

PROFESSIONAL EXPERIENCE

- 📅 2025.02 — Present **Department of Civil & Environmental Engineering, UIUC**
Postdoc Research Associate (PI: Xiaojia Shelly Zhang)
- 📅 2024.05 — 2025.02 **Department of Mechanical Engineering, Tsinghua University**
Postdoc Research Assistant, *Shuimu Tsinghua Scholar* (PI: Peng Wen)
- 📅 2018.09 — 2024.06 **School of Mechanical Engineering, Shanghai Jiao Tong University**
Integrated MSc/PhD program in ME (Advisor: Ping Zhu) GPA: 3.69 Rank: 3/108
Thesis: Energy-absorbing mechanism and design method of three-dimensional chiral mechanical metamaterials
- 📅 2014.09 — 2018.06 **School of Mechanical Engineering, Shanghai Jiao Tong University**
Bachelor in Mechanical Engineering GPA: 3.95 Rank: 1/27

RESEARCH PUBLICATIONS

In Progress (Under Review)

- 1 W.Y. Xu, D. Hong, Z. Zhao, R.D. Kundu, and X.S. Zhang. **Delaying the transmission attenuation of local deformation in soft metamaterials via mechanical-impedance-based topology optimization**, 2026.
- 2 Y.B. Wang*, A.F. Ahmed*, W.C. Li, **W.Y. Xu**, and X.S. Zhang. **Precise digital-to-physical inverse design of programmable liquid crystal elastomer architectures**, 2026.
- 3 X.Y. Tai, **W.Y. Xu**, and P. Zhu. **Gradient metamaterials with moment-of-inertia-induced low-frequency vibration attenuation**, 2025.

Journal Articles

- 1 **W.Y. Xu***, H.L. Pang*, H.J. Xu, J.G. Liu, Y.F. Zheng, and P. Wen. **Process-driven microstructure design of 3D-printed porous magnesium alloy scaffolds with tunable biodegradation kinetics**, *Int. J. Mach. Tools Manuf.*, vol. 215, p. 104362, 2025.
- 2 J.M. Liu, B. Peng, **W.Y. Xu**, Y. Wei, and P. Wen. **Highly Efficient Discovery of 3D Mechanical Metamaterials via Monte Carlo Tree Search**, *Adv. Sci.*, vol. 12, p. e13771, 2025.
- 3 Z.Z. Song, **W.Y. Xu**, M.A. Valdebenito, and M.G.R. Faes. **Efficient forward and inverse uncertainty quantification for dynamical systems based on dimension reduction and Kriging surrogate modeling in functional space**, *Mech. Syst. Signal Pr.*, vol. 235, p. 112898, 2025.
- 4 Z.J. Pei*, H.J. Xu*, M.Z. Guo*, **W.Y. Xu**, Y. Wen, F.P. Sun, T.Y. Zhang, B. Peng, P.Q. Zhao, L.K. Huang, M.Y. Wang, Z.S. He, J.Z. Liu, Z.C. Yang, Z. Zhang, P. Wen, and L.Y. Wen. **A soft-hard hybrid scaffold for osteochondral regeneration through integration of composite hydrogel and biodegradable magnesium**, *Biomaterials*, vol. 324, p. 123493, 2025.
- 5 **W.Y. Xu**, C. Zhou, H.Y. Zhang, Z. Liu, and P. Zhu. **A flexible design framework for lattice-based chiral mechanical metamaterials considering dynamic energy absorption**, *Thin-Walled Struct.*, vol. 203, p. 112108, 2024.
- 6 **W.Y. Xu**, H.Y. Zhang, Z. Liu, and P. Zhu. **Aperiodic design framework of chiral mechanical metamaterials considering crashworthiness**, *J. Mech. Eng.*, JME2023-1296, 2024. (In Chinese)
- 7 L. Zhang, **W.Y. Xu**, R.Y. Qiu, D.K. Xu, H.Y. Zhang, and P. Zhu. **Multiscale-based multiaxial fatigue model of short fiber reinforced polymer composites under high-cycle proportional loading**, *Compos. Part B-Eng.*, vol. 275, p. 111308, 2024.
- 8 **W.Y. Xu**, L. Zhang, B.Q. Zhang, H.Y. Zhang, Z. Liu, and P. Zhu. **Crushing behavior of contact-aided AlSi10Mg sandwich structure based on chiral mechanical metamaterials**, *Int. J. Mech. Sci.*, vol. 260, p. 108636, 2023.
- 9 **W.Y. Xu***, L.W. Wang*, Z. Liu, and P. Zhu. **General assembly rules for metamaterials with scalable twist effects**, *Int. J. Mech. Sci.*, vol. 259, p. 108579, 2023.
- 10 **W.Y. Xu**, Z. Liu, L.W. Wang, and P. Zhu. **3D chiral metamaterial modular design with highly-tunable tension-twisting properties**, *Mater. Today Commun.*, vol. 30, p. 103006, 2022.

