Tzu-Yuan (Justin) Lin

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Education

University of Michigan	Robotics	Ph.D	2020 – Present
University of Michigan	Robotics	M.S.	2018 – 2020
National Taiwan University	Mechanical Engineering	B.S.	2013 – 2017

Professional Career

Graduate Student Research Assistant May 2020 – Present
Computational Autonomy and Robotics Laboratory
Advised by Dr. Maani Ghaffari
University of Michigan, Ann Arbor, Michigan, USA

Applied Scientist Intern Jun. 2022 – Sep. 2022
Amazon Robotics AI
Seattle, Washinton, USA

Graduate Student Instructor Jan. 2022 – Apr. 2022
NAVARCH/EECS 568/ROB 530: Mobile Robotics: Methods and Algorithms
with Dr. Maani Ghaffari
College of Engineering, University of Michigan, Ann Arbor, Michigan, USA

Graduate Student Research Assistant Jan. 2019 – Apr. 2020
Biped Robotics Laboratory, advised by Dr. Jessy Grizzle
Perceptual Robotics Laboratory advised by Dr. Ryan Eustice & Dr. Maani Ghaffari
University of Michigan, Ann Arbor, Michigan, USA

Graduate Student Instructor Jan. 2020 – Apr. 2020
NAVARCH/EECS 568/ROB 530: Mobile Robotics: Methods and Algorithms
College of Engineering, University of Michigan, Ann Arbor, Michigan, USA

Teaching Assistant Aug. 2017 – Jul. 2018
National Taiwan University, Taipei, Taiwan

Intern Jul. 2016 – Aug. 2016
Industrial Technology Research Institute, Hsinchu, Taiwan

Intern Jul. 2015 – Oct. 2015
Abbott Vascular, Taipei, Taiwan

Teaching Experience

Guest Lecture

NAVARCH/EECS 568/ROB 530: Mobile Robotics: Methods and Algorithms Winter 2024
Graduate Course, University of Michigan
- Guest lecture on "DRIFT: Dead Reckoning in Field Time"

Teaching Assistant

NAVARCH/EECS 568/ROB 530: Mobile Robotics: Methods and Algorithms Winter 2020, 2022
Graduate Course
College of Engineering, University of Michigan
with Dr. Maani Ghaffari

ME 2001: Engineering Mathematics Fall 2017, Spring 2018
Undergraduate Course
Department of Mechanical Engineering, National Taiwan University
with Dr. Wen-Fang Wu

ME 1003: Engineering Graphics Spring 2018
Undergraduate Course
Department of Mechanical Engineering, National Taiwan University
with Dr. Wei-Jiun Su

ME 2004: Machine Design Theory Fall 2017
Undergraduate Course
Department of Mechanical Engineering, National Taiwan University
with Dr. Shana Smith

ME 2005: Thermodynamics Fall 2017
Undergraduate Course
Department of Mechanical Engineering, National Taiwan University
with Dr. Mei-Jiau Huang

Publications

Journal Articles

1. Xi Lin, Yewei Huang, Dingyi Sun, **Tzu-Yuan Lin**, Brendan Englot, Ryan M. Eustice, and Maani Ghaffari. "A Robust Keyframe-based Visual SLAM for RGB-D Cameras in Challenging Scenarios." *IEEE Access* (2023). [Paper Link]

2. Maani Ghaffari, Ray Zhang, Minghan Zhu, Chien Erh Lin, **Tzu-Yuan Lin**, Sangli Teng, Tingjun Li, Tianyi Liu, Jingwei Song. "Progress in symmetry preserving robot perception and control through geometry and learning." *Frontiers in Robotics and AI*, 9 (2022). [Paper Link]

3. Hao-Ming Hsiao, **Tzu-Yuan Lin**, Chien-Erh Lin, Han-Yu Lee, and Yi-Ping Wang. "Innovation of New Occlusion Devices for Cancers." *Applied Sciences* 7, no. 5 (2017): 530. [Paper Link]

4. Hao-Ming Hsiao, Yi-Ping Wang, Yu-Han Cheng, **Tzu-Yuan Lin**, and Chien-Erh Lin. "A Novel Spherical Stent Concept for Intracranial Aneurysm." *Sensors and Materials* 28, no. 9 (2016): 947-955. [Paper Link]

Refereed Conference Papers

1. **Tzu-Yuan Lin**, Minghan Zhu, and Maani Ghaffari. "Lie Neurons: Adjoint-Equivariant Neural Networks for Semisimple Lie Algebras." In *The Forty-first International Conference on Machine Learning (ICML)*. 2024. [arXiv preprint]

2. Xihang Yu, Sangli Teng, Theodor Chakhachiro, Wenzhe Tong, Tingjun Li, **Tzu-Yuan Lin**, Sarah Koehler, Manuel Ahumada, Jeffrey M. Walls, and Maani Ghaffari. "Fully Proprioceptive Slip-Velocity-Aware State Estimation for Mobile Robots via Invariant Kalman Filtering and Disturbance Observer." In *IEEE International Conference on Intelligent Robots and Systems (IROS)*. 2023. [Paper Link]

3. **Tzu-Yuan Lin**, Ray Zhang, Justin Yu, and Maani Ghaffari. "Legged Robot State Estimation using Invariant Kalman Filtering and Learned Contact Events." In *5th Annual Conference on Robot Learning (CoRL)*, pp. 1057-1066. PMLR, 2022. [Paper Link]

4. Ray Zhang, **Tzu-Yuan Lin**, Chien Erh Lin, Steven A. Parkison, William Clark, Jessy W. Grizzle, Ryan M. Eustice, and Maani Ghaffari. "A new framework for registration of semantic point clouds from stereo and RGB-D cameras." In *2021 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 12214-12221. IEEE, 2021. [Paper Link]

