

# Hao Luan

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## EDUCATION

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### Harbin Institute of Technology

*Bachelor of Engineering in Automation*

Shenzhen, CHN

Sep. 2017 – Jun. 2021

- CGPA: 90.1/100, 3.8/4.0
- Thesis: “Distributed Consensus of Multi-Agent Systems with State Constraints under Switching Directed Graphs.” [[Abstract](#)]

## EXPERIENCE

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### Research Assistant

Robotic Perception & Intelligence Lab

*Supervisor: Prof. Max Q.-H. Meng*

*Co-Supervisor: Dr. Jiankun Wang*

Aug. 2021 – Present

Southern University of Science and Technology

*Dept. Electrical & Electronic Eng.*

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- Developing an autonomous mobile manipulation platform operating in dynamic environments.
- Researching safe, efficient, and trustworthy planning algorithms for mobile robots.

### Undergraduate Research Assistant

MAS Lab

*Supervisor: Prof. Jie Mei*

Oct. 2019 – Jun. 2021

Harbin Institute of Technology, Shenzhen

*School of Mechanical Engineering and Automation*

- Proposed a framework addressing the distributed consensus problem for multi-agent systems with constraints, uncertainties, and time-varying directed topologies.
- Presented distributed consensus algorithms, theoretical proof of convergence, numerical simulations, and physical experiments for validation.

### Software Development Intern

Peng Bo Technology (Shenzhen) Co. Ltd.

*Supervisor: Dr. Shixin Mao*

Mar. 2021 – May 2021

Shenzhen, CHN

- Developed drivers for the vehicle chassis of the company’s autonomous robotic cleaning products.

### Visiting Research Student

Robotics Laboratory

*Supervisor: Prof. Hui Cheng*

Nov. 2015 – May 2016

Sun Yat-sen University

*School of Computer Science and Engineering*

- Optimized and implemented a centralized offline task-allocation algorithm for multi-robot systems based on the Ant Colony System.

## PUBLICATIONS & PREPRINTS

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\* indicates co-first authors.

- A. Xiao\*, **H. Luan\***, Z. Zhao\*, Y. Hong, J. Zhao, J. Wang, and M. Q.-H. Meng, “Robotic autonomous trolley collection with progressive perception and nonlinear model predictive control,” *2022 International Conference on Robotics and Automation (ICRA)*, 2022. **Under Review**. Available: <https://arxiv.org/abs/2110.06648>. [[Page](#)] [[PDF](#)]
- **H. Luan**, J. Mei, H. Yu, and A.-G. Wu, “Distributed constrained consensus of multi-agent systems with uncertainties and disturbances under switching directed graphs,” *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 2022. **Under Review**. [[Page](#)] [[Abstract](#)]

## SELECTED ACADEMIC SERVICES

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### Conference Reviewing

- IEEE International Conference on Robotics and Automation (ICRA 2022)
- IEEE International Conference on Robotics and Biomimetics (ROBIO 20/21)

## HONORS & AWARDS

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Outstanding Bachelor's Thesis (top 4%)	2021
Honorable Mention in the Mathematical Contest In Modeling (MCM)	2020
Undergraduate Academic Merit Scholarship	2018, 2019, 2020
Third Prize in the National Olympiad in Informatics in Provinces (NOIP)	2016
Honor Roll in the American Mathematics Contest (AMC) 12, and invited to the AIME	2016

## SELECTED PROJECTS

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<b>Robotic Autonomous Trolley Collection at Airports</b>	Aug. 2021 – Present
<i>Advisors: Prof. Max Q.-H. Meng, Dr. Jiankun Wang</i>	<i>SUSTech</i>

- Developing decision-making modules for a robotic solution to the autonomous trolley collection task at airports. Working on perception-aware planning and multi-robot collaboration.
- Proposed a safety-critical motion planner prototype for obstacle avoidance and perception-aware planning. Conducted realistic tests and validated the effectiveness of the prototype.

<b>Unmanned Palletizing Using Six-axis Robot Arm</b>	Apr. 2020 – Jul. 2020
<i>Advisor: Prof. Yunjiang Lou, Associate Dean</i>	<i>HITSZ</i>

- Designed robot manipulator control algorithms based on the 6-DOF manipulator's forward and inverse kinematics using LFPB trajectory planning.
- Developed a user interface for managing position information of manipulated objects.
- Achieved fast palletizing and grasping motions with high accuracy.

<b>Vision-Based Auto Parking</b>	Oct. 2019 – Dec. 2019
<i>Advisor: Prof. Haoyao Chen</i>	<i>HITSZ</i>

- Identified a specific parking sign by adopting traditional vision techniques including filtering, color segmentation, perspective transformation, Canny edge detection, polygon envelope, etc.
- Designed an online close-loop controller for a differential-drive autonomous car, employing multiple control schemes and leveraging vision information.
- Integrated searching, detection, and motion control with ROS and realized fully automated parking.

## SKILLS

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**Languages:** English (TOEFL iBT® 107/120), Mandarin Chinese (native), Cantonese (native)

**Programming:** C/C++, Python, Julia, Pascal

**Tools:** Git, MATLAB/Simulink, Wolfram Mathematica, ROS, VS Code, L<sup>A</sup>T<sub>E</sub>X

## MISCELLANEOUS

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<b>Athletics:</b> Centre Back/Full Back, HITSZ Student Soccer Team	2017 – 2021
<b>Volunteer services:</b> 2018 Hong Kong Universities and Colleges Forum at HITSZ	2018