

Yufeng (Kevin) Chen

CONTACT INFORMATION

Associate Professor without Tenure
Department of Electrical Engineering and Computer Science
Massachusetts Institute of Technology

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RESEARCH INTERESTS

Actuator; Soft Robot; Micro Robot; Aerial Robot; Dynamics and Control; Fluid Dynamics

APPOINTMENTS

Associate Professor without Tenure, Electrical Engineering, MIT	2024.07-
Assistant Professor, Electrical Engineering, MIT	2020 – 2024
Postdoctoral Fellow, Harvard University	2017 – 2019
Supervisors: Robert J. Wood and David R. Clarke	

EDUCATION

<i>Ph.D. in Engineering Sciences</i> , Harvard University	2012 – 2017
Adviser: Robert J. Wood	
Thesis: Experimental and computational study of flapping-wing dynamics and locomotion in aerial and aquatic environments	
<i>B.S. in Applied and Engineering Physics</i> , Cornell University	2008 – 2012
Advisor: Jane Z. Wang	
Thesis: Numerical simulation of flapping-wing flight	

AWARDS & HONORS

Office of Naval Research Young Investigator Award	2024
Steven Vogel Young Investigator Award	2024
Ruth and Joel Spira Award for Excellence in Teaching	2023
NSF CAREER Award	2023
IEEE ICRA Best Dynamics and Control Paper Finalist	2023
IEEE TRO King-Sun Fu Memorial Best Paper Award	2022
IEEE RAL Outstanding Associate Editor Award	2022
IEEE RAL Best Paper Award	2021
Forbes 30 Under 30, Science Category	2019
IEEE RCAR Best Paper Finalist	2018
IEEE IROS Best Student Paper Award	2015
Harvard Teaching Excellence Award	2015

SERVICE

Editor	<i>IEEE BioRob</i> , <i>NPJ robotics (Special Issue)</i> , <i>Advanced Intelligent Systems (Special Issue)</i> , <i>Micromachines (Special Issue)</i>
Associate Editor	<i>Science Advances</i> , <i>IJRR</i> , <i>IEEE RA-L</i> , <i>IEEE RoboSoft</i>
Steering Committee	<i>MARSS</i>
Program Committee	<i>IROS 2025</i>

Technical Committee	<i>CBS 2024, MHS 2025</i>
Workshop Organizer	<i>MARSS 2025, MARSS 2024, ICRA 2024, RoboSoft 2023, IROS 2023, ICRA 2022, AIM 2020, IROS 2019</i>
Session Chair	<i>SPIE-EAPAD 2023, ICRA 2022</i>
Reviewer	<i>Nature, Science, Science Robotics, Nature Electronics, Nature Machine Intelligence, Nature Reviews Electrical Engineering, Nature Communications, Science Advances, IEEE Transactions on Robotics, NPJ Robotics, IEEE Robotics and Automation Letters, Journal of Fluid Mechanics, Soft Robotics, Advanced Intelligent Systems, IEEE Transactions on Mechatronics, Bioinspiration & Biomimetics, Smart Materials and Structures, IROS, ICRA</i>
Proposal Reviewer	<i>NSF, NASA, URF (Royal Society, UK), Research Commission of ETH</i>
Mentor	Rising Stars Workshop, Postdoctoral Association Mentoring Program, EECS Communication Lab Mock Interview, EECS Discover EE Freshmen Orientation Program, Harvard Research Experience for Undergraduates

TEACHING EXPERIENCE

Instructor, Massachusetts Institute of Technology

6.302: Feedback Control

6.221: Electromagnetic Fields, Forces & Motion

6.002: Introduction to Circuits and Electronics

Teaching Fellow, Harvard School of Engineering and Applied Sciences

CS205: Computing Foundations – Parallel Computing

AM205: Advanced Introduction to Numerical Methods

ADVISING AND MENTORING EXPERIENCE

Postdoctoral Fellows Younghoon Lee, Steven Ceron (co-advised), Wedyan Babatain (co-advised)

