

Bo-Ruei (Ray) Huang

🏠 borueihuang.com | ✉ b09901171@ntu.edu.tw | 📞 +1(626)831-3755 | 🌐 rayray2002 | 📄 borueihuang | 🐦 [@borueihuang](https://twitter.com/borueihuang) | 🎓 [Bo-Ruei Huang](#)

Education

National Taiwan University (NTU)

Sep 2020 - Jan 2025

B.S. | Double Major in Computer Science and Information Engineering & Electrical Engineering

Taipei, Taiwan

- GPA: **4.24**/4.3 (3.99/4.0), Rank: 7/260 (Top 3%).
- Honors: Phi Tau Phi Scholastic Honor Society member (**Top 1%** in college); Dean's List Awards (4 semesters, Top 5% in class).

Publications

- [1] Xiaolin Fang*, **Bo-Ruei Huang***, Jiayuan Mao*, Jasmine Shone, Joshua B. Tenenbaum, Tomás Lozano-Pérez and Leslie Pack Kaelbling. Keypoint Abstraction using Large Models for Object-Relative Imitation Learning. In *Workshop on Language and Robot Learning at Conference on Robot Learning*, 2024. (**Best Paper**) [PDF]
- [2] **Bo-Ruei Huang**, Chun-Kai Yang, Chun-Mao Lai, Dai-Jie Wu and Shao-Hua Sun. Diffusion Imitation from Observation. In *Neural Information Processing Systems*, 2024. [PDF]
- [3] **Bo-Ruei Huang**, Sihe Chen, Vijay Natraj, Zhao-Cheng Zeng, Yangcheng Luo and Yuk L. Yung. Improving XCO₂ Precision in OCO-2/3 Retrievals through Machine Learning-Enabled Extraction of Volcanic Aerosol Information from L1B Spectra. In *American Geophysical Union Annual Meeting*, 2023. [PDF]

Research Experience

Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology

July 2024 - Present

Visiting Student | Advisor: Joshua B. Tenenbaum

Cambridge, MA

Using Exoskeletons to Improve Data Collection with Haptic Feedback

Advisors: Pulkit Agrawal and Edward Adelson | Ongoing

- Developed exoskeletons for bimanual dexterous robotic arms to enhance data collection through direct haptic feedback, eliminating the need for teleportation.
- Aiming to decouple tactile and visual feedback by composing diffusion models, enabling scalable multimodal learning.

Keypoint Abstraction using Large Models for Object-Relative Imitation Learning

Advisors: Joshua B. Tenenbaum, Leslie P. Kaelbling and Tomás Lozano-Pérez | [Project Page]

- **Workshop on Language and Robot Learning at CoRL, 2024 (Best Paper); ICRA, 2025 (Under reviewed)**
- Proposed a novel framework that uses VLMs to distill task-relevant keypoint abstractions from limited robot demonstrations, improving the data efficiency of downstream learning.
- Demonstrated strong generalization across object poses, camera views, and object instances with only 10 demonstrations.

Robot Learning Lab, National Taiwan University

Mar 2022 - Present

Undergraduate Researcher | Advisor: Shao-Hua Sun

Taipei, Taiwan

Leveraging Robotic Foundation Models as Data++ to Augment Datasets for Imitation Learning

Ongoing

- Developing a method to augment imitation learning datasets by leveraging robotics foundation models to enhance data diversity through synthetic trajectories.
- Currently exploring observation augmentation with video foundation models to introduce diverse trajectories with VLAs.

Diffusion Imitation Learning from Observation

NeurIPS, 2024 | [Project Page]

- Designed a Learning-from-Observation (LfO) algorithm using diffusion models to model state transitions and provide robust rewards to improve policy learning without action labels.
- Achieved SOTA performance in continuous control tasks and superior data efficiency compared to existing LfO methods.

Object-Centric Value-Implicit Pre-Training

RL Course Final Project, Best Project Award (Top 1/30) | [Report]

- Enhanced the Value-Implicit Pre-Training (VIP) framework with Temporal Cycle-Consistency (TCC) to map object and robot arm features, enabling object-centric task adaptation.
- Improved VIP robustness across novel tasks and embodiments, showing adaptability in diverse manipulation settings.

Division of Geological and Planetary Sciences, California Institute of Technology

Jun 2023 - Aug 2023

Summer Undergraduate Research Fellowship (SURF) | Advisor: Yuk L. Yung

Pasadena, CA

Improving XCO₂ Precision in OCO-2/3 Retrievals through Machine Learning-Enabled Extraction of Volcanic Aerosol Information from L1B Spectra

AGU Annual Meeting, 2023 | [Poster]

- Developed a machine learning model to predict aerosol properties from satellite spectra, significantly improving CO₂ retrieval accuracy in Orbiting Carbon Observatory (OCO) during volcanic events.

Teaching Assistant Experience

Cornerstone EECS Design and Implementation (NTU EE1006)

Spring 2023 & 2024

Instructors: Kun-You Lin, Cheng-Wei Chen, and Jiun-Peng Chen

- Guided open-ended maker projects for first-year students integrating hardware and software skills.

Reinforcement Learning (NTU CommE5069)

Fall 2023

Instructor: Shao-Hua Sun

- Mentored graduate-level RL course final projects with bi-weekly meetings and designed homework for a class of 120 students.

