Yao Su

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RESEARCH INTERESTS

Robotics，UAV，Humanoid，Control and System，Locomotion，Optimization，Planning，Dynamics

EDUCATION

University of California, Los Angeles **Los Angeles, CA**

Ph.D. in Mechanical Engineering 09/2017-06/2021

Mechatronics and Control Laboratory (MacLab), Advisor: Dr. **Tsu-Chin Tsao**

M.S. in Mechanical Engineering 09/2016-06/2017

Robotics and Mechanisms Laboratory (RoMeLa), Advisor: Dr. **Dennis Hong**

Harbin Institute of Technology **Harbin, China**

B.S in Mechanical Engineering and Automation 09/2012-06/2016

State Key Laboratory of Robotics and System, Advisor: Dr. **Yili Fu**

APPOINTMENTS

State Key Laboratory of General Artificial Intelligence, Beijing Institute for General Artificial Intelligence(BIGAI)
Research Scientist in Robotics 06/2021–Present

PUBLICATIONS

Under Review

[C18] Fu, Y., **Su, Y.**, Wei, J., Zhu, J., Li, F., Duan, L., Ding Xiang., Li, J.[#] (2025). Characterizing Focusing Properties During Ultrafast Laser Ablation Based on Acoustic Emission Technology. International Conference on UltrafastX

[J24] Qiao, L., Sun, E., Song, X., He Z., Liu, H., **Su, Y.,** Zhang, J., Li, Y., Zhang G.[#](2025). A Versatile Whole-Body Teleoperation Framework for Humanoid Robot Manipulation. IEEE/ASME Transactions on Mechatronics (TMECH).

[J23] Wang, Q., Ren, J., Yu, L., Wang, Y., Wu, J., Zhang, S., Yang Z., Yu Z., Sheng F., Liu F., Liu, H., Zhu K., Wang L., Xu G., He Z., **Su, Y.[#]** (2025). Towards Deployable Humanoid Mobile Manipulation in Industrial Manufacturing: System Integration and Part-Sorting Validation. IEEE Transactions on Automation Science and Engineering (TASE).

[C17] Huang, W., Li, Z., Li, H., Hou, B., **Su, Y.[#],** Zhang, J.[#] (2026). Towards Bridging the Gap between Large-Scale Pretraining and Efficient Finetuning for Humanoid Control. International Conference on Learning Representations (ICLR).

[J22] **Su, Y.*,** Jiao, Z.*, Liu, H., Li, J., Wang, M., Li, H., Liang, H., Zhang, J., Zhu, S., & Liu, H.[#](2025). Design, Planning, and Control of an Over-actuated Aerial Manipulator for Sequential Manipulation. IEEE Transactions on Robotics (TRO).

[J21] Zhang, S.， Wu, J., Liu, G., Zhu, H., Liu, J., Guo J., Li Z., Li, J., Liu, H., Zhang J., Wang J., LengX., **Su,Y** .[*#] (2025). Dynamic Whole-body Dancing with Humanoid Robots --- A Model-Based Control Approach. IEEE Robotics & Automation Magazine (RAM).

[J20] Qin, D.， Song, R., Song, X., He, Z., Li, Y., Zhang J., Zhang G.[*#], **Su, Y**.[*#](2025). MAGIC: Multi-Gait Adaptive Imitation Control via Lipschitz Constrained Wasserstein Adversarial Learning. IEEE Transactions on Industrial Electronics (TIE).

[J19] Liu, H.*, Liang, H., Li, H., Wang M., Liu, H., **Su, Y**.*# (2025). Omni-ph: An Omnidirectional Robotic Photographer with Terrestrial-aerial Translation Capability. IEEE/ASME Transactions on Mechatronics (TMECH).

[J18] Wu, J.*, Li, J.*, Zhang S., He, Z., Wang, Z., Leng, X., Liu, H., Zhang, J., Wang, J., Zhu, S., **Su, Y**.#(2025). Efficient Footstep Planning and Control for Humanoid Robots in Sequential Inspection Tasks. IEEE Robotics and Automation Letters (RA-L).

