

# CHRISTOPHER HOYLE, PH.D.

Associate Professor  
School of Mechanical, Industrial, and Manufacturing Engineering (MIME)  
Oregon State University

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## AREAS OF RESEARCH INTEREST

My research interests are focused upon decision making in engineering design, with emphasis on the early design phase when uncertainty is high and the design space is large. My areas of expertise are uncertainty quantification methodologies, non-linear optimization, design automation and Bayesian statistics and optimization.

## ACADEMIC PREPARATION

**Northwestern University**, Evanston, IL, December 2009

PhD Mechanical Engineering

- Dissertation Advisor: Prof. Wei Chen
- Dissertation: *Configuring Engineering Systems Considering Consumer Heterogeneity*

**Purdue University**, West Lafayette, IN, May 1994

MS Mechanical Engineering

- Thesis Advisor: Prof. Karthik Ramani
- Thesis: *Manufacture of Thermoplastic Composites*

**University of Illinois**, Urbana-Champaign, IL, June 1988

BS General Engineering

## POSITIONS HELD

**Oregon State University (OSU)**, Corvallis, OR **9/2017-Present**

Associate Professor (Design Area)

Research and teaching in design methodology and design optimization.

**Simon Fraser University**, Vancouver, BC, Canada **2/2019-5-2019**

Visiting Faculty (Mechatronics Area)

Research in design methodology and design optimization.

**NSF I/UCRC Center for eDesign**, Corvallis, OR **3/2017-3/2021**

OSU site Co-Director

Served as site co-director responsible for reporting and project administration.

**Oregon State University (OSU)**, Corvallis, OR **9/2011-9/2017**

Assistant Professor (Design Area)

Research and teaching in design methodology and design optimization.

**Oregon State University (OSU)**, Corvallis, OR **12/2010-9/2011**

Postdoctoral Researcher

DARPA funded joint research project to research methods of design verification for the early design phase of cyber-physical systems.

**Zilliant, Inc.**, Austin, TX **2/2010-11/2010**

Senior Pricing Scientist

Estimate demand models and perform optimization, using customer-supplied transaction data, to find target prices for business-to-business pricing problems.

**Illinois Institute of Technology (IIT), Chicago, IL**

**8/2009-12/2009**

Adjunct Professor of Mechanical, Materials, and Aerospace Engineering

Taught a course for undergraduate/graduate students covering the fundamentals of Computer Aided Design, Manufacturing, and Engineering.

**NASA Ames Research Center, Mountain View, CA.**

**6/2006 – 9/2006**

Summer Research Intern

Developed an optimization-based design tool to make decisions during conceptual design regarding the allocation of Integrated Systems Health Management (ISHM) in an aerospace system.

**Motorola, Inc., Deer Park, IL.**

**5/1994 – 3/2004**

Program Manager

Created a transmission control module concept and quotation proposal for a major automotive client, resulting in the largest business contract award in the history of the Motorola Automotive Group.

Mechanical Engineering Manager

Responsible for a department of eight mechanical engineers. Led the development of mechanical packaging for electronic controllers to survive in the most severe automotive environments.

Mechanical Engineering Group Leader

Managed a team of Mechanical Engineers developing mechanical packaging for automotive pressure sensors.

Mechanical Engineer

Designed several manifold pressure sensors and cost reduced existing sensor designs.

**ITW Deltar, Frankfort, IL.**

**9/1989 – 12/1991**

Project Engineer

Designed injection molded components for automotive original equipment manufacturers.

