

Ao Li

PhD Researcher in Engineering Mathematics (Robotic Visuotactile Sensing)

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Core Expertise

Research Areas: Embodied AI · Visuotactile Sensors (TacTip) · Vision-Language-Action Models · Spiking Neural Networks (SNNs) · Mobile Robot Path Planning

Engineering Tools: Python · C++ · C · ROS · Fusion 360

Education

University of Bristol · PhD Engineering Mathematics

Sep 2023 - Present

- Supervisors: Dr Benjamin Ward-Cherrier and Professor Nathan Lepora
- Thesis: *Human-Inspired Neuromorphic Tactile Capabilities*
- Fully funded through a joint PhD scholarship from the China Scholarship Council and the University of Bristol

University of Bristol & UWE Bristol · MSc Robotics

Sep 2022 - Sep 2023

- Degree classification: Distinction
- Dissertation: *Texture Exploration Strategies*

Northeastern University · BSc Automation

Sep 2018 - Jun 2022

- GPA: 3.3/5
- Dissertation: *Mobile Robot Obstacle Avoidance Based on SLAM*
- Awards: Northeastern University Third-Class Scholarship (2020-2022); Innovation and Entrepreneurship Scholarship

Research and Professional Experience

π0.5-DROID VTLA Dual-Arm System · Developer

Jun 2026 - Present

- Fine-tuned the **π0.5-DROID** model using **8x NVIDIA H100 GPUs** provided through the NVIDIA Developer Program, adapting visual, language and action representations for robotic manipulation tasks.
- Built a leader-follower teleoperation system using two **Franka Panda** robots and a **UMI gripper** for demonstration and manipulation-data collection.
- Integrated tactile information into the VLA framework to construct a **Vision-Tactile-Language-Action (VTLA)** pipeline for tabletop tasks including pick-and-place.
- Deployed the fine-tuned model locally on an **NVIDIA GeForce RTX 5090**, establishing an end-to-end workflow from teleoperated demonstration and model training to physical robot execution.

Bristol Robotics Laboratory (Dexterous Group) · Researcher

Jun 2023 - Jul 2026

- Investigated human-inspired tactile exploration strategies to enhance robotic tactile perception.
- Developed neuromorphic tactile-sensor hardware, using Fusion 360 to iteratively design and prototype complex sensor structures.
- Analysed experimental data and decoded complex tactile signals using spiking neural networks.

University of Bristol · Teaching Assistant

Sep 2024 - Jun 2026

- Delivered laboratory and tutorial sessions for engineering and robotics courses, translating complex theory into accessible practical tasks.
- Assessed coursework and technical reports against university marking criteria and provided specific, actionable feedback.
- Collaborated with unit directors to develop teaching materials, monitor student progress and support day-to-day course delivery.

University of Bristol FSE · Communications Assistant

Oct 2025 - Jun 2026

- Planned, filmed and edited faculty promotional videos covering facilities, research staff and campus information, coordinating production across university teams.
- Managed the faculty's official social media channels and organised pre-arrival Q&A sessions through WeChat to support incoming international students.

Dobot · Technical Support Engineer

Oct 2021 - Jan 2022

- Updated technical documentation for the Dobot Magician, M1 and M1 Pro robotic arms.
- Conducted physical robot testing and systematically recorded and analysed test data to support improvements in hardware stability.
- Delivered product demonstrations and accessible technical presentations on applications including robotic palletising and packing.

Research Projects and Funding

NCC Technology Pull Through Programme · Co-Investigator

Apr 2026 - Mar 2027

National Composites Centre (NCC) · Funding: £150,000

- **Project:** An autonomous composite-inspection system integrating digital twins and bio-inspired sensing. The system maps interactions between industrial manipulators and curved workpieces in ABB RobotStudio, then drives physical ABB IRB120/2600 robots equipped with neuromorphic tactile sensors for autonomous inspection. Event-based vision and neuromorphic touch provide high temporal resolution for low-latency, adaptive online detection of composite surface morphology and lay-up defects.
- Independently authored the successful funding proposal and currently lead hardware development, translating neuromorphic tactile sensing into industrial composite-manufacturing applications.

FSE ECR Partnering Fund · Principal Investigator

May 2025 - Aug 2025

University of Bristol · Funding: £1,000

- **Project:** Developed a neuromorphic tactile framework for real-time composite surface inspection and validated the feasibility of the proposed algorithms.

Publications

1. Li, A., Brayshaw, G., Lu, Y., & Ward-Cherrier, B. (2025). **Velocity Modulation in Robotic Texture Exploration Based on Human Perceptual Dimensions.** *2025 IEEE-RAS 24th International Conference on Humanoid Robots (Humanoids)*, 437-443.
2. Xu, X.*, Li, A.*, & Ward-Cherrier, B. (2025). **Exploratory Movement Strategies for Texture Discrimination with a Neuromorphic Tactile Sensor.** *2025 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 17869-17874. *Equal contribution.
3. Liu, T., Brayshaw, G., Li, A., Xu, X., & Ward-Cherrier, B. (2025). **Neuromorphic Touch for Robotics - A Review.** *Neuromorphic Computing and Engineering*, 5(3), 032001.
4. Li, A., Pearson, M., & Ward-Cherrier, B. (2025). **A Multimodal Dataset of Human Tactile Texture Perception and Exploration.** Under review at *Scientific Data*.

Teaching and Supervision

- Completed **300+ hours** of teaching, supervision and assessment in robotics and artificial intelligence (SEMTM0016, SEMTM0042), mathematical and data modelling (SEMT30005), and MSc data science projects (EMATM0047) within the Faculty of Science and Engineering.
- Completed training in higher-education teaching, teaching-support roles, MSc engineering project supervision and workshop management.
- Supervised three MSc Robotics students: Yanhui Lu (2023 Best Student Prize), Lance Shi (2024 Best Dissertation Project) and Yijun Liu.

Additional Information

- **Languages:** Mandarin Chinese (native); English (professional working proficiency); Mongolian, Japanese and Korean (elementary)
- **Leadership and Volunteering:** Vice President of the Student Union and Class Representative, Northeastern University; Student Ambassador, University of Bristol
- **Media and Design:** Web design, video editing, Adobe Premiere Pro, After Effects and Photoshop
- **Professional Memberships:** Open Neuromorphic Society; IEEE RAS Technical Committee on Haptics; Dexterous Robotics Group, Bristol Robotics Laboratory; Northeastern University Electronic Design Association
- **Interests:** Basketball, table tennis, hiking and travel