# CHUIZHENG KONG

**PhD Student in Robotics - Georgia Institute of Technology**

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## EDUCATION

M.S. Electrical Engineering, Rensselaer Polytechnic Institute (thesis advisor: Prof. John T. Wen) 2023
Thesis: *Design and Control of a Nonprehensile Impulse Manipulator* [Proquest Link]

B.S. Mechanical Engineering, Rensselaer Polytechnic Institute (research advisor: Prof. Sergio Pequito) 2021

## SYSTEM INTEGRATION RESEARCH

### Dual Arm Robot Teleoperation with Meta Quest3 Support [Link]

Jan 2025 - Apr 2025 Georgia Tech, Atlanta GA

- Designed and assembled a dual arm system with two 7-dof kinova gen3 robot
- Created a Mujoco digital twin simulation environment for the dual arm system with the corresponding joint position, joint velocity, joint torque, and operation space robot controller written in python.
- Implemented a interfacing code that converts motions of the Meta Quest3 Controller into motions in the dual-arm robot for teleoperation.

### Autonomous Robotic Pollination and Microscopic Inspection

May 2024 – August 2024 Georgia Tech, Atlanta GA, & USDA ARS, Charleston SC

- Led a hardware development team on the R&D of a novel vibratory pollination system with an auto-focusing microscope, RGB-D camera, and a 7-DoF Robot arm.
- Developed a perception, planning, and control algorithm pipeline that unit the above mentioned hardware to perform robot navigation, flower recognition and pollination, and microscopic inspection.
- The work was demoed in a [workshop], featured in an [interview], and a [paper] was submitted to ICRA 2024.

### Under-actuated Impulse Manipulator Design and Control

Jan 2022 – Jun 2023 Mitsubishi Electric Research Lab, Cambridge MA

- Designed and programmed a nonprehensile manipulator for robot assembly pick-and-place tasks
- Enabled camera vision guided assistance with contour extraction, shape recognition, and frame transformations
- Conducted machine learning based model-predictive control with a robot arm in the loop to perform industrial assembly tasks (k-Nearest Neighbor, Random Forest, or RBF kernel SVM)
- The work resulted a [patent] and two papers in [ACC'23] and [ICMLA'23] published

## ALGORITHMIC RESEARCH

### Goal-Reaching Trajectory Design Near Danger with Piecewise Affine Reach-avoid Computation

Sep 2023 - Mar 2024 Georgia Tech, Atlanta GA

- Designed a hybrid MPC + nonlinear PD controller for a dynamic vehicle simulation model in performing parallel drift parking featured in the [2014 Guinness World Records]
- Implemented a piecewise affine back reach-avoid set planner on the controller mentioned above to create a "safe starting zone" where the simulated vehicle can safely drift between two tightly parked cars.
- The work was accepted and presented in RSS'24.

## SELECTED PUBLICATION AND PATENT

- **Kong, Chuizheng**, Alex Qiu, Idris Wibowo, Marvin Ren, Aishik Dhori, Kai-Shu Ling, Ai-Ping Hu, and Shreyas Kousik. "Towards Closing the Loop in Robotic Pollination for Indoor Farming via Autonomous Microscopic Inspection." arXiv preprint arXiv:2409.12311 (2024). [Arxiv Link]
- Chung, Long Kiu, Wonsuhk Jung, **Chuizheng Kong**, and Shreyas Kousik. "Goal-Reaching Trajectory Design Near Danger with Piecewise Affine Reach-avoid Computation." arXiv preprint arXiv:2402.15604 (2024). [Arxiv Link]
- Yerazunis, William, **Chuizheng Kong**, and Daniel Nikovski. "Systems and Methods for Object Orientation and Manipulation Via Machine Learning Based Control." U.S. Patent Application 18/165,641, filed August 8, 2024. [Patent Link]