Graduate students Tony Guan, Jiaze Cai, Zhijian Ren, Suhan Kim, Yi-Hsuan Hsiao, Quang Phuc N Kieu (co-advised), Jaeyoun Choi (co-advised), Gloria Yin (co-advised), Shiqi Chen, Meenakshi Singh

Undergraduate students Pablo Rodriguez, Katrina Jander, Krystal Lan, Samvit Das, Gwyneth Liu, Zhongtao Guan, Natalie Huang, Matthew A Crespo, Olaoluwayimika J Olugbenle, Joshua J Feliciano (co-advised), Cathleen Arase, Kyle Heinz, Erin Menezes, Jiahui Yang, Aaron Ong (Harvard REU), Waad Kahouli (Harvard REU), Ronit Malka (Harvard REU)

OUTREACH

Microrobotic talk and exhibition at the MIT Museum

Insectarium exhibition at the American Museum of Natural History

MIT Think Mentor

Outreach lectures at the MIT Museum

Microrobot exhibition at the Boston Museum of Science

Robotics exhibition at the Annual Meeting of the New Champions (Summer Davos)

PUBLICATIONS

Refereed Journals

- J1. Hsiao, Y.H., Bai, S., Guan, Z., Kim, S., Ren, Z., Chirarattananon, P., and **Chen, Y.** Hybrid locomotion at the insect-scale – combined flying and jumping for enhanced efficiency and versatility. *Science Advances*, 11(15), p.Eadu4474 (2025).

