

Tianxin Hu

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Educational Background

Nanyang Technological University (Master of Science) Aug 2024 – Present

- School: Electrical and Electronic Engineering
- Major: Computer Control & Automation
- Dissertation: Minimizing Swept Area for AGVs in Singapore Seaport
- GPA: 92.00/100

Wuhan University of Science and Technology (Bachelor of Engineering) Sept 2020 – Jun 2024

- School: Automobile and Traffic Engineering
- Major: Vehicle Engineering (Industrial Planning)
- GPA: 88.30/100 (Class Ranking: 3/32 Department Ranking: 8/157)

Academic Experience

AIBOT Technology Pte. Ltd. — Autonomous Navigation System Development Jul 2025 – Present

- **Supervisor:** Professor Lihua Xie, Dr. Shenghai Yuan
- **Position:** Navigation Module Lead
- **Responsibilities:** Developed the full-stack navigation module for the company's autonomous mobile robot, responsible for cross-floor navigation, elevator interface integration, and dynamic obstacle avoidance within residential and commercial environments
- ✓ **Achievements:** Achieved fully autonomous navigation and delivery within multi-story residential complexes

Research Student — NTU Internet of Things Lab & Center for Advanced Robotics Technology and Innovation (CARTIN) Aug 2024 – Present

- **Supervisors:** Professor Lihua Xie, Dr. Shenghai Yuan
- **Research Focus:** Developed optimization-based motion planning methods for multi-axle autonomous vehicles to minimize swept volume during turning maneuvers and reduce tire wear under dynamic constraints
- ✓ **Achievements:** Published five papers on vehicle planning and control (three under review) [J1-J5]

Xin Chi Technology — Research and Development of Autonomous Driving System for Multi-Axle Heavy-Duty Transport Vehicles Jun 2022 – Jun 2024

- **Supervisor:** Senior Engineer Xiangrong You
- **Position:** Technical Director & Corporate Legal Representative
- **Responsibilities:** Led R&D of autonomous driving systems for heavy-duty vehicles, covering mathematical modeling, ROS architecture, microcontroller development, and both simulation and prototype validation
- ✓ **Achievements:** Contributed to multiple patents [P1-P4] and received several national awards [A1-A5]

Research and Development of Autonomous Driving System for Formula Racing Feb 2021 – Jun 2024

- **Supervisors:** Associate Professor Chao Deng, Dr. Junyi Zou
- **Position:** Leader of the Unmanned Group
- **Responsibilities:** Led the development of the autonomous driving system for Formula Student Autonomous China (FSAC), covering visual detection, mapping, planning, and tracking
- ✓ **Achievements:** Received the FSAC Third Prize and Best Rookie Award [A6], and published a paper on it [J6]

Publications

[J1] **Energy-Constrained Navigation for Planetary Rovers under Hybrid RTG-Solar Power** Sep 2025 (Under Review)

An International Conference about Robotics

Tianxin Hu, Weixiang Guo, Ruimeng Liu, Xinhang Xu, Rui Qian, Jinyu Chen, Shenghai Yuan, Lihua Xie

DOI: 10.48550/arXiv.2509.15062

- [J2] **STARC: See-Through-Wall Augmented Reality Framework for Human-Robot Collaboration in Emergency Response (Under Review)** Sep 2025
An International Conference about Robotics
 Shenghai Yuan, Weixiang Guo, **Tianxin Hu**, Yu Yang, Jinyu Chen, Rui Qian, Zhongyuan Liu, Lihua Xie
 DOI: 10.48550/arXiv.2509.15507
- [J3] **CleanUpBench: Embodied Sweeping and Grasping Benchmark (Under Review)** Aug 2025
An International AI conference
 Wenbo Li, Guanting Chen, Tao Zhao, Jiyao Wang, **Tianxin Hu**, Yuwen Liao, Weixiang Guo, Shenghai Yuan
 DOI: 10.48550/arXiv.2508.05543
- [J4] **Swept Volume-Aware Trajectory Planning and MPC Tracking for Multi-Axle Swerve-Drive AMRs** May 2025
IEEE International Conference on Robotics and Automation (ICRA 2025)
Tianxin Hu, Shenghai Yuan, Ruofei Bai, Xinhang Xu, Yuwen Liao, Fen Liu, Lihua Xie
 DOI: 10.1109/ICRA55743.2025.11127914
- [J5] **Tire Wear-Aware Trajectory Tracking Control for Multi-Axle Swerve-Drive Autonomous Mobile Robots** June 2025
Journal of Automation and Intelligence
Tianxin Hu, Xinhang Xu, Thien-Minh Nguyen, Fen Liu, Shenghai Yuan, Lihua Xie
 DOI: 10.1016/j.jai.2025.05.003
- [J6] **Improvement of YOLOv5 Algorithm for Formula Racing Based on TensorRT under ROS Platform** May 2023
Agricultural Equipment & Vehicle Engineering
Tianxin Hu, Chao Deng, Junjie Ma, Wang Liu
 DOI: 10.3969/j.issn.1673-3142.2023.05.004

