Wei (Wayne) Chen

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ACADEMIC APPOINTMENTS	**Assistant Professor, Texas A&M University**	
	J. Mike Walker '66 Department of Mechanical Engineering	August 2023 – Present
	College Station, Texas	
EDUCATION	**University of Maryland**, College Park, Maryland, USA	
	Ph.D., Mechanical Engineering	Aug 2015 – Aug 2019
	Informatics for Design, Engineering And Learning (IDEAL) Lab	
	Chongqing University, Chongqing, China	
	M.S., Mechanical Engineering	Sep 2012 – Jun 2015
	B.S., Mechanical Engineering	Sep 2008 – Jun 2012
PROFESSIONAL EXPERIENCE	**Postdoctoral Scholar, Northwestern University**	Apr 2021 – July 2023
	Integrated DEsign Automation Laboratory (IDEAL)	
	Evanstan, Illinois	
	Research Scientist, Siemens	Sep 2019 – Mar 2021
	Design & Simulation Systems Group	
	Princeton, New Jersey	

HONORS & AWARDS

ASME Journal of Mechanical Design Reviewer of the Year Award (Feb 2023)

ASME's Design Engineering Division Design Automation Committee Best Paper Award (Aug 2022)
Doksoo Lee, Yu-Chin Chan, **Wei (Wayne) Chen**, Liwei Wang, Wei Chen
"T-METASET: Task-Aware Generation of Metamaterial Datasets by Diversity-Based Ac- tive Learning"

2021 Journal of Mechanical Design Editors' Choice Honorable Mention (Jul 2022)
Wei (Wayne) Chen and Faez Ahmed
"PaDGAN: Learning to Generate High-Quality Novel Designs"

SELECTED PUBLICATIONS

Journal (* indicates equal contributions)

16. Lee, D.*, **Chen, W.***, Wang, L.*, Chan, Y. C., & Chen, W. (2023). Data-Driven Design for Metamaterials and Multiscale Systems: A Review. *Advanced Materials*, 2305254.

15. Zhang, H., **Chen, W.**, Rondinelli, J. M., & Chen, W. (2023). ET-AL: Entropy-targeted active learning for bias mitigation in materials data. *Applied Physics Reviews*, 10(2), 021403.

14. **Chen, W.**, Lee, D., Balogun, O., & Chen, W. (2023). GAN-DUF: Hierarchical Deep Generative Models for Design Under Free-Form Geometric Uncertainty. *Journal of Mechanical Design*, 145(1), 011703.

13. Lee, D., Chan, Y., **Chen, W.**, Wang, L., van Beek, A., & Chen, W. (2023). t-METASET: Task-Aware Acquisition of Metamaterial Datasets through Diversity-based Active Learning. *Journal of Mechanical Design*, 145(3), 031704.

12. Zhang, H., **Chen, W.**, Iyer, A., Apley, D. W., & Chen, W. (2022). Uncertainty-Aware Mixed-Variable Machine Learning for Materials Design. *Scientific Reports*, 12(1), 19760.

11. Wang, J., **Chen, W.**, Da, D., Fuge, M., & Rai, R. (2022). IH-GAN: A Conditional Generative Model for Implicit Surface-Based Inverse Design of Cellular Structures. *Computer Methods in Applied Mechanics and Engineering*, 396, 115060. doi:10.1016/j.cma.2022.115060.

10. Heyrani Nobari, A., **Chen, W.**, & Ahmed, F. (2021). RANGE-GAN: Design Synthesis Under Constraints Using Conditional Generative Adversarial Networks. *Journal of Mechanical Design*, 144(2). doi:10.1115/1.4052442.

9. Chen, Q., Wang, J., Pope, P., **Chen, W.**, & Fuge, M. (2021). Inverse Design of 2D Airfoils using Conditional Generative Models and Surrogate Log-Likelihoods. *Journal of Mechanical Design*, 144(2). doi:10.1115/1.4052846.