## **FUNDING**

### Full Proposals

- DARPA-Meta-X (Subaward to Vanderbilt DARPA: Contract VU-DSR-21806-S5): Probabilistic Requirements Verification through Uncertainty Propagation, Phase I. PI: I. Y. Tumer, CoPI: **C. Hoyle**. Oct 2011-Dec 2011.
- DARPA-Meta-X (Subaward to Vanderbilt DARPA: Contract VU-DSR-21806-S5): Probabilistic Requirements Verification through Uncertainty Propagation, Phase II. PI: I. Y. Tumer, CoPI: **C. Hoyle**. Jan 2012-Sept 2012.
- DARPA-Meta-X (Subaward to Vanderbilt DARPA: Contract VU-DSR-21806-S5): Probabilistic Requirements Verification through Uncertainty Propagation, Phase III. PI: I. Y. Tumer, CoPI: **C. Hoyle**. Sept 2012-Dec 2012.
- DARPA-Meta-X (Subaward to Vanderbilt DARPA: Contract VU-DSR-21806-S5): Probabilistic Requirements Verification through Uncertainty Propagation, Phase IV. PI: I. Y. Tumer, CoPI: **C. Hoyle**. Jan 2013-March 2014.
- Bonneville Power Administration: TIP 258: Development of a State-of-the-Art Computational Framework and Platform for the Optimal Control of Multi-Reservoir Systems under Uncertainty. PI: A. Leon, CoPI: **C. Hoyle** and N. Gibson. Oct 2012-Sept 2015.
- National Energy Technology Laboratory: Toward the Optimization of Collaborative Energy Supply Systems Influenced by the Analysis of Oregon Power Generation and Consumption, PI: B. DuPont, CoPI: **C. Hoyle**, E. Cotilla-Sanchez. Nov 2013-Nov 2014.

- SBIR (Adventium Labs): Reliability-Based Multidisciplinary Design Analysis and Optimization (RB-MDAO). PI: **C. Hoyle**, June 2014-Dec 2014.
- National Science Foundation: EAGER: A Control-Theoretic Approach for Designing Robust Complex Engineered Systems. PI: **C. Hoyle**. Oct 2013-Oct 2014.
- NSF CMMI: Collaborative Research: Safety-Informed Design of Complex Engineering Systems, Aug 2014- Aug 2016, PI: I. Y. Tumer, Co-PI: **C. Hoyle**, David Jensen.
- NSF CMMI: The Science of Designing Dependable & Adaptable Engineering Systems, Aug 2014-Aug 2016, PI: I. Y. Tumer, Co-PI: **C. Hoyle**, K. Tumer.
- DoD DMDII: Automated Assembly Planning: From CAD model to Virtual Assembly Process. PI: M. Campbell, CoPI: **C. Hoyle**. Jun 2015-Dec 2016.
- Bonneville Power Administration: TIP 258: Development of a State-of-the-Art Computational Framework and Platform for the Optimal Control of Multi-Reservoir Systems under Uncertainty. PI: A. Leon, CoPI: **C. Hoyle** and others. Oct 2015-Oct 2018.
- DOE NEUP: Model Calibration-based Design Methodologies for Structural Design of Supercritical CO<sub>2</sub> Compact Heat Exchangers under Sustained Cyclic Temperature and Pressure Gradients. PI: **C. Hoyle**, CoPI: R. Malhotra, B. Paul. Oct 2016-Oct 2019.
- Office of Naval Research: Large-Scale Hybrid Polymetal Manufacturing Using Graded and Tailored Alloys. PI: B. Paul, CoPI: **C. Hoyle** and others. Sept 2020 – Sept 2022.

#### I/UCRC Center for eDesign Projects

- OregonBest-Lucid Energy: A Tool to Estimate the Electrical Energy Generated from Turbines Inserted in Fresh Water Pipes, Oct 2014- Oct 2016, PI: **C. Hoyle**, CoPI: K. Niemeyer.
- NASA JPL: Failure-Resilient Design of Complex Systems Under Uncertainty, March 2016- March 2017, PI: **C. Hoyle**.
- NASA Ames: Autonomy in Aviation, Aug 2015- Aug 2016, PI: R. Stone, CoPI: **C. Hoyle**.
- NASA Ames: Resilient Design Methodology to Support On-Demand Mobility, Sept 2018- Sept 2020, PI: **C. Hoyle**.
- SGT, Inc.: Resilient Design Methodology to Support On-Demand Mobility, Sept 2018- Sept 2019, PI: **C. Hoyle**.

