Curriculum Vitae

DAVID C. JENSEN

Associate Professor of Mechanical Engineering
University of Arkansas

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APPOINTMENTS

2012 – 2018 Assistant Professor of Mechanical Engineering,
University of Arkansas, Fayetteville, AR

2018- Current Associate Professor of Mechanical Engineering,
University of Arkansas, Fayetteville, AR

EDUCATION

- Ph.D., Mechanical Engineering, Oregon State University, 2012
- M.S., Mechanical Engineering, Oregon State University, 2009
- B.S., Mechanical Engineering, Oregon State University, 2008

TECHNICAL EXPERTISE

Complex adaptive systems design; risk and reliability analysis in cyber-physical systems; modeling, representation languages, and state-space exploration; prognostics and health management methods and technologies, machine learning to support engineering design, and design education.

RESEARCH EXPERIENCE

University of Arkansas, Fayetteville, Arkansas
Associate Professor *August 2012-present*

Oregon State University, Corvallis, Oregon
Postdoctoral Researcher, under the supervision of Dr. Irem Tumer *June-August 2012*

Aalto University - Engineering Design and Production Dept., Espoo, Finland
Invited Researcher, under the supervision of Dr. Eric Coatanéa *May-July 2010*

TEACHING EXPERIENCE

Full Courses: University of Arkansas
Mechanics of Materials - Undergraduate
Machine Element Design – Undergraduate
Introduction to Machine Analysis and Design– Undergraduate
Dynamics – Undergraduate

Complex Systems Modeling – Graduate/ Undergraduate (*Created course)*
Advanced Product Design - Graduate/ Undergraduate (*Created course)*

MENTORSHIP AND ADVISING

Completed Graduate Student Advising:

- **Charlie DeStefano:**
  Adaptive Reasoning and Planning for Extended Operational Life in Manufacturing Systems. University of Arkansas, Doctor of Philosophy Dissertation, 2019.
- **Marvin Arroyo:**
  A Generative Statistical Approach for Data Classification in a Biologically Inspired Design Tool. University of Arkansas, Master of Science Thesis, 2018.
- **Jonathan Ashley:**
  The Effect of Incorporating End-User Customization into Additive Manufacturing Design. University of Arkansas, Master of Science Thesis, 2018.
- **Oladapo Bello:**
  Developing Methods of Obtaining Quality Failure Information from Complex Systems. University of Arkansas. Doctor of Philosophy Dissertation, 2017.
- **Nicholas Huisman:**
  Development of a Design Tool for Biologically Inspired Fault Adaptive Design by Strategy Mapping. University of Arkansas. Master of Science Thesis, 2015.
- **Charlie DeStefano:**
  Utilizing Failure Information for Mission Assessment and Optimization for Complex Systems. University of Arkansas. Master of Science Thesis, 2014.

PUBLICATIONS

JOURNAL ARTICLES

Irshad, L., Hulse, D., Demirel, H., Tumer, I.Y., **Jensen, D**., "Quantifying the Combined Effects of Human Errors and Component Failures," *Journal of Mechanical Design,* **143** (10), 2021. [access paper]

DeStefano, C., **Jensen, D**., "Fault Adaptive Mission Planning: Increasing Useful-Life and Reducing Downtime Through Condition-Based Decision-Making," *Journal of Computing and Information Science in Engineering*. **20** (6), 2020. [access paper]

Arroyo, M., Huisman, N., **Jensen, D**., "Exploring Natural Strategies for Bio-Inspired Fault Adaptive System Design," *Journal of Mechanical Design*. **140** (9)**,** 2018. [access paper]

Jensen, D., Beck, D., "Centralized Generative Design Activities to Enable Design Throughout the Engineering Curriculum." *International Journal of Engineering Education*. **34** (2), 2018.