[C17] Wang, M., Li, W., Chen, Q., Li, H., **Su, Y.#,** Liu, H.# (2026). Real-time High-accuracy Visuo-Tactile Localization with Structured 3D Patterns. IEEE International Conference on Robotics and Automation (ICRA).

[C16] Zhang, T., He, X., Han, M., **Su, Y.#,** Zhang, Z.#, Zhu, S. (2026). Multi-Agent Joint Task Planning in Symmetrical Reality. IEEE International Conference on Robotics and Automation (ICRA).

[J17] Gao, H., Li, Z., Zhou, K., Ding, K., **Su, Y.**, Liu, H., Li, S., & Liu, C.#(2025). BVA-Tracker: Belief-Space Visibility-Aware Target Tracking in Unknown Cluttered Environments. IEEE Transactions on Systems, Man, and Cybernetics (TSMC).

Journal Paper (*indicates joint first authors, # indicates joint corresponding authors)

[J16] Zhou, K., Li, Z., Gao, H., **Su, Y.**, Liu, H., Yu, J., & Liu, C.#(2025). ReSPIRe: Informative and Reusable Belief Tree Search for Robot Probabilistic Search and Tracking in Unknown Environments. IEEE Transactions on Systems, Man, and Cybernetics (TSMC).

[J15] Huang, W.*, Zhang, J.*#, Wu, J., Zhang, S., Zhu, S., Liu, H., Yang, Y., **Su, Y.#** (2025). A Reinforcement Learning Framework of Humanoid Robots for Minimizing Energy Consumption. IEEE Transactions on Automation Science and Engineering (TASE).

[J14] Jiao, Z., Niu, Y., Zhang, Z., Wu, Y., **Su, Y.**, Zhu, Y., Liu, H.#, & Zhu, S. (2025). Integration of Robot and Scene Kinematics for Sequential Mobile Manipulation Planning. IEEE Transactions on Robotics (TRO).

[J13] Liu, H., Xie, Q., Zhang, Z., Yuan, T., Wang, S., Wang, Z., Leng, X., Sun, L.,Zhang, J.#, He, Z.#, **Su, Y**.# (2025). PR2: A Physics- and Photo-realistic Humanoid Testbed with Pilot Study in Competition. Journal of Field Robotics (JFR). DOI: 10.1002/rob.22588

[J12] He, Z., Wu, J., Zhang, J., Zhang, S., Shi, Y., Liu, H, Sun, L., **Su, Y.#,** Leng, X.# (2024). CDM-MPC: An Integrated Dynamic Planning and Control Framework for Bipedal Robots Jumping. IEEE Robotics and Automation Letters (RA-L), 9(7), 6672-6679. DOI: 10.1109/LRA.2024.3408487.

[J11] Fu, Y., **Su, Y.**, Wei, J., Wang, B., Li, J.# (2024). Auto-focusing Femtosecond Laser Manufacturing System via Acoustic Emission Technology. Optics Letters, 49, 558-561. DOI: 10.1364/OL.516076

[J10] Yu, P.*, **Su, Y.*#,** Gerber, M. J., Ruan, L., & Tsao, T. C. (2023). Compensating Aerodynamics of Over-actuated Multi-rotor Aerial Platform with Data-driven Iterative Learning Control. IEEE Robotics and Automation Letters (RA-L), 8(10), 6187-6194. DOI: 10.1109/LRA.2023.3304539.

[J9] Li, W.*, Wang, M.*, Li, J., **Su, Y**.#, Jia, D.K., Qian, X., Althoefer K., & Liu, H.# (2023). L3 F-TOUCH: A Wireless GelSight with Decoupled Tactile and Three-axis Force Sensing. IEEE Robotics and Automation Letters (RA-L), 8(8), 5148-5155. DOI: 10.1109/LRA.2023.3292575.

