

# NAIAN TAO

New York | nt2712@columbia.edu | (313) 288 5352 | <https://tna001-ai.github.io>

## EDUCATION

---

### Columbia University

M.S. in Mechanical Engineering (Robotics Track), GPA: 3.83/4.00

New York, NY, US

Aug 2024 – Dec 2025

### Beijing University of Chemical Technology

B.E. in Mechanical Design, Manufacturing and Automation, GPA: 3.62/4.33

Chaoyang, Beijing, CN

Sept 2020 – Jun 2024

Courses: Program Design, Automatic Control Design, Artificial Intelligence

### University of Detroit Mercy

B.E. in Mechatronics, Robotics, and Automation Engineering, GPA: 3.81/4.00

Detroit, MI, US

Aug 2023 – Jun 2024

Courses: Robotics, Computational Intelligence Technique, Mechatronics Modeling & Simul

## RESEARCH & ACADEMIC EXPERIENCE

---

### Columbia University

#### Robotics Studio Project and Reinforcement Learning Implementation

New York, NY, US

Aug 2024 – Dec 2024

- Designed and fabricated a bipedal robot with 6 *dof*, focusing on mechanical design, 3D printing, drive system integration, and control using a *Raspberry Pi*.
- Developed and implemented a walking program, achieving a robot walking speed of 4.2 cm/s.
- Created the robot's *URDF (Unified Robot Description Format)* file to accurately model its physical properties. Simulated the robot in *NVIDIA Isaac Sim* for verification and testing.
- Trained the robot to walk on flat terrain using the *Proximal Policy Optimization (PPO)* algorithm in *Isaac Lab*. Input data included an *IMU (Inertial Measurement Unit)* and six joint position sensors. The robot achieved a walking speed of 20.1 cm/s on flat surfaces.
- Integrated a *ground height sensor (RayCaster)* for the robot and extended reinforcement learning training to uneven terrain in simulation, with varying heights ranging from 0 to 4 cm. Achieved a stable walking speed of 19.9 cm/s in the simulated environment.

### Tsinghua University Intelligent Connected Vehicle Research Group

#### Intern

Haidian, Beijing, China

Feb 2023 – May 2023

- Developed a system integrating electric truck fleet scheduling and battery swapping optimization with cloud control, enhancing efficiency, and reducing energy waste. In simulation experiments, using this algorithm saves 15% more energy and 9% more cost compared to the *Cruise Control (CC)* method.
- Created a *predictive cruise control (PCC)* for cruise control in electric trucks. Factored in road slope information and used the *Dynamic Programming (DP)* algorithm to generate efficient speed sequences, reduce energy consumption, and enhance energy regenerative capabilities.
- Implemented cloud control for real-time fleet, environment, and infrastructure connectivity, improving adaptive driving with dynamic traffic data by using the *Genetic Algorithm (GA)*. It helped reduce truck wait time by 60% in a single trip.
- Co-authored a patent on *Battery Swapping Rhythm Planning and PCC Method for Electric Heavy Truck Fleets* (Patent Number: CN117002500A).

### 2022 RoboCup China Open ROBOCUP@HOME

#### Team Leader

Chaoyang, Beijing, China

Aug 2022 – Nov 2022

- Lead the team to achieve the National First Prize.
- Used the *Grasp Pose Detection (GPD)* package to detect 6-DOF grasp poses for a 2-finger robot hand in 3D point clouds, enabling the grasping of objects in various orientations.
- Performed camera calibration and hand-eye calibration between the robotic arm and the camera.
- Successfully developed and implemented a unique robotic door-opening solution to complete the challenging task — the only team that completed this task.
- Combined precise base positioning and mechanical arm path planning significantly reduced computation time.

## SKILLS

---

**Language:** C, C++, Python, Matlab

**Technical:** ROS, Robot Manipulator, RL, Navigation, Cloud-Based Vehicle Control, Mathematical Modeling, SolidWorks