5. Yen-Ting Wang, Yi-Ping Wang, **Tzu-Yuan Lin**, Chien-Erh Lin, and Hao-Ming Hsiao. "Drug-eluting stent with rhombic-shape reservoirs for drug delivery." In *2016 International Conference on Applied System Innovation (ICASI)*, pp. 1-4. IEEE, 2016. [Paper Link]

Preprints

1. Zijian He, Sangli Teng, **Tzu-Yuan Lin**, Maani Ghaffari, Yan Gu. "Legged Robot State Estimation within Non-inertial Environments." Submitted to *2024 IEEE International Conference on Robotics and Automation (ICRA)*. 2024. [arXiv preprint]

2. **Tzu-Yuan Lin**, Tingjun Li, Wenzhe Tong, and Maani Ghaffari. "Proprioceptive Invariant Robot State Estimation." [arXiv preprint]

3. **Tzu-Yuan Lin**, William Clark, Ryan M. Eustice, Jessy W. Grizzle, Anthony Bloch, and Maani Ghaffari. "Adaptive Continuous Visual Odometry from RGB-D Images." [arXiv preprint]

Invited Talks

- University of Notre Dame Robotics Seminar — Jun. 2024
  "It's the Same Everywhere: Leveraging Symmetry for Robot Perception and Localization"
  Joint talk with Chien Erh Lin
- NVIDIA GTC AI Conference 2022 — Mar. 2022
  "Legged Robot State Estimation using Invariant Kalman Filtering and Learned Contact Events"

Awards

- Government Scholarship to Study Abroad, the Ministry of Education, Taiwan — May 2023
- Rackham International Student Fellowship and the Chia-Lun Lo Fellowship, University of Michigan — Dec. 2019
- Presidential Award, National Taiwan University — 2015-2017
- Altruism Award, National Taiwan University — Apr. 2016
- Gold Winner in the International Design Awards (IDA), USA — Jun. 2016
- Second Prize in the STAM Student Thesis Competition, Taiwan — Nov. 2016
- Honorable mention in the CGMH Medical Robot Competition, Taiwan — Dec. 2016

Mentoring

Master's & Undergraduate Students

- Hande Huang (Equivariant Learning) — 2024
- Chankyo Kim (IMU dynamic modeling, Equivariant Neural Network) — 2023 – 2024
  Next Position: Ph.D. Student, UM
- Wenzhe Tong (Proprioceptive State Estimation) — 2022 – 2023
  Next Position: Ph.D. Student, UM
- Xihang (Jimmy) Yu (Slip Aware State Estimation) — 2022 – 2023
  Next Position: Ph.D. Student, MIT
- Theodor Chakhachiro (Data-driven Friction Estimation) — 2022 – 2023
  Next Position: Ph.D. Student, USC
- Tingjun Li (Proprioceptive State Estimation) — 2021 – 2023
  Next Position: Software Engineer, Amazon
- Justin Yu (Sensor Suite for Mini Cheetah, Proprioceptive State Estimation) — 2021 – 2023
  Next Position: Ph.D. Student, UC Berkeley
- Zareef Safdar (Simultaneous Localization and Mapping) — 2021
  Next Position: MS student, Simon Fraser University
- Dianhao Chen (Model-based Friction Estimation) — 2021
  Next Position: Robotics Engineer, China
- Arthur Zhang (State Estimation for Mini Cheetah) — 2021
  Next Position: PhD student, UT Austin

- Harrison Chen (Contact Estimation for Mini Cheetah) 2020
  Next Position: Autonomous engineer, PDW
- Yicheng Tao (Contact Estimation for Cassie robot) 2020
  Next Position: Robotics & Machine Learning Engineer, China

Professional Service

Reviewing Activities

- IEEE Transactions on Robotics (T-RO) 2023 – 2024
- IEEE Robotics and Automation Letters (RA-L) 2021 – 2023
- IEEE/ASME Transactions on Mechatronics (TMech) 2024
- International Conference on Robotics and Automation (ICRA) 2021 – 2023
- International Conference on Intelligent Robots and Systems (IROS) 2020 – 2024
- Conference on Robot Learning (CoRL) 2022 – 2024
- Conference on Neural Information Processing Systems (NeurIPS) 2024
- Robotics and Autonomous Systems (RAS) 2023
- Control Systems Letters (L-CSS) 2023
- International Conference on Ubiquitous Robots (UR) 2020

Outreach

- UM Robotics Mentorship Program – Mentor 2019, 2020, 2023, 2024
- NTUME@US Mentorship Program – Mentor 2021, 2022
- UM Robotics Graduate Student Council – Outreach Chair 2021
- UM Robotics Master's Research & Prospective PhD Chat – Panelist Nov. 2020
- UM Discover Engineering – Workshop Organizer and Volunteer Jul. 2019 – Aug. 2019
- Ann Arbor Summer Festival – KidZone Volunteer Jul. 2019
- American Society of Mechanical Engineers (ASME) NTU Student Section – Public Relations Aug. 2016 – Jun. 2017
- NTU Mechanical Engineering Student Association – Director of Academic Division Jul. 2015 – Jun. 2016
- NTU Mechanical Engineering High School Summer Camp – Deputy Director & Organizer May 2015 – Jul. 2015
- NTU International Affairs – Student Volunteer Sep. 2014 – Jun. 2016

Professional Membership

- IEEE RAS Technical Committee on Computer & Robot Vision, Member 2024 – Present
- Institute of Electrical and Electronics Engineers (IEEE), Student Member 2019 – Present
- IEEE Robotics and Automation Society (RAS), Member 2019 – Present
- IEEE Young Professionals, Member 2019 – Present