8. **Chen, W.**, & Ahmed, F. (2021). MO-PaDGAN: Reparameterizing Engineering Designs for Augmented Multi-objective Optimization. *Applied Soft Computing*, 113, 107909. doi:10.1016/j.asoc.2021.107909.

7. **Chen, W.** & Ahmed, F. (2020). PaDGAN: Learning to Generate High-Quality Novel Designs. *Journal of Mechanical Design*, 143(3). doi:10.1115/1.4048626.

6. **Chen, W.**, Chiu, K., & Fuge, M. (2020). Aerodynamic design optimization and shape exploration using generative adversarial networks. *AIAA Journal*, 58(11), 4723-4735. doi:10.2514/1.J059317.

5. **Chen, W.** & Fuge, M. (2019). Synthesizing designs with interpart dependencies using hierarchical generative adversarial networks. *Journal of Mechanical Design*, 141(11), 111403. doi:10.1115/1.4044076.

4. **Chen, W.** & Fuge, M. (2018). Active expansion sampling for learning feasible domains in an unbounded input space. *Structural and Multidisciplinary Optimization*, 57(3), 925-945. doi:10.1007/s00158-017-1894-y.

3. **Chen, W.** & Fuge, M. (2017). Beyond the known: Detecting novel feasible domains over an unbounded design space. *Journal of Mechanical Design*, 139(11), 111405. doi:10.1115/1.4037306.

2. **Chen, W.**, Fuge, M., & Chazan, J. (2017). Design manifolds capture the intrinsic complexity and dimension of design spaces. *Journal of Mechanical Design*, 139(5), 051102. doi:10.1115/1.4036134.

1. Luo, J., **Chen, W.**, & Fu, G. (2014). Hybrid-heat effects on electrical-current aided friction stir welding of steel, and Al and Mg alloys. *Journal of Materials Processing Technology*, 214(12), 3002-3012. doi:10.1016/j.jmatprotec.2014.07.005.

Patent

1. **Chen, W.** & Ramamurthy, A. (2021). Deep neural networks for synthesis and optimization of smooth surfaced 3D objects (International Publication Number WO2021247662A1). World Intellectual Property Organization.

Conference (Full Length, Peer-Reviewed)

9. **Chen, W.**, Lee, D., Balogun, O., & Chen, W. (2022, August). Hierarchical Deep Generative Models for Design Under Free-Form Geometric Uncertainty. In *ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC-CIE)*. St. Louis, MO. Vol. 86236, p. V03BT03A042.

8. Lee, D., Chan, Y. C., **Chen, W.**, Wang, L., van Beek, A., & Chen, W. (2022, August). T-METASET: Task-Aware Generation of Metamaterial Datasets by Diversity-Based Active Learning. In *ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC-CIE)*. St. Louis, MO. Vol. 86229, p. V03AT03A011.

7. Nobari, A., **Chen, W.**, & Ahmed, F. (2021, August). PcDGAN: A Continuous Conditional Diverse Generative Adversarial Network For Inverse Design. In *Proceedings of the 27th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD '21)*. Virtual. pp. 606-616. doi:10.1145/ 3447548.3467414.

6. Nobari, A., **Chen, W.**, & Ahmed, F. (2021, August). Range-GAN: Range-Constrained Generative Adversarial Network for Conditioned Design Synthesis. In *ASME 2021*

International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC-CIE). Virtual. Vol. 85390, p. V03BT03A039. doi:10.1115/DETC2021-69963.

5. **Chen, W.** & Ramamurthy, A. (2021, January). Deep Generative Model for Efficient 3D Airfoil Parameterization and Generation. In *AIAA Scitech 2021 Forum.* Virtual. p. 1690. doi:10.2514/6.2021-1690.

4. **Chen, W.** & Ahmed, F. (2020, August). PaDGAN: A Generative Adversarial Network for Performance Augmented Diverse Designs. In *ASME 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC-CIE).* Virtual. Vol. 84003, p. V11AT11A010. doi:10.1115/DETC2020-22729.

