

Dr. Ze Zhang

[Robotic Researcher]

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Education

Jan. 2020 - May 2025 (Defense date)

Chalmers University of Technology (CTH)

*Ph.D. in Automation Group, School of Electrical Engineering
(Gothenburg, SE)*

Sept. 2024 - Nov. 2024

University of Pennsylvania (UPenn)

*Associate visiting student in GRASP Lab,
School of Mechanical Engineering and Applied Mechanics
(Philadelphia, USA)*

Sept. 2017 - Jan. 2020

Chalmers University of Technology (CTH)

*M.Sc. in Systems, Control, and Mechatronics (MPSYS), School of Electrical Engineering
(Gothenburg, SE)*

Sept. 2013 - July 2017

University of Electronic Science and Technology of China (UESTC)

*B.Sc. in Automation, School of Automation Engineering
(Chengdu, CN)*

Profile

Greetings! I'm a researcher/engineer in robotics, computer vision, machine learning, control, and automation. I finished my Ph.D. study at Chalmers and am actively seeking future possibilities. Please find more details about me and my projects via the link to my page ↗.

Professional & Project Experience

Jan. 2020 – Present

Gothenburg, SE

Research project at CTH (Automation group, supervised by Professor Knut Åkesson)

"Collision-Free Navigation of Mobile Robots with Multimodal Motion Prediction of Dynamic Obstacles"

- Initiate and construct a vision system for environmental perception [OpenCV].
- Build neural networks to make multimodal motion predictions of dynamic obstacles and use unsupervised machine learning for post-processing [Pytorch, Scikit-learn].
- Construct an indoor transport system pipeline with a mobile robot fleet controlled via distributed model predictive control [Casadi, ROS 2].

Sept. 2024 – Present

Philadelphia, USA

Research collaboration at UPenn (GRASP lab, supervised by Asst. Professor Nadia Figueroa)

"Proactive Obstacle Avoidance with On-Manifold Control Barrier Function in Dynamic Environments"

- Integrate motion prediction with the on-manifold CBF (mCBF) method [Pytorch].
- Improve the adaptability of the mCBF control for dynamic environments [Google Jax].
- Evaluate the proposed method on a real Fetch robot.

Sept. 2024 – Present

Gothenburg, SE

Research project at CTH (Automation group, as initiator)

"Multi-Robot Navigation in Complex Environments through LiDAR and Vision"

- Train deep reinforcement learning agents for robot navigation on cloud computers. [OpenAI Gym].
- Combine DRL with MPC for state-of-the-art navigation performance based on LiDAR and vision data.
- Create an efficient coordination approach using decentralized DRL agents with distributed MPC controllers.

June 2018 – Aug. 2018

Gothenburg, SE

Summer Intern at Volvo Cars (Battery SW Design, supervised by Dr. Christian Fleischer)

- Process massive battery data from both the lab and the real world.
- Build battery state models based on deep learning methods (Tensorflow).

Skills

- Python, C++, Matlab
- ROS 2
- Pytorch, Tensorflow
- OpenAI Gym, Google Jax
- Casadi (control), OpenCV
- Linux, Git, Overleaf, Inkscape
- GPU/Cuda, Cluster/Cloud
- Nvidia Xavier

Interests

- Climbing
- Badminton
- Movie

References

Supervisor (academic)

Knut Åkesson, Professor, Electrical Engineering, CTH
Email: knut.akesson@chalmers.se
Phone: +46 31 772 3717

Advisor (academic)

Nadia Figueroa, Asst. Professor, GRASP lab, UPenn
Email: nadiafig@seas.upenn.edu

Supervisor (industrial, master's thesis)

Christian Fleischer, Ph.D.
Email: christian@cognivity.ai

Co-author

Emmanuel Dean, Senior Researcher
Email: deane@chalmers.se

Colleague

Karinne Ramirez-Amaro, Assoc. Professor
Email: karinne@chalmers.se

Publications

Future-Oriented Navigation: Dynamic Obstacle Avoidance with One-Shot Energy-Based Multimodal Motion Prediction, *Robotics and Automation Letters (RA-L)*, 2025

Gradient Field-Based Dynamic Window Approach for Collision Avoidance in Complex Environments, *International Conference on Intelligent Robots and Systems (IROS)*, 2025.

Bird's-Eye-View Trajectory Planning of Multiple Robots Using Continuous Deep Reinforcement Learning and Model Predictive Control, *International Conference on Intelligent Robots and Systems (IROS)*, 2024

Prescient Collision-Free Navigation of Mobile Robots with Iterative Multimodal Motion Prediction of Dynamic Obstacles, *Robotics and Automation Letters (RA-L, presented at ICRA 2024)*, 2023

Collision-Free Trajectory Planning of Mobile Robots by Integrating Deep Reinforcement Learning and Model Predictive Control, *International Conference on Automation Science and Engineering (CASE)*, 2023

More previous papers, upcoming papers, video demos, and code can be found on my page.

Teaching Experience

- Supervisor of design projects (on deep learning, reinforcement learning, and control) with master's students.
- Co-supervisor of master thesis project (vision-based mobile robot navigation).
- TA of master course: Model-based Development of Cyber-Physical Systems (real-time operating system).
- TA of bachelor's course: Automatic control

Project Glance

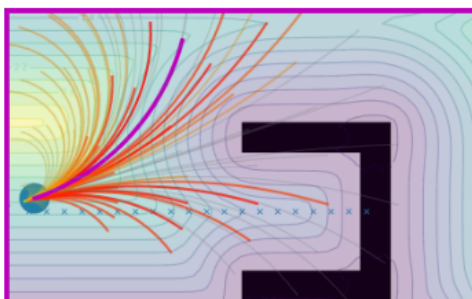
Multimodal motion prediction



Energy-based prediction and MPC



Gaussian process distance field and DWA



Motion prediction and MCBF