Signals and Systems (NTU EE2011)

Spring 2023

Instructor: Lin-Shan Lee

- Graded homework and term exams and hosted weekly office hours for a class of 200 students.

Extracurricular Activities & Leaderships

NTUEE Night

Sep 2022 – Jul 2023

Event General Coordinator | [[YouTube Playlist](#)]

- Coordinated a large-scale event for students featuring over 200 performers across 15 acts, including dance and stage plays.
- Attracted over 500 audiences in a 250-seat auditorium and sponsorship over USD\$2,000 from enterprises.

NTUEE Light Dance

Sep 2021 - Jul 2023

Leader of Software Team | [[Performance Video](#)] [[YouTube Channel](#)] [[GitHub](#)]

- Designed and integrated a software system connecting the web editor to hardware controllers for seamless light choreography.
- Developed an OS-level embedded system on Raspberry Pis to ensure real-time synchronization among over 500 optical fibers, 2,000 LED chips, and the music for a performance by 10 dancers.
- The performance received over 340,000 views on YouTube and was featured in four news outlets.

NTUEE Student Association

Sep 2020 – Jul 2023

Minister of Information Department | [[GitHub](#)]

- Led a team of 40 individuals in producing and maintaining student association websites and services, which included 8 long-standing services and various activity-based services, benefiting over 1,000 students.
- Offered technical courses to junior students and trained them in website and service development and maintenance.

NTU College Admissions Mentorship Seed Program

Sep 2021 – Jun 2022

Volunteer Mentor in STEM | [[Program Website](#)]

- Aimed to bridge educational disparities by providing equal access to college admissions resources and mentorship, supporting students from diverse backgrounds towards achieving academic success.
- Mentored over 200 underprivileged students (~10 personally) in college entrance exams and applications.

NTU Room Escape Club

Sep 2021 – Jun 2022

Officer of Activities Section

- Organized off-campus escape room visits for 50 club members and guided them in designing their own escape rooms.

NTUEE Baseball Team

Sep 2020 – Jan 2022

Team Member

Awards & Honors

Fellowships

2023 BaBar SURF Fellowship, *California Institute of Technology* *Pasadena, CA*

2023 Irving T. Ho Memorial Fellowship, *Irving T. Ho Memorial Foundation* *Taipei, Taiwan*

Scholarships

2023 NTUEE Class of 1960 Scholarship, *National Taiwan University* (Top 2 of the class; USD\$3,500) *Taipei, Taiwan*

2022 Jia-Lin Su Memorial Scholarship, *National Taiwan University* (Top 1 of the class; USD\$2,000) *Taipei, Taiwan*

Awards

2024 Best Paper, *Workshop on Language and Robot Learning at CoRL* (Top 2/60 papers) *Munich, Germany*

2024 Best Application, *MakeNTU Hackathon* (Nationwide) *Taipei, Taiwan*

2023 Best Maker, *MakeNTU Hackathon* (Nationwide) *Taipei, Taiwan*

2023 Fourth Place, *AIS3 EOF Cybersecurity Competition* (Nationwide) *Taipei, Taiwan*

2021 Second Place, *General Physics Experiment Creative Competition* (School) *Taipei, Taiwan*

2020 Third Place, *Taiwan International Science Fair* (Worldwide) *Taipei, Taiwan*

2018 Silver Medalist, *Taiwan Young Physicists' Tournament* (Nationwide) *Taipei, Taiwan*

Travel Grants

2024 Outstanding Students Conference Travel Grant, *Foundation for the Advancement of Outstanding Scholarship* (USD\$3,000) *Taipei, Taiwan*

Presentations

- 2024 Diffusion Imitation from Observation, *NeurIPS Poster* Vancouver, Canada
- 2023 Improving XCO₂ Precision in OCO-2/3 Retrievals through Machine Learning-Enabled Extraction of Volcanic Aerosol Information from L1B Spectra, *AGU Poster* San Francisco, CA
- 2020 Rhodium-Catalyzed Desymmetrization of Cyclodienones via Domino Reaction with Benzocyclobutenols, *Taiwan International Science Fair Poster* Taipei, Taiwan

Services

Reviewers

- 2024 ICLR, Workshop on Language and Robot Learning at CoRL

Selected Courses

ML Related Foundation of Artificial Intelligence, Machine Learning, Reinforcement Learning, Big Data Systems.

CS Related Computer Programming, Data Structures, Algorithms, Operating Systems, Formal Languages and Automata Theory.

EE Related Embedded Systems, Logic Design, Circuits, Electronics, Electromagnetics, Advanced Digital Signal Processing.

Math Calculus, Linear Algebra, Probability, Convex Optimization, Signals and Systems, Discrete Mathematics.

Skills

Programming Python (PyTorch;NumPy;MuJoCo), C/C++ (Embedded System;RTOS), Web (HTML;CSS;JavaScript), Shell Script.

Miscellaneous Unix/Linux, Docker, DevOps, LaTeX, Git.

Natural Science Physics (High School Olympiad), Organic Chemistry, Planetary Science (Radiative Transfer).

Languages Mandarin Chinese (Native), English (Professional; TOEFL: 104/120).