

Lei Zhou

Assistant Professor
University of Wisconsin-Madison
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Lab Website: <https://pmcl.me.wisc.edu/>

EDUCATION	Massachusetts Institute of Technology Jul. 2014 – Jun. 2019 Ph.D. in Mechanical Engineering - Major: Control and Mechatronics. Minor: Optimization and Learning. - Thesis: Magnetically Levitated Linear Stage for In-vacuum Transportation Tasks - Wunsch Foundation Award for Outstanding Graduate Research
	Massachusetts Institute of Technology Aug. 2012 – Jun. 2014 S.M. in Mechanical Engineering - Thesis: Magnetically Suspended Reaction Sphere Driven by One-axis Hysteresis Motor
	Tsinghua University Aug. 2008 – Jun. 2012 B.E. in Control and Instrumentation Engineering - Thesis: Frequency Stabilizing System for Dual-frequency Lasers using Optical Frequency Comb - Outstanding College Graduate Award
RESEARCH INTERESTS	<p>My research interest is centered around Precision Mechatronics, which aims to develop novel and high-performance mechatronic solutions through exploiting the <i>synergy</i> between precision mechanical design, electromagnetics, and control engineering, thereby enabling practical impact in critical application areas. My current research activities mainly focus on:</p> <p>Electric Machine and Drives: Modeling, design, and control for high-torque electric motors, linear actuators, bearingless motors, and magnetic bearings;</p> <p>Control Engineering: Novel control and estimation solutions for high-performance motion systems, electric machines, and robots;</p> <p>Precision Engineering: Precision positioning systems for photolithography machines, nano-manufacturing systems, and scientific instruments.</p>
POSITIONS HELD	University of Wisconsin-Madison Aug. 2023 – Present Assistant Professor Dept. of Mechanical Engineering (75%), Dept of Electrical Computer Engineering (25%) Director, Precision Mechatronics and Control Laboratory Associate Director, Wisconsin Electric Machines and Power Electronics Consortium (WEMPEC)
	The University of Texas at Austin Aug. 2020 – Aug. 2023 Assistant Professor, Walker Department of Mechanical Engineering
	Mitsubishi Electric Research Laboratories Jul. 2019 – Jul. 2020 Visiting Research Scientist
	Massachusetts Institute of Technology Aug. 2012 – Jun. 2019 Graduate Research Assistant, Department of Mechanical Engineering
	Massachusetts Institute of Technology Sep. 2014 – Dec. 2014 Teaching Assistant, 2.737 Mechatronics
	Massachusetts Institute of Technology Sep. 2014 – Dec. 2014 Teaching Assistant, 2.14/2.140 Analysis and Design of Feedback Control

Tsinghua University

Aug. 2011 – Jun. 2012

Undergraduate Research Assistant, Department of Precision Instruments and Mechanology

AWARDS AND
HONORS

- **NSF CAREER Award** 2025
U.S. National Science Foundation
- **ASPE Early Career Award** 2023
American Society of Precision Engineering (ASPE)
“In recognition for her development of novel electromagnetic actuators and control techniques applied to high-precision positioning systems”
- **IJAT Best Review Award** 2023
International Journal of Automation Technology
- **Meta Research Award** 2023
Meta Research Award Program
- **Sony Faculty Research Award** 2022
Sony Corporation, Sony research award program
- **2022 Best Experiment Paper Award** 2022
Society for Cardiac Robotic Navigation
- **Wunsch Foundation Award for Outstanding Graduate Research** 2018
Massachusetts Institute of Technology
- **First Place Winner** 2016
Third Annual Student Challenge, American Society for Precision Engineering
- **ASML Ph.D. Master Class Invitee** 2017
ASML, Veldhoven, The Netherlands
- **Best Poster Presentation Award** 2013
ASPE Spring Topical Meeting and MIT LMP Summit
- **Outstanding College Graduate** 2012
Tsinghua University
- **Academic Scholarships** 2009 - 2012
Tsinghua University

