Xiaokang Sun

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EDUCATION

Tsinghua University **September 2021 – June 2025 (Expected)**
B.Eng. in Automation *Beijing, P.R.China*

- Overall GPA: 3.6/4.0 (3.64/4.0, WES), TOFEL iBT: 102/120, GRE: 323/340
- Award: Tsinghua University Second Prize Scholarship for 2021 Freshmen
- Research keywords: Robot Learning, Multi-modal Perception, Robust Manipulation, Smart Planning and Control, etc.

RELEVANT COURSES

Theory of Automatic Control, Smart Robot Manipulation, Operations Research, Signals and System Analysis, Smart Sensing and Measuring, Pattern Recognition and Machine Learning, Digital and Analog Electronics, etc.

TECHNICAL SKILLS

Languages & Tools: C, C++, Python, PyTorch, NumPy, MATLAB, Simulink, Linux (Ubuntu), ROS, MuJoCo, PyBullet
Hardware Experience: FPGA, PSoC, EDA, Arduino Uno, Analog & Digital Circuits, Servo Motors, 3D Modeling & Print
Operation Experience with Robot Platforms: UR-5 (sim & real), Franka (sim & real), ALOHA (real), XBot-S (sim)

RESEARCH EXPERIENCES

Long-Horizon Task Planning with LLM-based STL/PDDL Planner **July 2024 – December 2024**
Research Assistant, Advisor: Prof. Jiachen Li *University of California, Riverside (TASL)*

- First authorship. Accepted at *SCR 2024*. Planned submission to *RSS 2025*.
- Leveraged formal methods like STL and PDDL, generated and validated by LLMs, to specify and generate task plans.
- Extending to dual-arm mobile manipulators for handling more intricate and compound everyday tasks.

Visual-Tactile Fusion-Based Regrasping Policy Learning **July 2024 – Present**
Research Assistant, Advisor: Prof. Yao Jiang *Tsinghua University (ME)*

- First authorship. Integrated visual and tactile perception for regrasping after failures on objects with different COM.
- Applied reinforcement learning for grasping skill acquisition and validated the approach in simulated environments.

Wearable Fingertip Tactile Rendering Devices Based on Parallel Mechanisms **October 2023 – Present**
Research Assistant, Advisor: Prof. Yao Jiang *Tsinghua University (ME)*

- Co-first authorship. Developed fingertip haptic rendering devices with another undergraduate and a Ph.D. student, focused on improving flexibility and rendering capabilities for enhanced user experience.
- Completed the mechanism design, 3D modeling, and 3D printing, developed test software to evaluate performance.

Fine-tuned Sim-to-sim Framework for Mitigating Sim-to-real Problem **February 2024 – June 2024**
Research Assistant, Advisor: Prof. Jianyu Chen *Tsinghua University (IIIS)*

- Collaborated on validating policies with real humanoid robots to ensure robustness across different environments.
- Fine-tuned learned policies in a sim-to-sim framework to address sim-to-real transfer challenges.
- Conducted simulations in MuJoCo and Isaac Gym, refining models for better real-world performance.

Brain-Machine Integrated Intelligent Animal Experiment Platform **August 2022 – January 2023**
Research Assistant, Mentor: Mr. Jingwei Li *Tsinghua University (BME)*

- Developed a brain-machine hybrid intelligence platform for experiments with mice and miniature pigs, expanding applications in brain-computer interfaces.
- Designed the structure and completed 3D printing of a mini-vehicle platform, supporting the experimental setup.
- Gained significant skills in mechanical design and hardware programming, which are essential for robotics research.

EXTENDED ABSTRACT & POSTERS

Zhixu Li*, **Xiaokang Sun***, Mingyu Cai, Jiachen Li. "Good Data Matters: STL-Enhanced Data-Efficient Imitation Learning for Long-Horizon Manipulation." Accepted for presentation at *the 2024 Southern California Robotics Symposium* (co-first authorship). Planned submission to *Robotics: Science and Systems* (first authorship).

