Approved by the Regents
May 18, 2023

PROMOTION RECOMMENDATION
The University of Michigan-Dearborn
College of Engineering and Computer Science

Zhen Hu, assistant professor of industrial and manufacturing systems engineering, Department of Industrial and Manufacturing Systems Engineering, College of Engineering and Computer Science, is recommended for promotion to associate professor of industrial and manufacturing systems engineering, with tenure, Department of Industrial and Manufacturing Systems Engineering, College of Engineering and Computer Science.

Academic Degrees:

Ph.D.	2014	Mechanical Engineering, Missouri University of Science and Technology, Rolla, MO
M.S.	2011	Mechatronics Engineering, Huazhong University of Science and Technology (HUST), Wuhan, Hubei, China
B.S.	2008	Central South University (CSU), Changsha, Hunan, China

Professional Record:

2017-present	Assistant Professor, Department of Industrial and Manufacturing Systems Engineering, University of Michigan-Dearborn
2016-2017	Research Assistant Professor, Vanderbilt University, Nashville, TN
2014-2016	Post-doctoral Research Scholar, Vanderbilt University, Nashville, TN
2010-2013	Visiting Assistant Professor, Department of Mathematics, Texas A&M University, College Station, TX

Summary of Evaluation:

Teaching: Professor Hu is an excellent and knowledgeable instructor who is always prepared for class. Professor Hu taught undergraduate and master's level courses in the industrial and systems engineering and manufacturing engineering programs. At the undergraduate level, he taught Engineering Probability and Statistics, and at the master's level, he taught Probability and Statistical Models, Design of Experiments, and Reliability Engineering courses. His overall instructor evaluations have been excellent, averaging 4.27/5.0. Professor Hu served as research advisor for two Ph.D. students and is currently advising or co-advising three students in their Ph.D. research. He also served on twelve Ph.D. dissertation committees.

Research: Professor Hu is a highly regarded researcher in the area of reliability and uncertainty quantification. His scholarly output is quite remarkable. Since joining the Industrial and Manufacturing Systems Engineering department in 2017, Professor Hu published 52 peer-reviewed journal papers. The venues he has chosen to publish his research are excellent. He has been a recipient of the 2020 *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems*, Part B: Mechanical Engineering best paper award and several of his publications received papers of distinction and finalist status for the best paper award in the ASME International Design Engineering Technical Conferences. Professor Hu has been very successful in attracting external support for his research. He secured 15 externally funded grants and contracts while at UM-Dearborn for a total of more than $1.36 million. The external review

letters are consistent in their assessment of the quality and impact of his work and long-term research promise.

Recent and Significant Publications:

Chen Jiang, Manuel A. Vega, Mukesh K. Ramancha, Michael D. Todd, Joel P. Conte, Matthew Parno, and Zhen Hu, "Bayesian Calibration of Multi-Level Model with Unobservable Distributed Response and Application to Miter Gates," *Mechanical Systems and Signal Processing*, 2022, 170, 101852.

Quan Lin, Qi Zhou, Jiexiang Hu, Yuansheng Cheng, and Zhen Hu, "A Sequential Sampling Approach for Multi-fidelity Surrogate Modeling-Based Robust Design Optimization," *ASME Journal of Mechanical Design*, 2022, in press.

Chen Jiang, Zhen Hu, Zissimos P. Mourelatos, David Gorsich, Paramsothy Jayakumar, Yan Fu, and Monica Majcher., "R2-RRT: Reliability-Based Robust Mission Planning of Off-Road Autonomous Ground Vehicle Under Uncertain Terrain Environment," *IEEE Transactions on Automation Science and Engineering*, 2020, 19(2), 1030-1046.

Zhuo Wang, Chen Jiang, Wenhua Yang, Ying Zhao, Mark F. Horstemeyer, Zhen Hu, Lei Chen, "Uncertainty Quantification and Reduction in Metal Additive Manufacturing," *npj Computational Materials*, 2020, 6(1), 1-10.

Service: Professor Hu has made significant service contributions. At the department level, Professor Hu served on the Undergraduate Human-Centered Engineering Design (HCED) Program Committee and Lecturer Major Review Committees. As a member of the HCED Committee, he helped to design the curriculum of the new Bachelor of Science in Engineering in human-centered engineering design program. At the college level, he served as a department representative on an advisory committee to the associate dean for graduate education and research. Professor Hu is also active in professional societies, including SAE International, American Society of Mechanical Engineers, and American Institute of Aeronautics and Astronautics (AIAA). He organized conference sessions, chaired sessions, and coordinated reviews for conferences of these three societies almost every year. He served as the student paper competition chair for the 2020 AIAA SciTech Non-Deterministic Approaches conference. Finally, he served as a reviewer for top-tier journals in his field.

