Bujingda Zheng, Ph.D

Assistant professor, department of Mechanical Engineering, Western New England University

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Google Scholar: https://scholar.google.com/citations?user=frtQLcQAAAAJ&hl=en&oi=ao

Research Interests

- AI-driven autonomous manufacturing
- Hybrid additive manufacturing (3D printing)
- Digital twins for manufacturing
- Mechatronics and robotics

Education

University of Missouri | Columbia MO, US

Doctor of Philosophy, Mechanical and Aerospace Engineering	01/2020 – 05/2024
Minor in Statistics	01/2020 – 02/2023

The University of Melbourne | Melbourne, Australia

Master of Engineering (*with Distinction*), Mechanical Engineering	07/2016 – 07/2018

Northwestern Polytechnical University | Xi'an, China

Bachelor of Engineering, Aircraft Manufacturing Engineering	09/2012 – 07/2016

Work Experience

Assistant Professor at Western New England University	08/2024 – present
Graduate research project 'Freeform 3D Printing of Dirt with Seed'	08/2023 – 05/2024
Graduate research project 'LIG Manufacturing with Bayesian Optimization'	08/2023 – 05/2024
Capstone project 'Autonomous Navigation Robot Based on Machine Vision'	08/2023 – 12/2023
Capstone project 'Close loop Manufacturing Process with Multi-Sensor Integration'	08/2022 – 12/2022
Teaching assistant of (MAE 3100) Numerical Simulation Lab	08/2022 – 05/2023
Teaching assistant of (MAE 4825) Additive/Subtractive Manufacturing & PLC Lab	08/2021 – 05/2022
Teaching assistant of (MAE 3800) Mechatronics Lab	08/2020 – 05/2021

Publications (Google Scholar citations: 216 as of Oct 24, 2025)

- Ruckman, K.[†], **Zheng, B.**[†], Byfield, R., Sattari, K., Xie, Y.[†*], Lin, J.*. Autonomous Manufacturing Robot with Computer Vision Models for Optimizing Nanomaterial Surface Wettability. Under preparation.

- Peralta, M., Ruckman, K., **Zheng, B.**, Yunchao, X., Bayati, M., Lin, J., & Fidalgo, M. (2025). In Situ Fabrication of Functionalized Laser-Induced Graphene Materials for Water Treatment Applications. *Journal of Environmental Chemical Engineering*.

- Xia, C., Lee, CH., Leifer, M. and **Zheng, B***. (2025) Additive Reinforced Concrete (ARC) for Multifunctional Construction Component. *Proceedings of International Structural Engineering and Construction (Accepted)*

- Yang, S., Elkasabi, Y., Yan, Q., **Zheng, B.**, Qian, H., Lin, J., Wan, C. Self-Detached Laser Induced Graphene Derived from Bio-oil Distillation Residues for Multifunctional Applications. (2025) *Carbon*

- **Zheng, B.**, Xie, Y., Xu, S., Meng, A.C., Wang, S., Wu, Y., Yang, S., Wan, C., Huang G., Tour, J.M., and

Lin, J. (2024) Programmed Multimaterial Assembly by Synergized 3D Printing and Freeform Laser Induction. *Nature Communications*

· Wu, Y., Qiu C., Silva, K., Wang, S., **Zheng, B.**, Chen, Z., Huang, G., Tour, J.M., & Lin, J. Manipulate Dynamic Chemical Interactions in Renewable Biopolymers for 3D Printing Tunable, Healable, and Recyclable Metamaterials. (2024). *Chemical Engineering Journal*

· Xie, Y., Xu, S., Meng, A., **Zheng, B.**, Chen, Z., Tour, J.M., & Lin, J. Laser-Induced High-Entropy Alloys as Long-Duration Bifunctional Electrocatalysts for Seawater Splitting. (2024). *Energy & Environmental Science*

· Yang, S., **Zheng, B.**, Qian H., Zhang H., Yan Q., Huang G., Lin, J., Wan, C. Low-defect Laser-induced Graphene from Lignin for Smart Triboelectric Touch Sensors. (2024) *ACS Applied Nano Materials*

