Yihua Qin

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EDUCATION

- **Tsinghua University, Dual Degree**   *Beijing, China*
  Bachelor of Engineering - Mechanical Engineering   *Sep. 2022 - Jun. 2026*
  Courses: Computer Hardware Technology, Material Mechanics , Theoretical Mechanics , Mechanical Principle , Mechanical Design , Robotics and Intelligent Manufacturing , Automatic Control Theory , Fluid Mechanics , Thermodynamics and Heat Transfer , Electrical and Electronic Engineering , Principle of Economics, General Chemistry

- **Bachelor of Science - Mathematics and Physics**   *Sep. 2022 - Jun. 2026*
  Courses: Calculus, Advanced Linear Algebra, Artificial Intelligence, Operating System, Data Structure, Mathematical Methods in Physics, Probability and Mathematical Statistics, Complex Variables, Partial Differential Equations, Numerical Analysis, Fundamental of Physics, Quantum Mechanics

- **Total GPA**: *3.93/4.00 (Ranking: 4th)*

EXPERIENCE

- **Berkeley CS-285 Course - Deep Reinforcement Learning**   ***Self-study Online***
  - *Learn **DQN**, **PPO**, and other deep reinforcement learning algorithms and implement them in code.*
- **TH-MOS Robot Football Team**   ***Decision Group Leader***
  - *Developed the decision-making algorithm for the robot, including the goalkeeper strategy and closed-loop kicking strategy.*

PUBLICATIONS

Yinglei Zhu[1+], Sixiao He[1+], Zhenghao Qi[1], Zhuoyuan Yong[1], **Yihua Qin**[1] and Jianyu Chen[2*]. (2024, Oct). Whleaper: A 10-DOF Flexible Bipedal Wheeled Robot. ***International Conference on Intelligent Robots and Systems (IROS).***

Fangchen Liu[+], Chuanyu Li[+], **Yihua Qin (Co-first author)**[+], Ankit Kumar Shaw, Jing Xu[*], Pieter Abbeel[*], Rui Chen[*]. ViTaMIn: Learning Contact-Rich Tasks Through Robot-Free Visuotactile Manipulation Interface. ***Robotics: Science and Systems (RSS).***

PROJECTS

- **Universal Manipulation Interface Based n Imitation Learning with Visual-Tactile Fusion (in collaboration with UC Berkeley, preparing for *RSS2025*)**   *Jun.2024 - Now*
  Supervisor: Tsinghua University   Prof. Rui Chen
  Co-Supervisor: UC Berkeley   Prof. Pieter Abbeel
  - *Designed a handheld gripper equipped with two cameras, two tactile sensors, an encoder, and a Raspberry Pi. Designed the sensor connections to the Raspberry Pi and calibrated the stereo cameras and encoder.*
  - *Used handheld gripper to collect data for tasks like bottle grasping and developed code for data processing (utilizing `ORB_SLAM3` for tracking the end-effector poses; using a `T_camera` for cameras alignment.).*
  - *Fused visual and tactile information using different encoders, trained a diffusion model for imitation learning, and deployed it on a robotic arm platform.*

- **LSTM-Based Adaptive Grasping Force Control Method**   *Dec.2023 - Mar.2024*
  Supervisor: Tsinghua University   Prof. Yao Jiang
  - *Study the three-loop control method for permanent magnet synchronous motors. Enhance the force control performance by integrating an LSTM neural network into the traditional PI grasping force control method.*
  - *Train LSTM model in a simulation environment (generating contact force-position curves for different objects) and validate its compliance and reliability in the real world when grasping fragile objects with varying stiffness (such as grapes, tofu, eggs).*

- **Whleaper: A 10-DOF Flexible Bipedal Wheeled Robot based on Reinforcement Learning (accepted as oral pitch at *IROS2024*)**   *Dec.2022 - May.2023*
  Supervisor: Tsinghua University   Prof. Jianyu Chen
  - *Mechanical design of a 10-DOF bipedal wheel-legged robot, Whleaper, with terrain adaptability and high-performance mobility.*
  - *Development of tailored control methods, including Linear Quadratic Regulator (LQR) and Reinforcement Learning (RL), which enable smooth transitions be-tween sliding and walking modes.*
  - *Establishment of the physical system for Whleaper,including both hardware and software.*
  - *Validation of the mechanical design and algorithms via a series of simulations and real-world experiments.*