PUBLICATIONS IN
REFERRED
JOURNALS

- J12 Jingjie Wu and **Lei Zhou**. “Transcending the Acceleration-Bandwidth Trade-off: Lightweight Precision Stages with Over-Actuation and Selected Compliance.” *Mechatronics* 108 (2025): 103314.
- J11 Jingjie Wu, Kevin Yu, Ithza Lopez, Alexa Aguilar Izquierdo, Hamidreza Saber, Farshid Alambeigi, and **Lei Zhou**. “Integrated Magnetic Location Sensing and Actuation of Steerable Robotic Catheters for Peripheral Arterial Disease Treatment.” *IEEE Robotics and Automation Letters* 8.9 (2023): 5656-5663.
- J10 Ian Heyman, Jingjie Wu, and **Lei Zhou**, “LevCube: A Six-Degree-of-Freedom Magnetically Levitated Nanopositioning Stage with Centimeter-Range XYZ Motion”, *Precision Engineering* 83 (2023): 102-111.
- J9 Yang Liu, Tarunraj G. Mohanraj, Mohammad R. Rajebi, **Lei Zhou***, and Farshid Alambeigi*. “Multiphysical Analytical Modeling and Design of a Magnetically Steerable Robotic Catheter for Treatment of Peripheral Artery Disease.” *IEEE/ASME Transactions on Mechatronics* 27.4 (2022): 1873-1881, (*Corresponding Authors).
Best Experiment Paper Award, Society for Cardiac Robotic Navigation, 2022.

- J8 **Lei Zhou**, and Jingjie Wu. “Magnetic Levitation Technology for Precision Motion Systems: A Review and Future Perspectives.” *International Journal of Automation Technology* 16.4 (2022): 386-402. **IJAT Best Review Award 2023.**
- J7 **Lei Zhou**, and David L. Trumper, “Magnetically Levitated Linear Stage with Linear Bearingless Slice Hysteresis Motors”, *IEEE/ASME Transactions on Mechatronics* 26.2 (2020): 1084-1094.
- J6 **Lei Zhou**, Jun-Young. Yoon, Alex Andren, Blair Allison, and David L. Trumper, “FlexLab/LevLab: A Portable Control and Mechatronics Educational System”, *IEEE/ASME Transactions on Mechatronics*, 25.1, pp. 305-315, 2019.
- J5 Yebin Wang, **Lei Zhou**, Scott Bortoff, Akira Satake, and Shinichi Furutani, “An Approximate High Gain Observer for Speed-Sensorless Estimation of Induction Motors”, *IEEE/CAA Journal of Automatica Sinica* 6.1 pp. 53-63, 2018.
- J4 **Lei Zhou**, Wolfgang Gruber, and David L. Trumper, “Position Control for Hysteresis Motors: Transient-time Model and Field-oriented Control”, *IEEE Transactions on Industry Applications*, vol. 54, no. 4, pp. 3197-3207, 2018.
- J3 **Lei Zhou**, Mohammad Imani Nejad, and David L. Trumper, “One-axis Hysteresis Motor Driven Magnetically Suspended Reaction Sphere”, *Mechatronics*, vol. 42, pp. 69-80, 2017.
- J2 **Lei Zhou** and David L. Trumper, “Reluctance Force Magnetic Suspension Characteristics and Control for Cylindrical Rotor Bearingless Motors”, *ASME Journal of Dynamic Systems, Measurement and Control*, vol. 139, no. 3, pp. 031003, 2017.
- J1 Yebin Wang, Huazhen Fang, **Lei Zhou**, and Toshihiro Wada, “Revisiting the State-of-Charge Estimation for Lithium-ion Batteries-A Methodical Investigation of the EKF Approach”, *IEEE Control Systems*, vol. 37, no. 4, 73-96, 2017.

