

# Hao Luan

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Website: <https://edmundluan.github.io/>

## EDUCATION

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- University of Toronto** Toronto, ON  
*Master of Applied Science (M.A.Sc.), Electrical & Computer Engr.* *Sep. 2022 – Nov. 2024 (expected)*
  - Relevant coursework: controls, game theory, and robotics.
- Harbin Institute of Technology** Shenzhen, CHN  
*Bachelor of Engineering (B.Eng.), Automation* *Sep. 2017 – Jun. 2021*
  - Overall GPA: 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** Aug. 2021 – Jul. 2022  
Robotics Perception & Intelligence Lab Southern University of Science and Technology  
*Supervisor: Prof. Max Q.-H. Meng* *Dept. Electronic & Electrical Engr.*  
*Co-Supervisor: Prof. Jiankun Wang* *Dept. Electronic & Electrical Engr.*
  - Developed an autonomous mobile manipulation platform operating in dynamic environments.
  - Conducted research on safe, efficient, and trustworthy planning algorithms for mobile robots.
- Undergraduate Research Assistant** Oct. 2019 – Jun. 2021  
Multi-Agent Systems Lab Harbin Institute of Technology, Shenzhen  
*Supervisor: Prof. Jie Mei* *School of Mechanical Engineering and Automation*
  - Conducted theoretical research on multi-agent systems control over directed networks.
- Software Development Intern** Mar. 2021 – May 2021  
Peng Bo Technology (Shenzhen) Co. Ltd. Shenzhen, CHN  
*Supervisor: Dr. Shixin Mao*
  - Developed drivers for the vehicle chassis of the company’s autonomous robotic cleaning products.
- Visiting Research Student** Nov. 2015 – May 2016  
Robotics Laboratory Sun Yat-sen University  
*Supervisor: Prof. Hui Cheng* *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, W. Chen, J. Wang, and M. Q.-H. Meng, “Robotic autonomous trolley collection with progressive perception and nonlinear model predictive control,” *International Conference on Robotics and Automation (ICRA)*, 2022. [[Page](#)] [[PDF](#)]
- **H. Luan**, J. Mei, A.-G. Wu, and G. Ma, “Distributed constrained consensus of multi-agent systems with uncertainties and disturbances under switching directed graphs,” 2022. ***Under Review.*** [[Page](#)] [[Abstract](#)]

## SELECTED ACADEMIC SERVICES

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### Conference Reviewing

- IEEE International Conference on Robotics and Automation (ICRA 2022)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022)
- IEEE International Conference on Robotics and Biomimetics (ROBIO 20/21)

## AWARDS & FELLOWSHIPS

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ECE Department M.A.Sc. Student Fellowship, <i>University of Toronto</i>	2022 – 2024
Outstanding Bachelor's Thesis (top 4%), <i>Harbin Institute of Technology</i>	2021
Honorable Mention in the Mathematical Contest In Modeling (MCM)	2020
Undergraduate Academic Merit Scholarship, <i>Harbin Institute of Technology</i>	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 – Sep. 2022
<i>Advisors: Prof. Max Q.-H. Meng, Prof. Jiankun Wang</i>	<i>SUSTech</i>

- Developing decision-making modules for a robotic solution towards the autonomous trolley collection and transportation task at airports.
- In charge of researching multi-robot collaborative manipulation for trolley transportation.
- 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>Constrained Multi-Agent Consensus over Directed Networks</b>	May 2020 – Jun. 2021
<i>Advisor: Prof. Jie Mei</i>	<i>HITSZ</i>

- Proposed a control 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.

<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,  $\text{\LaTeX}$

## 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