Conference Proceedings/Oral Presentations

- 1 W.Y. Xu, B. Peng, and P. Wen. **SD-DAL: Structure discovery of elastic metamaterials via deep active learning**, *APS Global Physics Summit 2025*, Anaheim, CA, USA, Mar. 17-21, 2025.
- 2 W.Y. Xu, X.Y. Tai, and P. Zhu. **Bio-inspired Mechanical Metamaterials with Enhanced Energy Absorption**, *APS Global Physics Summit 2025*, Anaheim, CA, USA, Mar. 17-21, 2025.
- 3 W.Y. Xu, H.J. Xu, H.L. Pang, J.G. Liu, and P. Wen. **Corrosion resistance and mechanical properties of biodegradable WE43 magnesium alloy porous structure controlled by 3D printing layer thickness**, *The 2nd Ganjiang Academic Forum on Biomaterials and Medical Devices*, Ganzhou, China, Nov. 22-24, 2024.
- 4 W.Y. Xu. **High temperature oxidation treatment of magnesium alloys in additive manufacturing**, *2024 Chinese Society for Biomaterials (CSBM) Annual Symposium*, Weihai, China, Oct. 11-13, 2024.
- 5 W.Y. Xu. **Energy absorption mechanism of three-dimensional chiral mechanical metamaterials and their application in the frame of electric heavy-duty trucks**, *The 2nd Doctoral Academic Forum of the China Society of Automotive Engineers*, Beijing, China, Jun. 15-16, 2024.
- 6 W.Y. Xu, W.J. Wang, and P. Zhu. **GNN-based inverse design of three-dimensional aperiodic metamaterials enabling programmable shapes**, *APS March Meeting 2024*, Minneapolis, MN, USA, Mar. 3-8, 2024.
- 7 W.Y. Xu, H.Y. Zhang, Z. Liu, and P. Zhu. **On the crashworthiness of aperiodic chiral mechanical metamaterials: design and modeling method** in *J. Phys. Conf. Ser.*, vol. 2639, p. 012029, 2023.

Patents

- 1 W.Y. Xu, P. Zhu, Z. Liu, and Y.F. Li. **Chiral mechanical metamaterial sandwich structures with size-effect-free twist and the applications**, China Patent CN115691719B, Jul. 29, 2025. (Authorized)
- 2 P. Zhu, L. Zhang, Z. Liu, W.Y. Xu, and Z.Z. Song. **Stiffness-based mixed rapid prediction method for fatigue life of SFRP**, China Patent CN116305990B, Jul. 22, 2025. (Authorized)
- 3 P. Zhu, W.Y. Xu, Z. Liu, L.W. Wang, and L. Zhang. **Automatic simulation system and method for strut-based metamaterial under multiple working conditions**, China Patent CN114297877B, Nov. 5, 2024. (Authorized)
- 4 P. Zhu, W.Y. Xu, Z. Liu, and M.S. Li. **Mesosopic structural optimization methods**, China Patent CN110362912B, Nov. 8, 2022. (Authorized)
- 5 W.Y. Xu, P. Zhu, and W.Z. Guo. **Foldable multi-form electric vehicle**, China Patent CN109178180B, May 5, 2020. (Authorized)
- 6 H.Y. Zhang, W.Y. Xu, Z. Liu, and P. Zhu. **Implementation method for aperiodic chiral mechanical metamaterial**, China Patent CN120781587A, Oct. 14, 2025. (Pending)
- 7 Z. Liu, W.Y. Xu, and P. Zhu. **Twist angle measurement fixture for compression-torsional testing of chiral mechanical metamaterial**, China Patent CN116026678A, Apr. 28, 2023. (Pending)