3. **Chen, W.**, Chiu, K., & Fuge, M. (2019, January). Aerodynamic design optimization and shape exploration using generative adversarial networks. In *AIAA Scitech 2019 Forum.* San Diego, CA. p. 2351. doi:10.2514/6.2019-2351. (**Invited talk**)

2. **Chen, W.**, Jeyaseelan, A., & Fuge, M. (2018, August). Synthesizing designs with inter-part dependencies using hierarchical generative adversarial networks. In *ASME 2018 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC-CIE).* Quebec City, Canada. Vol. 51753, p. V02AT03A007. doi:10.1115/DETC2018-85339.

1. **Chen, W.**, Chazan, J., & Fuge, M. (2016, August). How designs differ: Non-linear embeddings illuminate intrinsic design complexity. In *ASME 2016 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC-CIE).* Charlotte, NC. Vol. 50107, p. V02AT03A014. doi:10.1115/DETC2016-60112.

Workshop (Peer-Reviewed)

4. Zhang, H., **Chen, W.**, Rondinelli, J., & Chen, W. (2023, October). Mitigating Bias in Scientific Data: A Materials Science Case Study. In *NeurIPS 2023 AI for Science Workshop.*

3. Wang, J., **Chen, W.**, Da, D., Fuge, M., & Rai, R.. (2022, July). IH-GAN: A Conditional Generative Model for Inverse Design of Heterogeneous Cellular Structures. In: Workshop on Machine Learning in Computational Design, *Thirty-ninth International Conference on Machine Learning (ICML).*

2. **Chen, W.**, Lee, D., & Chen, W. (2022, February). Deep Generative Models for Design Under Uncertainty. In: Workshop on AI for Design and Manufacturing (ADAM), *Thirty-Sixth AAAI Conference on Artificial Intelligence (AAAI).*

1. **Chen, W.** & Ahmed, F. (2020, July). MO-PaDGAN: Generating Diverse Designs with Multivariate Performance Enhancement. In: Workshop on Negative Dependence and Submodularity: Theory and Applications in Machine Learning, *37th International Conference on Machine Learning (ICML).*

Preprint

4. Khan, S., Masood, Z., Usama, M., Kostas, K., Kaklis, P., & **Chen, W.** (2024). Physics-Informed Geometric Operators to Support Surrogate, Dimension Reduction and Generative Models for Engineering Design. arXiv preprint arXiv:2407.07611.

3. **Chen, W.**, Sun, R., Lee, D., & Portela, C. M. (2023). Generative Inverse Design of Metamaterials with Functional Responses by Interpretable Learning. arXiv preprint arXiv:2401.00003.

2. **Chen, W.** & Fuge, M. (2020). Adaptive Expansion Bayesian Optimization for Unbounded Global Optimization. arXiv preprint arXiv:2001.04815.

1. **Chen, W.** & Fuge, M. (2018). BézierGAN: Automatic Generation of Smooth Curves from Interpretable Low-Dimensional Parameters. arXiv preprint arXiv:1808.08871.

AWARDED GRANTS

"Generation of Structurally-Functional Parametric Mechanical Shapes" awarded Siemens's Innovation Core Technology (ICT) funding, 2020 (Role: **Principal Investigator**; Award amount: €300,000)

ACADEMIC SERVICE	**Conference Organizer**
	The 25th International Conference on Engineering Design (ICED 25), Organising Committee

Session Chair
ASME IDETC, AI-Driven Design Innovation
ASME IDETC, Novel AI or ML Frameworks for Design or Systems Science

Journal Reviewer
Journal of Mechanical Design
Structural and Multidisciplinary Optimization
Computer-Aided Design
Design Science
AIAA Journal
Applied Soft Computing
Computational Materials Science
Journal of Manufacturing Processes
Journal of Computational Design and Engineering
Engineering Optimization
Cognitive Computation
Journal of Industrial Information Integration
IEEE Transactions on Industrial Electronics
IEEE Transactions on Engineering Management
Artificial Intelligence for Engineering Design, Analysis and Manufacturing
Journal of Verification, Validation and Uncertainty Quantification
International Journal of Production Research
Frontiers of Information Technology & Electronic Engineering

