GA
November 2014 – Present

Postdoctoral Fellow, Massachusetts Institute of Technology, Cambridge, MA and Singapore University of Technology and Design, Singapore, Republic of Singapore
September 2012 – September 2014

Graduate Research Assistant, Carnegie Mellon University, Pittsburgh, PA
August 2007 – May 2012

Education

Ph.D. Mechanical Engineering, May 2012
Carnegie Mellon University, Pittsburgh, PA

Thesis:
Discovering and Exploring Structure in Design Databases and Its Role in Stimulating Design

Advisors:
Dr. Jonathan Cagan, Mechanical Engineering
Dr. Kenneth Kotovsky, Psychology

M.S. Mechanical Engineering, May 2009
Carnegie Mellon University, Pittsburgh, PA

B.S. Mechanical Engineering, May 2007
Brown University, Providence, RI

Professional Affiliations

American Society of Mechanical Engineers
The Design Society

Research

Selected Peer-Reviewed Archival Journal Publications

Fu, K., Murphy, J., Yang, M., Otto, K., Jensen, D., Wood, K.L., 2014, "Design-by-Analogy: Experimental Evaluation of a Functional Analogy Search Methodology for Concept Generation Improvement", Research in Engineering Design, DOI: 10.1007/s00163-014-0186-4.

Fu, K., Moreno, D., Yang, M. C., Wood, K. L., 2014, "Bio-Inspired Design: An Overview Investigating Open Questions from the Broader Field of Design-by-Analogy," Journal of Mechanical Design, Special Issue 2014: Biologically Inspired Design, 136(11), 111102, DOI: 10.1115/1.4028289

Murphy, J., **Fu, K.**, Otto, K., Yang, M., Jensen, D., Wood, K., 2014, "Function Based Design-by-Analogy: A Functional Vector Approach to Analogical Search," Journal of Mechanical Design, 136(10) 101102, DOI: 10.1115/1.4028093.

Fu, K., Chan, J., Schunn, C., Cagan, J., and Kotovsky, K., 2013, "Expert Representation of Design Repository Space: A Comparison to and Validation of Algorithmic Output," Design Studies, 34(6), 729-762, DOI: 10.1016/j.destud.2013.06.002.

Fu, K., Cagan, J., Kotovsky, K., and Wood, K., 2013, "Discovering Structure In Design Databases Through Functional And Surface Based Mapping," J. of Mech. Des., 135 (3), 031006.

Fu, K., Chan, J., Cagan, J., Kotovsky, K., Schunn, C., and Wood, K., 2013, "The Meaning of "Near" and "Far": The Impact of Structuring Design Databases and the Effect of Distance of Analogy on Design Output," J. of Mech. Des., 135 (2), 021007.

Chan, J., **Fu, K.**, Schunn, C., Cagan, J., Wood, K., and Kotovsky, K., 2011, "On the Benefits and Pitfalls of Analogies for Innovative Design: Ideation Performance Based on Analogical Distance, Commonness, and Modality of Examples," J. of Mech. Des., 133 (8), 081004.

Fu, K., Cagan, J., and Kotovsky, K., 2010, "Design Team Convergence: The Influence of Example Solution Quality," J. of Mech. Des., 132 (11), 111005.

Linsey, J.S., Tseng, I., **Fu, K.**, Cagan, J., Wood, K. L., and Schunn, C. D., 2010, "A Study of Design Fixation, Its Mitigation and Perception in Design Faculty," J. of Mech. Des., 132 (4), 041003.

Selected Peer-Reviewed Conference Publications

Fu, K., Yang, M., Wood, K.L., 2015, "Design Principles: The foundation of Design", Proceedings of the ASME 2015 International Design Engineering Technical Conferences

& Computers and Information in Engineering Conference, August 2-5, 2015, Boston, MA.

Fu, K., Tan, U., Teo, T. H., Soh, G. S., Wood, K. L., "Interdisciplinary Learning Through Design Activities Uniting Fundamentals of Engineering Curriculum", Proceedings of the International Conference on Engineering Design, July 27-30, 2015, Milan, Italy.

Murphy, J., **Fu, K.**, Otto, K., Yang, M., Jensen, D., Wood, K.L., 2014, "Facilitating Design-by-Analogy: Development of a Complete Functional Vocabulary and Functional Vector Approach to Analogical Search", Proceedings of the ASME 2014 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, August 17-20, 2014, Buffalo, NY.

