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Rui JIN

EDUCATION BACKGROUND

Zhejiang University, Hangzhou *Sep 2021-Mar 2024*

- FAST Lab, College of Control Science and Engineering.
- Co-supervised by Prof. Fei Gao and Prof. Haojian Lu
- MEng of Control Science and Engineering.
- GPA: 3.68/4.3, Postgraduate Recommendation (Ranking: 1/81).

Northwestern Polytechnical University, Xi'an *Sep 2017-Jun 2021*

- School of Mechanical Engineering.
- BEng of Mechanical Design & Manufacturing and Their Automation.
- Average Score: 86.37, Comprehensive Ranking: 1/94 (1.1%).

INTERNSHIP EXPERIENCE

Peking University, Beijing *Jun 2024-Present*

- Research assistant
- PKU-Agibot Lab, supervised by Hao Dong

Skysys Intelligent Technology (SKYSYS) *Aug 2023-Jan 2024*

- Research and Development Department
- **Photovoltaic Cleaning Robot (Project Leader)**
  Proposed a UAV-based autonomous delivery system for deploying and retrieving cleaning robots on photovoltaic panels.

PUBLICATIONS

1. **GS-Planner: A Gaussian-Splatting-based Planning Framework for Active High-Fidelity Reconstruction**
   Rui Jin*, *Yuman Gao**, *Haojian Lu, Fei Gao.*
   Accepted by ***IROS* 2024** | *pdf* | *video* | *arxiv*
   - Proposed the first active 3D reconstruction system using 3DGS with online evaluation.
   - Designed a feedback strategy of online model-consistent completeness and quality evaluation.
   - Devised a planning framework for active reconstruction and safe navigation in the 3DGS map.
2. **Unmanned Aerial Vehicle Mediated Drug Delivery for First Aid**
   *Sheng Tao**, ***Rui Jin**** ***(co-first author)****, et al, Fei Gao, Haojian Lu, Jichen Yu, Zhen Gu.*
   Advanced Materials 2023 *(**Frontispiece**, IF: 29.4)* | *pdf* | *paper*
   - Proposed a UAV-mediated first-aid system achieving autonomous administration of emergency medication without the involvement of bystander or the conscious patient.
   - Designed a contact-triggered microneedle applicator capable of providing adequate force to insert microneedles upon contact with the skin, enabling fully autonomous first aid administration.
3. **Canfly: A Can-sized Autonomous Mini Coaxial Helicopter**
   *Neng Pan, **Rui Jin**, Chao Xu, Fei Gao.*
   IROS 2023 | *pdf* | *paper* | *video*
   - Presented hardware design and control strategy for a mini coaxial helicopter, which occupies 62% less

collision area compared to the state-of-the-art autonomous mini quadrotor.

4. **HGS-Planner: Hierarchical Planning Framework for Active Scene Reconstruction using 3D Gaussian Splatting**
   *Zijun Xu, **Rui Jin**, Ke Wu, Yi Zhao, Zhiwei Zhang, Jieru Zhao, Zhongxue Gan, Wenchao Ding.*
   Submitted to ***ICRA 2025***

Other Publications

1. **Adaptive Tracking and Perching for Quadrotor in Dynamic Scenarios**
   *Yuman Gao, Jialin Ji, Qianhao Wang, **Rui Jin**, Yi Lin, Zhimeng Shang, Shaojie Shen, Chao Xu, Fei Gao.*
   T-RO 2024 | *pdf* | *link* | *video*
2. **Modeling and Force Control of a Variable-Length Continuum Robot with Variable Stiffness for Minimally Invasive Surgery**
   *Jingyu Zhang, Qin Fang, Lilu Liu, **Rui Jin**, Pingyu Xiang, Rong Xiong, Yue Wang, Haojian Lu.*
   T-ASE 2024 | *pdf* | *link*
3. **Soft Lightweight Small-Scale Parallel Robot With High-Precision Positioning**
   *Qin Fang, Jingyu Zhang, et al, **Rui Jin** (5th), Yue Wang, Rong Xiong, Zhefeng Gong, Haojian Lu.*
   T-MECH 2023 | *pdf* | *link*
4. **A Survey on Design, Actuation, Modeling, and Control of Continuum Robot**
   *Jinyu Zhang, Qin Fang, et al, **Rui Jin** (6th), Ke Qiu, Yue Wang, Rong Xiong, Haojian Lu.*
   Cyborg and Bionic Systems 2022 *(IF: 10.7)* | *pdf* | *link*
5. **Hand-inspired Flying Grasper**
   Yuze Wu, Fan Yang*, **Rui Jin**, Yuhang Zhong, Junjie Wang, Fei Gao.*
   Science (under review)
6. **Fast Iterative Region Inflation for Computing Large 2-D/3-D Convex Regions of Obstacle-Free Space**
   *Qianhao Wang, Zhepei Wang, Mingyang Wang, et al, **Rui Jin** (7th), Yuman Gao, Chao Xu, Fei Gao.*
   T-RO (under review) | *arxiv*

RESEARCH EXPERIENCES

Design, Modeling and Control of Miniature Coaxial Helicopter ***Dec 2020-Nov 2023***

- Proposed the hardware design and flight control algorithm for an autonomous coaxial dual-rotor UAV weighing 1.5 kg with a 33-minute endurance.
- Developed the flight control algorithm with a differential-flatness-based cascading controller and an actuator allocation algorithm based on quadratic programming to prevent actuator saturation.

Neural Collision Field for Efficient Trajectory Optimization for Mobile Robots ***Jan 2023-Present***

- Compressed a swept-volume-based continuous-time SDF into the neural network to enable efficient and accurate representation, and applied it to optimize quadrotor trajectories.
- Designed a progressive guidance training strategy, and a Level-of-Details sampling strategy to enhance network performance and training efficiency.

Nuclear Power Plant Autonomous Inspection Tracked Robot ***Aug 2023-Dec 2023***

- Engineered software algorithms enabling autonomous inspection, obstacle avoidance, and cross-platform capability for a nuclear power plant inspection tracked vehicle.

COMPETITION EXPERIENCES

China Robot Competition, **Championship Prize** (**Top 1%**) **2019**

・Designed and built a transformer robot capable of transforming between vehicular and humanoid forms.

National 3D Innovative Design Competition, **Top-tier Award of Shanxi Province** (**Top 3%**) **2019**

HONORS AND AWARDS

Outstanding Graduate of Northwestern Polytechnical University **2021**

Interdisciplinary Contest In Modeling, Honorable Mention **2020**

Fastgear Scholarship, **Top-tier Prize** (**Top 1%**) **2019**

National Training Program of Innovation for Undergraduates, Outstanding Conclusion Award **2018&2019**

Huawei Scholarship, First Prize (**Top 1%**) **2018**

Northwestern Polytechnical University Scholarship, First Prize (**Top 10%**) **2017&2018&2019**

SKIllS

Programming Skills

・C++, Python, MATLAB, ROS

English Proficiency

・IELTS: 7.0, GRE: 327, CET 6: 581

Design Skills

・Solidworks, Altium Designer, Keyshot, Premiere

FAST Lab Video Account Management

・Produced video edits with over a million views