- J2. Kim, S., Hsiao, Y.H., Ren, Z., Huang, J., and **Chen, Y.** Acrobatics at the insect-scale: a durable, precise, and agile micro-aerial-robot. *Science Robotics*. 10(98). Eadp4256 (2025).
- J3. Lee, Y., Ren, Z., Hsiao, Y.H., Kim, S., Song, W.J., Lee, C., and **Chen, Y.** Liftoff of a Soft-Actuated Micro-Aerial-Robot Powered by Triboelectric Nanogenerators. *Nano Energy*. 109602 (2024).
- J4. Hsiao, Y.H., Bai, S., Zhou, Y., Jia, H., Ding, R., **Chen, Y.**, Wang, Z., and Chirarattananon, P. Energy efficient perching and takeoff of a miniature rotorcraft. *Communications Engineering*. 2(38) (2023).
- J5. Choi, D., Lee, Y., Lin, Z.H., Cho, S., Kim, M., Ao, C.H., Soh, S., Sohn, C., Jeong, C.K., Lee, J., Lee, M., Lee, S., Ryu, J., Parashar, P., Cho, Y., Ahn, J., Kim, I.D., Jiang, F., Lee, P.S., Khandelwal, G., Kim, S.J., Kim, H.S., Song, H.C., Kim, M., Nah, J., Kim, W., Menge, H.G., Park, Y.T., Xu, W., Hao, J., Park, H., Lee, J.H., Lee, D.M., Kim, S.W., Park, J.Y., Zhang, H., Zi, Y., Guo, R., Cheng, J., Yang, Z., Xie, Y., Lee, S., Chung, J., Oh, I.K., Kim, J.S., Cheng, T., Gao, Q., Cheng, G., Gu, G., Shim, M., Jung, J., Yun, C., Zhang, C., Liu, G., **Chen, Y.**, Kim, S., Chen, X., Hu, J., Pu, X., Guo, Z.H., Wang, X., Chen, J., Xiao, X., Xie, X., Jarin, M., Zhang, H., Lai, Y.C., He, T., Kim, H., Park, I., Ahn, J., Huynh, N.D., Yang, Y., Wang, Z.L., Baik, J.M., and Choi, D. Recent Advances in Triboelectric Nanogenerators: From Technological Progress to Commercial Applications. *ACS nano*, (2023). **(Cover article)**
- J6. Hsiao, Y.H., Kim, S., Ceron, S., Ren, Z., and **Chen, Y.** Modular and scalable fabrication of insect-scale aerial robots towards demonstrating swarm flights. *Advanced Intelligent Systems*, 2300059. (2023).
- J7. Kim, S., Hsiao, Y.H., Lee, Y., Zhu, W., Ren, Z., Niroui, F., and **Chen, Y.** Laser-assisted failure recovery for dielectric elastomer actuators in aerial robots. *Science Robotics*, 8 (76). eadf4289 (2023). **(Cover article)**
- J8. **Chen, Y.**, Arase, C., Ren, Z., and Chirarattananon, P. Design, Characterization, and Liftoff of an Insect-Scale Soft Robotic Dragonfly Powered by Dielectric Elastomer Actuators. *Micromachines*, vol. 13, no. 7, pp. 1136 (2022).
- J9. Kim, S., Hsiao, Y.H., Chen, Y., Mao, J., and **Chen, Y.** Firefly: An Insect-Scale Aerial Robot Powered by Electroluminescent Soft Artificial Muscles. *IEEE Robotics and Automation Letters*. vol. 7, no. 3, pp. 6950-6957. (2022).
- J10. Ren, Z., Kim, S., Ji, X., Zhu, W., Niroui, F., Kong, J., and **Chen, Y.** A High Lift Micro-Aerial-Robot Powered by Low Voltage and Long Endurance Dielectric Elastomer Actuators. *Advanced Materials*, 2106757 (2022). **(Cover article, Rising Star collection, Top downloaded article)**
- J11. Xu, S., **Chen, Y.**, Hyun, N.P., Becker, K.P., and Wood, R.J. A dynamic electrically driven soft valve for control of soft hydraulic actuators. *Proceedings of the National Academy of Sciences*. 118, no. 34 (2021).
- J12. Wang, H., York, P., **Chen, Y.**, Russo, S., Ranzani, T., Walsh, C. and Wood, R.J. Biologically inspired electrostatic artificial muscles for insect-sized robots. *The International Journal of Robotics Research*, 40(6-7), pp.895-922. (2021).
- J13. **Chen, Y.**, Xu, S., Ren, Z. and Chirarattananon, P. Collision Resilient Insect-Scale Soft-Actuated Aerial Robots With High Agility. *IEEE Transactions on Robotics*. (2021). **(Best Paper Award)**
- J14. **Chen, Y.**, Doshi, N., Wood, R.J. Inverted and Inclined Climbing Using Capillary Adhesion in a Quadrupedal Insect-Scale Robot. *IEEE Robotics and Automation Letters*. vol. 5, no. 3, pp. 4820-4827. (2020). **(Best Paper Award)**
- J15. Wang, S., Li, L., Sun, W., Wainwright, D., Wang, H., Zhao, W., Chen, B., **Chen, Y.**, and Wen, L. Detachment of the remora suckerfish disc: kinematics and a bio-inspired robotic model. *Bioinspiration and Biomimetics*. Vol. 15, no. 5. (2020)

- J16. Becker, K., **Chen, Y.**, and Wood, R.J. Mechanically Programmable Dip Molding of High Aspect Ratio Soft Actuator Arrays. *Advanced Functional Materials*. 30(12), p.1908919. (2020). **(Cover Article)**
- J17. **Chen, Y.**, Zhao, H., Mao, J., Chirarattananon, P., Helbling, E.H., Hyun, N-s.P., Clarke, R.D., and Wood R.J. Controlled flight of a microrobot powered by soft artificial muscles. *Nature*. 575(7782), 324-329 (2019).
- J18. **Chen, Y.**, Doshi, N., Goldberg, N., Wang, H. and Wood, R.J. Controllable water surface to underwater transition through electrowetting in a hybrid terrestrial-aquatic microrobot. *Nature Communications*. 9(1), pp 2495 (2018). **(top 50 physics articles in Nature Communications from 2018)**
- J19. **Chen, Y.**, Wang, H., Helbling, E.F., Jafferis, N.T., Zufferey, R., Ong, A., Ma, K., Gravish, N., Chirarattananon, P., Kovac, M. and Wood, R.J. A biologically inspired, flapping-wing, hybrid aerial-aquatic microrobot. *Science Robotics*. 2(11), eaao5619 (2017).
- J20. Wang, Y*, Yang, X*, **Chen, Y***, Wainwright, D.K., Kenaley, C.P., Gong, Z., Liu, Z., Liu, H., Guan, J., Wang, T. and Weaver, J.C., Wood, R.J. and Wen, L. A biorobotic adhesive disc for underwater hitchhiking inspired by the remora suckerfish. *Science Robotics*. 2(10), eaan8072 (2017). **(Cover article)** *equal contribution
- J21. Chirarattananon, P., **Chen, Y.**, Helbling, E.F., Ma, K.Y., Cheng, R. and Wood, R.J. Dynamics and flight control of a flapping-wing robotic insect in the presence of wind gusts. *Interface Focus*. 7(1), 20160080 (2017).
- J22. **Chen, Y.**, Gravish, N., Desbiens, A.L., Malka, R. and Wood, R.J. Experimental and computational studies of the aerodynamic performance of a flapping and passively rotating insect wing. *Journal of Fluid Mechanics*. 791, pp.1-33 (2016).