Fu, K., Murphy, J., Yang, M., Otto, K., Jensen, D., Wood, K.L., 2013, "Investigating the Effect of Functionality Level of Analogical Stimulation on Design Outcomes", Proceedings of The 13th Design Engineering Workshop, November 28 - 30, 2013, Kitakyushu, Fukuoka, Japan.

Fu, K., Reid, T.N., Terpenny, J.P., Thurston, D.L., Vance, J.M., Finger, S., Wiens, G.J., Kazerounian, K., Allen, J.K., Jacobson, K., 2013, "Ac 2013 - 6781: Broadening Participation: A Report On A Series Of Workshops Aimed At Building Community And Increasing The Number Of Women And Minorities In Engineering Design," Proceedings of the ASEE Annual Conference, June 23-26, Atlanta, Georgia.

Fu, K., Chan, J., Schunn, C., Cagan, J., Kotovsky, K., 2013," Substantiating the Basis for an Automated Design-by-Analogy Tool through Comparison to Expert Thinking," Proceedings of the ASME 2013 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, August 4-7, 2013, Portland, Oregon.

Fu, K., Dilmore, J., Cagan, J., Dougherty Jr., C.H., 2013, "Using Design Database Structures to Characterize Freedom-to-operate in a Design Space: A Legal Case Study," Proceedings of the International Conference on Engineering Design, August 19-22, 2013, Seoul, South Korea.

Fu, K., Chan, J., Cagan, J., Kotovsky, K., Schunn, C., and Wood, K., 2012, "The Meaning of "Near" and "Far": The Impact of Structuring Design Databases and the Effect of Distance of Analogy on Design Output," Proceedings of the ASME Design Theory and Methodology Conference, Chicago, IL.

Wood, M., Chen, P., **Fu, K.**, Cagan, J., and Kotovsky, K., 2012, "The Role of Design Team Structure on Individual and Shared Mental Models," Proceedings of the Conference on Design Computing and Cognition, College Station, TX.

Chan, J., **Fu, K.**, Schunn, C., Cagan, J., Wood, K., and Kotovsky, K., 2011, "On the Benefits and Pitfalls of Analogies for Innovative Design: Ideation Performance Based on Analogical Distance, Commonness, and Modality of Examples," Proceedings of the 2011 International Conference on Engineering Design, Copenhagen, Denmark.

Fu, K., Cagan, J., Kotovsky, K., 2011, "A Methodology for Discovering Structure in Design Databases," Proceedings of the 2011 International Conference on Engineering Design, Copenhagen, Denmark.

Fu, K., Cagan, J., Kotovsky, K., and Wood, K., 2011, "Discovering Structure In Design Databases Through Functional And Surface Based Mapping," Proceedings of the ASME Design Theory and Methodology Conference, Washington, D.C.

Fu, K., Cagan, J., and Kotovsky, K., 2009, "Design Team Convergence: The Influence of Example Solution Quality," Proceedings of the ASME Design Theory and Methodology Conference, San Diego, CA.

Linsey, J.S., Tseng, I., **Fu, K.**, Cagan, J., and Wood, K. L., 2009, "Reducing and Perceiving Design Fixation: Initial Results from an NSF-Sponsored Workshop," Proceedings of the 2009 International Conference on Engineering Design, Stanford, CA.

Selected Awards

Reviewer's Favourite Award, 2013 International Conference on Engineering Design (ICED), Fu, K., Dilmore, J., Cagan, J., Dougherty Jr., C.H., 2013, "Using Design Database Structures to Characterize Freedom-to-operate in a Design Space: A Legal Case Study"

Best Paper Award, 2012 ASME Design Theory and Methodology (DTM) Conference, Fu, K., Chan, J., Cagan, J., Kotovsky, K., Schunn, C., and Wood, K., 2012, "The Meaning of "Near" and "Far": The Impact of Structuring Design Databases and the Effect of Distance of Analogy on Design Output"

Best Design Cognition Paper Prize, Conference on Design Computing and Cognition 2012, "The Role of Design Team Structure on Individual and Shared Mental Models"

John and Claire Bertucci Graduate Fellowship, 2010-2011

ARCS Foundation Scholar, Lawrence J. Rhoades Memorial Award, 2007-2008, 2008-2009, 2009-2010

Teaching

Courses Taught

Georgia Institute of Technology, Atlanta, GA – Undergraduate Courses

- ME1770 - Introduction to Engineering Graphics and Visualization, Spring semester, 2015

Singapore University of Technology and Design, Singapore – Undergraduate Courses

- **3.007 -** Introduction to Design, Fall semester, 2013

Carnegie Mellon University, Pittsburgh, PA – Undergraduate Courses

- Integrated Product Development (IPD), Spring semester, 2009