Patents

- [P1] **(Granted) Multi-axle all-wheel steering vehicle vector-division correction method and system** Sep 2025
Tianxian Hu, Xiangrong You, Dongmei Wang, Xinhe Long, Xinyu Wang, Shuang Liu, Yutong Fu, Xinyao Wang, Lefeng Wei, Baizhen Zhang
 Patent No.: CN116534005B
- [P2] **(Granted) A system and method for automatically correcting the deviation of a beam transport vehicle in a tunnel** Jul 2023
 Xiangrong You, Enze Jin, Dongmei Wang, Yuran Huang, **Tianxian Hu**, Shuai Zhu, Beijia Zhang
 Patent No.: CN114633801B
- [P3] **(Pending) Energy-saving system and method for beam transport vehicle based on traveling pressure control** Feb 2024
 Wei Li, Xiangrong You, Dongmei Wang, Xinhe Wang, Peng Cheng, Yuming Liu, Shuang Hu, **Tianxian Hu**, Xinyao Wang, Lefeng Wei, Baizhen Zhang
 Application No.: CN117508238A
- [P4] **(Pending) Method, system and equipment for planning obstacle avoidance path of multi-shaft all-wheel steering beam transporting vehicle** Dec 2023
 Xiangrong You, Yucheng Yin, Liwei Wang, Dongmei Wang, **Tianxian Hu**, Shuang Liu, Xinyao Wang, Lefeng Wei, Baizhen Zhang
 Application No.: CN117168481A

Awards

- [A1] **(International Level) Bronze Award of the 9th China International College Students Innovation Competition** Apr 2024
Organizing Committee of China College Students "Internet+" Competition
- [A2] **(National Level) The First Prize of the 18th "Challenge Cup" National Undergraduate Curricular Academic Science and Technology Works** Oct 2023
China Association for Science and Technology, Ministry of Education of the PRC, Chinese Academy of Social Sciences
- [A3] **(International Level) Bronze Award of the 8th China College Students "Internet+" Innovation and Entrepreneurship Competition** Apr 2023
Organizing Committee of China College Students "Internet+" Competition

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| [A4] | (National Level) Second Prize of the 15th China College Student Computer Design Competition
<i>Organizing Committee of Chinese College Student Computer Design Competition</i> | Jul 2022 |
| [A5] | (National Level) Second Prize of the 15th Energy Saving and Emission Reduction Competition
<i>China College Student Energy Conservation and Emission Reduction Social Practice and Technology Competition Committee</i> | Aug 2022 |
| [A6] | (National Level) Third Prize and Best Rookie Award of Formula Student Competition
<i>China Society of Automotive Engineers, Organizing Committee of FSAC</i> | Oct 2022 |

Technical Expertise

Programming: C, C++, Python, XML (URDF/Launch)

Robotics & Simulation: ROS/ROS2, Gazebo Classic & GZ Sim, RViz, URDF/SDF modeling

Embedded Systems: NVIDIA Jetson (AGX Xavier, Orin NX), STM32, ESP8266, 8051; FreeRTOS, LVGL, U8G2

Hardware Design: Altium Designer, Proteus; multilayer PCB design and soldering

Modeling, Simulation & CAD: MATLAB, COMSOL, SolidWorks, CATIA, Blender, AutoCAD