Chen Chen

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Education

Tsinghua University (THU), Beijing, China — Sept. 2020 – Jun. 2024 (expected)

- *Bachelor* of Engineering in Automation
- GPA: *3.96/4.0* (Sophomore and Junior year), 3.76/4.0 (overall)

Relevant Courses: Pattern Recognition and Machine Learning (A), Artificial Intelligence (A-), Theory of Automatic Control (A-), Data Structures (A-), Computer Networks (A-), Operation Research (A), Random Mathematics and Statistics (A-), Synthetical Practice of Electronics System Design (A), Contemporary Electronic System Design (A), Intelligent Systems: Design and Practice (A+), Students Research Training Project (A+).

Publication

[1] **Adaptive Vision-Based Control of Redundant Robots with Null-Space Interaction for Human-Robot Collaboration**

X. Yan, **C. Chen** and X. Li, *2022 International Conference on Robotics and Automation (ICRA)*

[2] **A Complementary Framework for Human-Robot Collaboration with a Mixed AR-Haptic Interface**

X. Yan, Y. Jiang, **C. Chen**, L. Gong, M. Ge, T. Zhang and X. Li, *IEEE Transactions on Control Systems Technology (TCST)*

[3] **Multi-Modal Interaction Control of Ultrasound Scanning Robots with Safe Human Guidance and Contact Recovery**

X. Yan, Y. Jiang, G. Wu, **C. Chen**, G. Huang and X. Li, submitted to *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*

Research Experience

Intelligent Robotic Manipulation Lab, Dept. of Automation, Tsinghua University — Apr. 2021 – Present

Research Assisstant Advisor: Xiang Li

- Designed a novel Augmented Reality (AR) interface for interaction with robots' null space. [1]
  - Enabled a UR5 robot to carry out tasks with an uncalibrated camera while interacting with humans via the AR interface to deal with unforeseen changes.
  - Ensured efficient and safe collaboration without affecting the robot end-effector's main task.
- Proposed a complementary framework for human-robot collaboration with an AR-haptic interface. [2]
  - Enabled a Franka robot to carry out a picking task using a vision-based adaptive controller while the human expert supervises and manipulates the robot's null space to avoid collisions.
  - Extended the interface proposed in [1] by adding a haptic device, which allows the robot to learn the expert's demonstration with dynamic movement primitives (DMP) in a placing task.
- Proposed a novel multi-modal control scheme for ultrasound scanning robots. [3]
  - Achieved automatic switching between different control modes smoothly, depending on the doctor's actions and changes in the environment, such as the movement of the patient's body.
  - Combined the advantages of the doctor's experience/knowledge and the robot's autonomous ability, allowing the doctor to intervene safely at any time while maximizing the robot's scanning ability.
  - Developed a perception system based on Azure Kinect, which can recognize the doctor's actions and generate the movement trajectory of the ultrasound probe on the patient's neck.

Medical Cosmetic Robot Project, Tsinghua and Peking Union Medical College — Sept. 2022 – Present

Research Assisstant Advisor: Gangtie Zheng, Xiao Long

- Developed a surgery robot for mesotherapy, a non-invasive cosmetic treatment.
- Implemented admittance control scheme on UR5e and developed a point cloud registration method to obtain geometric relationships between the patient and a previously obtained high-precision facial model.

DISCOVER Lab, Institute for AI Industry Research (AIR), Tsinghua University Oct. 2022 – Mar. 2023

Research Assisstant Advisor: Guyue Zhou

- Developed the official AI for the RoboMaster University Sim2Real Challenge (RMUS) at ICRA 2023.
- Used Bayesian optimization to adjust the placement of scoring props in the scene so that the contestants take the longest time to complete the task.

Skills

Programming C/C++, Python, C#, MATLAB, Julia, Rust, Java

Tools ROS, LaTeX, Unity3D, Docker, KiCAD, SolidWorks, Blender

Platforms UR5(e), Franka Emika Panda, Unitree Go1, RoboMaster ep, HoloLens 2, Omega 3, and so on

Languages Chinese (native), English (fluent, GRE 156+170)

Honors and Awards (Selected)

- **Jiang Nanxiang Scholarship**, Tsinghua University Oct. 2023
  First place in departmental scholarship defense.
- **China National Scholarship**, Ministry of Education of the People's Republic of China Dec. 2022
  Top 0.1%, highest scholarship given by the Chinese government.
- **Outstanding Project of Student Research Training (SRT) Program**, Tsinghua University Dec. 2022
  Top 5% of all SRT projects at Tsinghua University.
- **Comprehensive Excellence Award**, Dept. of Automation, Tsinghua University Oct. 2022
  Top 10%, highest honor for students in the Department of Automation.
- Third Prize in the **RoboMaster University Sim2Real Challenge** (RMUS) at ICRA 2022 Jun. 2022
  Ranked 4th among all 117 participating teams in the simulation stage.
- Second Prize in the 23rd **Electronic Design Competition**, Tsinghua University Dec. 2021
  Ranked 3/51, highest level competition in the field of EE/CS at Tsinghua.
- Second Prize in the 15th **Intelligent Vehicle Competition**, Tsinghua University Apr. 2021
- First Prize in the 33rd **Chinese Chemistry Olympiad** Sept. 2019

Professional Activities

Open source contribution: PointCloudLibrary/pcl, mathjax/MathJax, tuna/mirror-web, ripperhe/Bob