Bujingda Zheng, Ph.D

Assistant professor, dept. of Mechanical Engineering, Western New England University

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Research Interests

- Hybrid & Multi-material Additive Manufacturing
- Robotic & Mechatronic Manufacturing Systems
- AI-Enabled Closed-Loop Manufacturing
- Laser-Based Manufacturing

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

Academic appointments

Assistant Professor at Western New England University	08/2024 – present

Prior Research Experience

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

Grant

PI/CO-PI (Institutional Lead, WNEU component**)**

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.

Publications (†: equal contribution, *: corresponding author, ‡: student advised by the applicant)

- **Zheng, B**, Xie, Y*. Additive lamination of functional thermoplastic films for three-dimensional electronic integration. *Under preparation*.

- 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*

- 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 US194/23,935

A Multi-Material Laser-Cutting Hot-Press Printing Platform and a Manufacturing Method Thereof

Status: under preparation

Teaching Experience

Western New England University:

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   (student evaluation: **4.95**/5.0)

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

University of Missouri:

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

Student Advising

Graduate students:

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

Charles Przechocki (MS student, focus: Robotics)

Max Leifer (MS student, [1 publication](#), focus: multi-material additive manufacturing, laser processing)

Amit Motwani (MS student, focus: sensor fabrication)

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

Undergraduate students:

Mason E. Blount	Julio A. Serrano
Bismuth Furesz	Bourne F. Spooner
Justin R. Loveland	Aaron Thapa
Emilio Mendez	Khoa Vu
Isaiah M. Priest	Tjay Wharton
Sullivan J. Quirk	Jack Graney
Alex D. Rivers	Atilla Troy

Professional Service

Guest Editor for *Nanomaterials*

Reviewer for *IEEE Transactions on Reliability*

Reviewer for *Applied Sciences*

Reviewer for *Processes*

Reviewer for *Modelling*

Reviewer for *ISEC 2025*

Reviewer for *ASME IDETC-CIE 2024*

Reviewer for *ASME IDETC-CIE 2023*

Reviewer for *Academia Engineering*

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 (12 years of mechanical design experience).
- Abaqus, Ansys, Fluent, COMSOL, OpenFoam (4 years of research experience).
- PowerMill, MeshCAM (4 years of 3-axis CNC teaching/manufacturing experience).
- FFF, DLP, SLA, LCD additive manufacturing (7 years of research/development experience).

Computer Programming

- MATLAB, Python, C++ R, Gcode (10 years of research and robotic development experience).

Embedded System

- Arduino, ESP32, OpenMV, Allen-Bradley CompactLogix 5380 PLC and Click PLC (Ladder logic), multiple sensors (6 years of research/teaching experience).