[J8] **Su, Y.*#**, Yu, P.*, Gerber, M. J., Ruan, L.#, & Tsao, T. C. (2024). Fault-Tolerant Control of an Over-actuated UAV Platform Built on Quadcopters and Passive Hinges. IEEE/ASME Transactions on Mechatronics (TMECH), 29(1), 602-613. DOI: 10.1109/TMECH.2023.3288032.

[J7] Ruan, L.*#, Pi, C.*, **Su, Y**.#, Yu, P., Cheng, S., & Tsao, T. C. (2023). Control and experiments of a novel tiltable-rotor aerial platform comprising quadcopters and passive hinges. Mechatronics, 89, p.102927. DOI: 10.1016/j.mechatronics.2022.102927.

[J6] **Su, Y**., Jiang,Y., Zhu, Y., & Liu, H. (2021). Object Gathering With a Tethered Robot Duo. IEEE Robotics and Automation Letters (RA-L), 7(2), 2132-2139. DOI: 10.1109/LRA.2021.3141828.

[J5] **Su, Y.***, Ruan, L.*, Yu, P.*, Pi, C. H., Gerber, M. J., & Tsao, T. C. (2021). A Fast and Efficient Attitude Control Algorithm of a Tilt-Rotor Aerial Platform Using Inputs Redundancies. IEEE Robotics and Automation Letters (RA-L), 7(2), 1214-1221. DOI: 10.1109/LRA.2021.3138806.

[J4] **Su, Y.***#, Yu, P.*, Gerber, M. J., Ruan, L., & Tsao, T. C. (2021). Nullspace-Based Control Allocation of Overactuated UAV Platforms. IEEE Robotics and Automation Letters (RA-L), 6(4), 8094-8101. DOI: 10.1109/LRA.2021.3095035.

[J3] Yu, P.*#, **Su, Y.***, Gerber, M. J., Ruan, L., & Tsao, T. C. (2021). An Over-Actuated Multi-Rotor Aerial Vehicle With Unconstrained Attitude Angles and High Thrust Efficiencies. IEEE Robotics and Automation Letters (RA-L), 6(4), 6828-6835. DOI: 10.1109/LRA.2021.3095035.

[J2] Luo, J., Gong, Z., **Su, Y.**, Ruan, L., Zhao, Y., Asada, H. H., & Fu, C.# (2021). Modeling and Balance Control of Supernumerary Robotic Limb for Overhead Tasks. IEEE Robotics and Automation Letters (RA-L), 6(2), 4125-4132. DOI: 10.1109/LRA.2021.3067850.

[J1] Luo, J., **Su, Y.**, Ruan, L., Zhao, Y., Kim, D., Sentis, L., & Fu, C.# (2019). Robust Bipedal Locomotion Based on a Hierarchical Control Structure. Robotica, 37(10), 1750-1767. DOI: 10.1017/S0263574719000237.

Conference Paper (*indicates joint first authors, # indicates joint corresponding authors)

[C15] Li, W.*, Lin, P.*, Wang, M., Xiao, C., Althoefer K., **Su, Y.#,** Jiao, Z.**#**, Liu, H.# (2025). R-FTact：A Round High-Frequency Transferable Monochrome Vision-based Tactile Sensor for Shape Reconstruction. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

[C14] Qian, Y., Yu, P., Wu, Y., **Su, Y**, Wang, W.#, & Fan, L.#(2024). Learning Concept-Based Visual Causal Transition and Symbolic Reasoning for Visual Planning. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

[C13] Wang, M.*, Li, W.*, Liang, H., Li, B., Althoefer K., **Su, Y**.#, & Liu, H.#(2024). Large-scale Vision-based Tactile Sensor Deployment on Multi-fingered Grippers. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

[C12] **Su, Y.**, Jiao, Z., Zhang, Z., Zhang, J., Li, H., Wang, M., & Liu, H.# (2024). Flight Structure Optimization of Modular Reconfigurable UAVs. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

[C11] Li, Z.*, Niu, Y.*, **Su, Y.,** Liu, H., Jiao, Z.# (2024). Dynamic Planning for Sequential Whole-body Mobile Manipulation. IEEE Conference on Industrial Electronics and Applications (ICIEA).