DeStefano, C., **Jensen, D**., "Adaptive Mission Planning and Analysis for Complex Systems," *Journal of Computing and Information Science in Engineering*. **17** (4), 2017. [access paper]

McIntire, M., Hoyle, C., Tumer, I.Y., **Jensen, D**. "Safety-Informed Design: Using Subgraph Analysis to Elicit Hazardous Emergent Failure Behavior in Complex Systems." *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, **30** (4), 2016. [access paper]

Jensen, D., Bello, O., Hoyle, C., Tumer, I.Y., "Reasoning About System-Level Failure Behavior from Large Sets of Function-Based Simulations." *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, **28**, 385–398, 2014. [access paper]

O'Halloran, D., Haley B., **Jensen, D**., Arlitt, R., Tumer, I.Y., Stone, R.B., "The Early Implementation of Failure Modes into Existing Component Model Libraries." *Research in Engineering Design*, **25**(3) pp 203-221, 2013. [access paper]

Mutha, C., **Jensen, D**., Tumer, I.Y., Smidts, C., "An Integrated Multidomain Functional Failure and Propagation Analysis Approach for Safe System Design," *Journal of Artificial Intelligence for Engineering Design, Analysis and Manufacturing*. **27**, pp 317-347, 2013. [access paper]

Papakonstantinou, N., Sierla S., **Jensen, D**., Tumer, I.Y., "Multi-Scale Simulation of Interactions and Emergent Failure Behavior During Complex System Design," *Journal of Computing and Information Science in Engineering*. **12**(3), 031007, 2012. [access paper]

Sierla S., Papakonstantinou, N., Tumer, I.Y., Koskinen, K., **Jensen, D**., "Early Integration of Safety to the Mechatronic System Design Process by the Functional Failure Identification and Propagation Framework." *Journal of Mechatronics,* **22**(2), pg.137-151, 2012. [access paper]

Coatanéa, E., Nonsiri, S., Ritola, T., Tumer, I.Y., **Jensen, D**., "A Framework for Building Dimensionless Behavioral Models to Aid in Function-Based Failure Propagation Analysis," *Journal of Mechanical Design*,**133**(12), pg. 1-13, 2011. [access paper]

Kurtoglu, T., Tumer, I.Y., **Jensen, D**., "A Function Failure Reasoning Methodology for Evaluation of Conceptual System Architectures," *Journal of Research in Engineering Design*, **21**(4), pg. 209-234, 2010. [access paper

PEER-REVIEWED CONFERENCE PAPERS

Irshad, L., Hulse, D., Demirel, H., Tumer, I.Y., **Jensen, D**., "Introducing Likelihood of Occurrence and Expected Cost to Human Error and Functional Failure Reasoning Framework," In *Proceedings of 2020 ASME International Design Engineering Technical Conferences,* Virtual, Online. August 17-19, 2020.

Hunter, S., **Jensen, D.,** Tumer, I.Y., Hoyle, C., "The Impact of Abstraction and Fidelity Levels on the Usefulness of Early System Functional Models," In *Proceedings of 2016 ASME International Design Engineering Technical Conferences,* Charlotte, NC. August 21-24, 2016.

Hunter, S., **Jensen, D.,** Tumer, I.Y., Hoyle, C., "Validating Model-Based Design Simulation: The Impact of Abstraction and Fidelity Levels," In proceedings of *2015 IEEE International Conference on Complex Systems Engineering*. Storrs, Connecticut. November 9-10th, 2015.

McIntire, M., Hoyle, C., Tumer, I.Y., **Jensen**, **D**., "Safety Informed Design: Using Clustering Analysis to Elicit Hazardous Emergent Failure Behavior in Complex Systems," In proceedings of *ASME 2015*

International Mechanical Engineering Congress and Exposition. Houston, Texas. November 13-19th, 2015.

Jensen, D., Beck, D., "Learning Design Through Student-Generated Learning Aids." In *Proceedings of 2015 ASME International Design Engineering Technical Conferences, Design Education Conference,* Boston, MA. August 2-5, 2015.

Jensen, D., Huisman, N., "Biologically Inspired Fault Adaptive Strategies for Engineered Systems." In *Proceedings of ICED 2015, International Conference on Engineering Design*, Milan, Italy. July 27-30, 2015.

DeStefano, C., **Jensen, D**., "Utilizing Failure Information for Mission Analysis for Complex Systems." In *Proceedings of ICED 2015, International Conference on Engineering Design*, Milan, Italy. July 27-30, 2015.

