

Tom Z. Jiahao

zjh@seas.upenn.edu
+1 412 576 9236
jiahaoz.com
LinkedIn

RESEARCH INTERESTS

Dynamical Systems, Machine Learning, Robotics

EDUCATION

University of Pennsylvania (expected 2024), Philadelphia, PA, USA
Ph.D. in Computer Science, Department of Computer and Information Science
Advisor: Prof. M. Ani Hsieh

Cornell University (Dec 2018), GPA: 3.75, Ithaca, NY, USA
B.Sc. in Computer Science, Department of Computer Science
B.Sc. in Mechanical Engineering, Sibley School of Mechanical and Aerospace Engineering

SKILLS

Programming Python, C, MATLAB, Linux, ROS

Design Solidworks, Creo, ANSYS, COMSOL, Adobe Illustrator

Manufacturing Laser Cutting, 3D printing, Machine shop, Rubber molding, Injection molding

Language English, Mandarin Chinese

EMPLOYMENT

Research Assistant Aug. 2019 - Present

GRASP Lab, University of Pennsylvania, Philadelphia, PA

Develop algorithms to combine deep learning with first-principle models for modeling dynamical systems.

Apply these algorithms in computer vision, control, robotics, and other applications.

Research Assistant Feb. 2019 - Jul. 2019

Autonomous Systems Lab, Cornell University, Ithaca, NY

Develop Gazebo simulation for decentralized holonomic robot team in non-reactive scenarios. Optimize collision avoidance and deadlock mitigation for continuous controller implementation. Develop AirSim simulation for a team of ground/air robot.

Hardware Electrical Engineer Feb. 2019 - Jul. 2019

Geegab LLC, Ithaca, NY

Work includes concepts generation, analog circuit design, mechanical/electronic components prototyping, and process automation around a proprietary GHz ultrasonic transducer.

Research Assistant May 2016 - Sep. 2018

SonicMEMS Lab, Cornell University, Ithaca, NY

Design layout of GHz ultrasonic transducer phased array MEMS device with Cadence, design test PCBs with EAGLE. Implement MATLAB code for phasing ultrasonic transducer array, to achieve wave steering and focusing. Research on quarter wave length matching layer.

Hardware Engineering Intern June 2018 - Aug. 2018

Uber ATG, Pittsburgh, PA

Prototyped a device for applying adhesive films onto glasses. The prototype is fabricated using sheet metal and

uses compressed air and vacuum systems for operation.

Product Engineering Intern

Sep. 2017 - May 2018

Rapyuta Robotics, Tokyo, Japan

Designed electronics and mechanical prototypes for product development. Scripted SolidWorks plug-ins in VBA to facilitate BOM generation and management. Designed and conducted experiments to drive key design decisions on drone design. Instructed and supervised Mechatronics assemblers on prototype and product assembly tasks.

Mechanical Engineering Intern

May 2017 - Aug. 2017

iRobot, Bedford, MA

Performed testing and data analysis on robot prototype to drive key design decisions in the mopping robot product line. Implemented design for manufacturability (DFM) requests from contract manufacturers. Designed, and fabricated testing fixtures for various sub-assembly prototype testing. Developed rubber component prototypes, including designing and manufacturing molds.

PUBLICATIONS

Journal Articles

- [2] K. Y. Chee^{*1}, **T. Z. Jiahao**^{*}, and M. A. Hsieh, "KNODE-MPC: A knowledge-based data-driven predictive control framework for aerial robots," *IEEE Robotics and Automation Letters (RA-L)*, vol. 7, no. 2, pp. 2819–2826, 2022.
- [1] **T. Z. Jiahao**, M. A. Hsieh, and E. Forgoon, "Knowledge-based learning of nonlinear dynamics and chaos," *Chaos: An Interdisciplinary Journal of Nonlinear Science*, vol. 31, no. 11, p. 11101, 2021.

Conference Articles

- [6] Thomas Beckers, **T. Z. Jiahao**, and George J Pappas, "Learning Switching Port-Hamiltonian Systems with Uncertainty Quantification," *IFAC*, vol. 56, Issue 2, Pages 525-532, ISSN 2405-8963, 2023.
- [5] Sandeep Manjanna, **T. Z. Jiahao**, and M. A. Hsieh, "Leveraging Predictive Models for Adaptive Sampling of Spatiotemporal Fluid Processes," *Under Review*, 2023.
- [4] **T. Z. Jiahao**^{*}, K. Y. Chee^{*}, and M. A. Hsieh, "Online Dynamics Learning for Predictive Control with an Application to Aerial Robots," *The Conference on Robot Learning (CoRL)*, 2022.
- [3] Y. Wu^{*}, **T. Z. Jiahao**^{*}, J. Wang, P. A. Yushkevich, M. A. Hsieh, and J. C. Gee, "NODEO: A Neural Ordinary Differential Equation Based Optimization Framework for Deformable Image Registration," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022.
- [2] **T. Z. Jiahao**^{*}, L. Pan^{*}, and M. A. Hsieh, "Learning to swarm with knowledge-based neural ordinary differential equations," *IEEE International Conference on Robotics and Automation (ICRA)*, 2022.
- [1] T. Nathans-Kelly, R. Evans, L. Klein, and **J. Zhang**, "We WOVE, we designed, we conquered: Assessing engineering self-efficacy in a Mechanical Engineering Communication Initiative—Instructor and student perspectives," *2017 IEEE International Professional Communication Conference (ProComm)*, 2017.