CONFERENCE
PUBLICATIONS

- C35 Jingjie Wu and **Lei Zhou**, “H-Infinity Robust Dynamic Decoupling for Precision Motion Systems: an LMI Approach.” 2025 American Control Conference (ACC), Jul 2025, to appear.
- C34 Jingjie Wu, Abraham Goldsmith, **Lei Zhou**, Dehong Liu, Bingnan Wang, Yebin Wang, “A Unified Observer for Smooth Speed-Sensorless Drive Control of Induction Machines at Full Speed Range,” *IEEE International Electric Machines & Drives Conference (IEMDC)*, May 2025.
- C33 Jingjie Wu, Abraham Goldsmith, **Lei Zhou**, Dehong Liu, Bingnan Wang, Yebin Wang, “A Novel High-Frequency Injection Method Towards Speed-Sensorless Drive Control of Induction Machines over Full Speed Range.” *IEEE International Electric Machines & Drives Conference (IEMDC)*, May 2025.
- C32 Laura Homiller, Jixuan Feng, and **Lei Zhou**, “Vernier Permanent Magnet Motors for Small-Size Servo Drives: A Scalability Study and Discussions”, 2024 ECCE, October 2024.
- C32 Jingjie Wu and **Lei Zhou**, “Nonsmooth-Optimization-Based Bandwidth Optimal Control for Precision Motion Systems.” 2024 American Control Conference (ACC), June 2024.
- C31 Jingjie Wu and **Lei Zhou**, “Flexstage: Lightweight Magnetically Levitated Precision Stage with Over-Actuation towards High-Throughput IC Manufacturing”, 38th Annual Meeting of American Society of Precision Engineering (ASPE), Oct. 2023.
- C30 Seong-Hyo Ahn, Juan Chavarria, Haoxuan Mu, Yifeng Liao, Jamie Warner, and **Lei Zhou**, “Semi-Automated Soft Robotic Stamp Transfer Machine for van der Waals Heterostructure Device Assembly.” 2023 ASME International Manufacturing Science and Engineering Conference (MSEC), June 2023.

- C29 Yebin Wang and Lei Zhou, “Self-Tuning Optimal Torque Control for Servomotor Drives Via Adaptive Dynamic Programming.” 2022 IEEE International Conference on Systems, Man, and Cybernetics (SMC), Oct. 2022.
- C28 Ian Heyman and Lei Zhou, “Laser Interferometry System for Long-Range Precision Displacement Sensing”, 37th Annual Meeting of American Society of Precision Engineering (ASPE), Oct. 2022.
- C28 Abdel Fahmy, Laura Homiller, and Lei Zhou, “Magnetically Levitated XY-Theta Stage using a Bearingless Motor Design”, 37th Annual Meeting of American Society of Precision Engineering (ASPE), Oct. 2022.
- C27 Jingjie Wu and **Lei Zhou**, “Transcending the Acceleration-Bandwidth Trade-off: Lightweight Precision Stages with Active Control of Flexible Dynamics”, 37th Annual Meeting of American Society of Precision Engineering (ASPE), Oct. 2022.
- C26 Tarunraj G. Mohanraj, Jaeyun Song, Mohammad R. Rajebi, **Lei Zhou**, and Farshid Alambeigi, “A Kirigami-Based Magnetically Steerable Robotic Catheter for Treatment of Peripheral Artery Disease”, International Conference on Biomedical Robotics Biomechatronics (BioRob 2022).
- C25 Jingjie Wu and **Lei Zhou**, “Sequential Structure and Control Co-design of Lightweight Precision Stages with Active control of flexible modes”, 2022 International Symposium on Flexible Automation (ISFA), *July 2022*.
- C24 Ian Hayman, Malek Ibrahim, Jingjie Wu, and **Lei Zhou**, “Magnetically Levitated Precision Stage for XYZ Sample Positioning in X-ray Microscopes”, 2022 International Symposium on Flexible Automation (ISFA), *July 2022*.
- C23 Jingjie Wu, **Lei Zhou**, “Control Co-design of Actively Controlled Lightweight Structures for High-acceleration Precision Motion Systems”, 2022 American Control Conference (ACC), June 2022.
- C22 Laura Homiller, **Lei Zhou**, “Self-Sensing Hysteresis-Type Bearingless Motor”, 36th Annual Meeting of American Society of Precision Engineering (ASPE), 2021.
- C21 Jingjie Wu, **Lei Zhou**, “Hardware and Control co-design towards Lightweight Precision Stages for High-Throughput Manufacturing”, 36th Annual Meeting of American Society of Precision Engineering (ASPE), 2021.
- C20 Ian Heyman, Malek Ibrahim, **Lei Zhou**, “Magnetically Levitated XYZ Precision Sample Stage for Next-generation X-ray Microscope”, 36th Annual Meeting of American Society of Precision Engineering (ASPE), 2021.
- C19 Seonghyo Ahn, **Lei Zhou** “Precision stamp-based 2D material transfer system using soft-robotic manipulation”, 36th Annual Meeting of American Society of Precision Engineering (ASPE), 2021.
- C18 Bingnan Wang, **Lei Zhou**, Hongyu Wang, Chungwei Lin, “Analytical Modeling and Design Optimization of a Vernier Permanent Magnet Motor”, IEEE Energy Conversion Congress and Exposition (ECCE), 2021.
- C17 **Lei Zhou**, Feng Guo, Hongyu Wang, Bingnan Wang, “High-Torque Direct-Drive Machine with Combined Axial-and Radial-flux Out-runner Vernier Permanent Magnet Motor”, IEEE International Electric Machines & Drives Conference (IEMDC), 2021
- C16 **Lei Zhou**, Bingnan Wang, Chungwei Lin, Hiroshi Inoue, Masahito Miyoshi, “Static Eccentricity Fault Detection for PSH-type Induction Motors Considering High-order Air Gap Permeance Harmonics”, IEEE International Electric Machines & Drives Conference (IEMDC), Jun. 2021
- C15 **Lei Zhou**, Yebin Wang “Improve Speed Estimation for Speed-Sensorless Induction Machines: A Variable Adaptation Gain and Feedforward Approach”, In Proc. International Conference on