COURSE PROJECTS

Blocks Classification and Stacking with UR-5 | *Smart Robot Manipulation, Prof. Xiang Li* **June 2024**

- **Key words**: Perception, Planning, Control, Robot Manipulation.
- Performed block detection, classification, and stacking, ensuring task completeness, safety, and speed of execution.
- Implemented a full pipeline grasping task on UR-5 using ROS, MoveIt, OpenCV, and other frameworks and tools.
- Open-sourced code and more details on my GitHub (`https://github.com/Studeas/Smart_Robot_Manipulation_2024`)

Image Classification by Head Features | *Principles of AI, Prof. Rui Jiang* **December 2023**

- **Key words**: Computer Vision, Image Classification, Neural Network, Machine Learning.
- Applied ML methods to solve binary and five-class head feature classification problems.
- Strengthened foundational knowledge in image classification and practiced the application of PyTorch and NumPy.
- Open-sourced code and more details on my GitHub (`https://github.com/Studeas/Principle_of_AI_2023`)

Bipedal Walking Based on PDW | *Research and Practice Humanoid Robot, Prof. Mingguo Zhao* **December 2023**

- **Key words**: Humanoid, Legged Robot, Passive Dynamic Walking, Gait Simulation.
- Developed a walking model based on Passive Dynamic Walking (PDW), powered by center of mass (COM) movement.
- Proposed and verified a passive walking solution, including literature review, simulation, and reporting.

Optical Field Imaging and Digital Refocusing | *Smart Sensing and Measuring, Prof. Lihui Peng* **December 2023**

- **Key words**: Computer Vision, Optical Field Imaging, Refocus, Depth Map.
- Gained deep understanding of light field imaging and digital refocusing algorithms.
- Conducted experiments using a light field camera, captured images, implemented digital refocusing algorithms.

Escape Tower of the Sorcerer: Search Algorithms Application | *Principles of AI, Prof. Rui jiang* **October 2023**

- **Key words**: Search Algorithms, NP-hardness, Game Interface.
- Built a simplified Tower of the Sorcerer scenario and implemented a search algorithm for character escape.
- Implemented algorithms to solve high-complexity search problems and developed a visual interface to display.
- Open-sourced code and more details on my GitHub (`https://github.com/Studeas/Principle_of_AI_2023`)

Holiday Management Software Development | *Object Oriented Programming (OOP), Prof. Jingtao Fan* **July 2023**

- **Key words**: C++ Programming, Object Oriented Programming, Software Engineering.
- Independently completed the design of a holiday management software and wrote several thousand lines of code.
- Conformed to MVC pattern and OOP principles, developed a good coding style.
- Open-sourced code and more details on my GitHub (`https://github.com/Studeas/Holiday-Management-OOP`)

LEADERSHIP / EXTRACURRICULAR

Cantare Sempre (Tsinghua University Yongheng Choir) **August 2023 – Present**

Tenor Section Leader & Publicity director *Tsinghua University*

- Created and published 20+ press releases and designed 10+ sets of promotional materials for choir events.
- Managed tenor section of 30+ members, responsible for organizing daily rehearsals and team-building activities. Led the section in 10+ performances of varying sizes, contributing to the choir's success.

Summer Work and Study Program, Wuyuan, Jiangxi Province Team **July 2022 - August 2022**

Program Participant *Wuyuan, Jiangxi*

- Traveled to Jiangxi to experience factory and rural labor, gaining insight into Chinese social life and issues.
- Gained an understanding of how technology affects workers' rights, as well as the struggles faced by rural populations.
- Combined study with hands-on labor, integrating theory and practice, and completed two reports.

Student Association of Educational Poverty Alleviation (SAEPA) **Feburary 2022 – July 2022**

Member of Dream Class Section *Tsinghua University*

- Served as one of the managers and volunteer teachers of SAEPA2022 Spring Cloud Teaching Program.
- One-on-One Tutoring for a Middle School Student in a Remote Area of Xinjiang for a Semester.

Publicity Department of Xinya College Student Union **September 2021 – July 2023**

Core Member *Tsinghua University*

- Actively participated in cultural and creative design, contributing to the promotion of four large-scale events.
- Designed various items such as postcards and phone cases as part of the creative projects for event promotions.