

Hongyi Chen

	Homepage: https://hychen-naza.github.io/	Email: hchen657@gatech.edu
RESEARCH INTERESTS	High-level robot planning and reasoning: Language-model based high-level task reasoning and decomposition; Neuro-symbolic planner; Planner-guided progressive skill learning. Contact-rich manipulation: Bridge learning and control theory to create robust and efficient solutions for greater scopes of contact-rich manipulation tasks. Trustworthy learning algorithms: Design reliable learning and execution models using rigorous control theory to achieve safety assurances and robustness guarantees. Application: Smart robotics for manufacturing applications and daily household assistants.	
EDUCATION	Carnegie Mellon University , Pittsburgh, PA Incoming Ph.D in Robotics 2023 Fall Georgia Institute of Technology , Atlanta, GA M.S in Robotics; GPA: 4.0 / 4.0 May 2023 Carnegie Mellon University , Pittsburgh, PA M.S in Electrical and Computer Engineering; GPA: 3.72 / 4.0 May 2021 Peking University , Beijing B.A in Economics; GPA: 3.19 / 4.0 June 2019 Beijing University of Chemical Technology (BUCT) , Beijing B.S in Mathematics and Applied Mathematics; GPA: 3.88 / 4.0 June 2018	
REFEREED JOURNAL PUBLICATIONS	[1] Ruinian Xu, Hongyi Chen , Yunzhi Lin and Patricio A. Vela. SGL: Symbolic Goal Learning for Human Instruction Following in Robot Manipulation. <i>Robotics and Automation Letters (RA-L) with the IROS option</i> , 7(4):10375–10382. 2022 [PDF] [2] Hongyi Chen , Changliu Liu. Safe and Sample efficient Reinforcement Learning for Clustered Dynamic Uncertain Environments. <i>IEEE Control System Letters (L-CSS) with ACC option</i> , 6:1928–1933. 2021 [PDF] [3] Hongyi Chen , Fan Zhang, Bo Tang, Qiang Yin and Xian Sun. Slim and Efficient Neural Network Design for Resource-Constrained SAR Target Recognition. <i>Remote Sensing</i> , 10(10):1618. 2018 [PDF]	
REFEREED CONFERENCE & WORKSHOP PUBLICATIONS	[4] Hongyi Chen , Ruinian Xu, Shuo Cheng, Patricio A. Vela, Danfei Xu. Zero-Shot Object Searching Using Large-scale Object Relationship Prior. In: <i>The IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)</i> , 2023. Under Review [PDF] [5] Hongyi Chen , Yilun Du, Yiye Chen, Patricio A. Vela, Joshua B. Tenenbaum. Planning with Language Models through Iterative Energy Minimization. In: <i>The International Conference on Learning Representations (ICLR)</i> , 2023. Accepted [PDF] [6] Hongyi Chen , Letian Wang, Yuhang Yao, Ye Zhao, and Patricio A. Vela. Human Instruction Following: Graph Neural Network Guided Object Navigation. In: <i>CVPR workshop in Embodied AI</i> , 2022. Accepted [PDF] [7] Hongyi Chen , Shiyu Feng, Ye Zhao, Changliu Liu, and Patricio A. Vela. Safe Hierarchical Navigation in Cluttered Dynamic Uncertain Environments. In: <i>IEEE Conference on Decision and Control (CDC)</i> , 2022. Accepted [PDF]	
RESEARCH EXPERIENCE	Georgia Institute of Technology , Atlanta, GA Advisor: Patricio A. Vela , School of Electrical and Computer Engineering Dec 2021 – present <ul style="list-style-type: none">• Designed a hierarchical solution consisting of a multi-phase planner and a low-level safe controller to jointly solve the safe navigation problem in crowded, dynamic, and uncertain environments.• Developed a hybrid planner combining symbolic and neural-based approaches for human instruction parsing and task planning, and further designed a semantic graph neural network guided object searching for home-assistant robots.	

- Advisor: **Danfei Xu**, School of Interactive Computing
- Deployed human instruction following pipeline, including 3D map construction, object search and manipulation, on **physical stretch robots**.
 - Decompose high-level tasks into mid-level plans with language models and train the task skills in self-supervised way through language guidance.
- Massachusetts Institute of Technology**, Cambridge, MA Jun 2022 – present
 Advisor: **Joshua B. Tenenbaum**, Department of Brain and Cognitive Sciences
- Proposed an iterative planning approach with language models through energy minimization, and further demonstrate its unique benefits, including new task generalization, test-time constraints adaptation, and the ability to compose plans together.
- Carnegie Mellon University**, Pittsburgh, PA Jan 2021 – Sep 2021
 Advisor: **Changliu Liu**, Robotics Institute
- Exploited safe control theory to address two major challenges in reinforcement learning (RL): satisfying safety constraints and efficiently learning with limited samples.
- Tsinghua University**, Beijing Jun 2018 – Sep 2018
 Advisor: **Zhihui Du**, Department of Computer Science and Technology
- Accelerated online-searching for gravitational waves by parallelizing the linear recurrence computation and optimizing the inefficient memory access in GPU.
- Beijing University of Chemical Technology**, Beijing Feb 2018 – May 2018
 Advisor: **Fan Zhang**, College of Information Science and Technology
- Designed slimmed CNN in resource-constrained platforms, achieving 40x model compression while maintaining its accuracy for synthetic aperture radar target recognition.

- PROFESSIONAL EXPERIENCE
- Carnegie Mellon University**, Pittsburgh, PA May 2020 – Aug 2020
 Autonomous Driving Software Engineer
- Implemented path planning algorithms, from high level behavior planning to low level RRT path generation; Improved localization accuracy by fusing the IMU and GPS sensor.
- Interdisciplinary-Technology Company**, Beijing Feb 2020 – May 2020
 Quantitative Trading Researcher
- Constructed and optimized effective stock factors using genetic algorithms and further developed the dynamic contextual multi-factor model to build stock portfolio.

- COURSE PROJECTS
- Carnegie Mellon University**, Pittsburgh, PA
 18-349 Introduction to Real-Time Embedded Systems (A)
- Developed a real-time kernel capable of admission control, task scheduling, isolation, and synchronization.
- Georgia Institute of Technology**, Pittsburgh, PA
 CS8803 Special Topics in Compiler (A)
- Built a TigerCompiler that includes scanner, parser and syntax error detector in front-end, and is capable of semantics analysis and IR code generation in back-end.

- AWARDS AND HONORS
- Outstanding Undergraduate Thesis (Top 1%) of BUCT, 2018
 Outstanding Student Scholarship (Top 5%) of BUCT, 2014, 2015

- ACADEMIC SERVICE
- Journal reviewer:** IEEE Transactions on Automatic Control
- SKILLS
- Programming:** C/C++, Python, Java, CUDA
Tools: Tensorflow, Pytorch, ROS
Languages: Proficient in English and Chinese