Book and Chapter

- 1 P. Zhu. **Advanced design theory and methodology**. Beijing, China: China Machine Press, 2023, ISBN: 978-7-111-71470-5. (in Chinese) (Chapter 3 and 7)

MISCELLANEOUS EXPERIENCE

Representative Research Funding Acquisition

- **National Natural Science Foundation of China (Grant No. 12472119)** 2025.01 — 2028.12
Energy absorption mechanism and design of 3D chiral mechanical metamaterials based on PINN
- **Shanghai Natural Science Foundation (Grant No. 23ZR1431600)** 2023.04 — 2026.03
Research on energy absorption mechanism and optimization design method of 3D chiral metamaterials
- **Shanghai Natural Science Foundation (Grant No. 21ZR1431500)** 2021.04 — 2024.03
Research on data-driven multi-scale optimization design method of mechanical metamaterial

Leadership & Service

Student President of Graduate Union, Shanghai Jiao Tong University	2019.05 — 2020.07
Certified Volunteer, 2025 Christie Clinic Illinois Race Weekend	2025.04
Certified Volunteer, 2016 Shanghai International Marathon	2016.11

Teaching Assistant

Undergraduate Course <i>Open Source and Modeling</i>	Spring Semesters, 2021-2022
Undergraduate Course <i>Fundamentals of Manufacturing Processes</i>	Fall Semesters, 2019-2023
Undergraduate Course <i>The Way To Success</i>	Fall 2015

Industry Experience

Face Recognition Project Internship, Honeywell (China) Ltd., Shanghai	2018.07 — 2018.08
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AWARDS & HONORS / FELLOWSHIPS

National Scholarship (1%), Ministry of Education of P. R. China	2017/2019/2023
National Inspirational Scholarship, Ministry of Education of P. R. China	2016
Merit Student Award, Shanghai Jiao Tong University	2017
Outstanding Graduate Award, Shanghai Jiao Tong University	2018
Excellent Graduation Design Award, School of Mechanical Engineering, SJTU	2018
1 st Place in Road Test Competition of PACE, General Motors (North America) Ltd.	2018
2 nd Place of 30 th International Design Contest ROBOCON, MIT	2019
Inspirational Individual Award, Shanghai Jiao Tong University	2020
Excellence Teaching Assistant Award, Shanghai Jiao Tong University	2020
Shanghai PhD Outstanding Graduate Award, Shanghai Jiao Tong University	2024
APS DMP Ovshinsky Travel Award, APS Division of Materials Physics	2024
APS FGSA Graduate Research Excellence Travel Award, APS FGSA	2024
Class D Municipal High-level Talent, Ganzhou, Jiangxi Province, P. R. China	2024
Shuimu Tsinghua Scholar Fellowship, Tsinghua University	2024
Excellent PhD Dissertation, School of Mechanical Engineering, SJTU	2025
Scholarship and Teaching for Engineering Postdocs (STEP) Program, GCOE, UIUC	2025

SKILLS

Languages	Strong reading, writing, and speaking competencies for English and Mandarin Chinese.
Coding	Java, Python, C/C++, SQL (Postgres), JavaScript, MATLAB, Latex.
CAD	Solidworks, Unigraphics NX, AutoCAD, Blender, nTopology, ParaView
CAE	ABAQUS, ANSYS, COMSOL Multiphysics, LS-DYNA, Hypermesh, FEniCSx
Hardware	Arduino, STM8/STM32, Raspberry Pi
Manufacturing	CNC, Casting, Additive Manufacturing (FDM, SLA, SLM, SLS), DIY 3D-Printer