

# Yunfan Gao

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## EDUCATION

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### Albert-Ludwigs-Universität Freiburg

PhD student in Microsystems Engineering

Freiburg, Germany

Mar 2022 – Present

### ETH Zürich

Master in Robotics, Systems, and Control (GPA: 5.8/6.0)

Zürich, Switzerland

Sep 2019 – Jan 2022

### Fudan University

Bachelor in Electronic Engineering (GPA: 3.79/4.00)

Shanghai, China

Sep 2015 – Jun 2019

### University of California, Santa Barbara

Exchange Program (GPA: 4.0/4.0)

Santa Barbara, the United States

Sep 2017 – Dec 2017

## EMPLOYMENT

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### Bosch Corporate Research

Safe Motion Planning for Mobile Robots, Industrial PhD student

Renningen, Germany

Mar 2022 – Aug 2025 (Expected)

- Developed robust (and stochastic) MPC-based controllers for mobile robots, accounting for human motion uncertainties and system disturbances.
- Proposed constraint formulations with few approximations of collision-free conditions while maintaining favorable numerical properties for the solver.
- Developed reliable algorithms to efficiently solve numerically challenging optimal control problems in real-time at 20 Hz.
- Deployed the controllers on real robots operating in crowded environments.

### Carl Zeiss

Research Intern

Oberkochen, Germany

Jul 2021 – Dec 2021

- Fused the camera and the inertial measurement unit (IMU) sensor measurements for object tracking using extended Kalman filtering (EKF)

## PUBLICATIONS AND FILED PATENTS

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- **Y. Gao**, F. Messerer, N. van Duijkeren, B. Houska, M. Diehl. “Real-Time-Feasible Collision-Free Motion Planning For Ellipsoidal Objects,” *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.
- 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.
- **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.
- 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. 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 2021 Int. Conf. on Embedded Wireless Systems and Networks*, Apr 2021.
- Z. Gao\*, **Y. Gao\***, S. Wang, D. Li, and Y. Xu, “CRISLoc: Reconstructable CSI Fingerprinting for Indoor Smartphone Localization,” *IEEE Internet of Things Journal*, Mar 2021.

## SUPERVISION

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- Rashmi Dabir, student at University of Freiburg, master thesis at Bosch Corporate Research
- Eslam Elshiekh, student at University of Freiburg, master thesis at Bosch Corporate Research

## SKILLS

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**Programming:** Python, C++

**Competency:** Model predictive control, robotics, numerical optimization

**Technologies:** Git, ROS 2