Jensen, D., Beck, D., "Self-Evaluation of Design Decision-Making Skills Gained Through Student Generated Learning Aids." In *Proceedings of 2015 ASEE Annual Conference and Exposition,* Seattle, WA. June 14-17, 2015.

DeStefano, C., **Jensen, D.,** 2014 "A Qualitative Failure Analysis Using Function-Based Performance State-Machines for Fault Identification and Propagation During Early Design Phases," *Proceedings of the ASME 2014 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference,* Buffalo, New York.

Jensen, D., Tumer, I.Y., 2013, "Modeling and Analysis of Safety in Early Design," *Conference on Systems Engineering Research*, Atlanta, Georgia.

O'Halloran, B., **Jensen, D.,** Tumer, I.Y., Kurtoglu, T., Stone R.B., "A Framework to Generate Fault-Based Behavior Models for Complex Systems Design," *Reliability and Maintainability Symposium (RAMS 2013),* Orlando, Florida.

Jensen, D., Tumer, I.Y., 2012, "Clustering Function-Based Failure Analysis Results to Evaluate and Reduce System-Level Risks," *ASME IDETC/CIE, Computers and Information in Engineering Conference*, Chicago, Illinois.

Mehrpouyan, H., **Jensen, D.**, Hoyle, C., Tumer, I.Y., 2012, "A Model-Based Failure Identification and Propagation Framework for Conceptual Design of Complex Systems," *ASME IDETC/CIE, Computers and Information in Engineering Conference*, Chicago, Illinois.

Papakonstantinou, N., Sierla S., **Jensen, D**., Tumer, I.Y., 2012, "Using Fault Propagation Analyses for Early Elimination of Unreliable Design Alternatives of Complex Cyber-Physical Systems." *ASME IDETC/CIE, Computers and Information in Engineering Conference*, Chicago, Illinois.

Papakonstantinou, N., **Jensen, D**., Sierla S., Tumer, I.Y., 2011, "Capturing Interactions and Emergent Failure Behavior in Complex Engineered Systems at Multiple Scales," *Proceedings of the 2011 ASME Design Engineering Technical Conferences; Computers and Information in Engineering*. Washington, D.C.

Coatanéa, E., Ritola, T., Tumer, I.Y., **Jensen, D**., 2010, "A Framework for Building Behavioral Models for Design Stage Failure Identification Using Dimensional Analysis," *Proceedings of the 2010 ASME International Design Theory and Methodology Conference*. Montreal, Quebec.

Kurtoglu, T., **Jensen, D**., Poll, S., 2009, "Systematic Benchmarking of Diagnostic Technologies for an Electrical Power System," *Proceedings of the 2009 IEEE Aerospace Conference*. Big Sky, Montana.

Jensen, D., Tumer, I.Y., Kurtoglu, T., 2009, "Flow State Logic (FSL) for Analysis of Failure Propagation in Early Design," *Proceedings of the 2009 ASME Design Engineering Technical Conferences; International Design Theory and Methodology Conference*. San Diego, California.

Jensen, D., Tumer, I.Y., Kurtoglu, T., 2009, "Design of an Electrical Power System Using the Failure Flow State Logic Reasoning," *Proceedings of the 2009 Annual Conference of the Prognostic and Health Management Society*. San Diego, California.

Jensen, D., Tumer, I.Y., Kurtoglu, T., 2008, "Modeling the Propagation of Failures in Software Driven Hardware Systems to Enable Risk-Informed Design," *Proceedings of the 2008 ASME International Mechanical Engineering Congress and Exposition*. Boston, Massachusetts.

TECHNICAL REPORTS – NOT PEER REVIEWED

Jensen, D., Bello, O., 2013. "A Classification of Critical Failure Events for Complex Systems and Space Missions." *Final report for NASA sub-award through University of Alabama-Huntsville*.

Uckun, S., Kurtoglu, T., Fritz, C., Bunus, P., Jarvis, P., Tumer, I.Y., Hoyle, C., **Jensen, D.,** Musliner, D., Engstrom, E., Nagel, J., Kluck, D., Knudson, M., 2011 "META II: Formal Co-Verification of Correctness of Large-Scale Cyber-Physical Systems during Design. Volume 1," *For DARPA META II Contract*.