· Wu, Y., Su, C., Wang, S., **Zheng, B.**, Mahjoubnia, A., Sattari, K., Zhang, H., Meister, J., Huang, G. and Lin, J., (2023). A photocured Bio-based shape memory thermoplastics for reversible wet adhesion. *Chemical Engineering Journal*

· **Zheng, B.**, Zhao, G., Yan, Z., Xie, Y., & Lin, J. (2022). Direct Freeform Laser Fabrication of 3D Conformable Electronics. *Advanced Functional Materials*

· **Zheng, B.**, Su, J. W., Xie, Y., Miles, J., Gao, W., Xin, M., & Lin, J. (2022). An Autonomous Robot for Shell and Tube Heat Exchanger Inspection. *Journal of Field Robotics*

· Xie, Y., Zhang, C., Deng, H., **Zheng, B.**, Su, J. W., Shutt, K., & Lin, J. (2021). Accelerate Synthesis of Metal–Organic Frameworks by a Robotic Platform and Bayesian Optimization. *ACS Applied Materials & Interfaces*

· Qiu, F., Bu, K., **Zheng, B.**, & Tian, G. (2020). Control of edge plate stray grain of single-crystal turbine blade by using process bar method. *International Journal of Metalcasting*

Presentation:

· **Zheng, B.**, & Lin, J. *ASME IDETC-CIE 2023.* Fabrication of 3D conformable electronics on arbitrary curvilinear surfaces by direct freeform laser technique. (2023)

· **Zheng, B.** *Annual SME Student Night presentation.* Freeform Multimaterial Assembly via 3D printing and spatial laser induction. (2023)

Patent

Programmed Multimaterial Assembly via 3D Printing and Freeform Laser Induction: apparatus and methods of use thereof   Status: filed under 194/23,935

Grant Writing

PI/CO-PI

Western New England University   08/2024 – present

1. SimulARC: A Rheology-Informed Adaptive Co-Extrusion platform for Additive Manufacturing of Cementitious Mortars and Thermoplastic Materials. Agency: NSF. Funding: $420k. Under review.

2. AI/AE for Rapid, Industry-informed, Sustainable, and Scalable Advanced Semiconductor Packaging and Thermal Management Materials. Agency: NIST. Funding: $30M. Under review.
3. Western New England University Internal Grant. New faculty start-up package $30k. Awarded.

Lead writer

University of Missouri   01/2020 – 12/2023

1. Toward Autonomous Laboratories: Convergence of Artificial Intelligence and Experimental Automation for Future Materials Processing. Agency: UM MAE (Internal). Funding: $15k. Awarded: 06/2022.
2. Developing a Facile Technology for Converting Domestic US Coal into High-Value Graphene. Agency: DOE. Collaborator: Universal Matters. Funding: $150k. Awarded: 09/2022.
3. A Data-driven Closed-loop Framework for De Novo Generation of Molecules with Targeted Properties. Agency: NSF. Funding: $360k. Awarded: 05/2022.
4. Flash Joule Heating to Destroy Hazardous Waste and Repurpose it For Energy or Urban Mining of Valuable Metals. Agency: US Army ERDC. Collaborator: Rice University. Funding: $100k. Awarded: 09/2021.
5. Super hydrophobic laser induced graphene-ceramic composite membrane for membrane distillation. Agency: Bureau of Reclamation. Funding: $250k. Awarded: 01/2021.
6. Explainable deep neural networks for rapid identification of materials spectra based on limited data. Agency: Sony Research Award Program. Funding: $100k. Awarded: 03/2020.

Teaching Experience (Evaluation reports are included at the end of the teaching statement.)

ME – 311: Mechatronics   (student evaluation: **4.38**/5.0)

Micro-controller programming, sensor and actuator usage, data analysis

ME – 324: Design of Mechatronics systems   (student evaluation: **4.67**/5.0)

System level micro-controller programming, power-supply, remote control and sensing

ME – 455: Applications of Mechatronics system   (student evaluation: **4.80**/5.0)

Mechatronics system design, PID design and parameter tuning, 3D printer modification

ME – 655: Advanced Mechatronics systems   (student evaluation: **4.80**/5.0)

Computer vision, human machine interface, feedback system design

ME – 671: Machine Learning and Its Applications   (first offering)

Python basics, traditional ML algorithms, neural networks, deep learning, reinforcement learning.