[C10] Zhou, K., Wu, P., **Su, Y.**, Gao, H., Ma, J., Liu, H., & Liu, C.#(2024). ASPIRe: An Informative Trajectory Planner with Mutual Information Approximation for Target Search and Tracking. IEEE International Conference on Robotics and Automation (ICRA).

[C9] **Su, Y.***, Zhang, J.*, Li, H., Wang, M., & Liu, H.# (2024). Real-time Dynamic-Consistent Motion Planning for Over-actuated UAVs. IEEE International Conference on Robotics and Automation (ICRA).

[C8] Gao, H., Wu, P., **Su, Y.**, Zhou, K., Ma, J., Liu, H., & Liu, C.# (2024). Probabilistic Visibility Aware Trajectory Planning for Target Tracking in Cluttered Environments. IEEE American Control Conference (ACC).

[C7] Zhang, Z.#, Zhang, Z., Jiao, Z., **Su, Y.**, Liu, H., Wang, W., & Zhu, S. (2024). On the Emergence of Symmetrical Reality. IEEE Conference on Virtual Reality and 3D User Interfaces (VR).

[C6] Wang, M.*, **Su, Y.***, Li, H., Li, J., Liang, J., & Liu, H.#(2023). Aggregating Single-wheeled Modular Robots for Omnidirectional Movements. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

[C5] **Su, Y.***, Li, J.*, Jiao, Z*., Wang, M., Chu, C., Li, H., Zhu, Y., & Liu, H.# (2023). Planning Sequential Aerial Manipulation for Over-actuated Unmanned Aerial Manipulators. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

[C4] **Su, Y.***, Chu, C.*, Wang, M., Li, J., Yang, L., Zhu, Y., & Liu, H.# (2022). Downwash-aware Control Allocation for Over-actuated UAV Platforms. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

[C3] Pi, C., Ruan, L., Yu, P., **Su, Y.**, Cheng, S., & Tsao, T. C.# (2021). A Simple Six Degree-of-Freedom Aerial Vehicle Built on Quadcopters. IEEE Conference on Control Technology and Applications (CCTA).

[C2] Wang, M., **Su, Y.**, Liu, H., & Xu, Y.# (2020). WalkingBot: Modular Interactive Legged Robot with Automated Structure Sensing and Motion Planning. IEEE International Conference on Robot and Human Interactive Communication (RO-MAN).

[C1] Lin, X., Krishnan, H., **Su, Y.**, & Hong, D. W.# (2018). Multi-limbed robot vertical two wall climbing based on static indeterminacy modeling and feasibility region analysis. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

Dissertation

Su, Y. "Compensation and control allocation with input saturation limits and rotor faults for multi-rotor copters with redundant actuations." PhD diss., University of California, Los Angeles, 2021.

FUNDING --HORIZONTAL PROJECTS

[H1] Anhui Leju Artificial Intelligence Application Technology Service Co., Ltd., Research on Grasping Operation Planning and Control Methods for Biped Robots, 2023, CNY 400,000 (Principal Investigator).

[H2] Leju (Shenzhen) Robotics Technology Co., Ltd., Research on Motion Control Algorithms for Biped Robots, 2024, CNY 1,000,000 (Principal Investigator).

[H3] BIGAI-Leju Humanoid Robot Joint Laboratory, 2024–2029.

[H4] BIGAI-Leju Humanoid Robot Technical Exploration Cooperation Agreement for Industrial Applications.

[H5] School of Intelligence, Peking University, Visual Object Detection for Electronic Device Interfaces, 2024, CNY 100,000 (Participant).