Electrical Machines, Aug. 2020

- C14 **Lei Zhou**, David L. Trumper, “Harness the Lag: Precision Motion with Hysteresis Motors”, ASPE Spring Topical Meeting Design and Control of Precision Mechatronic System, 2020.
- C13 **Lei Zhou**, David L. Trumper, “Finite Element Model for Pre-magnetized Linear Hysteresis Motors”, 34th Annual Meeting of the American Society of Precision Engineering (ASPE), 2019.
- C12 Jun-Young Yoon*, **Lei Zhou***, David L. Trumper, “Linear Stages for Next Generation Precision Motion Systems”, IEEE/ASME Int. Conf. on Advanced Intelligent Mechatronics (AIM), 2019. (* Equal Contribution.)
- C11 **L. Zhou**, David L. Trumper, “Magnetically Levitated Linear Stage for In-vacuum Transportation Tasks”, 33rd Annual Meeting of American Society of Precision Engineering (ASPE), 2018.
- C10 Tyler Hamer, Minkyun Noh, **Lei Zhou**, Joshua Chabot, David L. Trumper, “A Magnetically Suspended, Spherical Permanent Magnetic Dipole Actuator”, 33rd Annual Meeting of the American Society of Precision Engineering, 2018.
- C9 **Lei Zhou**, Wolfgang Gruber, David L. Trumper, “Position Control for Hysteresis Motors: A Field-oriented Control Approach”, IEEE International Electric Machines and Drives Conference (IEMDC), 2017.
- C8 Tyler Hamer, **Lei Zhou**, David L. Trumper, A.H. Slocum, N. Calvet, “An Origami-Inspired Design of a Thermal Mixing Element Within a Concentrated Solar Power System”, ASME International Design Engineering Technical Conferences (IDETC), Aug. 2017, p. V05BT08A061.
- C7 Yebin Wang, **Lei Zhou**, Scott Bortoff, Akira Satake, and Shinichi Furutani. “High Gain Observer for Speed-Sensorless Motor Drives: Algorithm and Experiments”, IEEE International Conference on Advanced Intelligent Mechatronics (AIM), Aug. 2016, pp. 1127-1132.
- C6 **Lei Zhou**, Yebin Wang. “Speed Sensorless State Estimation for Induction Motors: A Moving Horizon Approach”, American Control Conference (ACC), 2016.
- C5 **Lei Zhou**, Yebin Wang, D. Trumper, “Iterative Tuning Feedforward Speed Estimator for Sensorless Induction Motors”, ASPE Topical Meeting on Mechatronic System Design and Control, 2016.
- C4 **L. Zhou**, Mohammad Nejad, David L. Trumper, “Hysteresis Motor Driven One-axis Magnetically Suspended Reaction Sphere”, 29th Annual meeting, American Society of Precision Engineering, 2014.
- C3 Antoni Gil, Daniel S. Codd, **Lei Zhou**, David L. Trumper, Nicolas Calvet, and Alexander H. Slocum “Concentrated solar power on demand demonstration: Construction and operation of a 25 kW prototype,” American Institute of Physics (AIP) Conference, Aug. 2016, p. 050017.
- C2 Antoni Gil, Daniel S. Codd, **Lei Zhou**, David L. Trumper, R. Campbell, and Alexander H. Slocum, “Design of a 100 kW Concentrated Solar Power on Demand Volumetric Receiver with Integral Energy Storage System”, ASME Power Conference, 2015.
- C1 **Lei Zhou**, Mohammad Imani Nejad, D. L. Trumper, “Magnetically Suspended Reaction Sphere with One-axis Hysteresis Drive”, 14th International Symposium on Magnetic Bearings, Aug. 2014.
- P8 **Lei Zhou**, Jingjie Wu, “Method of Lightweight High-Acceleration Precision Positioning Stage”, US Provisional Patent, Sep. 2022.
- P7 Farshid Alambeigi, **Lei Zhou**, Rajabi Rajebi, “Magnetically Steerable Catheter”, PCT/US23/65872, Apr. 2023.