Advising

Graduate students:

Jenil Patel (PhD student, focus: AI and Computer Vision)

Max Leifer (Master student, focus: multi-material additive manufacturing)

Amit Motwani (Master student, focus: sensor fabrication)

Jerin Lnu (Master student, focus: 3D scanning, system reliability)

Undergraduate students:

Mason E. Blount	Isaiah M. Priest
Angelees Carrasquillo	Sullivan J. Quirk
Bismuth Furesz	Alex D. Rivers
Justin R. Loveland	Julio A. Serrano
Emilio Mendez	Bourne F. Spooner

Aaron Thapa   Jack Graney

Khoa Vu   Atilla Troy

Tjay Wharton

Project Experience

1.**An AI-enabled robot for detecting heat exchanger defects.**

Developed an autonomous robot for operating ECT instrument and a CNN model achieving 99% accuracy for ECT data analysis, eliminating the need for human involvement in the heat exchanger inspection process.

Media coverage:

https://engineering.missouri.edu/2022/engineers-develop-robot-to-automatically-inspect-heat-exchangers/

2.**Conformal 3D electronics fabrication process.**

Developed a 5-axis laser process capable of precisely focusing the laser perpendicular to any freeform surface, thereby facilitating the fabrication of 3D conformal electronics.

Media coverage:

https://www.mittrchina.com/news/detail/11366

3.**A low-cost multilayer PCBs fabrication process by desktop hybrid 3D printers.**

Developed a hybrid process utilizing FFF 3D printing for multilayer PCB substrate fabrication and laser synthesis for 3D conductive traces, with an equipment setup cost of under $1000.

Media coverage:

https://techxplore.com/news/2024-06-required-3d-method-multi-materials.html#google_vignette

4.**Vision-Guided Manufacturing of Tunable Nanomaterial Wettability**

Developed an AI-guided autonomous manufacturing platform integrating real-time computer vision detection and closed-loop control to rapidly fabricate laser-induced graphene surfaces with programmable wettability, enabling precise formation of super-hydrophilic and super-hydrophobic regions.

5.**Laser-Induced High-Entropy Alloy for Seawater Splitting**

Developed a rapid, ambient-condition CO_2 laser induction method to synthesize FeNiCoCrRu high-entropy alloy nanostructures with uniform, phase-stable composition, achieving 0.148 V (HER, 600 mA/cm²) and 0.353 V (OER, 300 mA/cm²) overpotentials and stable seawater electrolysis for 3000 hours.

6.**Additive Reinforced Concrete (ARC) for multifunctional construction components.**

Developed a hybrid 3D printing method combining FFF and CEP to create polymer-embedded concrete with improved insulation and 24% lower heating energy use.

Professional Skills

Mechanical Engineering
- SolidWorks, NX, AutoCAD, GD&T, DFA, DFM (10 years of mechanical design experience).
- Abaqus, Ansys, Fluent, COMSOL, OpenFoam (2 years of research experience).
- PowerMill, MeshCAM (2 years of 3-axis CNC teaching/manufacturing experience).
- FFF, DLP, SLA, LCD additive manufacturing (5 years of research/development experience).

Computer Programming
- MATLAB, Python, C++ R, Gcode (8 years of research and robotic development experience).

Embedded System

·   Arduino, ESP32, OpenMV, Allen-Bradley CompactLogix 5380 PLC (Ladder logic), multiple sensors (5 years of research/teaching experience).

List of Recommenders

Dr. Jian Lin (my Ph.D. advisor)
University of Missouri, Columbia, MO, 65211
Email: linjian@umsystem.edu

Dr. Zheng Yan (project collaborator)
University of Missouri, Columbia, MO, 65211
Email: yanzhen@umsystem.edu

Dr. Ming Xin (project collaborator)
University of Missouri, Columbia, MO, 65211
Email: xin@umsystem.edu

Dr. Sheldon Xie (project collaborator)
University of North Carolina at Charlotte, Charlotte, NC 28223
Email: yxie10@charlotte.edu