Chen Chen

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Education

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

- *Bachelor* of Engineering in Automation
- GPA: *3.96/4.0* (Sophomore and Junior year), 3.75/4.0 (overall)

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

Publication

[5] **Visual Attention Based Cognitive Human–Robot Collaboration for Pedicle Screw Placement in Robot-Assisted Orthopedic Surgery**

Chen Chen, Qikai Zou, Yuhang Song, Shiji Song, Xiang Li, *in 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*

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

Xiangjie Yan, Yongpeng Jiang, Guokun Wu, **Chen Chen**, Gao Huang and Xiang Li, *in 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*

[3] **Independence in the Home: A Wearable Interface for a Person with Quadriplegia to Teleoperate a Mobile Manipulator** Best Paper Award in Systems

Akhil Padmanabha, Janavi Gupta, **Chen Chen**, Jehan Yang, Vy Nguyen, Douglas J Weber, Carmel Majidi, and Zackory Erickson, *in Proceedings of the 2024 ACM/IEEE International Conference on Human-Robot Interaction*, Mar 2024

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

Xiangjie Yan, Yongpeng Jiang, **Chen Chen**, Leiliang Gong, Ming Ge, Tao Zhang and Xiang Li, *IEEE Transactions on Control Systems Technology*, Jan 2024

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

Xiangjie Yan, **Chen Chen** and Xiang Li, *in 2022 International Conference on Robotics and Automation (ICRA)*, May 2022

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. [4]
  - 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.
- Developed a visual attention-based cognitive human–robot collaboration system for surgical robots. [5]
  - Proposed a novel HRI scheme for safety-critical tasks like surgery.
  - Developed a shared interaction controller for the robot.

Medical Cosmetic Robot Project, Tsinghua and Peking Union Medical College Sept. 2022 – Mar. 2024

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.

Robotic Caregiving and Human Interaction Lab, RI, Carnegie Mellon University Apr. 2023 – Present

Research Intern Advisor: Zackory Erickson

- Developed a shared control scheme for a assistive robot to help people with quadriplegia to teleoperate a mobile manipulator. [3]
- Conducted a week-long human study to evaluate the system's usability and performance.

Skills

Programming C/C++, Python, C#, MATLAB, Julia, Rust, Java
Tools ROS, ROS 2, LaTeX, Unity3D, Docker, KiCAD, SolidWorks, Blender
Platforms UR5(e), Franka Emika Panda, Stretch, Unitree Go1, HoloLens 2, Omega 3, and so on
Languages Chinese (native), English (fluent, GRE 156+170)

Honors and Awards (Selected)

- **Outstanding Graduate**, Department of Automation, Tsinghua University Jun. 2024
- **Outstanding Graduate in Beijing**, Beijing Municipal Education Commission Jun. 2024
- **Jiang Nanxiang Scholarship**, Tsinghua University Oct. 2023
  40 out of 16320 undergrads, second highest honor at Tsinghua University.
- **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.
- Most Elegant Solution, 9th **Robotic Grasping and Manipulation Competition** at ICRA 2024 May. 2024
  1st Place in RGMC In-Hand Manipulation Track.
- First Prize in the **Beijing Challenge Cup** May. 2023
- 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

Reviewer of HRI, IROS
Open source contribution: PointCloudLibrary/pcl, mathjax/MathJax, tuna/mirror-web, ripperhe/Bob, UniversalRobots/Universal_Robots_ROS2_Driver