

Bo Ai

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RESEARCH INTERESTS

I study the role of embodiment in building general-purpose intelligent agents. My research focuses on how agents can learn from, generalize across, and even optimize physical embodiments for complex manipulation tasks.

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, mobile 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

NUS Outstanding Undergraduate Researcher Prize, NUS School of Computing Innovation Prize

EXPERIENCE

Boston Dynamics AI Institute June 2025 – Sep 2025

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

Boston, MA

- Developing algorithms and systems for whole-body, contact-rich manipulation.

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 PUBLICATIONS

- [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, to appear on Sept 17, 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] 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
- [4] **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
- [5] **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

- [6] **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

- UCSD CSE Department Fellowship 2024
- 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
- Commendation for Top students $\times 3$ 2021 - 2022
- NUS Science and Technology Scholarship (\sim **200K** USD) 2018 - 2023

TEACHING

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

MENTORING

- Shresth Grover (MS, UC San Diego) 2025
- Zihao He (Undergrad, Shanghai Jiao Tong University) 2025
- Chen Si (MS, UC San Diego) 2025
- Dichen Li (MS, UC San Diego) 2024 - 2025
- Tongxuan Tian (MS, Virginia Tech) 2024 - 2025

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, IROS '22 '23 '24
- *Society Memberships*: ACM '20 '21, IEEE '21 '22

SKILLS

- **Programming**: Python, C, Java, JavaScript, TypeScript, Elixir, HTML, LaTeX, R, SAS
- **Robotics & Simulation**: ROS, ROS2, Isaac Lab, MuJoCo
- **Machine Learning**: PyTorch, PyTorch Geometric, TensorFlow, Keras, scikit-learn, OpenCV, Open3D
- **DevOps & HPC**: Git, Docker, Kubernetes, Slurm
- **Hardware**: Laser cutting, 3D printing, welding
- **Robots**: Boston Dynamics Spot, Franka Panda, LEGO Mindstorms, Arduino
- **Languages**: English (fluent), Chinese (native)