Bujingda Zheng

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Available to relocate nationwide

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

Professional skills

Mechanical Engineering
- SolidWorks, NX, AutoCAD, GD&T (10 years of 3D modeling/drafting experience).
- Abaqus, Ansys, Fluent, COMSOL, OpenFoam (Solid mechanics, fluid dynamics, 2 years of research experience).
- PowerMill, MeshCAM (2 years of 3-axis CNC teaching/research experience).
- FFF, DLP, SLA, LCD additive manufacturing (Hardware design/manufacturing, parameter optimization, firmware customization, development of 3/5-axis slicing tool path, 5 years of research/development experience).

Material Characterization
- Raman spectrometer, scanning electron microscope (SEM), tensile testing, four-point-probe sheet resistance tester, hardness testing, UV-visible absorption spectrometer (material characterization, mechanical performance testing, 5 years of research experience).

Computer Programming
- MATLAB, Python, R (Large-scale data processing, machine/reinforcement/deep learning, statistical analysis, real-time sensor data visualization, computer vision, hardware-software integration, numerical simulation of ordinary/partial differential equations, fluid dynamics simulation, kinematic modeling, 7 years of research and development experience).

Embedded System
- Arduino, ESP32, OpenMV, multiple sensors (Python/C++ programming, edge computing, wireless data transmission, multi-hardware integration, development of robotic systems for mechanical arm/intelligent vehicles/quadcopter drones/NDE defect detection in metal tubes, PID feedback controller debugging, pressure/Hall effect/optical sensor arrays, 5 years of research/development experience).
- Eddy current tester (Through integration with autonomous mobile platforms, microcontroller communication, real-time data analysis using deep learning, achieving automatic detection of defects in metal pipes, 2 years of research experience).
- Structured light 3D scanner (mesh to solid body conversion, 1 year of research experience, 2 years of teaching experience).
- Programmable logic controller (Logix 500, Studio 5000 PLC programming, 2 years of

teaching experience).

Research Interests

Robotics, Computer vision, Deep Learning, Sensors, Additive Manufacturing

PhD Research Projects

- Led a team of 7 on a robotic project, achieving the goal of autonomous heat exchanger tube defects inspection. The robot uses computer vision, April-tag and Hough transform algorithms to navigate to the target. With data augmentation, we addressed the issue of insufficient data. The CNN model we trained achieves a 99% accuracy in classifying heat exchanger tube defects. Published in the *Journal of Field Robotics*.
- Led a team of 5 on the project, developed a 5-axis laser machine, achieving the goal of fabricating conformal electronic devices on planar surface. Applications include circuits on shells and strain sensors on tree twigs. Published in *Advanced Functional Materials and featured on MIT Technology Review*.
- Led a team of 11 in developing a lasing and printing hybrid platform, achieving the goal of fabricating PCB with a desktop 3D printer. This project combines fused filament fabrication for structural materials like polycarbonate with freeform laser induction and direct ink writing for functional materials such as silver and semiconductors. Research outcomes accepted by *Nature Communications*.

Research Outcomes

Published 3 papers as first author:

- **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* (Accepted)
- **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*

Published 6 papers as co-author:

- 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). To be submitted.
- 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. (2024) Low-defect Laser-induced Graphene from Lignin for Smart Triboelectric Touch Sensors. *Carbon*
- 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*

- 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: **Ongoing**

Teaching & Mentorship experience

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

Grant writing

Co-author of a proposal funded by the National Science Foundation (NSF).

Honors & Awards

ASME IDETC-CIE Conference travel award	8/2023
SME student's night best presentation award	5/2023
Mizzou Graduate Fellowship	1/2020
Awarded with the degree of Master of Engineering with Distinction	7/2018
2nd Class Scholarship of School of Engineering in NPU	9/2015
2nd place in Navigation Cup Competition	8/2015
2nd Class Scholarship of School of Engineering in NPU	9/2014