THESIS AND DISSERTATION

Design Analysis using Function-Based Failure Propagation in Failed System States.
Oregon State University. Masters of Science Thesis, 2009. [access thesis]

Enabling Safety-Informed Design Decision Making Through Simulation, Reasoning and Analysis.
Oregon State University. Doctor of Philosophy Dissertation, 2012. [access dissertation]

INVITED PRESENTATIONS

Graduate Seminar – Texas A&M University, September 30th, 2015.
"Designing Safety into Complex Systems"

ASME 9th Conference on Design Education - Chicago, Illinois. August 14th, 2012.
Panelist for "Safety in Children's Products"

DARPA P.I. Progress Demo Meeting - *PARC, Palo Alto, California*. January 13th, 2011.
"Function Failure Analysis as a Filter for Automatic Concept Generation"

Palo Alto Research Center - *Palo Alto, California*. December 2nd, 2010.
"Conducting a Function Failure Identification and Propagation Analysis"

Radiation and Nuclear Safety Authority - *STUK headquarters, Helsinki, Finland*. June 14th, 2010.
"FFIP Framework: Initial Application to a Boiling Water Reactor Design"

Design Research Area - *Aalto University, Espoo, Finland*. June 2nd, 2010.
"Complex System Design: Model-Based Failure Propagation Analysis"

AFOSR Program Manager Update Meeting - *OSU, Corvallis, Oregon*. September 24th, 2009.
"Advancing FFIP: Flow States and Health Management"

Doctoral Symposium - *PHM Conference, San Diego, California*. September 27th, 2009.
"Design Stage Modeling and Model-Based PHM"

Design Area Seminars - *OSU, Corvallis, Oregon*.
"Function Failure Analysis: Application to a Boiling Water Reactor Design" - January 24th, 2011
"Design Analysis Using Function-Based Failure Propagation" - May 22nd, 2009

AWARDS

2015 – 21st Century Professorship endowed award, three-year duration.

2015 – Outstanding Teacher Award for 2014-2015 for the Department of Mechanical Engineering at the University of Arkansas.

2011 – Travel grant awarded by the National Institute of Standards and Technology for graduate poster presentation.

2010 – Outstanding Graduate Research Assistant awarded by the School of Mechanical, Industrial, and Manufacturing Engineering, Oregon State University.

2010 – Travel grant awarded by the National Institute of Standards and Technology for graduate poster presentation.

2010 – Departmental Fellowship awarded by the School of Mechanical, Industrial, and Manufacturing Engineering, Oregon State University.

2009 – Travel grant awarded by the Prognostics and Health Management Conference for selection to its doctoral symposium session.

2008 – Travel grant awarded by the Computers in Engineering Conference for graduate poster presentation.

PROFESSIONAL ACTIVITIES

- Technical Area Chair for the 2018 SEIKM Conference.
- Program Chair for the 2017 ASME SEIKM Conference.
- Conference Secretary for the 2016 ASME SEIKM Conference.
- Review coordinator and session chair for 2013-2017 ASME IDETC.

- Invited panelist for 2012 Design Education Conference on reliability and safety of children's products and how to address this in design education.

- Invited (fully funded) to the joint NSF-NASA funded workshop on Large-Scale Complex Engineered Systems: From Basic Research through Product Realization. Arlington, VA, February 7-8th, 2012.

- Invited speaker for Prognostic and Health Management 2011 conference symposium on "PHM in Education."

- Committee member for the Doctoral Symposium for the 2011 conference of the Prognostic and Health Management

- Student Chair for the Prognostic and Health Management Society's 2011 International Conference.

- Member of: American Society of Mechanical Engineers, Design Society, American Society of Engineering Educators.

- Conference participation and referee: International Conference on Engineering Design, ASME Computers and Information in Engineering, ASME Design Theory and Methodology, Prognostics and Health Management Society, ASME International Mechanical Engineering Congress and Exposition, ASEE Conference and Exposition.

- Referee for: International Journal of Prognostic and Health Management, ASME Journal of Mechanical Design, Research in Engineering Design, Artificial Intelligence in Engineering Design and Manufacturing, Journal of Engineering Design, Journal of Aerospace Information Systems, Journal of Systems and Software.