#### Short Proposals

- COB/COE Collaborative Seed Fund: Effectuation in New Product Development and Design: Driving Radical and Disruptive Innovation. PI: T. Moss (COB) and **C. Hoyle**, Funded by Oregon State University, July 2102.
- COB/COE Collaborative Seed Fund: Mapping User Requirements to Design Alternatives: the Whole Nine Yards. PI: **C. Hoyle** and B. Zhu (COB), Funded by Oregon State University, Jan 2102.

#### TEACHING

- OSU: Introduction to Design ME 382, 4 cr.
- OSU: Capstone Design ME 497, 4 cr.
- OSU: Capstone Design ME 498, 4 cr.
- OSU: Optimization in Design ME 517, 4 cr.
- OSU: Design Automation ME 617, 4 cr.
- OSU: Design Under Uncertainty ME 615, 4 cr.
- OSU: Bio-inspired Design ME 513, 4 cr.
- IIT: CAD/CAM/CAE Introduction, Fall 2009.
- NU: CAD for Engineering Design and Innovation M.S. Boot Camp, Fall 2008.

#### SERVICE:

## UNIVERSITY

- NSF IU/CRC Center for eDesign site co-director. 2017 – 2021.
- ASME Student Chapter Faculty Advisor. 2012-present
- Mechanical Engineering Undergraduate Program Committee: 2011-2018
- Mechanical Engineering Graduate Program Committee: 2018 - present

## TECHNICAL CONFERENCE

### *Technical Committee Participation*

- *Overall Technical Committee Chair (2015-16), Program Chair (2014-15) and Technical Secretary (2012-14), Systems Engineering & Information and Knowledge Management (SEIKM) Technical Committee.*
- *Session Chair*
  - ASME Computers in Engineering Conferences (CIE), Systems Engineering & Information and Knowledge Management (SEIKM), 2012-present
  - ASME International Design Engineering Technical Conferences, *Platform Architecture and Product Family Design Special Session (DAC)*, 2013-present
  - ASME International Design Engineering Technical Conferences, *Simulation-Based Design Under Uncertainty (DAC)*, 2016
  - ASME International Mechanical Engineering Congress & Exposition (IMECE), *Systems and Complexity*, 2016

### *Review Coordinator (2011-present)*

- ASME International Design Engineering Technical Conferences: Design Theory and Methodology Conference (DTM)
- ASME International Design Engineering Technical Conferences: Design Automation Conference (DAC)
- ASME Computers in Engineering Conferences, Systems Engineering & Information and Knowledge Management (SEIKM)
- ASME International Mechanical Engineering Congress & Exposition (IMECE)

## OTHER

- *Associate Editor:* Journal of Mechanical Design, Fall 2019-present
- *Invited Reviewer,* NSF Grant Review Panel, NSF CMMI, Spring 2016, 2017, 2019
- *Journal Reviewer:*
  - ASME Journal of Mechanical Design
  - Engineering Optimization
  - Journal of Engineering Design
  - Structural and Multidisciplinary Optimization
  - IMechE Journal of Engineering Manufacture
  - AI EDAM
  - Journal of Aerospace Information Systems
- *Conference Reviewer:*
  - ASME International Design Theory and Methodology Conferences
  - ASME Design Automation Conference
  - ASME Computers in Engineering Conferences
  - ASME International Mechanical Engineering Congress & Exposition

## HONORS AND AWARDS

- Walter P. Murphy Fellowship, Northwestern University: 2005-2006
- Altair Corporation Fellowship: 2008
- Arthur Hitsman Faculty Scholar, Oregon State University, 2011-present.

