Guofei CHEN

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EDUCATION

Carnegie Mellon University, Robotics Institute *Aug 2023 - May 2025 (expected)*
GPA: 4.0/4.0 — M.S. in Robotics
Advisor: Ji Zhang, Wenshan Wang
Research: Planning, Localization, Active Navigation

Zhejiang University, Chukochen Honors College *Sep 2019 - Jul 2023*
GPA: 3.94/4.0 — B.E. in Automation
Advisor: Fei Gao, Rong Xiong
Research: Multi-robot Localization, Optimization

PUBLICATIONS

1. **G. Chen**, B. He, S. Zhao, C. Fermuller, Y. Aloimonos, W. Wang, J. Zhang. AI-Navigation Development Environment: A Research Platform for Semantic Navigation and Robot Learning on Mobile Robots in Real-World. *Preprint 2024.* [abstract][website][code1][code2]
2. B. He*, **G. Chen***, W. Wang, J. Zhang, C. Fermuller, Y. Aloimonos.(*: equal contribution) Interactive-FAR: Interactive, Fast and Adaptable Routing for Navigation Among Movable Obstacles in Complex Unknown Environments. *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems* [paper][video][website]
3. B. He, **G. Chen**, C. Fermuller, Y. Aloimonos, J. Zhang. Air-FAR: Fast and Adaptable Routing for Aerial Navigation in Large-scale Complex Unknown Environments. *2025 International Conference on Robotics and Automation (Submitted)*[paper][website]
4. Z. Ren, B. Suvonov, **G. Chen**, B. He, Y. Liao, C. Fermuller, J. Zhang. Search-Based Path Planning among Movable Obstacles. *2025 International Conference on Robotics and Automation (Submitted)*[paper]
5. Z. Chen, H. Wang, **G. Chen**, Y. Ma, L. Yao, Z. Ge, Z. Song. Analyzing and Improving Supervised Nonlinear Dynamical Probabilistic Latent Variable Model for Inferential Sensors. *2023 IEEE Transaction on Industrial Informatics.* [paper]

RESEARCH EXPERIENCE

Carnegie Mellon University Aug 2023 - Present
Advisor: Ji Zhang, Wenshan Wang, Yiannis Aloimonos (UMD)

Interactive Navigation (IROS 2024) [paper] [website]

- Proposed a real-time planning algorithm that actively changes the environment for navigation by manipulating movable obstacles.
- Enables the robot to attempt to push movable objects and estimate their properties online, which shortens the path or reaches previously unfeasible task spaces.
- Encoded the interaction policy to a sparse path-searching graph, which makes global path searches orders of magnitude faster than baseline methods using grid-map.

AI-Navigation Development Environment [Unitree Go2 Setup] [Diablo Setup][website]

- Developed two full-stack navigation platforms for learning-based navigation tasks, supporting Unitree Go2 and Direct Drive Diablo.
- Integrated LiDAR SLAM, local controller, and global planner with rigorous test, which enables it to safely navigate to the commanded waypoint from upstream modules in an unknown environment.

- Key features: 1) low cost: no extra cost for Unitree Go2; $6000 for one Diablo, including the robot; 2) usability: fully modularized; 3) small sim-to-real gap: 20+ photorealistic simulation environments with exactly the same sensor configuration and motion models.
- Released a ready-to-use training/fine-tuning pipeline for 3D object detection module. The module can be deployed for online scene graph generation or other upstream tasks using the platform.

Sparse Visibility Graph Based Planning for 3D Enviornments (Submitted to ICRA 2025)[paper][website]

- Proposed a method to build a three-dimensional sparse dynamic visibility graph for global path planning from depth input in real-time. The algorithm is up to **1000x** faster than SOTA grid-map-based path search methods in large-scale or complex environments, such as BIT*.

Zhejiang University June 2020 - June 2023

Advisor: Fei Gao, Rong Xiong, Zhiqiang Ge

Relative Localization in Quadrotor Swarm using Range Measurements [thesis]

- Proposed a certifiable relative pose solver for quadrotor swarm with range measurements from UWB, using convex relaxation and Riemannian staircase optimization.
- Enables relative localization module to find the global optimum when the relative measurement error is smaller than 50% without initialization. In contrast, the baseline SOTA local optimization method is prone to failure due to sensitivity to initialization.

RoboCup Robot Soccer Small Size League Team - ZJUNlict

- **1st place** in *2020* and *2021 RoboCup China Open*. Responsible for (a) planning and motion control module; and (b) multi-robot coordinate defense module. [video] [news]
- Developed a planning module using a sparse graph, reducing its time consumption from more than 60% to 10% per execution cycle. [post]

Soft Sensor based on Bayesian Inference (TII) [code][paper]

- Proposed Optimal-Control Nonlinear Dynamic Latent Variable Model (OC-NDPLVM), which improves the accuracy of NDPLVMs with deep learning backend.
- Derived rigorous proof that optimizing the proposed loss function is equivalent to optimizing the evidence lower bound (ELBO) constrained by the Ito state transition process. Work accepted by *IEEE TII*.

HONORS AND AWARDS

- 2023 Chiang Chen Overseas Graduate Scholarship (**1 in Zhejiang University, 9 in China**) [Website]
- 2020, 2021 RoboCup (ChinaOpen) Champion of Small Size League [highlights]
- 2020, 2021, 2022 Excellence Award in Academics, Zhejiang University

SKILLS

Programming: C/C++, Python, Lua, MATLAB
Robotics and ML Platforms: ROS, Unity, Isaac Sim, Jax
Language: English (TOEFL: 111, S: 25), Mandarin Chinese