Mingzhang Zhu
(508) 335-8054, normanzmz@g.ucla.edu, Website

EDUCATION

University of California, Los Angeles (UCLA), Los Angeles, CA
Ph.D. Candidate, Mechanical and Aerospace Engineering Sep 2021 - Jun 2027 (Expected)
Worcester Polytechnic Institute (WPI), Worcester, MA
Bachelor of Science, Robotics Engineering and Mechanical Engineering, GPA 3.85/4.00 Aug 2017 - May 2021

SKILLS

Programming & Tool: Python, C++, MATLAB, ROS2
Hardware: Mechanical Design (Solidworks, Onshape, AutoCAD), Prototyping (3D Printing, 3-axis CNC, Laser Cutting)
Control & Mechatronics: Whole Body Control (WBC), Model Predictive Control (MPC), Sensor integration, and extensive experience developing real-world robotic systems

RESEARCH INTERESTS

Dexterous manipulation; Mechanisms and designs; Model-based locomotion; Robot Soccer

PROJECT EXPERIENCE

TriMI: Tri-Modal Manipulation Interface, UCLA Sep 2026 - Present
- Co-developed a four-finger, 13-DoF manipulation interface supporting direct demonstration, joint-level haptic teleoperation, and robotic execution through shared hardware.

MIDAS Hand: Direct-Drive Dexterous Hand, UCLA Apr 2026 - Jun 2026
- Co-developed an open-source anthropomorphic hand integrating low-impedance direct-drive actuation and tactile sensing, with 16 total DoF, 13 active DoF, and 283 three-axis tactile taxels.

DexEXO: Wearable Dexterous Exoskeleton, UCLA Dec 2025 - Mar 2026
- Co-developed a wearability-first hand exoskeleton aligning demonstration and robot embodiment for cross-operator data collection and learning from wrist-camera observations.

Underactuated Massage Hand, UCLA Sep 2025 – Dec 2025
- Designed and built an anthropomorphic underactuated massage hand for BODYFRIEND, enabling multiple massage modalities using only two actuators through mechanical transmission design.

Humanoid Movie Character, UCLA Dec 2023 – Apr 2025
- Collaborated on the creation of a fully functional humanoid named COSMO, a robot equipped with 20 proprioceptive actuators, featured in Netflix's sci-fi film *The Electric State*, ensuring cinematic realism and technical performance.
- Designed the upper body of COSMO, integrating all electronics within strict spatial constraints to match the character's cinematic design.
- Developed and tuned the model-based locomotion stack in C++, enabling the robot to stand and walk with coordinated and expressive upper-body movements.

Robotics Soccer Competition (RoboCup), UCLA Oct 2023 – May 2025
- Co-led RoboCup 2024 world champion team, managing integration across vision, localization, path planning, locomotion and hardware test for fully autonomous soccer performance.
- Developed a novel path planning and tracking algorithm using MPC and visibility graphs for efficient obstacle-aware navigation in Python.
- Tuned multi-layered locomotion control stack of our humanoid robot ARTEMIS, enabling stable walking up to 1.5m/s and autonomous dynamic ball-kicking behavior.

LIMMS: Modular Mobility System, UCLA 2023 - 2024
- Developed and integrated a latching module combining mechanical latch blades, micro-servos, motor drivers, and an onboard camera, with a slip-ring interface for continuous-rotation power and data transmission.

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Low-cost Quadruped with Customized Actuation Module, UCLA May 2022 - Sep 2022
- Designed a 12-DOF quadruped robot featuring a custom actuation module integrating BLDC motors, two-stage belt transmission, and optical encoders.
- Developed and implemented Field Oriented Control (FOC) algorithms for BLDC speed and torque control.

A Climbing Robot with Extending and Bending Limb, UCLA Jan 2023 – May 2023
- Designed and built magnetic grippers enabling the climbing robot to traverse freely along 3D ferromagnetic surfaces.

Steerable Laser Delivery System for Laryngeal Surgery, WPI Jun 2020 - May 2021
- Investigated the feasibility of miniaturization of steerable laser probes for laryngeal surgery.
- Built and tested a fiber coupling system transferring surgical laser source to thinner, flexible optical fibers.

BATTLEBOTS Season 9, Los Angeles Apr 2019
- Designed and operated the 220lb robot 'Railgun Max' with a high-power spinner weapon.

WORK EXPERIENCE

Hardware Research Intern, Dyna Robotics Jun 2026 - Sep 2026
- Developed a puppeteering-style teleoperation interface mechanically coupling a human-worn exoskeleton to a physical Wuji2 leader hand through linkages.
- Designed the interface to teleoperate a matching Wuji2 follower hand with joint-level force feedback, without retargeting.

