

# Linhao Bai

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## EDUCATION

### Georgia Institute of Technology

Atlanta, GA

*Master of Science in Computer Science, GPA: 4.0*

*Aug. 2024 – May 2026 (Expected)*

- Relevant Coursework: **Machine Learning(A)**, **Deep Reinforcement Learning(A)**, **AI for Robotics (A)**

### Chongqing Jiaotong University

Chongqing, China

*Bachelor of Engineering in Civil Engineering*

*Sep. 2018 – June 2022*

## EXPERIENCE

### Georgia Institute of Technology, STAR Lab

Atlanta, GA

*Research Assistant*

*Oct 2024 – Present*

- Researching and developing techniques for dexterous manipulation, model-based reinforcement learning, and sim-to-real transfer.
- Integrating advanced robotic hardware and exploring structured dynamics learning (Koopman, SINDy) **aiming to improve control stability and long-horizon prediction accuracy.**

### SEER Robotics

Shanghai, China

*Project Manager / Software Engineer*

*June 2022 – July 2024*

- Managed technical support for **35+** international clients, resolving critical issues and streamlining project delivery timelines **by implementing improved issue tracking protocols.**
- Designed and developed robot auxiliary systems (Qt framework) and **ROS** plugins for multi-brand gripper integration, **including rapidly co-developing mobile robot prototype with URG (Germany) in 7 days.**
- Contributed to technical groundwork supporting potential **multi-million** euro contracts with key partners like Tesla and URG.

## PROJECTS

### Advanced Dexterous Manipulation with Koopman Operators

Oct 2024 – Present

- Integrated diverse hardware (Allegro Hand, PSYONIC Hand, Kinova Arm) into a unified **ROS** control framework, **enabling consistent testing environments** for dexterous manipulation research.
- Developed and implemented **Koopman operator-based** methods for trajectory prediction in in-hand rotation tasks, **significantly reducing short-term prediction error compared to baseline models.**
- Investigated the impact of enforcing **linear dynamics** in latent spaces via Koopman loss regularization, **finding improved training stability while analyzing trade-offs with peak policy performance.**
- Researched **domain randomization** and policy adaptation techniques, **successfully bridging the sim-to-real gap for deployment on the physical Allegro Hand.**

### Structured Latent Dynamics Learning for Complex Control

Feb 2025 – Present

- Investigated structured latent representation learning within **Model-Based Reinforcement Learning (MBRL)** frameworks, using benchmarks like **TD-MPC** for evaluating complex control tasks.
- Developed and implemented approaches imposing **linear** or **Sparse Identification of Nonlinear Dynamics (SINDy)**-like structures onto latent space dynamics, **aiming to enhance model interpretability and long-horizon prediction stability compared to unstructured recurrent models.**
- Analyzed trade-offs between using memory-based encoders (e.g., GRU) versus memory-less encoders combined with structured latent dynamics, **identifying scenarios where explicit memory encoding is crucial for performance.**
- Explored co-design strategies for learning latent representations conducive to both accurate dynamics prediction and simplified (**linear**) control synthesis, potentially enabling more efficient **Model Predictive Control (MPC)** implementations.

## SKILLS

**Programming Languages:** Python, Java, C++, Go, JavaScript

**Frameworks & Libraries:** Qt, Django, Flask, **ROS**, Pytest, **PyTorch**, Scikit-learn, NumPy, Pandas

**Big Data & Distributed Systems:** Kubernetes, Docker, Hadoop, Spark, Flink

**Databases & Caching:** MySQL, PostgreSQL, Redis

**Web Development:** RESTful APIs, HTML, CSS, JavaScript

**Other Skills:** Git, GitHub, **Linux**