[H6] Hefei Leju Robotics Technology Co., Ltd., FAW Prosperity Factory Humanoid Robot POC Project, 2024, CNY 300,000 (Principal Investigator).

[H7] Leju (Shenzhen) Robotics Technology Co., Ltd., Embodied AI Robot Curriculum Development Series, 2024, CNY 500,000 (Participant).

[H8] Leju Smart Home (Qingdao) Robotics Technology Co., Ltd., Research on Full-Body Mobile Manipulation for Humanoid Robots, 2025, CNY 2,000,000 (Principal Investigator).

[H9] Leju Smart Home (Qingdao) Robotics Technology Co., Ltd., Pre-research Project on Autonomous Sorting Operations for Humanoid Robots, 2025, CNY 1,200,000 (Principal Investigator).

FUNDING --VERTICAL PROJECTS

[V1] 26th and 27th China Robotics and Artificial Intelligence Competition Humanoid Robot Innovation Challenge, 2024, 2025.

[V2] Ministry of Industry and Information Technology (MIIT) 2023 Future Industry Innovation Task "Unveiling and Leading" Project (Humanoid Robot Direction): Typical Applications for Hazardous Operations, 2024–2025 (Participant).

[V3] National Natural Science Foundation of China Youth Fund, Configuration Design and Intelligent Control Planning Methods for Over-Actuated UAVs Based on Omnidirectional Thrust Generators, 2025–2028.

[V4] MIIT Intelligent Elderly Service Robot Joint Research and Scenario Application Pilot Project, "Integrated Application Pilot of Multi-Scenario Daily Care Intelligent Elderly Care Robots," Aug 1, 2025 - Jul 30, 2027 (Key Member)

[V5] Beijing Municipal Science & Technology Commission, Administrative Committee of Zhongguancun Science Park, Beijing Key Application Scenario Project, "Demonstration Application of Multi-Robot Collaborative Intelligent Service Scenarios," Nov 1, 2025 - Oct 30, 2026, Project Lead, State-funded: 6 million CNY.

[V6] Beijing Shijingshan District Science and Technology Commission, Shijingshan Regional Innovation Ecosystem Construction Project, "Research on High-Dynamic Running Algorithms for Humanoid Robots Integrating Model Predictive Control and Reinforcement Learning," Jan 1, 2025 - Jun 30, 2026, Project Lead, State-funded: 500,000 CNY.

[V7] Shenzhen Science, Technology and Innovation Commission, 2025 Major Science and Technology Special Project, "Research and Development of Hand-Eye-Body Robot Motion Collaboration Technology Based on High-Fidelity Spatiotemporal Environment Models," Jan 1, 2026 - Dec 30, 2028, Sub-project Lead, State-funded: 1.2 million CNY (Total Project Funding: 10 million CNY).

HONORS AND AWARDS

- IROS 2023 Best Paper Award on Mobile Manipulation--Finalist
- The Excellent Graduate of HIT (3%)
- Merit Students for three times (6%)

INTERNSHIP

Robotics Engineer at DMAI, Los Angeles, CA 90024 01/2018-04/2020

PERSONAL EXPERIENCE

- Recommended for admission to Harbin Institute of Technology (HIT) without examination 03/2012
- First Prize of National Olympiad in Informatics in Provinces, Hebei，China 11/2011
- Second Prize of National Olympiad in Informatics in Provinces, Hebei，China 11/2010

PERSONAL SERVICE

IEEE IROS 2025 Workshop Organizer --The Art of Robustness: Surviving Failures in Robotics

IEEE ICRA 2024 Section Chair of Aerial Systems: Applications

IEEE Humanoids 2025 Associate Editor

Conference Reviewer: IEEE: IROS, ICRA, RSS, ACC, RO-MAN

Journal Reviewer: IEEE: TRO, TMECH, TIE, RA-L, Communications Magazine

IFAC: Automatica

Elsevier: Mechatronics, Robotics and Autonomous Systems

Journal Editor: Elsevier: Biomimetic Intelligence and Robotics