Teaching Assistant, Mechanical Engineering Capstone Design, UCLA Jan 2023 – Present
- Assist students with their capstone design project, including brainstorming, components design and selection.

Summer Robotics Engineer Internship, Lingzhi Science and Technology LTD, Shanghai May 2019 - Aug 2019
- Created CAD model for the chassis of a medical service robot and plotted sketches for manufacturing.
- Assembled and debugged face recognition door locks.

Summer Mechanical Engineer Internship, Mark Punk Technology LTD, Shanghai May 2018 - Jul 2018
- Designed a wheel-legged robot prototype and verified its technical feasibility.

RESEARCH EXPERIENCE

Graduate Researcher, UCLA, Robotics and Mechanisms Laboratory (RoMeLa) Sep 2022 – Present
- Researching dynamic locomotion and mechanism design for high-performance humanoid robots.

Undergraduate Researcher, WPI, Optomechanics Lab Dec 2019 - May 2021
- Developed miniaturized steerable laser probes and fiber coupling systems for medical applications.

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PUBLICATIONS

1. A. Zhu*, **M. Zhu***, B. J. Kim*, Q. Wang*, J. V. S. H. Ramos*, D. Hong, "MIDAS Hand: Modular low-Impedance Direct-drive Anthropomorphic Sensing Hand," *arXiv*, 2026. *Preprint.*
2. A. Zhu*, **M. Zhu***, et al., "DexEXO: A Wearability-First Dexterous Exoskeleton for Operator-Agnostic Demonstration and Learning," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2026. *Accepted.*
3. **M. Zhu***, A. Zhu*, et al., "WHED: A Wearable Hand Exoskeleton for Natural, High-Quality Demonstration Collection," *arXiv*, 2026. *Withdrawn preprint.*
4. Q. Wang*, **M. Zhu***, et al., "A Hierarchical, Model-Based System for High-Performance Humanoid Soccer," *Advanced Intelligent Systems*, 2026.
5. R. Hou, **M. Zhu**, H. Nam, G. I. Fernandez, D. W. Hong, "Fast and Robust Localization for Humanoid Soccer Robot via Iterative Landmark Matching," *International Conference on Ubiquitous Robots (UR)*, 2026.
6. H. Liu*, **M. Zhu***, et al., "From Screen to Stage: Kid Cosmo, A Life-Like, Torque-Controlled Humanoid for Entertainment Robotics," *IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, 2025.
7. R. Hou, G. I. Fernandez, **M. Zhu**, D. W. Hong, "Model Predictive Control with Visibility Graphs for Humanoid Path Planning and Tracking Against Adversarial Opponents," *IEEE International Conference on Robotics and Automation (ICRA)*, 2025.
8. G. I. Fernandez, Y. Liu, ..., **M. Zhu**, et al., "RoboCup 2024 Adult-Sized Humanoid Champions Guide for Hardware, Vision, and Strategy," *RoboCup 2024: Robot World Cup XXVII, Lecture Notes in Computer Science, Springer*, 2025.
9. J. Quan, **M. Zhu**, D. Hong, "Re-Examining Climbing Robots: Design and Performance of a Lightweight, Low-Cost Robot with a Highly Extendable Limb," *International Conference on Reconfigurable Mechanisms and Robots (ReMAR)*, 2024.
10. J. Quan, **M. Zhu**, D. Hong, "A Lightweight Mobile Robot for Climbing Steel Structures With an Extending and Bending Tape Spring Limb," *ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC-CIE)*, 2023.
11. **M. Zhu**, Y. Shen, A. J. Chiluisa, J. Song, L. Fichera, Y. Liu, "Optical Fiber Coupling System for Steerable Endoscopic Instruments," *Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, 2021.

HONORS

CoRL UMI Workshop Device Track, Top 3	Nov 2026
IEEE Humanoids, Mike Stilman Best Paper Award	Seoul, Korea, Sep 2025
ICRA EXPO Best Demo Award	Atlanta, USA, May 2025
First Place in RoboCup Humanoid League AdultSize Soccer Competition	Eindhoven, Netherlands, Jul 2024
ICRA EXPO Best Demo Award	Yokohama, Japan, May 2024
IEEE Humanoids Conference Humanoid Free Walk Winner	Austin, USA, Dec 2023
WPI Presidential Scholarship	Worcester, USA, Aug 2017 - May 2021