

Wenzhe Tong

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EDUCATION

University of Michigan, Ann Arbor

Ph.D. Candidate in Robotics, Advisor: Xiaonan Huang, Maani Ghaffari

M.S.E in ECE, GPA: 3.95/4.0

Selected Courses: Mobile Robotics, Self Driving Cars: Perception and Control, Robotic System Lab, Machine learning, Flight and Trajectory Optimization.

Ann Arbor, US

08/2023 - Present

08/2021 - 04/2023

University of California, Berkeley

Visiting Student, EECS, GPA: 3.73/4.0

Selected Courses: Robotic Manipulation and Interaction, Feedback Control Systems, Mechatronics Design, Hybrid Systems and Intelligent Control, Geometry and Learning for 3D Vision.

Berkeley, US

08/2019 - 09/2020

Harbin Institute of Technology, Weihai

B.S. in Robotics, GPA: 89.0/100 (Rank top 3%), National Scholarship

Weihai, China

08/2017 - 06/2021

PUBLICATIONS

- [1] Design of a Variable Stiffness Quasi-Direct Drive Cable-Actuated Tensegrity Robot RA-L 2025
J. Mi, **W. Tong**, Y. Ma, and X. Huang [\[paper\]](#)
- [2] Tensegrity Robot Proprioceptive State Estimation with Geometric Constraints RA-L 2025
W. Tong, T. Lin, J. Mi, Y. Jiang, M. Ghaffari, and X. Huang [\[paper\]](#)
- [3] Proprioceptive Invariant Robot State Estimation 2023
T. Lin, T. Li, **W. Tong**, and M. Ghaffari [\[paper\]](#)
- [4] Fully Proprioceptive Slip-Velocity-Aware State Estimation for Mobile Robots via Invariant Kalman Filtering and Disturbance Observer IROS 2023
X. Yu, S. Teng, T. Chakhachiro, **W. Tong**, T. Li, T. Lin, S. Koehler, M. Ahumada, J. M. Walls, and M. Ghaffari [\[paper\]](#)
- [5] Robotic Guide Dog: Leading a Human with Leash-Guided Hybrid Physical Interaction ICRA 2021
A. Xiao*, **W. Tong***, L. Yang*, J. Zeng, Z. Li, and K. Sreenath [\[paper\]](#) (Best Service Robotics Paper Finalist)

RESEARCH EXPERIENCE

Hybrid Dynamic Robotics Lab (HDRL), UMich

Graduate Researcher

08/2023 - Present

Advisor: Xiaonan Huang, Maani Ghaffari

- Proposed a novel proprioceptive state estimator for tensegrity robots using contact-aided Invariant Extended Kalman Filter (InEKF) for real-time robot pose estimation.
- Designed an optimization-based shape reconstruction algorithm integrating geometric constraints with IMU and encoder data to deliver accurate kinematic information.
- Investigated a quasi-static locomotion controller for tensegrity robots, enabling reliable omnidirectional movements.

Computational Autonomy and Robotics Lab (CURLY), UMich

Graduate Researcher

01/2022 - 09/2023

Advisor: Maani Ghaffari

- Implemented unified C++ state estimation library employing an invariant extended Kalman filter, applicable to diverse platforms including wheeled, legged, underwater, and home robots.
- Developed wheel slip detector for wheeled robot Husky using invariant observer and disturbance observer.
- Engineered a state estimator based on the right-invariant extended Kalman filter, delivering real-time, accurate body velocity and wheel slip velocity estimations across varied terrains.

Hybrid Robotics Lab (HRL), UC Berkeley

Undergraduate Researcher

03/2020 - 11/2020

Advisor: Koushil Sreenath

- Developed an autonomous robotic guide dog system using a hybrid physical human-robot-interaction (pHRI) model to assist visually impaired persons by leash.
- Designed and integrated a sensor suite for the MIT Mini Cheetah quadruped robot, leveraging ROS and LCM for planning, perception, and communication.
- Built a mixed-integer programming problem for the local planner and an A*-based global planner, enabling safe obstacle avoidance and effective human navigation.

INDUSTRY EXPERIENCE

Bosch Research and Technology Center, Shanghai, China

12/2020 - 05/2021

Research Intern

Advisor: Marc Patrick

- Benchmarked sensor fusion and localization algorithm across diverse sensor modalities – including RGB/RGBD cameras, lidars, IMUs, and UWB sensors – for indoor industrial AGV.
- Implemented RGB camera bird-eye-view(BEV) mapping and lidar 3D occupancy mapping algorithms for autonomous bus.

HONORS

First-Year PhD Fellowship in Robotics Department	2023
Best Service Robotics Paper Finalist	ICRA 2021
Provincial Outstanding Graduate Student	2021
First Prize in Course Coding Competition "Scheme Art Contest" (1/59 teams)	2020
First Prize in Robomaster Northern China Robotic Competition	2019
Second Prize in Robomaster National Robotic Competition	2019
National Scholarship (0.2%)	2018

COURSE PROJECTS

Neural Landing Controller for Quadcopter

01/2022 - 05/2022

- Assembled quadcopter from components, performed system identification (thrust map, mass, MoI, etc.) to assist PID hovering controller design with C and *librobotcontrol* package on a BeagleBone microcontroller.
- Designed and implemented a trajectory generator and PID controller to accurately follow predefined waypoints, validated using an indoor motion capture(MoCAP) system.
- Implemented a smooth landing maneuver by compensating for ground effects through a pre-trained neural network model, developed with a limited dataset of take-off and landing sequences acquired via MoCAP system.

Motion & Grasp Planning for Bi-Manual Humanoid Robot

09/2020 - 12/2021

- Designed and implemented controllers for a bi-manual robot arm, including end-effector position, joint angle, and joint torque controllers.
- Implemented a comprehensive motion planning framework for PR2 bi-manual robot platform in *pybullet* simulator, including search-based algorithms(A*, ANA*, ARA*) and sample-based algorithms(RRT, RRT-connect, bi-RRT, RRT*, informed-RRT*).
- Engineered a convex optimization-based, collision-free grasping framework that discretizes the friction cone into convex polygons, validated through integrated testing on the PR2 robot.

ACADEMIC SERVICES

- **Reviewer:** RA-L 2025, IROS 2025, 2023, BioRob 2024, Robosoft 2025
- **Teaching:** Mobile Robotics 2025, 2023

SKILLS

- **Programming:** Python, C/C++, MATLAB, HTML, SQL.
- **Tools:** ROS, git, L^AT_EX, docker, LCM, MoCAP, CAD.
- **Packages:** Pytorch, mujoco, pybullet, gazebo, OpenCV, CasADi, Eigen.