Refereed Conference Proceedings

- C1. Hsiao, Y.H., Chen, W., Chang, Y.S., Agrawal, P., and **Chen, Y.** Hovering Flight of Soft-Actuated Insect-Scale Micro Aerial Vehicles using Deep Reinforcement Learning. In *IEEE - RAS International Conference on Soft Robotics (RoboSoft)*, (2025). **(Spotlight paper)**
- C2. Hsiao, Y.H., Kim, S., Ren, Z., and **Chen, Y.** Heading Control of a Long-Endurance Insect-Scale Aerial Robot Powered by Soft Artificial Muscles. In *IEEE/RSJ International Conference on Robotics and Automation (ICRA)*, (2023).
- C3. Ren, Z., Yang, J., Kim, S., Hsiao, Y.H., Lang, J., and **Chen, Y.** A lightweight high-voltage boost circuit for soft-actuated micro-aerial-robots. In *IEEE/RSJ International Conference on Robotics and Automation (ICRA)*, (2023).
- C4. Tagliabue, A*, Hsiao, Y.H*, Fasel, U., Kutz, J.N., Brunton, S., **Chen, Y.**, and How, J. Robust, High-Rate Trajectory Tracking on Insect-Scale Soft-Actuated Aerial Robots with Deep-Learned Tube MPC. In *IEEE/RSJ International Conference on Robotics and Automation (ICRA)*, (2023). *equal contribution. **(Best Paper Finalist in Dynamics and Control)**
- C5. Wang, S., Li, L., **Chen, Y.**, Wang, Y., Sun, W., Xiao, J., Wainwright, D., Sun, W., Wang, T., Wood, R., and Wen, L. A bio-robotic remora disc with attachment and detachment capabilities for reversible underwater hitchhiking. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (ICRA)*. 4653-4659 (2019).
- C6. **Chen, Y.**, Ong, A. and Wood, R.J. An efficient method for the design and fabrication of 2D laminate robotic structures. In *IEEE International Conference on Real-time Computing and Robotics (RCAR)*. 19-24 (2018). **(Best Paper Finalist)**

- C7. **Chen, Y.**, Ma, K. and Wood, R.J. Influence of wing morphological and inertial parameters on flapping flight performance. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2329-2336 (2016).
- C8. **Chen, Y.**, Helbling, E.F., Gravish, N., Ma, K. and Wood, R.J. Hybrid aerial and aquatic locomotion in an at-scale robotic insect. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 331-338 (2015). **(Best Student Paper)**
- C9. Gravish, N*, **Chen, Y***, Combes, S.A. and Wood, R.J. High-throughput study of flapping wing aerodynamics for biological and robotic applications. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 3397-3403 (2014). *equal contribution
- C10. Malka, R., Desbiens, A.L., **Chen, Y.** and Wood, R.J., 2014, September. Principles of microscale flexure hinge design for enhanced endurance. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2879-2885 (2014).
- C11. **Chen, Y.**, Desbiens, A.L. and Wood, R.J., 2014, May. A computational tool to improve flapping efficiency of robotic insects. In *IEEE/RSJ International Conference on Robotics and Automation (ICRA)*. 1733-1740 (2013).
- C12. Desbiens, A.L*, **Chen, Y***, and Wood, R.J. A wing characterization method for flapping-wing robotic insects. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 1367-1373 (2013). *equal contribution