INVENTION
DISCLOSURES

- P6 **Lei Zhou**, Bingnan Wang, Hongyu Wang, *Electric Machine with Combined Axial-and Radial-Flux*, US 2022/0123607 A1, 2022.
- P5 Hongyu Wang, **Lei Zhou**, Bingnan Wang, *Motor Designs having Spline Structure Connecting Motor shaft and Stator Structure*, US 2022/0123609 A1, 2022.
- P4 **Lei Zhou**, Bingnan Wang, Chungwei Lin, “Method for Static Eccentricity Fault Detection of Induction Motors”, Patent Disclosure, Jul. 2022.
- P3 **Lei Zhou**, David L. Trumper, “Magnetically-Levitated Transporter”, US 11,393,706 B2, 2022.
- P2 **Lei Zhou**, David L Trumper, Ruvinda Gunawardana, “Transport System Having a Magnetically Levitated Transportation Stage”, US 2022/0187720 A1, 2020.
- P1 Yebin Wang, **Lei Zhou**, “System and Method for Controlling Speed of Electric Motors”, US 9,966,891 B2, 2019.

INTERNAL SERVICE	Faculty Recruitment Committee–Robotics	2024–2025
	Department of Mechanical Engineering, UW-Madison	
	Dynamics Systems & Control Lead, Grad Student Recruitment Committee	2021–2023
	Department of Mechanical Engineering, The University of Texas at Austin	
	Member, Diversity, Equity, and Inclusive (DEI) Committee	2022–2023
	Department of Mechanical Engineering, The University of Texas at Austin	
EXTERNAL PROFESSIONAL ACTIVITIES	Faculty Mentor, Career Gateway Electives for Robotics and Mechatronics	2021–2023
	Department of Mechanical Engineering, The University of Texas at Austin	
	Reviewer, 2022-2023 VPR Research & Creative Grants	Oct. 2022
	The University of Texas at Austin	
	Faculty Advisor, Texas Guadaloop (UT Austin Hyperloop team)	2021–present
	Associate Editor for <i>Precision Engineering</i> : Journal of the International Societies for Precision Engineering and Nanotechnology, Elsevier, 2022–present	
	Director at Large of for <i>American Society of Precision Engineering</i> , 2024–2026	
	Student Challenge Organizing Team Member : participated in the planning and organizing effort for the 10th ASPE student challenge, 2023.	
	Program Committee Member , International Symposium on Flexible Automation (ISFA), 2022	
	Symposium Organizer , ASME Int. Manufacturing Sci. and Eng. Conf. (MSEC), 2023, 2024	
	Special Session Chair , IEEE Int. Electric Machines and Drives Conference (IEMDC), 2025	
	Session Chair for - International Symposium on Flexible Automation (ISFA), 2022 - American Control Conference (ACC), 2022, 2024	
	Reviewer for 10+ journals and conferences including - IEEE Transactions on Industrial Electronics - IEEE/ASME Transactions on Mechatronics - IEEE Transactions on Energy Conversion - IEEE Transactions on Power Electronics - Precision Engineering - IEEE Trans. on Applied Superconductivity - American Control Conference (ACC) - IEEE/CAA Journal of Automation Sinica - Int. Con. Automation Sci. & Eng. (CASE)	- Int. Electric Machines & Drives Conf. (IEMDC) - Advanced Intelligent Mechatronics (AIM) - ASPE Annual meeting - Review of Scientific Instruments - Manufacturing Letters - Journal of Manufacturing Processes - ASME J. of Manufacturing Sci. and Eng.