- Faculty Advisor for the 2016-2022 ASME student chapter *Shell EcoMarathon* competition: the team won 2<sup>nd</sup> place in the Battery/prototype vehicle class (in their inaugural year).
- ASME faculty advisor and senior capstone advisor for the Shell EcoMarathon team winning the 2016 Boeing Engineering Excellence Award at the 2016 OSU Engineering Expo

### **STUDENTS SUPERVISED:**

#### *PhD Students:*

- Vignesh Bhaskaran (current)
- Arpan Biswas, PhD Student (Graduated 2020)
- Daniel Hulse, PhD Student (Graduated 2020)
- Elham Keshavarzi, PhD Student (Graduated 2018)
- Trung Pham, PhD Student (Graduated 2019)
- Weifeng Huang (co-advised with Matt Campbell), PhD Student (Graduated 2017)
- Matthew McIntire, PhD Student (Start Date: Graduated 2016)
- Hoda Mehrpouyan (co-advised with Irem Tumer), PhD Student (Graduated: 2014)
- Joseph Piacenza (co-advised with Irem Tumer), PhD Student (Graduated: 2014)

#### *MS Students:*

- Akash Kolte, MS Student (current)
- Cole Jetton, MS Student (current)
- Daniel Hulse (Graduated: 2017)
- Arpan Biswas, MS Student (Graduated: 2017)
- Danielle Jackson, MS Student (Graduated: 2016)
- Yue Liu, MS Student (Graduated: Winter 16)
- John Fields, MS Student (Graduated: Fall 13)
- Prasad Edekar, MS Student (Graduated: Summer 13)

### **PUBLICATIONS**

#### *Book:*

1. Chen, W., Hoyle, C., Wassenaar, H.J., *Decision-Based Design: Integrating Consumer Preferences into Engineering Design*, 2013, Springer-Verlag London Ltd. (Organized the material for the entire book and wrote 6/12 chapters)
2. Book Chapter, Flumerfelt, S., Alves, A., Calvo-Amodio, J., Hoyle, C. and Kahlen, F-J., “Managing Systems Complexity Through Congruence” to appear in *Trans-Disciplinary Perspectives on System Complexity*, Springer-Verlag London Ltd, 2016. (minor contributor)

#### *Journal Publications:*

1. Biswas, A., Fuentes, C., and Hoyle, C. (2022). "A Nested Weighted Tchebycheff Multi-Objective Bayesian Optimization Approach for Flexibility of Unknown Utopia Estimation in Expensive Black-box Design Problems." *ASME. J. Comput. Inf. Sci. Eng.*
2. Biswas, A., Fuentes, C., & Hoyle, C. (2021). A Multi-Objective Bayesian Optimization Approach Using the Weighted Tchebycheff Method. *Journal of Mechanical Design*, 144(1), 011703.
3. Chen, Y., Gibson, N., Biswas, A., Li, A., Bashiri, H., Sharifi, E., Fuentes, C., Hoyle, C., Leon, A.S. and Skypeck, C.J., (2021). Valuation of operational flexibility: A case study of Bonneville power administration. *Energy Economics*, 98, p.105251.
4. Hulse, D., Biswas, A., Hoyle, C., Tumer, I. Y., Kulkarni, C., & Goebel, K. (2021). Exploring Architectures for Integrated Resilience Optimization. *Journal of Aerospace Information Systems*, 1-14.
5. Hulse, D., Walsh, H., Dong, A., Hoyle, C., Tumer, I., Kulkarni, C., & Goebel, K. (2021). fmdtools: A Fault Propagation Toolkit for Resilience Assessment in Early Design. *International Journal of Prognostics and Health Management*, 12(3).

