

Weijun Zhang

Curriculum Vitae

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in wei-jun-zhang

"Be the change that you want to see in the world."

Career Objective: To advance intelligent and sustainable manufacturing through research in adaptive control, additive-hybrid processes, and human-machine collaboration, while fostering inclusive, hands-on education that empowers students to innovate and lead in industry and academia.

Research Interests

My research focuses on **intelligent metal additive and hybrid manufacturing**, with an emphasis on real-time sensing, multi-sensor data fusion, and adaptive closed-loop process control. I am interested in developing unified control architectures for advanced manufacturing system that integrate multi parameters' regulation through physics-informed and AI-driven strategies. Related topics include **hybrid additive-subtractive manufacturing** for aerospace, defense, and semiconductor applications; **thermal-mechanical modeling** and **microstructure-property relationships**; **digital twins and cyber-physical manufacturing systems**; and **human-machine integration** through explainable AI and adaptive interfaces. My work aims to advance **Industry 5.0** concepts by creating autonomous, geometry-aware, and human-centered manufacturing ecosystems.

Education

Expected Mar. 2026 **Ph.D. in Mechanical and Aerospace Engineering**, *University of California, Davis*, GPA: 3.775/4.00

Dissertation: "A Comprehensive Directed Energy Deposition (DED) Control System for Geometric Accuracy, Productivity, and Thermal Management"

Advisor: Prof. Masakazu Soshi

Aug. 2020 **M.S. in Mechanical and Aerospace Engineering**, *University of California, Davis*, GPA: 3.730/4.00

Thesis: "Development of an additive and subtractive hybrid manufacturing process planning strategy of planar surface for productivity and geometric accuracy"

Advisor: Prof. Masakazu Soshi

Jul. 2015 **B.S. Mechanical Design, Manufacturing & Automation**, *Shaoxing University*, GPA: 3.686/4.500, Rank: 1/65

Jul. 2013 **B.S. Mechanical Design, Manufacturing & Automation**, *Shaoxing Institute of Technology*, GPA: 3.686/4.500, Rank: 1/130

Skills

Traits	Honest and diligent; reliable and well-organized; analytical and practical problem solver; clear and logical communicator; collaborative team member in diverse and multicultural environments; confident yet teachable mentor with emerging leadership capability.
Software	Python, Git, AutoCAD, SOLIDWORKS, Siemens NX, Pro/ENGINEER, ES-PRIT, Mastercam, Fusion 360, G-code (FANUC, SIEMENS), PyTorch, MATLAB, R, PLC Programming, Abaqus, ANSYS, LabVIEW, C/C++, LaTeX
Hardware	CNC machining (lathe, mill, EDM, grinding), 3D printing (DED, SLM, FFF), manual machining, CMM metrology, Arduino, circuit assembly
Languages	Fluent in English; Native Mandarin Chinese and Jiangshan dialect

Research Projects

- 2022–Present **Comprehensive DED Control System, UC Davis**
- Developed and validated a **first-of-its-kind comprehensive, real-time monitoring and control system** for Directed Energy Deposition (DED) processes by adopting multiple sensors, forming the core of the Ph.D. dissertation.
 - Designed **dual-loop, hybrid controllers** (manipulating both laser power, deposition feed rate, and powder flow rate) to achieve multi-objective control over geometric accuracy, productivity and thermal management for part quality.
 - Implemented a hybrid laser-power and feed-rate control and a cascade control to stabilize the melt pool, reducing build height variability by **56%** and improving width uniformity by **50%**, while simultaneously cutting cycle time by over **25%**.
 - The system was validated on two different laser head systems to produce parts with better residual stress outcomes, contributing directly to four journal publications.
- 2023–Present **Material Property Analysis of DED Thin-Walls, UC Davis, J-PARC, KIT**
- Prepared samples through cutting, polishing, mounting and grinding for microscopy.
 - Measured internal residual stress using neutron diffractometer.
 - Analyzed porosity, grain size, hardness, and tensile strength of 316L thin-wall specimens.
 - Results showed that energy-based control **reduced residual stress** and powder-based control **induced beneficial compressive stress**.
 - These studies establish a foundation for **material-aware adaptive control**
- 2024–2025 **Comparative Study of Hybrid Additive-Subtractive Processes, UC Davis, UW–Madison, TU Wien**
- Benchmarked three hybrid processes—DED (powder), WAAM (wire), and friction surfacing (solid rod)—by fabricating identical artifact geometries.
 - Assessed differences in geometric accuracy, material behavior, and system integration to inform hybrid AM research and process selection.
 - Analyzed key process outcomes, including cycle time, resource consumption, distortion, energy consumption, microstructure, hardness, and tensile strength.
 - It was observed that: Friction Surfacing demonstrates **higher hardness** due to its solid-state nature; Wire Arc Additive Manufacturing offers **lower cycle times** and **resource consumption**; and Directed Energy Deposition provides **near net shape geometries**.

