

Yingjie Bai

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Education

The University of Sydney

- Bachelor of Advanced Computing (Honours)
- Majors: Computer Science & Financial Economics
- Honours Supervisor: Dr. [Weiming Zhi](#)

Sydney, Australia
Feb 2023 – Nov 2026

National University of Singapore

- Exchange Student · Vice-Chancellor's Global Mobility Scholarship

Singapore
Sep 2025 – Dec 2025
Wuxi, China

The University of New South Wales (UNSW)

- UNSW Global Foundation in Science

Jun 2021 – Nov 2022

Research Interests

My research lies at the intersection of robotics, machine learning, economics, and complex systems, focusing on the structural links between intelligent systems and real-world dynamics. I am particularly interested in how AI and automation, as general-purpose technologies, reshape productivity, labor structures, and the global economy at scale. More broadly, I study how these transformations reconfigure the production and distribution of knowledge and opportunity. Drawing on cross-cultural educational experiences, I explore how institutional design and public governance can help ensure that the benefits of technological progress are more broadly accessible in an increasingly AI-driven world. A full list of research projects and ongoing work is available at: www.yingjiebai.xyz

Publication & Research Output

First Author, “*Data-CAPM: Risk-Adjusted Data Valuation under Distribution Shift*”
arXiv preprint, 2026; under review at NeurIPS 2026.

Inspired by the Capital Asset Pricing Model (CAPM), Developed a risk-aware framework that decomposes data value into systematic exposure (beta) and idiosyncratic contribution (alpha). Identified a key failure mode in conventional data valuation where shortcut-driven signals inflate apparent value, and demonstrated that risk-adjusted selection improves out-of-distribution robustness (>10%).

Research Experience

- **Research Intern, [Lin Shao](#) Research Group, *National University of Singapore*** (Aug 2025 – Present)
Research on planning complex tasks for dual-arm robots using LLM, and conduct a benchmark on robots. Investigating coordination and control strategies for dual-arm and multi-arm robotic systems in dynamic environments.
- **Research Intern, [Songfang Huang](#) Research Group, *Peking University*** (Nov 2024 – Feb 2025)
Designed and implemented Retrieval-Augmented Generation (RAG) pipelines for large-scale energy AI models in collaboration with ENN Group, improving domain-specific question-answering accuracy and recall.
- **Research Intern, [Kun Tang](#) Research Group, *Tsinghua University*** (Jul 2023 – Sep 2023)
Applied satellite imagery and machine learning to analyze regional health disparities, contributing to the *Tsinghua–Lancet China Health Poverty Alleviation Report* on integrating remote sensing and big data for public health policy insights.

Leadership & Engagement Experience

- **Initiator & Founder, *Lumen Agora***: Initiated an open-source, non-profit academic platform inspired by a “Xiaohongshu + LinkedIn” model for research, aimed at reducing barriers to knowledge access in an era of information overload. Built as a public-facing digital infrastructure, it leverages concise research summaries to improve discovery, while enabling deeper inquiry, intellectual exchange, and opportunity matching through verified academic identities and open, community-driven governance.
- **Participant, 2025 Kent Ridge Ministerial Forum**: Engaged in discussions on AI governance and robotics with former Singaporean Prime Minister [Lee Hsien Loong](#), exploring societal and intergenerational implications of emerging technologies.
- **International Relations Department Lead, Sydney University Chinese Students & Scholars Association**: Organized English Corner events (50+ participants) to promote cultural exchange and coordinated with the Chinese Consulate, media outlets, and NSW public institutions to support public outreach for Mid-Autumn cultural events. (2024–2025)
- **Participated in a policy dialogue at the China Development Forum**: discussed the implications of China’s rise for Australia’s foreign policy with former Australian Foreign Minister and NSW Premier [Bob Carr](#). (Feb 2023)
- Selected participant in **academic exchange programs**, including Tsinghua–Technical University of Munich Winter School (Nov 2024), Shanghai Jiao Tong University International Student Development Program (Jul 2025), and Google technology forums.

Projects

- **Multi-Robot Coordination via Economic Pricing Mechanisms** — Proposed and implemented a framework where multiple robots coordinate through dynamic pricing of shared spatiotemporal resources, exploring market-inspired mechanisms for decentralized task allocation and congestion management in robotic systems.
- **Robot Task and Motion Planning (TAMP) Project** — Developed a robotic task organization system integrating large language models, PDDL planning, and agent frameworks to study multi-robot coordination and complex task planning.
- **Financial Machine Learning (Loan Prediction)** — Developed predictive models using GNN and CatBoost with engineered financial and online behavioral features to estimate loan levels.
- **Urban Traffic Data Analysis (Sydney Light Rail)** — Analyzed open transport data using R for time-series modeling and visualization, studying passenger flow dynamics and implications for congestion management and transport capacity planning.

Skills & Interests:

- **Technical Skills**
Programming: Python, C/C++, Java, R, Git, Linux;
Robotics & AI: multi-robot systems, motion planning, robotics frameworks and simulation (Isaac Sim), machine learning, RAG systems;
Quantitative: Statistics, Monetary Economics, Econometrics
- **Interests**
Fencing, kayaking, international travel, and cross-cultural exchange, Game theory, philosophy of algorithms, technology and society.