6. Biswas, A. and Hoyle, C. (2021). An Approach to Bayesian Optimization for Design Feasibility Check on Discontinuous Black-Box Functions. *Journal of Mechanical Design*, Jan 12, 1-26.
7. Hulse, D., Hoyle, C., Tumer, I. Y., and Goebel, K. (2021). How Uncertain Is Too Uncertain? Validity Tests for Early Resilient and Risk-Based Design Processes. *Journal of Mechanical Design*, 143(1), 011702.
8. Biswas, A., Chen, Y., Gibson, N., and Hoyle, C. (2020). "Bi-Level Flexible-Robust Optimization for Energy Allocation Problems." *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems Part B: Mechanical Engineering*, DOI: <https://doi.org/10.1115/1.4046269>
9. O'Halloran, B. M., Hoyle, C., Tumer, I. Y., & Stone, R. B. (2019). "The early design reliability prediction method." *Research in Engineering Design*, 30(4), 489-508.
10. Piacenza, J. R., Faller, K. J., Bozorgirad, M. A., Cotilla-Sanchez, E., Hoyle, C., & Tumer, I. (2019). "Understanding the Impact of Decision Making on Robustness During Complex System Design: More Resilient Power Systems." *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems Part B: Mechanical Engineering*.
11. Hulse, D., Hoyle, C., Goebel, K., & Tumer, I. Y. (2019)." Quantifying the Resilience-Informed Scenario Cost Sum: A Value-Driven Design Approach for Functional Hazard Assessment." *Journal of Mechanical Design*, 141(2), 021403.
12. Hulse, D., Tumer, K., Hoyle, C., & Tumer, I. (2019). "Modeling multidisciplinary design with multiagent learning." *AI EDAM*, 33(1), 85-99.
13. Zurita, N. F. S., Colby, M. K., Tumer, I. Y., Hoyle, C., & Tumer, K. (2018). "Design of Complex Engineered Systems Using Multi-Agent Coordination." *Journal of Computing and Information Science in Engineering*, 18(1), 011003.
14. Piacenza, J. R., Proper, S., Bozorgirad, M. A., Hoyle, C., & Tumer, I. Y. (2017). "Robust Topology Design of Complex Infrastructure Systems." *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering*, 3(2), 021006.
15. Keshavarzi, E., McIntire, M., & Hoyle, C. (2017). "A dynamic design approach using the Kalman filter for uncertainty management." *AI EDAM*, 31(2), 161-172.
16. Mehrpouyan, H., Giannakopoulou, D., Brat, G., Tumer, I. Y., & Hoyle, C. (2016). "Complex Engineered Systems Design Verification Based on Assume-Guarantee Reasoning." *Systems Engineering*, 19(6), 461-476.
17. Mehrpouyan, H., Giannakopoulou, D., Brat, G., Tumer, I.Y., and Hoyle, C., "Towards A Framework for Resilient Design of Complex Engineered Systems," *Research in Engineering Design*. Accepted with revision, 2016.
18. McIntire, M. G., Hoyle, C., Tumer, I. Y., & Jensen, D. C. (2016). "Safety-informed design: Using subgraph analysis to elicit hazardous emergent failure behavior in complex systems." *AI EDAM*, 30(4), 466-473.
19. DuPont, B., Azam, R., Proper, S., Cotilla-Sanchez, E., Hoyle, C., Piacenza, J., Oryshchyn, D., Zitney, S., and Bossart, S., "An Optimization Framework for Decision Making in Large, Collaborative Energy Supply Systems," *Journal of Energy Resources Technology*, 138(5), 051601, 2016. (minor contributor)
20. Mehrpouyan, H., Haley, B., Dong, A., Hoyle, C., Tumer, I., "Resiliency Analysis for Complex Engineered System Design," *AI EDAM Special Issue on the Design of Complex Engineering Systems*, 29(1), pp 93-108, 2015. (key contributor)
21. Jensen, D., Bello, O., Hoyle, C., Tumer, I., "Reasoning about Emergent System Failure Behavior Using Large Sets of Qualitative Function-Based Simulation Data," *AI EDAM Special Issue on the Design of Complex Engineering Systems*, 28(4), pp 385-398, 2014. (minor contributor)

