Approved by the Regents
May 16, 2024

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Mechanical Engineering

Xun Huan, assistant professor of mechanical engineering, Department of Mechanical Engineering, College of Engineering, is recommended for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Academic Degrees:

Ph.D.	2015	Massachusetts Institute of Technology, Computational Science and Engineering, Cambridge, MA
M.S.	2010	Massachusetts Institute of Technology, Aerospace Engineering, Cambridge, MA
B.S.	2008	University of Toronto, Engineering Science (Aerospace), Toronto, ON, Canada

Professional Record:

2018 – present	Assistant Professor, Department of Mechanical Engineering, University of Michigan
2016 – 2018	Post-Doctoral Appointee, Combustion Research Facility, Sandia National Laboratories, Liverpool, CA
2015 – 2016	Post-Doctoral Associate, Aeronautics and Astronautics, Massachusetts Institute of Technology, Cambridge, MA

Summary of Evaluation:

Teaching: Across both undergraduate and graduate courses, Professor Huan has integrated a diverse set of evidence-based learning techniques. Professor Huan has taught three courses within Mechanical Engineering spanning undergraduate and graduate levels, including one that was completely redesigned (ME502), and another that he created (ME599). Professor Huan has also revised ME305 by working with CRLT to promote a more inclusive learning environment. Professor Huan has graduated two Ph.D. students (one as co-chair) and has another four in progress, with two expected to graduate this year. In addition, he has served as a committee member for 21 Ph.D. students, which is clear evidence of the high regard in which his colleagues hold him.

Research: Professor Huan's groundbreaking research in computational science and engineering has garnered acclaim, particularly for his pioneering work in data-driven modeling and scientific AI. Drawing from his expertise in applied mathematics, statistical methods, scientific machine learning, and computational physics, he has developed innovative methods for computational simulation and modeling, delivering valuable insights into complex systems. His contributions have significantly advanced various fields, earning him recognition as a leading figure in the scientific community. With an impressive publication record of 28 papers and a citation count of 1,251 on Google Scholar, accompanied by an h-index of 18, he continues to leave a profound

impact on the research landscape. His ability to secure and manage a robust funding portfolio, which includes 15 current grants, six pending, and six completed, underscores his exceptional leadership and strategic vision.

Recent and Significant Publications:

Sanat V. Modak, Wanggang Shen, Siddhant Singh, Dylan Herrera, Fairooz Oudeif, Bryan Goldsmith, Xun Huan, and David G. Kwabi, "Understanding capacity fade in organic redox-flow batteries by combining spectroscopy with statistical inference techniques," *Nature Communications*, 14:3602, 2023.

Myles Morelli, Jeremiah Hauth, Alberto Guardone, Xun Huan, and Beckett Y. Zhou, "A rotorcraft in-flight ice detection framework using computational aeroacoustics and Bayesian neural networks," *Structural and Multidisciplinary Optimization*, 2023.

Jiayuan Dong, Jiankan Liao, Xun Huan, and Daniel Cooper, "Expert Elicitation and Data Noise Learning for Material Flow Analysis using Bayesian Inference," *Journal of Industrial Ecology*, 2023.

Tahera Hossain, Wanggang Shen, Anindya Das Antar, Snehal Prabhudesai, Sozo Inoue, Xun Huan, and Nikola Banovic, "A Bayesian Approach for Quantifying Data Scarcity when Modeling Human Behavior via Inverse Reinforcement Learning," *ACM Transactions on Computer-Human Interaction*, 30: 8:1-8:27, 2023.

Snehal Prabhudesai, Jeremiah Hauth, Dingkun Guo, Arvind Rao, Nikola Banovic, and Xun Huan, "Lowering the computational barrier: Partially Bayesian neural networks for transparency in medical imaging AI," *Frontiers in Computer Science*, 2023.

Service: Professor Huan's commitment to service shines through his involvement in various committees at the university, college, and department levels. He has also made significant contributions to the research community by reviewing for journals such as *ACM Transactions*, *AIAA Journal*, and *CMAME*, and organizing many mini-symposia and chairing sessions at USNCCM and SIAM conferences. Additionally, he has created open-source software, mentored international students, and started a journal club at UM during the COVID Pandemic.

External Reviewers:

Reviewer A: "Xun provides a compelling and well-rounded package. He excels along the three axes of research, teaching, and service. He is an emerging leader in the field of OED for inverse problems, does excellent teaching, and is generous with his time and efforts in both internal and external service."

Reviewer B: "An interesting aspect of Prof. Huan's research is his strive and success in tackling a broad set of complex and relevant applications using his UQ and machine learning developments. This is unlike many other researchers in the field who often stop at very simplified models."

Reviewer C: "Dr. Huan has a robust publication record, with 25 published journal papers as an assistant professor and another 7 in review. He has compiled a remarkably strong and diverse record of funding from such agencies as NSF, DARPA, ONR, Ford, DOE, Keck, and others."

Reviewer D: "Dr. Huan is also an outstanding, passionate educator and mentor who has made significant contributions to the education and training of undergraduate and graduate students in mechanical engineering and related fields."

Reviewer E: "…I believe that, during his tenure-track period at UM, Xun has posted exceptional performance in research, education and service, and has developed into a leading expert in the field of Scientific Machine Learning and Uncertainty Quantification."

Summary of Recommendation: Professor Huan's exceptional research, teaching, and service records stand as a testament to his commitment to advancing the state of knowledge in his field. Moreover, his engagement in various diversity, equity, and inclusion initiatives demonstrate his dedication to fostering a thriving academic environment. It is with the support of the College of Engineering Executive Committee that I recommend Xun Huan for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Steven L. Ceccio, Ph.D.
Interim Dean of Engineering
Vincent T. and Gloria M. Gorguze Professor
of Engineering
College of Engineering

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