- **Grasping and Cruising Robot Car Based on Embedded Systems**   ***Aug.2024 - Sep.2024***
  - *Designed and 3D printed a four-wheeled robot equipped with a storage compartment and a robotic arm.*

- ○ *Conducted assembly of the robot, including meticulous hardware selection and design, and successfully integrated components such as an IMU, ultrasonic distance sensor, motor encoders, and servos.*
- ○ *Developed robust hardware control software and implemented visual image processing algorithms for the global camera and OpenMV, ensuring seamless communication with the robotic platform.*

- **Human-Machine Interaction Electronic Piano Hardware and Software Design Based on STM32 Microcontroller** *Dec.2023 - Jan.2024*
  - ○ *Study the STM32 microcontroller and electronic components such as Bluetooth, buzzers, and USB to TTL converters.*
  - ○ *Using STM32CubeIDE for software and hardware design, I developed an electronic piano controlled by 10 keys, capable of playing three octaves, playing music, recording, adjusting speed and pitch, and supporting MIDI interface for interactive functionalities.*

- **Sentiment Recognition Models Based on Artificial Neural Network** *Mar.2024 - Apr.2024*
  - ○ *Encode the comments in the dataset as word vectors to use as input for neural networks.*
  - ○ *Train MLP, CNN, and RNN models for sentiment analysis of the comments, and compare the impact of training parameters (such as network architecture and parameter initialization methods) on the validation set performance.*

- **Robot Soccer Simulation Project Based on ROS** *Sep.2023 - Nov.2023*
  - ○ *Utilized the publish-subscribe feature of ROS topics to control a robot for penalty kicks in the Webots simulation environment on Linux.*
  - ○ *Developed Python code to manage kicking coordination logic for two soccer robots during competitive matches, successfully securing first place against other teams.*

INTERNSHIP

- **Xi'an Baile Information Technology Co., Ltd.** *Feb.2024 - Jun.2024   Xi'an, China*
  - ○ *Learn the complete process of using artificial intelligence algorithms (such as **CNN**) for breast cancer detection in medical imaging.*
  - ○ *Use data science techniques such as regression analysis and cluster analysis to explore the correlation between breast cancer and various factors.*

- **Henan Hydrology and Water Resources Bureau** *Jul.2023 - Aug.2023   Henan, China*
  - ○ *Use artificial intelligence algorithms such as **RNN** and **LSTM** for time series prediction of river water flow.*
  - ○ *Visit the water resources data collection process in the Yellow River basin (using drones and boats) and provide recommendations for data sampling methods.*

- **Tsinghua University Basic Industrial Training Center** *Aug.2023 - Sep.2023   Beijing, China*
  - ○ *Learn machining, milling, grinding, fitting, welding, casting, and other methods of mechanical manufacturing.*
  - ○ *Visit the entire car production line at Beijing Ideal Automobile Co., Ltd. and provide recommendations for optimizing the production line.*

HONORS AND AWARDS

- **Second Prize (top 20%) in the National Undergraduate Mathematical Modeling Contest** *September, 2023*
- **Comprehensive Excellence Award at Tsinghua University** *November, 2023*
- **Academic Excellence Award at Tsinghua University** *November, 2023 ; November, 2024*
- **H Award (top 20%) in the Mathematical Contest in Modeling(MCM) Organized by the Consortium for Mathematics and Its Applications(COMAP)** *February, 2024*
- **Second Prize (ranking 3/16) in the Challenge Cup (Mechanical Control Track)** *May, 2024*
- **First Place in the Team Competition in 2024 China Robot Competition and RoboCup China Open** *May, 2024*
- **Outstanding Award for Technological Innovation at Tsinghua University** *November, 2024*

SKILLS SUMMARY

- **Programming Languages:** Python, C/C++, Bash
- **Frameworks:** Pytorch and CUDA, Stable-Baselines3, Gym
- **Tools:** Docker, git, ROS
- **Platforms:** Linux(Ubuntu, Debian), Windows
- **Softwares:** VS-Code, Solidworks, Matlab
- **Hardwares:** STM32, Raspberry-Pi
- **English Level:** TOEFL 102 (Speaking 23)