22. Yannou, B., Yvars, P.A., Hoyle, C., Chen, W., “Set-Based Design by Simulation of Usage Scenario Coverage”, *Journal of Engineering Design*, 24(8), 575-603, 2013. (key contributor)
23. Van Bossuyt, D., Hoyle, C., Tumer, I., Dong, A., “Considering Risk Attitude Using Utility Theory in Risk-Based Design,” *AI EDAM Special Issue on Intelligent Decision Support and Modelling*, Vol. 26, No. 4, 2012. (key contributor)
24. He, L., Chen, W., Hoyle, C., Yannou, B., “Choice Modeling for Usage Context-Based Design,” *Journal of Mechanical Design*, Vol. 134, No. 3, 2012. (key contributor)
25. He, L., Hoyle, C., Chen, W., “Examination of Customer Satisfaction Surveys in Choice Modelling to Support Engineering Design”, *Journal of Engineering Design*, Vol. 22, No. 10, 2011. (key contributor)
26. Hoyle, C., Chen, W., and Wang, N., “Understanding and Modeling Heterogeneity of Human Preferences for Engineering Design”, *Journal of Engineering Design*, Vol. 22, No.8, 2011. (primary author)
27. Hoyle, C., Chen, W., Wang, N., Koppelman, F., “Integrated Bayesian Hierarchical Choice Modeling Approach to Capture Heterogeneous Consumer Preferences in Engineering Design”, *Journal of Mechanical Design*, Vol. 132, No. 12, 2010. (primary author)
28. Hoyle, C., Chen, W., Ankenman, B., Wang, N., “Optimal Experimental Design of Human Appraisals for Modeling Consumer Preferences in Engineering Design”, *Journal of Mechanical Design*, Vol. 131, No. 7, 2009. (primary author)
29. Hoyle, C., Tumer, I., Mehr, A., Chen, W., “Health Management Allocation during Conceptual System Design”, *Journal of Computing & Information Science in Engineering*, Vol. 9, No. 2, 2009. (primary author)
30. Hoyle, C. and Chen, W., “Product Attribute Function Deployment (PAFD) for Decision-Based Conceptual Design”, *IEEE Transactions on Engineering Management*, Vol. 56, No. 2, 2009. (primary author)
31. Kumar, D., Hoyle, C., Chen, W., Wang, N., Gomez-Levi, G., Koppelman, F., “A Hierarchical Choice Modeling Approach for Incorporating Customer Preferences and Market Trends in Engineering Design”, *International Journal of Product Development*, Vol. 8, No. 3, 2009. (key contributor)
32. Ramani, K. and Hoyle, C., “Processing of Thermoplastic Composites Using a Powder Slurry Technique. I. Impregnation and Preheating,” *Materials and Manufacturing Processes*, Vol. 10, No. 6, pp. 1169-1182, 1995. (primary author)
33. Ramani, K. and Hoyle, C., “Processing of Thermoplastic Composites Using a Powder Slurry Technique. II. Coating and Consolidation,” *Materials and Manufacturing Processes*, Vol. 10, No. 6, pp. 1183-1200, 1995. (primary author)
34. Ramani, K., Borgoankar, H., Hoyle, C., “Experiments on Compression Molding and Pultrusion of Thermoplastic Powder Impregnated Towpregs,” *Composites Manufacturing*, Vol. 6, No. 1, pp. 35-43, 1995. (minor contributor)

Conference Publications (Peer Reviewed):

1. Hulse, D., Zhang, H., & Hoyle, C. (2021). Understanding Resilience Optimization Architectures With an Optimization Problem Repository. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*.
2. Ferrero, V., Hoyle, C., & DuPont, B. (2021). A Probabilistic Approach for Estimating the Environmental Impact of Novel Product Concepts. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*.
3. Biswas, A., Fuentes, C., & Hoyle, C. (2020). An Approach to Bayesian Optimization in Optimizing Weighted Tchebycheff Multi-Objective Black-Box Functions. In *ASME International Mechanical*

