

# Bo Ai

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## RESEARCH INTERESTS

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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

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**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

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**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

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- [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] 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

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- 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

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- 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

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- 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

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- **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

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- *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

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- **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)