

# Tianxin Hu

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## Educational Background

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- 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

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- 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

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- [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<br><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<br><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<br><i>China Society of Automotive Engineers, Organizing Committee of FSAC</i>  | Oct 2022 |

## Technical Expertise

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**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