INVITED TALKS

- [1] Invited speaker, SIAM Conference on Applications of Dynamical Systems (DS21) Minisymposium, Virtual, May 2021.
- [2] Invited speaker, West Virginia University, July 2022.

¹ * indicates co-first authors.

SERVICES

Reviewer

- Reviewer for the conferences ICRA 2024, ICRA 2023, ICRA 2022, ICRA 2023, ISR 2022, IROS 2023, IROS 2022, MRS 2021, ACC 2023.
- Reviewer for the journals: *Physica D: Nonlinear Phenomena*, *Ocean Modeling*, *Physical Review Research*, *Physical Review E*, *Robotics and Automation Letters*, *Autonomous Robots*, *International Journal of Machine Learning and Cybernetics*, *Chaos: An Interdisciplinary Journal of Nonlinear Science*, *IEEE Transactions on Medical Imaging*.
- AAAI 2022 Special Prog Program Committee Member.

Teaching

- CIS 810: Writing and Speaking in Styles. Spring 2022, *University of Pennsylvania*
- CIS 502: Analysis of Algorithms. Fall 2020, *University of Pennsylvania*
- MAE 3780: Mechatronics. Fall 2016, *Cornell University*.

Mentorship

- Lishuo Pan, UPenn Data Science Master Student
- Sam Chen, UPenn ROBO Master Student
- Yixiang Xiao, UPenn Computer and Information Science Master Student
- Mehul Suri, UPenn Systems Science and Engineering Undergraduate Student
- Rohan Maliekkal, UPenn Mechanical Engineering Undergraduate Student

GRANTS AND AWARDS

Awards and Honors

- 2023 Penn Miller Innovation Fellow, awarded \$15,000
- 2023 Penn Wharton Innovation Fund Launch Award, awarded \$5,000
- 2022 Penn Wharton Innovation Fund Implementation Award, awarded \$2,500
- 2017 Print Provider Prize, IARPA Nail to Nail (N2N) Fingerprint Challenge, awarded \$8,000
- 2017 Master Builder Prize, IARPA Nail to Nail (N2N) Fingerprint Challenge, awarded \$2,000
- 2016 Cornell Engineering Learning Initiatives Undergraduate Research Award, awarded \$2,900
- 2014–18 Dean's List for all semesters, Cornell University

Fellowships

- 2019–20 Graduate Fellowship, University of Pennsylvania

OTHER EXPERIENCE

Mechanical Project Lead

Sep. 2014 - Dec. 2018

Cornell Unmanned Air Systems, Cornell University, Ithaca, NY

Spent four years designing, prototyping, and manufacturing mechanical components of fixed-wing aircrafts. During this time, I led the development of a 2-axis camera gimbal with protective dome. I designed and fabricated modularized UAV payload mounts, bulkheads, and accessories SolidWorks, 3D printers, machine shop tools and laser cutter. I designed and fabricated antenna tracker pitch mechanism, which keeps antennas in-line with plane. I fabricated and post-processed composite-based airfoil and fuselage components. I assisted as the mechanical representative for emergency fix, crashed plane salvation, and failure analysis during routine test flights at Neno International Airport.

Technician

Sep. 2015 - May 2017

Cornell Rapid Prototyping Lab, Cornell University, Ithaca, NY

Operated various models of 3D printers, laser cutter, post-processing printed/cut parts for students, faculties, and research labs. Advised students on mechanical designs for rapid prototyping and performed design analysis. Conducted regular 3D printer, laser cutter, and fume extractor maintenance.

EurekaFest 2017 Duck 'N' Hover Student Mentor

Summer 2017

Museum of Science, Boston, MA

Mentored a group of 5 high school students in the finale competition on the design and build of a wind-powered device capable of hovering three stories in the air, carrying as many rubber ducks as possible. My team won the grand champion, with our device lifting over 200 ducks.

Home Fire Safety Volunteer

Summer 2018

American Red Cross, Pittsburgh, PA

Put up door hangers for houses in the neighborhood as a notice for upcoming fire alarm installation.

Updated December 2023