Yu Chen

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**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.*

1. **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.*

1. **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.*

1. **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.*

1. [CN114252178A] Touch Sensor, Pressure Event Detection Method and Device and Intelligent Robot

*Peng Qi, Yu Chen, Yu Zheng, Zhengyou Zhang, Juhong Wang, Tingting Liu.*

1. [CN112109111A] Mechanical Joint, Mechanical Arm and Control Method for Oblique-Section Cylindrical Connection

*Peng Qi, Yu Chen.*

1. [CN112089490A] Full-Automatic Venipuncture Recognition Integrated Robot

*Peng Qi, Yu Chen, Xu Cao, Yuxuan Wang, Zhiyu Tian.*

1. [CN112022293A] Gesture Recognition Venipuncture Method and Device for Intravenous Injection Robot

*Peng Qi, Yu Chen.*

1. [CN112022294A] Operation Trajectory Planning Method of Venipuncture Robot Based on Ultrasonic Image Guidance

*Peng Qi, Yu Chen.*

1. [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