*Engineering Congress and Exposition.*

4. Hulse, D., Hoyle, C., Tumer, I. Y., Goebel, K., & Kulkarni, C. (2020). Temporal Fault Injection Considerations in Resilience Quantification. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*
5. Hulse, D., Hoyle, C., Goebel, K., & Tumer, I. (2019). Using Value Assessment to Drive PHM System Development in Early Design. In *Proceedings of the Annual Conference of the PHM Society* (Vol. 11, No. 1).
6. Hulse, D., Hoyle, C., & Tumer, I. (2019). Ethics and Strategy in Decision-Based Design Frameworks: Problems and Solutions. In *Proceedings of the Design Society: International Conference on Engineering Design* (Vol. 1, No. 1, pp. 3301-3310). Cambridge University Press.
7. Biswas, A., Hoyle, C. A Literature Review: Solving Constrained Non-Linear Bi-Level Optimization Problems With Classical Methods. (2019) In *ASME 2019 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. American Society of Mechanical Engineers Digital Collection.
8. Hulse, D., Hoyle, C., Tumer, I. Y., & Goebel, K. (2019) Decomposing Incentives for Early Resilient Design: Method and Validation. In *ASME 2019 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. American Society of Mechanical Engineers Digital Collection.
9. Keshavarzi, E., Goebel, K., Tumer, I. Y., & Hoyle, C. (2018). Model Validation in Early Phase of Designing Complex Engineered Systems. In *ASME 2018 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. American Society of Mechanical Engineers Digital Collection.
10. Hulse, D., Tumer, K., Hoyle, C., & Tumer, I. (2018). Modeling Collaboration in Parameter Design Using Multiagent Learning. In *International Conference on Design Computing and Cognition* (pp. 577-593). Springer, Cham.
11. Biswas, A., Chen, Y., & Hoyle, C. (2018). A Bi-Level Optimization Approach for Energy Allocation Problems. In *ASME 2018 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. American Society of Mechanical Engineers Digital Collection.
12. Hulse, D., Hoyle, C., Goebel, K., & Tumer, I. Y. (2018). Optimizing function-based fault propagation model resilience using expected cost scoring. In *ASME 2018 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. American Society of Mechanical Engineers Digital Collection.
13. Huang, W., Rafibakhsh, N., Campbell, M. I., & Hoyle, C. (2017). Product Based Sequence Evaluation for Automated Assembly Planning. In *ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers.
14. Biswas, A., Chen, Y., & Hoyle, C. (2017). An Approach to Flexible-Robust Optimization of Large-Scale Systems. In *ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers.
15. Keshavarzi, E., McIntire, M., Goebel, K., Tumer, I. Y., & Hoyle, C. (2017). Resilient System Design Using Cost-Risk Analysis with Functional Models. In *ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers.
16. Hulse, D., Gigous, B., Tumer, K., Hoyle, C., & Tumer, I. Y. (2017). Towards a Distributed Multiagent Learning-Based Design Optimization Method. In *ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society



of Mechanical Engineers.