Work Experience

2021–2022 **Mac System Product Design Intern, Apple R&D, Shanghai**

- Contributed to data-driven mechanical sensing and input system development for Mac products through mechanical design and physics-informed machine learning modeling.
 - Developed sensing solutions that improved interaction localization accuracy from 83% to 97%.
 - Performed DOE to identify root causes of performance variation and implement corrective design actions.
 - Designed components in Siemens NX, conducted FEA in ABAQUS, and collaborated with cross-functional engineering teams.
- Fabricated and validated functional prototypes and test fixtures using advanced manufacturing methods, including metal additive manufacturing, wire EDM, and multi-axis CNC machining.

Teaching Experience

2022–2023 **Associate Instructor, UC Davis, MAE Dept.**

ABET-accredited Courses: ENG 004 (Engineering Graphics), EME 050 (Manufacturing Processes)

- Instructed 140+ undergraduates in engineering design, graphical communication (2D/3D CAD), and hands-on manufacturing methods (GD&T, machining, additive manufacturing).
- Delivered ABET-aligned lectures 2–3 times per week; designed and administered exams.
 - Champion an experiential, inclusive, and research-informed pedagogy to prepare students for Industry 5.0.
- Integrated up-to-date research topics such as metal 3D printing, process planning, and metrology into a practice-oriented curriculum.
- Supervised 10 teaching assistants supporting studio instruction, machine tool demos, and grading.
- Earned student evaluations exceeding 90% satisfaction.

2019–Present **Teaching Assistant, UC Davis, MAE Dept.**

ABET-accredited Courses: ENG 004 (Engineering Graphics), EME 108 (Measurement Systems), EME 050 (Manufacturing Processes), EME 154 (Mechatronics), MAE 257 (Advanced Manufacturing)

- Led hands-on labs sessions for 300+ undergraduates, including engineering sketching/CAD (SOLIDWORKS), CNC machining (Clausing lathe, Bridgeport mill, DMG MORI DMU50 with Fusion 360 CAM), LabVIEW circuits/sensors, and mechatronics projects with PID control systems.
- Designed graduate-level manufacturing demos (high-speed CNC machining, chatter vibration analysis).
- Delivered pre-lab lectures&discussions, graded assignments/reports/exams with detailed feedback.
- Consistently received over 90% satisfaction in student and faculty evaluations.

Selected Publications and Manuscripts.

A. Accepted and Published Journal Articles

- 1 **Zhang, W.**, Yang, M., Li, G., and Soshi, M., "Productive Energy Fluence (PEF) controller using feed and laser hybrid control for Directed Energy Deposition (DED)." *Journal of Manufacturing Processes*, Vol. 142, pp. 1–17, 2025.
- 2 Baumann, C.*, Yerranagu, M.*, **Zhang, W.***, Deshpande, A., Maier, S., Gössinger, S., Soshi, M., Bleicher, F., and Pfefferkorn, F. E., "Comparison of three hybrid metal additive-subtractive manufacturing processes." *CIRP Annals*, 2025. (*Co-first author).
- 3 Lafirenza, M.*, **Zhang, W.***, and Soshi, M., "Development of a cost-effective dual-camera real-time monitoring system for clad height control in 3D direct energy deposition processes." *Manufacturing Letters*, Vol. 44, pp. 904–914, 2024. (*Co-first author).
- 4 **Zhang, W.**, Yang, M., Mao, W., Takesue, S., and Soshi, M., "The effect of productive and quality deposition strategies on residual stress for Directed Energy Deposition (DED) process." *Manufacturing Letters*, Vol. 41, pp. 868–878, 2024.
- 5 **Zhang, W.**, Soshi, M., and Yamazaki, K., "Development of an additive and subtractive hybrid manufacturing process planning strategy of planar surface for productivity and geometric accuracy." *The International Journal of Advanced Manufacturing Technology*, Vol. 109(5), pp. 1479–1491, 2020.
- 6 **Zhang, W.**, Dong, Y., and Xu, J., "Subassembly Indexing Approach Based on Fastening-Connection Relationship." *Proceedings of the 14th IFToMM World Congress*, pp. 69–77, 2015.

