

Kai Gao

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EDUCATION

Rutgers, the State University of New Jersey

Aug. 2019 – Present

Robotics PhD

Piscataway, USA

- GPA:93/100
- **Three first-author papers** in top robotics conferences in 2021.
- Related courses: Computer Vision, Machine Learning

University of Science and Technology of China(USTC)

Aug. 2015 – Jun. 2019

Bachelor in Mathematics

Hefei, China

- Outstanding Graduates(2019)
- Outstanding Student Scholarship (2015-2016) (2017-2018)
- Gold Award of China Undergraduate Mathematical Contest in Modeling in Anhui Province(2017)(1/65 in USTC)
- Related courses: Computer Graphics

Pohang University of Science and Technology (POSTECH)

Feb. 2017 – Aug. 2017

Exchange Student

Pohang, South Korea

RESEARCH EXPERIENCE

Object Rearrangement

Mar. 2020 – Present

Research Assistant

Algorithmic Robotics and Control Lab(ARCL), Rutgers University, USA

- Set up a complete perception-planning-control pipeline with UR-5e.
- Developed efficient algorithms and studied structural properties for different manipulation scenarios.
- Experience in using deep learning models for perception and designing DQN for push planning tasks.
- Experience in simulation software e.g. PyBullet, ROS+Gazebo.

Vehicle Routing Problem

Aug. 2019 – Mar. 2020

Research Assistant

Algorithmic Robotics and Control Lab(ARCL), Rutgers University, USA

- Designed fast algorithms for vehicle routing problems
- Conducted comprehensive UE-4 based simulation studies for the drone scenario.

Multi-Robot Path Planning

Jul. 2018 – Sep. 2018

Research Intern

Algorithmic Robotics and Control Lab(ARCL), Rutgers University, USA

- Designed fast algorithms to solve multi-robot path planning problems with different objectives.
- Designed an efficient algorithm to solve the perimeter guarding problem.
- Proved some lemmas and theorems on the efficiency of the algorithms.

Image Registration

Sep. 2017 – Jun. 2019

Research Assistant

Graphics&Geometric Computing Laboratory(GCL), USTC, China

- Designed a fast non-rigid image registration algorithm which is robust to noise and outliers and outperforms the state of the art.
- Implemented the algorithm with C++ and visualized it with OpenGL.

PUBLICATIONS

K. Gao and J. Yu. "Capacitated Vehicle Routing with Target Geometric Constraints." 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021).

K. Gao, S. W. Feng, and J. Yu. "On Minimizing the Number of Running Buffers for Tabletop Rearrangement." 2021 Robotics: Science and Systems (RSS 2021).

R. Wang*, **K. Gao***, D. Nakhimovich*, J. Yu, and K. E. Bekris. "Uniform Object Rearrangement: From Complete Monotone Primitives to Efficient Non-Monotone Informed Search." 2021 IEEE International Conference on Robotics and Automation (ICRA 2021).

S. W. Feng, **K. Gao**, J. Gong, and J. Yu. "Sensor Placement for Globally Optimal Coverage of 3D-Embedded Surfaces." 2021 IEEE International Conference on Robotics and Automation (ICRA 2021).

S. W. Feng, S. D. Han, **K. Gao**, and J. Yu. "Efficient Algorithms for Optimal Perimeter Guarding." 2019 Robotics: Science and Systems (RSS 2019).

Other Submitted Works

K. Gao, D. Lau, B. Huang, K. E. Bekris and J. Yu. "Fast High-Quality Tabletop Rearrangement in Bounded Workspace." submitted to 2022 IEEE International Conference on Robotics and Automation (ICRA 2022).

E. R. Vieira, D. Nakhimovich, **K. Gao**, R. Wang, J. Yu and K. E. Bekris. "Persistent Homology for Effective Non-Prehensile Manipulation" submitted to 2022 IEEE International Conference on Robotics and Automation (ICRA 2022).

Invited Presentations

On Minimizing the Number of Running Buffers for Tabletop Rearrangement

May 2021

TRIPODS (Transdisciplinary Research in Principles of Data Science) Seminar

Virtual

- A 20-minute presentation introducing my RSS 2021 paper.

OTHER EXPERIENCE

Teaching Assistant

Sep. 2019 – Dec 2020

Rutgers University

Piscataway, USA

- Courses: CS314 Principles of Programming Languages; CS205 Introduction to Discrete Structures I

Class President

Apr. 2016 – Jun. 2019

University of Science and Technology of China

Hefei, China

- The class won the Outstanding Class Prize in the school (ranking 1st among 9 classes)

Vice President of International Cooperation Voluntary Group

Feb. 2016 – May 2017

University of Science and Technology of China

Hefei, China

- Co-organized the reception of foreign exchange students and visiting professors during their visits in USTC.
- Organized a ball as the managing director for international students in USTC.

SKILLS

Programming Languages : Python, Matlab, C++

Tools : Git, ROS, PyBullet, Gazebo, OpenCV, Gurobi