Conference Abstracts

- C13. Hsiao, Y.H., and **Chen, Y.** Nonlinear transduction and dynamic buckling of dielectric elastomer actuators. Accepted in *Third International Nonlinear Dynamics Conference* (2023).
- C14. Wang, S., Li, L., **Chen, Y.**, Kenaley, C., Wainwright, D., Wood, R.J., and Wen, L. The detachment of remora: kinematics, dynamics, and a bio-robotic model. In *Integrative and Comparative Biology*. Vol. 59, pp. E241-E241 (2019).
- C15. Wang, Y., Yang, X., **Chen, Y.**, Kenaley, C.P., Liu, H., Guan, J., Wainwright, D.K., Wood, R.J. and Wen, L. A Bio-robotic Remora (*Echeneis naucrates*) Adhesive Disc: Design, Fabrication and Function. In *Integrative and Comparative Biology*. Vol. 57, pp. E440-E440 (2017).

INVITED TALKS

Keynote	Conference on Robotics for Science (<i>by Science Robotics</i>)	2025
	Conference on Active Materials and Soft Mechatronics (<i>AMSM</i>)	2024
	Conference on Electromechanically Active Polymers (<i>EuroEAP</i>)	2023
	SPIE Electroactive Polymer Actuators and Devices (<i>SPIE – EAPAD</i>)	2023
	International Conference on Manipulation, Automation and Robotics at Small Scales (<i>MARSS</i>)	2022
	<i>IEEE ICRA</i>	2021
	International Symposium on Micro-Nano Mechatronics and Human Science (<i>MHS</i>)	2020
Seminar	Swiss Federal Technology Institute of Lausanne (EPFL) Robotics Seminar	2025
	ETH Zurich Robotics Seminar	2025
	Northeastern University Robotics Seminar	2025
	Purdue Institute for Control, Optimization and Networks Seminar	2025
	University of Hong Kong Robotics Seminar	2025
	MIT-NAVSEA Lecture	2024
	Cornell University Robotics Seminar	2024
	Gachon University Robotics Seminar	2024

	Seoul National University Robotics Seminar	2024
	Johns Hopkins University Robotics Seminar	2024
	Squishy physics seminar, Harvard University	2024
	Hong Kong University of Science and Technology Robotics Seminar	2024
	City University of Hong Kong Robotics Seminar	2024
	University of Michigan Robotics Seminar	2023
	University of Utah Robotics Seminar	2023
	University of Exeter Robotics Seminar	2023
	MIT Robotics Seminar	2023
	UCSD Contextual Robotics Seminar	2023
	Georgia Institute of Technology Robotics Seminar	2022
	The Pennsylvania State University Robotics Seminar	2022
	Intelligent and Bio-inspired Mechanics Seminar	2021
	Columbia University	2019
	Princeton University	2019
	Massachusetts Institute of Technology	2019
	University of Toronto	2019
	UC Berkeley	2019
	UIUC	2019
	Stanford University	2019
	University of Pennsylvania	2018
	Cornell University Robotics Seminar	2017
Industry	GE Edge Symposium	2023
	Cooper Perkins	2022
	MIT MTL Industrial Advisory Board meeting	2022
	Vertical Flight Society, East New England Chapter	2021
Workshop	Insect-scale mobile robotics, <i>MARSS</i>	2025
	Microsystems Exploratory Council fabrication workshop, <i>DARPA</i>	2025
	Self-healing and Damage Resilient Soft Robots, <i>IROS</i>	2024
	Future of Work in the Age of Robotics and AI, <i>AIM</i>	2024
	Sensing, actuation, and control of insect-like robots, <i>MARSS</i>	2024
	Brockhouse Institute for Materials Research, <i>BIMR</i>	2024
	Bioinspired robotics and robotics for biology, <i>ICRA</i>	2024
	Impulsive Motion in Soft Robotic and Microrobotic Systems, <i>ICRA</i>	2024
	Bio-inspired Soft Aerial Robotics, <i>RoboSoft</i>	2024
	Challenges and Opportunities of Electrically-Driven Soft Actuators, <i>RoboSoft</i>	2024
	Science Robotics Workshop	2023
	Agile Robotic Locomotion Workshop, <i>ICRA</i>	2023
	Bio-inspired Design, Actuation and Locomotion, <i>ICRA</i>	2022
	Bioinspired and Bio-hybrid (Cyborg) Systems, <i>ICRA</i>	2022
	Flapping-Wing Aerial Robots, <i>ICRA</i>	2022
	Soft Aerial Robotics, <i>RoboSoft</i>	2022
	Soft Robotics, <i>AIM</i>	2020
Conference	International Liquid Crystal Elastomer Conference (<i>ILCEC</i>)	2025
	Soft Transducers and Electromechanically Active Polymers (<i>EuroEAP</i>)	2025
	IEEE International Conference on Cyborg and Bionic Systems (<i>CBS</i>)	2024
	Third International Nonlinear Dynamics Conference (<i>NoDyCon</i>)	2023