External Reviewers:

Reviewer A: "Dr. Hu has successfully demonstrated that his research methods are not only theoretically sound but also practically useful by applying his approach to emerging engineering applications. For example, he pioneered a holistic uncertainty quantification (UQ) and uncertainty management framework for metal-based additive manufacturing. He developed a multi-level UQ framework to quantify the uncertainty in the material microstructure due to uncertainty sources in the melt pool simulation model and grain growth model. His work on UQ of AM has gained much attention [sic] in different communities and has great potential to further expand the impact of design under uncertainty in the other communities such as manufacturing and material science, beyond engineering design."

Reviewer B: "Dr. Hu's research topics include uncertainty quantification, structured health monitoring, and reliability assessment with applications in autonomous ground vehicles, unmanned aerial vehicles, and river network management. In my opinion, Dr. Hu has worked on

important research problems with promising applications. Dr. Hu's publication record is so impressive. He has published 90 journal articles. Particularly, 50 of these articles have been published since joining UM-Dearborn in 2017. Dr. Hu's productivity is outstanding for faculty at any level."

Reviewer C: "His publication record can be ranked in the top 5% of his peer group and is better than many associated [sic] professors who have already been tenured for several years."

Reviewer D: "Dr. Hu's scholarly output is outstanding for a junior researcher, both from quantitative and qualitative points of view."

Reviewer E: "The extent of collaboration across departments, schools, and universities speaks to the value Dr. Hu has added to the field. He has collaborated with researchers within the University of Michigan system in electrical and computer engineering (on power grid resilience and related research), mechanical engineering (additive manufacturing research on the application of second-life batteries), industrial and manufacturing systems engineering (optimization of charging stations and distracted driving detection)."

Reviewer F: "Dr. Hu's main strength is the proclivity and quality of his publication record. The rate at which he disseminates his research is outstanding and I believe is indicative of a deep passion for research and academia. I believe he is near the top of his group of peers in this regard and, given his current funding and extensive collaborations, does not appear to be slowing. A second main strength that I believe must be noted here is his collaboration with the U.S. Army and co-authored publications with collaborators from the U.S. Army. I believe that this relationship is unique among his peers and has/will lead to exclusive opportunities for Dr. Hu that will have a lasting and significant impact."

Reviewer G: "By reviewing Dr. Hu's complete publication list, I'm impressed by both the quantity and quality of his work. Since joining UM-Dearborn in 2017, he has published about 60 journal articles which is a significant number of publications in the field. By further checking the journals, I also see high quality journals such as *Journal of Mechanical Design*, *Reliability Engineering and Systems Safety*, *Structural and Multidisciplinary Optimization*, etc. Even for some new journals, they are expected to become well-known journals in the field based on the publisher and the corresponding society of the journal. Hence, it is obvious to me that Dr. Hu's publications are of high standards."

Reviewer H: "Dr. Hu's original research contributions are in two main areas. The first one is reliability analysis, and the second area is uncertainty quantification. As engineering systems become more complex, how to design reliable systems that provide the desirable functions whenever needed is an important research question. Furthermore, when systems are deployed and in use, the health condition and any degradation of the systems need to be monitored to ensure that the normal functions are delivered. Dr. Hu's research efforts in these areas are very important in systems design and engineering optimization. The reliability analysis and uncertainty quantification methods he developed will bring significant benefits to manufacturing, energy, transportation, and many other industries."

Summary of Recommendation: Professor Hu is a well-published and well-funded educator who has made significant contributions to the field reliability analysis and uncertainty quantification, both of which have numerous practical implications. He is an excellent teacher and mentor; and he is a leader who contributes both in external and internal service. It is with the support of the College of Engineering and Computer Science Executive Committee that I recommend Zhen Hu for promotion to associate professor of industrial and manufacturing systems engineering, with tenure, Department of Industrial and Manufacturing Systems Engineering, College of Engineering and Computer Science.

Ghassan Kridli, Dean
College of Engineering and Computer Science

Domenico Grasso, Chancellor
University of Michigan-Dearborn

May 2023