Member, Controls and Mechatronics Technical Leadership Committee, American Society for Precision Engineering (ASPE)

Faculty Mentor, UT-Austin Student Competition Team, American Society for Precision Engineering (ASPE), 2022.

Panelist, NSF Phase I/II: Analytical Instrumentation II SBIR/STTR Review Panel

Ad-hoc Reviewer, NSF Advanced Manufacturing Program

- INVITED TALKS
- T15 Transcending Trade-offs through Synergistic Mechatronic Design and Control, Department of Mechanical Engineering, University of Minnesota Twin Cities, Dec. 2024.
 - T14 Transcending Trade-offs through Synergistic Electromechanical Designs, KLA, May 2024.
 - T13 Synergistic Mechatronic Design for Chip Manufacturing, Robotics, and Beyond, Tsinghua University, Beijing, China, Jun. 2023.
 - T12 Synergistic Mechatronic Design for Chip Manufacturing, Robotics, and Beyond, University of Wisconsin-Madison, WI, Jan. 2023.
 - T11 Ultra-Lightweight Precision Positioning Systems with Flexible Dynamics Control for High Throughput Photolithography, Mitsubishi Electric Research Laboratories, Cambridge, MA, Aug. 2022.
 - T10 Ultra-Lightweight Precision Positioning Systems with Flexible Dynamics Control for High Throughput Photolithography, ASML Inc., Wilton, *zoom*, July 2022.
 - T9 Synergistic Mechatronic Design for Magnetic Levitation Technology: From Semiconductor Manufacturing to X-ray Microscopes
Advanced Photon Source, Argonne National Laboratory, June. 2022.
 - T8 Magnetically Levitated Precision Motion Systems: From Hysteresis Motor to Microscopes
Department of Mechanical Engineering, Yonsei University, *zoom*, Nov. 2021.
 - T7 Magnetically Levitated Motion System for Precision Manufacturing
3M Forum on Micro-Nano Manufacturing using Novel Techniques, St. Paul, MN, Jun. 2, 2021.
 - T6 Next-Generation High-torque Direct-Drive Motor
Mitsubishi Electric Advanced Technology R&D Center, Jun. 2020.
 - T5 Precision Mechatronics with Magnetically Levitated Hysteresis Motors
WEMPEC, University of Wisconsin-Madison, WI, Mar. 2019.
 - T4 Precision Mechatronics with Magnetically Levitated Hysteresis Motors
Department of Mechanical Engineering, The University of Maryland, MD, Feb. 2019.
 - T3 Precision Mechatronics with Magnetically Levitated Hysteresis Motors
Department of Mechanical Engineering, The University of Texas at Austin, TX, Dec. 2018.
 - T2 Magnetically Levitated Hysteresis Motors: from Reaction Wheel to Linear Stage
Mitsubishi Electric Research Laboratories, Cambridge, MA, Dec. 2018.
 - T1 Magnetically Levitated Linear Stage for In-Vacuum Reticle Transportation in Next Generation EUV Lithography Machines, ASML Inc., Wilton, CT, Sep. 2018.