B. Manuscripts Under Review/In Preparation

- 1 **Zhang, W.**, and Soshi, M., "A Comprehensive Directed Energy Deposition (DED) Control System for Geometric Accuracy, Productivity, and Thermal Management" *Additive manufacturing* (Manuscript in Preparation).
- 2 **Zhang, W.**, and Soshi, M., "Quality prodwer fluence (QPF) controller using dual-loop control for directed energy deposition (DED) process" *CIRP Annals*, (Manuscript in Preparation).
- 3 Ahmed, O. K., **Zhang, W.**, and Soshi, M., "Algorithmic optimization of process selection for additive-subtractive hybrid manufacturing ." *Journal of Manufacturing Systems* (Under Review).
- 4 Takesue, S., **Zhang, W.**, and Soshi, M., "Effect of real-time multi-objective deposition control on material properties in directed energy deposition (DED) process" *Scripta Materialia*,(Manuscript in Preparation).

Conference Proceedings

- 2025 NAMRC 53 (Clemson University, Greenville, SC): *Development of a cost-effective dual-camera monitoring system for clad height control in DED.*

- 2025 MSEC 2025 (Clemson University, Greenville, SC): *A Comprehensive Directed Energy Deposition (DED) Control System for Geometric Accuracy, Productivity, and Energy Management.*
- 2024 NAMRC 52 (University of Tennessee, Knoxville, TN): *Effect of Productive and Quality Deposition Strategies on Residual Stress in DED.*
- 2019 MTTRF Conference (San Francisco, CA): *Development of Additive & Subtractive Hybrid Manufacturing Process Strategy to Achieve Accurate Geometry.*
- 2018 MTTRF Conference (San Francisco, CA): *Experiment-based Development of Directed Energy Deposition Process Strategy to Achieve Sufficient Clad Geometry.*

Professional Societies

- 2020–Present Member, SME and ASME Manufacturing Divisions
- 2019–Present Conference participant and volunteer, North American Manufacturing Research Conference (NAMRC), Manufacturing Science and Engineering Conference (MSEC), Machine Tool Technologies Research Foundation (MTTRF)

Professional Service

- Reviewer *Journal of Manufacturing Processes (JMP)*, *Additive Manufacturing*, *Progress in AM*, *Journal of Manufacturing and Materials Processing (JMMP)*, NAMRC (2024, 2025).
- Conference Reviewer, NAMRC and MSEC student research presentations.
- Conference MTTRF (2018, 2019).
- Organization ○ MTTRF / iAM-CNC Annual Meeting, San Francisco, CA, Jul. 2018
- Assistant ○ MTTRF / iAM-CNC Annual Meeting, San Francisco, CA, Jul. 2019
- Recruitment & K-12 STEM Outreach ○ Panelist, *MAE Open House* (2022)
- Presenter (2x), *MAE Research Poster Symposium (2023&2024)* — engaged prospective M.S./Ph.D. students and supported graduate recruitment.

Other Service & Mentorship

- Undergraduate Mentor Advised and trained over 10 undergraduate students in high-precision CNC machining (e.g., 3-axis milling on Mori Seiki NVD 1500 DCG) for research and lab participation. Provided guidance on academic and career development, including graduate school and scholarship applications (e.g., Civil Engineer Corps, Stanford transfer, UC Davis scholarships).
- Visiting international Scholar Mentor Provided research guidance on real-time process monitoring on DED process for a visiting Ph.D. scholar from the Politecnico di Bari, Italy, resulting in one co-authored publication (Lafirenza, M. et al., 2025).

- Research Lab Manager Managed lab safety compliance and training, maintained chemical and tool inventories, and coordinated consumable and equipment procurement with vendors. Oversaw lab budgeting and logistics, while administering and updating the ARMS Lab website to support ongoing research and outreach activities.
- Outreach Delivered invited technical presentations at the University of the Pacific, demonstrating additive manufacturing applications and promoting interdisciplinary collaboration.

Honors and Awards

- Graduate Student Researcher Fellowship, UC Davis (2019, 2023–Present)
- MAE Department Travel Award (2024, 2025)
- Global Research Grant, ARMS Lab (2023)
- MAE Non-Resident Tuition Fellowship (2020–2023)
- Academic Excellence Scholarship, Shaoxing Univ. (2015)
- Outstanding Graduate Award, Zhejiang Ed. Dept. (2015)
- National Scholarship, China (2014)
- Comprehensive Top Scholarship, SUYPC (2013)

References

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