	PowerMEMS School	2022
	ICRA & IROS	2013-2022
Outreach	After Dark: Teeny/Tiny, MIT Museum	2024
	SciCafe Seminar, American Museum of National History	2023
	TEDxMIT	2023
	IEEE Soft Robotic Podcast	2021
	Imagination in Action, MIT Media Lab	2019
Guest Lecture	ECE 5960 Advanced Topics in Micro and Nano Robotics, Cornell University	2021
	2.74 Bio-inspired Robotics, MIT	2020-2024

SELECTED PRESS

CNN: This bumblebee-like robot might one day pollinate plants on Mars	2025
MIT News: Hopping gives this tiny robot a leg up	2025
Tech Briefs: Hopping robots to traverse challenging terrain	2025
Reuters: Bug-sized robots could help pollination on future farms	2025
CBC: Building a robot bee that could one day pollinate crops	2025
Veritasium: Why is MIT Making Robot Insects?	2025
New Scientist: Tiny insect-like robot can flip, loop and hover for up to 15 minutes	2025
Tech Briefs: Designing Robotic Insects for Mechanical Pollination	2025
MIT News: This fast and agile robotic insect could someday aid in mechanical pollination	2025
BBC Earth: Are Robot Bees the Future?	2023
Advanced Science News: Robotic insects that fly in teams to lift objects	2023
MIT News: Resilient bug-sized robots keep flying even after wing damage	2023
MIT News: MIT's top research stories of 2022	2022
MIT Technology Review: Robo-fireflies	2022
Washington Post: Cyborg cockroaches are coming	2022
MIT News: Robotic lightning bugs take flight	2022
MIT News: Giving bug-like bots a boost	2021
World Economic Forum: Meet the new generation of tiny, agile drones	2021
NPR: Don't Swat This Bug. It Might Be A Robot On A Rescue Mission	2021
MIT News: Researchers introduce a new generation of tiny, agile drones	2021
Daily Mail: Scientists create robotic BEES with artificial soft 'muscles' that allow them to crash into walls unharmed	2019
Harvard Gazette: RoboBee powered by soft muscles –first flight of a microrobot with a soft actuator	2019
BBC News: Could a robotic cockroach aid rescues?	2018
Popular Mechanics: Harvard Robotic Cockroach Walks Underwater	2018
Forbes: New RoboBee Can Fly and Dive Into Water - The Microbot Equivalent Of Smashing Through Brick Walls	2017
Business Insider: The 19 most important things that happened in robotics this year	2016
IEEE Spectrum: Harvard's Robot Bee Is Now Also a Submarine	2015