TEACHING
EXPERIENCES

- ME/ECE 577: Automatic Control Laboratory, UW-Madison - Spring 2024**
- Graduate-level course with extensive hands-on experience introducing the design, control, and experimental evaluation for feedback control systems
 - Developed a new series of lab assignments that assembles into a macro-scale atomic force microscope using voice coil stage, stepper motor stage, and self-resonance controlled cantilever beam

- Student Ratings 4.4/5.0.

ME 376: Automatic Control Laboratory, UW-Madison - Fall 2023

- Core junior-level course introducing the design and analysis of circuits, electronics, and electromechanical system
- Student Ratings 4.3/5.0.

ME 392Q-9: Advanced Mechatronics II, UT-Austin - Fall 2021, 2022

- Graduate-level course with extensive hands-on experience introducing the design, control, and experimental evaluation for precision mechatronic systems
- Developed a new series of lab assignments that assembles into a macro-scale atomic force microscope using voice coil stage, stepper motor stage, and self-resonance controlled cantilever beam
- Student Ratings 4.75/5.0 in 2022, 4.8/5.0 in 2021.

ME 340: Mechatronics, UT-Austin - Spring 2021, Spring 2022, Spring 2023

- Core junior-level course (> 100 students) introducing the design and analysis of circuits, electronics, and electromechanical system
- Student Ratings 4.4/5.0 in 2022, 3.7/5.0 in 2021.

ME 140L: Mechatronics Laboratory, UT-Austin - Fall 2022

- Core junior-level lab course (> 100 students) on the practice and experiments of circuits, electronics, and electromechanical system;
- Developed end-of-semester project on mini wind turbine with AC/DC converter and speed detection circuit.
- Student Ratings 4.6/5.0.

ME266K: Senior Design, UT-Austin (Faculty Project Advisor) - 2021-2023

- Design and fabrication for stamp-based thin-film material transfer. Students: Seonghyo Ahn, Wendy Montano, Weicong Kuang, Xinyu Liu. Summer 2021.
- Vision-based part inspection and automated sorting system. Students: Oscar Cai, Anel Ruiz, Elizabeth Smith, VrYong, Spring 2022.
- PCB-based magnetically levitated precision stage. Students: Rohit Ashok, Yohannes Bekele, Zakari Ishak-Boushaki, Israel Rangel, Spring 2022.
- Inspection robot for safety monitoring. Students: Ameya Telang, Niko Gies, David Exiga, Spring 2022.

Guest Lecturer, 2.14: Analysis and Design of Feedback Control, MIT - Spring 2016

- Gave guest lectures on the modeling and analysis for operational amplifier circuits using the feedback system point-of-view.

TA, 2.737 Mechatronics, MIT - Fall 2014

- Prepared and run lab sessions, conducted check-off interview for students, graded lab reports, held tutorial sessions and office hours, and supported students in final projects.
- Gave lectures on the modeling and analysis for operational amplifier circuits using the feedback system point-of-view.
- Student rating: 6.3/7.0.

TA, 2.14 Analysis and Design of Feedback Control, MIT - Spring 2014

- Prepared and run lab sessions, conducted check-off interview for students, graded lab reports and problem sets, held office hours.
- Student rating: 6.2/7.0.

Mentor, MechE Student Machine Shop Makerworkshop, MIT, 2015 – 2018

- Provided lathe training for a new user weekly.

**OUTREACH
ACTIVITIES**

UW-Madison Engineering EXPO, 2024

- Preparing, organizing, and presenting WEMPEC booth, demonstrating power conversion using electromechanical systems to pre-college students

Undergraduate Research Projects Supervision 2020 – 2021

- Mentored ~10 undergraduate students in research projects, including 1 female student and 2 Hispanic students.