17. Huang, W., Rafibakhsh, N., Hoyle, C., & Campbell, M. I. (2017). Automated Assembly Stability Evaluation by Theoretical and Physics Simulation Methods. *In ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers.
18. Liu, Y., Huang, W., Rafibakhsh, N., Campbell, M., Hoyle, C., “Design of Experiments to Support Automated Assembly Planning,” *Proc. ASME 2016 International Mechanical Engineering Congress and Exposition*, American Society of Mechanical Engineers, 2016. (key contributor)
19. McIntire, M. G., Keshavarzi, E., Hoyle, C., Tumer, I. Y., “Functional Models with Inherent Behavior: Towards a Framework for Safety Analysis Early in the Design of Complex Systems,” *Proc. ASME 2016 International Mechanical Engineering Congress and Exposition*, American Society of Mechanical Engineers, 2016. (key contributor)
20. Pham, T., Hoyle, C., Zhang, Y., Nguyen, T., “Topology Optimization of Hyperelastic Continua” *Proc. ASME 2016 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers. (key contributor)
21. Soria, N. F., Colby, M., Tumer, I. Y., Hoyle, C., and Tumer, K., “Design of Complex Engineering Systems Using Multiagent Coordination,” *Proc. ASME 2016 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers. (minor contributor)
22. Hunter, S., Jensen, D. C., Tumer, I. Y., and Hoyle, C., “The Impact of Abstraction and Fidelity Levels on the Usefulness of Early System Functional Models,” *Proc. ASME 2016 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers. (minor contributor)
23. Tumer, I. Y., Hoyle, C., Jensen, D. C., and Hunter, S., “Validating model-based design simulation: The impact of abstraction and fidelity levels,” *2015 International Conference on Complex Systems Engineering (ICCSE)*, IEEE, pp. 1-6, 2015. (minor contributor)
24. Piacenza, J. R., Proper, S., Bozorgirad, M. A., Tumer, I. Y., and Hoyle, C., “Robust Topology Design of Complex Infrastructure Systems,” *Proc. ASME 2015 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers, pp. V01BT02A040-V001BT002A040, 2015. (key contributor)
25. Piacenza, J. R., Fields, J. J., Hoyle, C., and Tumer, I. Y., 2015, “Quantification of Indoor Environmental Quality in Sustainable Building Designs using Structural Equation Modeling,” *DS 80-1 Proceedings of the 20th International Conference on Engineering Design (ICED 15) Vol 1: Design for Life*, Milan, Italy, pp. 053-064, 2015. (key contributor)
26. McIntire, M. G., Hoyle, C., Tumer, I. Y., and Jensen, D. C., “Safety-Informed Design: Using Cluster Analysis to Elicit Hazardous Emergent Failure Behavior in Complex Systems,” *Proc. ASME 2015 International Mechanical Engineering Congress and Exposition*, American Society of Mechanical Engineers, pp. V011T014A043-V011T014A043, 2015. (key contributor)
27. Manion, C., Soria, N. F., Tumer, K., Hoyle, C., and Tumer, I. Y., “Designing a Self-Replicating Robotic Manufacturing Factory,” *Proc. ASME 2015 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers, pp. V01BT02A045-V001BT002A045, 2015. (minor contributor)
28. Keshavarzi, E., McIntire, M., and Hoyle, C., “Dynamic Design Using the Kalman Filter for Flexible Systems with Epistemic Uncertainty,” *Proc. ASME 2015 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers, pp. V02BT03A019-V002BT003A019, 2015. (key contributor)
29. DuPont, B., Azam, R., Proper, S., Cotilla-Sanchez, E., Hoyle, C., Piacenza, J., Oryshchyn, D., Zitney,

- S., and Bossart, S., "Decision Making for the Collaborative Energy Supply System of Oregon and Washington," *Proc. ASME 2015 Power Conference collocated with the ASME 2015 9th International Conference on Energy Sustainability, the ASME 2015 13th International Conference on Fuel Cell Science, Engineering and Technology, and the ASME 2015 Nuclear Forum*, American Society of Mechanical Engineers, pp. V001T001A012-V001T001A012, 2015. (minor contributor)
30. Calvo-Amodio, J., Flumerfelt, S., and Hoyle, C., "A Complementarist Approach to Lean Systems Management," *Proceedings of the 58th Annual Meeting of the ISSS-2014*, United States, pp. 787-795, 2015. (minor contributor)
31. Pham, T. B., Hoyle, C., and Bay, B., "Robust Topology Optimization Under Random Load Locations," *Proc. ASME 2014 International Mechanical Engineering Congress and Exposition*, American Society of Mechanical Engineers, pp. V011T014A029-V011T014A029, 2015. (key contributor)
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