Conference Reviewer
ASME International Design Engineering Technical Conference (IDETC)
ACM Symposium on Computational Fabrication (SCF)
SME North American Manufacturing Research Conference (NAMRC)

INVITED TALKS

"Generative Inverse Design to Achieve Functional Responses Using Forward Machine Learning Models"
ASME IDETC 2024 Early Career Research, Aug 26, 2024

"Redesigning the Design Space: Reshaping Design Spaces with Generative Machine Learning"
AM Talks: A CAMDI Seminar Series, Center for Additive Manufacturing and Design Innovation (CAMDI), The University of Texas at Austin, Mar 29, 2024

"GAN-DUF: Hierarchical Deep Generative Models for Design Under Free-Form Geometric Uncertainty"
SIAM UQ24 mini-symposium "Generative Models for Physics-based Forward and Inverse Problems", Feb 27, 2024

"Generative Design of Multiscale Heterostructures with Blended Multiclass Metamaterials"
SES 2023 Eringen Medal Symposium, Oct 10, 2023

"PaDGAN: Learning to Generate High-Quality Novel Designs"
ASME IDETC 2022 Spotlight Session, Aug 16, 2022

"Aerodynamic design optimization and shape exploration using generative adversarial networks"
AIAA Scitech 2019 Forum, Jan 11, 2019

TEACHING EXPERIENCE

MEEN 423 Machine Learning for Mechanical Engineers
Machine learning techniques with applications to the analysis and design of mechanical, fluid,

thermal, material and multidisciplinary systems; linear and kernel support vector machines; neural networks; Bayesian techniques; decision trees and random forests; dimension reduction and model selection; data management and learner validation strategies; tools and application studies.

MEEN 401 Introduction to Mechanical Engineering Design
The design innovation process; need definition, functional analysis, performance requirements and evaluation criteria, conceptual design evaluation, down-selected to an embodiment; introduction to systems and concurrent engineering; parametric and risk analysis, failure mode analysis, material selection, and manufacturability; cost and life cycle issues, project management.

STUDENTS ADVISING

PhD Student

Haoxuan Mu	Mechanical Engineering	Aug 2023 – Present
Jiahui (Cal) Zheng	Mechanical Engineering	Aug 2023 – Present
Jipeng Cui	Mechanical Engineering	Aug 2024 – Present

MS Student

Bhavyasree Mohan	Computer Science	Feb 2024 – Present
Vinay Chandra	Computer Science	May 2024 – Present

Undergraduate Student

Aayush Garg	Computer Science	Feb 2024 – May 2024
Eddie Guerrero	Pre-Engineering	May 2024 – Aug 2024
Wisam Gadam	Mechanical Engineering	May 2024 – Aug 2024

PhD Committee Member

Gabriel Apaza	Aerospace Engineering	2024
Shantanu Vyas	Mechanical Engineering	2024
Mahtab Heydari	Mechanical Engineering	2024

OUTREACH ACTIVITIES

Hosted summer interns in the Texas Summer Research Experience program and the Research Experiences for Undergraduates (REU) program, College Station, TX   May 2024 – Aug 2024

Served as a judge for the STEM research projects of high school students at the Texas Science & Engineering Fair (TXSEF), College Station, TX   Mar 23, 2024

Advised a capstone design team at Weiss High School to create an AI-augmented device that tracks food items in a fridge/pantry using Raspberry Pi and multimodal vision LLM, Pflugerville, TX   Nov 1, 2023 – Present

Hosted a Society of Women Engineers (SWE) activity table at the annual *Kits, Cats, and Kids Block Party*, Evanston Township High School, Evanston, IL   Sep 15, 2022