Faculty Mentor, Texas Guadalupe Team 2021 – present

- Serving as a faculty mentor for a student team on hyperloop pod project focusing on developing linear induction motors for ground transportation.

Elevate ME Initiative, ME Department, UT Austin, 2020 – 2023

- Volunteering for Elevate ME Q&A session for women high-school senior students. The goal of the initiative is to increase the number of women who select ME as their major when applying UT.

MIT Summer Research Program, Mentor - Summer 2016

- Mentored one underrepresented minority students in their summer research project focusing on development of an educational platform on brushless motor commutation.

**STUDENT
MENTORING****Ph.D. Students Supervision**

2020–Present	Jingjie Wu , Thesis project: Hardware and Control Co-design for Lightweight Precision Position Stages <u>Student Awards:</u> <ul style="list-style-type: none"> - Jan van Eijk Student Scholarship, APSE - Cockrell School of Engineering Admission Fellowship, UT Austin - First Prize Scholarship, Tongji University
2020–Present	Ian Heyman , Thesis project: Magnetically Levitated Sample Stage for Next-Generation X-ray Microscopes <u>Student Awards:</u> <ul style="list-style-type: none"> - Dr. Graham J. Siddall ASPE Student Scholarship - Cockrell School of Engineering Admission Fellowship, UT Austin - First place winner, ME Department Poster Competition, UT Austin
2020–Present	Laura Homiller , Thesis project: Self-Sensing Magnetic Bearings and Bearingless Motors <u>Student Awards:</u> <ul style="list-style-type: none"> - Honorable Mention, NSF Graduate Research Fellowships Program - ASPE Student Scholarships - Cockrell School of Engineering Admission Fellowship, UT Austin - Second place winner, ASPE Student Challenge
2021–Present	Seonghyo Ahn , Thesis project: Soft-robotic Stamp for Wafer-Scale 2D Electronics Assembly <u>Student Awards:</u> <ul style="list-style-type: none"> - Honorable Mention, ME Department Poster Competition, UT Austin - Cockrell School of Engineering Admission Fellowship, UT Austin
2023–Present	Junnan Gao , Thesis project: Topology Optimization Guided Hardware-Control Co-Optimization of Novel Electromechanical Systems <u>Student Awards:</u> <ul style="list-style-type: none"> - First Place Winner, ASPE student challenge
2023–Present	YiZhou Han , Thesis project: Integrated High-Torque High-Transparency Actuators using Magnetic Gears
2024–Present	Mohammad ErfaniMatin , Thesis project: Fault Diagnosis and Predictive Maintenance for Electric Machines <u>Student Awards:</u>

- First Place Winner, ASPE student challenge

2024–Present **Anson Chan**, Thesis project: Design and Control for Over-Actuated Lightweight Electric Machines

Master Students

2022–2024 **Sean Feng**, Thesis project: High-torque direct drive miniature actuators.
Student Awards:
- Thomas A. Dow Student Scholarship, ASPE
- Undergraduate Research Fellowship, UT-Austin

2022–2024 **Ithza Lopez**, Thesis project: Magnetically steerable catheters for peripheral artery disease treatment.

2022–2024 **Daniil Kirsanov**, Thesis project: Soft electromagnetic actuators for wearable haptic devices.

2020–2022 **Abdel Fahmy**, Thesis project: Magnetically levitated rotary stage. Currently working at Intel

Undergraduate Students Mentored

2022–2023 Peter Mathew
2022–2023 Yifeng Liao
2022–2023 Haoxuan Mu
2022–2023 Kevin Yu
2021–2023 Andrew Burch
2021–2023 Tanten Jones
2021–2022 Fionn Whelan
2021–2022 Paavani Rai
2021–2022 Jaeyun Song
2021–2022 Jonathan Tao, Graduated, Currently master student at UC Berkeley
2021–2022 Malek Ibrahim, Graduated, Currently PhD student at MIT
2020–2022 Sean Feng, Graduated, Currently master student UT Austin