Yu Chen

Website: https://neuling-jpg.github.io/yuchen.github.io/

Email: uchen0223@gmail.com, yuchen3@andrew.cmu.edu

Google Scholar: https://scholar.google.com/citations?hl=en&user=U6s4IpUAAAAJ

Education

Carnegie Mellon University, School of Computer Science, Robotics Institute **2022.8 – 2024.8**

Master of Science in Robotics

- GPA: 4.19
- Research interest: Robot motion planning, robot kinematics, and robotic system design.
- Coursework: Kinematics/Dynamics/Control (A+), Introduction to Robot Learning (A+), Machine Learning (A+), Computer Vision (A+), Mechanics of Manipulation (A), Optimal Control & Reinforcement Learning (A), Robot Math (A).

Tongji University, Institute of Rail Transit **2017.9 – 2022.6**

Bachelor in Vehicle Engineering (Railway), Minor in Artificial Intelligence

- GPA: 4.78/5.0 or 92.83/100, rank No.1 in the department.
- Selected awards: Graduation with Honor - College Graduate Excellence Award of Shanghai (top 5%), Outstanding Graduation Project (top 5%), National Scholarship (top 5%), Special Award in Tongji University Challenge Cup (team leader, top 5%), #1 in Tongji University Excellent Scientific Research and Education Competition (team leader, top 1).

Selected Publications

1. **Propagative Distance Optimization for Motion Planning**
   IEEE International Conference on Robotics and Automation (ICRA), 2024 [under review]
   Yu Chen, Jinyun Xu, Yilin Cai, Ting-Wei Wong, Zhongqiang Ren, Howie Choset, Guanya Shi.

2. **Propagative Distance Optimization for Constrained Inverse Kinematics**
   The 16th International Workshop on the Algorithmic Foundations of Robotics (WAFR), 2024 [*Oral Presentation*]
   Yu Chen, Yilin Cai, Jinyun Xu, Zhongqiang Ren, Guanya Shi, Howie Choset.

3. **Graph-Propagation-based Kinematic Algorithm for In-pipe Truss Robots**
   IEEE Robotics and Automation Letters
   Invited to IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024 [*Oral Presentation*]
   Yu Chen, Jinyun Xu, Yilin Cai, Shuo Yang, Ben Brown, Fujun Ruan, Yizhu Gu, Howie Choset, Lu Li.

4. **Semi-Supervised Vein Segmentation of Ultrasound Images for Autonomous Venipuncture**
   IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021 [*Oral Presentation*]
   Yu Chen, Yuxuan Wang, Bolin Lai, Zijie Chen, Xu Cao, Nanyang Ye, Zhongyuan Ren, Junbo Zhao, Xiao-Yun Zhou, Peng Qi.

Selected Research Experiences

Biorobotics Lab, Carnegie Mellon University. **2022.9 – present**

In collaboration with Prof. Howie Choset and Prof. Guanya Shi *Pittsburgh, USA*

- Developed an efficient framework for inverse kinematics and motion planning in high-dimensional articulated robots with complex task constraints, leveraging propagative distance optimization to enhance accuracy and scalability.

- Addressed the open problem of theoretically demonstrating the advantages of distance-based kinematics parameterization over classical methods.

In collaboration with Prof. Howie Choset and Mr. Ben Brown (*Project Scientist*) *Pittsburgh, USA*

- Proposed and formulated an efficient locomotion technique for the confined-and-complex-space traversal of truss robots.
- Devised a computationally efficient kinematic algorithm for truss robots using graph propagation principles.
- Designed and constructed an in-pipe truss robot hardware system capable of navigating straight pipes and pipe elbows.

School of Electronics and Information Engineering, Tongji University **2020.6 – 2022.5**

In collaboration with Dr. Xiao-Yun Zhou and Prof. Peng Qi *Shanghai, CN*

- Designed a comprehensive hardware-software framework for an autonomous venipuncture robot, including mechanical structure development and a semi-supervised learning algorithm for ultrasound-based vein detection.

Selected Patents

1. [CN113788081B] Multi-terrain Driving Unmanned Vehicle Based on Vehicle Body Deformation
   Qing Jia, Yu Chen, Rongsheng Zhou, Yijun Jiang, Bowen Liang, Wenyi Cui, Chen Luo.
2. [CN114252178A] Touch Sensor, Pressure Event Detection Method and Device and Intelligent Robot
   Peng Qi, Yu Chen, Yu Zheng, Zhengyou Zhang, Juhong Wang, Tingting Liu.
3. [CN112109111A] Mechanical Joint, Mechanical Arm and Control Method for Oblique-Section Cylindrical Connection
   Peng Qi, Yu Chen.
4. [CN112089490A] Full-Automatic Venipuncture Recognition Integrated Robot
   Peng Qi, Yu Chen, Xu Cao, Yuxuan Wang, Zhiyu Tian.
5. [CN112022293A] Gesture Recognition Venipuncture Method and Device for Intravenous Injection Robot
   Peng Qi, Yu Chen.
6. [CN112022294A] Operation Trajectory Planning Method of Venipuncture Robot Based on Ultrasonic Image Guidance
   Peng Qi, Yu Chen.
7. [CN111968097A] Blood Vessel Puncture Image Processing Method and Blood Vessel Puncture Robot
   Peng Qi, Yu Chen.

Selected Skills

Programming: C/C++, CUDA programming model, Python, Julia, Matlab

Robotic Application Tools: ROS, ROS2, MuJoco, Isaac Sim, Gazebo, Bullet

Computer-Aided Design: AutoCAD, Solidworks, Blender