

Bo Ai

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RESEARCH INTERESTS

My research focuses on developing **cross-embodiment robot intelligence**: agents that learn from and transfer across diverse physical forms, accumulating knowledge across hardware generations toward general embodied intelligence. Fundamental questions include how to represent embodiment structures, disentangle embodiment-agnostic abstractions from embodiment-specific adaptations, and understand the scaling behavior along the dimension of embodiments. Answers to these questions would open up practical opportunities in learning from surrogate embodiments like humans, co-design of embodiments and policies, multi-embodiment collaboration, and beyond. I approach these challenges by drawing on ideas from foundation models, world modeling, and the integration of model-based and model-free methods.

EDUCATION

University of California San Diego (UCSD) *Sep 2024 - Present*

Ph.D. in Computer Science and Engineering. Advisors: [Hao Su](#) and [Henrik I. Christensen](#)

Research interest: cross-embodiment robot learning, world model learning, manipulation

National University of Singapore (NUS) *Aug 2019 - June 2023*

Highest Distinction, B.Comp. in Computer Science with a Second Major in Statistics

Turing Program. Advisor: [David Hsu](#)

Thesis: Scaling Robot Learning: Generalization Through Invariant Representations

EXPERIENCE

Physical Intelligence *Oct 2025 - Mar 2026*

Research Intern with [Allen Ren](#) and [Quan Vuong](#) San Francisco, CA

- Studying pre- and post-training recipes to improve cross-embodiment transfer in vision-language-action models.

Boston Dynamics AI Institute *June 2025 - Sep 2025*

Research Intern with [Pang Tao](#) and [Jiuguang Wang](#) Boston, MA

- Developed algorithms and systems for whole-body, contact-rich manipulation on the Spot robot.

Agency for Science, Technology and Research (A*STAR) *Dec 2023 - Sep 2024*

Research Engineer with [Cheston Tan](#) Singapore

- Led projects in world model learning and large language model reasoning.

Stanford Vision and Learning Lab, Stanford University *June 2023 - Dec 2023*

Research Intern with [Yunzhu Li](#) and [Jiajun Wu](#) Stanford, CA

- Developed a framework that learns world models with visual and tactile sensing from real-world interactions and integrates the learned models with planning for manipulating objects with unknown physical properties.

- Demonstrated the manipulation system to distinguished lab visitors.

Adaptive Computing Lab, National University of Singapore *Dec 2020 - May 2023*

Undergraduate Research Assistant with [David Hsu](#) Singapore

- Developed learning-based controllers and robotic systems that enable kilometer-scale visual navigation.

- Demonstrated systems to renowned faculty, senior industry executives, and government officials during lab visits.

SELECTED PAPERS

- [1] **Bo Ai**, Stephen Tian, Haochen Shi, Yixuan Wang, Tobias Pfaff, Cheston Tan, Henrik I. Christensen, Hao Su, Jiajun Wu, Yunzhu Li
A Review of Learning-Based Dynamics Models for Robotic Manipulation
Science Robotics, 2025
- [2] **Bo Ai***, Liu Dai*, Nico Bohlinger*, Dichen Li*, Tongzhou Mu, Zhanxin Wu, K. Fay, Henrik I. Christensen, Jan Peters, Hao Su
Towards Embodiment Scaling Laws in Robot Locomotion
Conference on Robot Learning (**CoRL**), 2025
- [3] Zihao He*, **Bo Ai***, Tongzhou Mu, Yulin Liu, Weikang Wan, Jiawei Fu, Yilun Du, Henrik I. Christensen, and Hao Su
Scaling Cross-Embodiment World Models for Dexterous Manipulation
arXiv, 2025

- [4] Tongxuan Tian*, Haoyang Li*, **Bo Ai**, Xiaodi Yuan, Zhiao Huang, Hao Su
Diffusion Dynamics Models with Generative State Estimation for Cloth Manipulation
Conference on Robot Learning (**CoRL**), 2025
- [5] **Bo Ai***, Stephen Tian*, Haochen Shi, Yixuan Wang, Cheston Tan, Yunzhu Li, Jiajun Wu
RoboPack: Learning Tactile-Informed Dynamics Models for Dense Packing
Robotics: Science and Systems (**RSS**), 2024
- [6] **Bo Ai**, Zhanxin Wu, David Hsu
Invariance is Key to Generalization: Examining the Role of Representation in Sim-to-Real Transfer for Visual Navigation
International Symposium on Experimental Robotics (**ISER**), 2023
- [7] **Bo Ai**, Wei Gao, Vinay, David Hsu
Deep Visual Navigation under Partial Observability
International Conference on Robotics and Automation (**ICRA**), 2022

SELECTED AWARDS AND HONORS

- Stanford School of Engineering Fellowship 2026
- UCSD CSE Department Fellowship 2024
- NUS School of Computing Dean's List (5%, Department-Wide) 2022
- NUS Outstanding Undergraduate Researcher Prize (35 Recipients Annually, University-Wide) 2022
- NUS School of Computing Innovation Prize (2 Recipients Annually, Department-Wide) 2022
- Certificate of Distinction in Artificial Intelligence 2022
- NUS Science and Technology Scholarship (~ 200K USD) 2018 - 2023

MENTORING

- Shresth Grover (Master's student, UC San Diego) 2025
- Zihao He (Undergraduate, Shanghai Jiao Tong University) 2025
- Chen Si (Master's student, UC San Diego) 2025
- Dichen Li (Master's student, UC San Diego) 2024 - 2025
- Tongxuan Tian (Master's student, Virginia Tech) 2024 - 2025

TEACHING

- Teaching Assistant, NUS CS5478 Intelligent Robots: Algorithms and Systems *Spring 2023*
- Teaching Assistant, NUS CS3244 Machine Learning *Fall 2022*
- Teaching Assistant, NUS CS1101S Programming Methodology *Fall 2020*

INVITED TALKS

- **Integrating Learning and Planning for Robot Navigation**
– Stanford Intelligent Systems Lab *July 2023*
- **Deep Learning for Robot Navigation with a Floor Map**
– NUS Smart System Institute *Feb 2022*

PROFESSIONAL ACTIVITIES

- *Journal Reviewer*: IEEE RA-L '22 '23 '24 '25; RAM '25
- *Conference Reviewer*: ICRA '22 '23 '25 '26; IROS '22 '23 '24; CoRL '25; RSS '26; CVPR '26; ECCV '26

SKILLS

- **Programming**: Python, C, Java, JavaScript, TypeScript, Elixir, HTML, LaTeX, R, SAS
- **Robotics & Simulation**: ROS, ROS2, Isaac Lab, MuJoCo
- **Robots**: Boston Dynamics Spot, Unitree Go2, Franka Panda, UR5e, ARX, XHand, LEGO Mindstorms, Arduino
- **Languages**: English (fluent), Chinese (native)