Yunfan Gao

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Education

Mar 2022–Now
Albert-Ludwigs-Universität Freiburg Freiburg, Germany
PhD in Microsystems Engineering
- *Advisor*: Prof. Dr. Moritz Diehl
- *Thesis*: Efficient and robust motion planning in cramped spaces under uncertainty.
- Associated fellow of Marie Skłodowska-Curie Innovative Training Network ELO-X.

Sep 2019–Jan 2022
ETH Zürich Zürich, Switzerland
Master in Robotics, Systems, and Control GPA: 5.8/6.0
- *Thesis project*: Projection-based augmented reality with an ANYmal robot, supervised by Dr. Ryan Luke Johns, Perry Franklin, and Prof. Dr. Marco Hutter.
- *Semester project*: Multi-sensor fusion for drone localization, supervised by Dr. David Hug, Dr. Marco Karrer, and Prof. Dr. Margarita Chli.
- *Award*: Swiss Robotics Master Award

Sep 2015–Jun 2019
Fudan University Shanghai, China
Bachelor in Electronic Engineering GPA: 3.79/4.00
- *Thesis project*: Channel-state-information-based indoor smartphone localization, supervised by Prof. Dr. Yuedong Xu.

Sep 2017–Dec 2017
University of California, Santa Barbara Santa Barbara, the United States
Exchange Program GPA: 4.0/4.0

Experience

Mar 2022–Aug 2025
Bosch Corporate Research Renningen, Germany
Industrial PhD student
- *Supervisor*: Dr. Niels van Duijkeren
- Research and development of robust and stochastic model predictive control (MPC)-based controllers for motion planning of mobile robots, explicitly accounting for human motion uncertainties and system disturbances. The optimal control problems (OCP) are formulated with few approximations of (robust) collision-free conditions. Algorithms that efficiently address the numerical challenges of the resulting OCPs are proposed. The developed controllers enable real robots to navigate safely and smoothly in tight spaces.

Jul 2021–Dec 2021
Carl Zeiss Oberkochen, Germany
Intern
- Sensor fusion (a camera and an inertial measurement unit) for object tracking.

Publications And Filed Patents

2024
- **Y. Gao**, F. Messerer, N. van Duijkeren, B. Houska, M. Diehl. "Real-Time-Feasible Collision-Free Motion Planning For Ellipsoidal Objects," in *Proc. of the IEEE Conf. on Decision and Control (CDC)*, Dec 2024.
- **Y. Gao**, F. Messerer, N. van Duijkeren, and M. Diehl, "Stochastic Model Predictive Control with Optimal Linear Feedback for Mobile Robots in Dynamic Environments," *IFAC-PapersOnLine*, Aug 2024.
- R. Dabir, **Y. Gao**, N. van Duijkeren. "MPC-based Robot Motion Planning on Signed Euclidean Distance Transforms," filed at the patent office, Jun 2024.

2024
- J. Frey, **Y. Gao**, F. Messerer, A. Lahr, M. Zeilinger, and M. Diehl "Efficient Zero-Order Robust Optimization for Real-Time Model Predictive Control with acados," in *Proc. of the European Control Conf. (ECC)*, Jun 2024.

2023
- **Y. Gao**, N. van Duijkeren, F. Messerer, and M. Diehl, "Optimization-based collision checking between objects represented by Minkowski sums of ellipsoids," filed at the patent office, Jun 2023.
- **Y. Gao**, F. Messerer, J. Frey, N. van Duijkeren, and M. Diehl, "Collision-free motion planning for mobile robots by zero-order robust optimization-based MPC," in *Proc. of the European Control Conf. (ECC)*, Jun 2023.

2021
- Z. Gao, A. Li, **Y. Gao**, B. Li, Y. Wang, and Y. Chen. "FedSwap: A federated learning based 5G decentralized dynamic spectrum access system, " (INVITED) in *Proc. of IEEE/ACM Int. Conf. On Computer Aided Design (ICCAD)*, Nov 2021.
- Z. Gao, A. Li, **Y. Gao**, Y. Wang, and Y. Chen, "Hermes: Decentralized Dynamic Spectrum Access System for Massive Devices Deployment in 5G," in *Proc. of the Int. Conf. on Embedded Wireless Systems and Networks (EWSN)*, Apr 2021.

2020
- Z. Gao*, **Y. Gao***, S. Wang, D. Li, and Y. Xu, "CRISLoc: Reconstructable CSI Fingerprinting for Indoor Smartphone Localization," *IEEE Internet of Things Journal*, Sep 2020.

Supervision

Oct 2022–Jun 2023
- Rashmi Dabir, master student at Universität Freiburg, thesis at Bosch Research.

May 2021–Oct 2021
- Eslam Elshiekh, master student at Universität Freiburg, thesis at Bosch Research.

Teaching

2021
- *Programming for Robotics - ROS*: Tutorial and exercise sessions.

Skills

Programming: Python, C++
Competency: Model predictive control, robotics, numerical optimization
Software: Git, ROS 2, Blender, MuJoCo
Language: English (fluent), Chinese (native), German (basic)