

# Bairui Li

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## Education

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### Peking University

*Sep. 2023 - Present*

- B.S. candidate in **Theoretical and Applied Mechanics** (Computational Science and Engineering track), [College of Engineering, PKU](#) 📄;
- B.S. candidate in **Computer Science**, [School of Electronics Engineering and Computer Science, PKU](#) 📄.
- **GPA: 3.67/4.00**; **CS Major GPA: 3.75/4.00**.
- **Related Course:**
  - **Systems:** Computer Networks (Honor Track) (93), Introduction to Computer Systems (85), Computer Architecture.
  - **AI:** Introduction to Artificial Intelligence (96), Introduction to Computer Vision (89), Continuous-Time Diffusion Processes in Machine Learning Theory (94), Machine Learning, Multimodal Learning, Introduction to Visual Computing and Interaction, Reinforcement Learning (self-studied with Reinforcement Learning: An Introduction).
  - **Programming and Algorithms:** Practice of Programming in C & C++ (89), Data Structures and Algorithms B (92.5), Programming in Artificial Intelligence.
  - **Mathematics:** Numerical Analysis (88), Ordinary Differential Equations (91), Engineering Mathematics (93), Advanced Algebra I (87), Probability and Statistics B.

## Standardized Tests

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- **TOEFL iBT: 104** (Reading 29, Listening 26, Writing 25, Speaking 24)

## Research Experience

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### Diffusion LLM with Flexible-Length Generation

*Aug. 2025 – Present*

*Advisor: [Dr. Yitao Liang](#) 📄, Assistant Professor, Institute for Artificial Intelligence, Peking University*

- Analyzed why *fixed-length* decoding in diffusion-based LLMs degrades generation quality; surveyed Diffusion-LM, Masked dLLM, DreamOn, and related architectures.
- Built and evaluated experimental pipelines to diagnose sources of low-quality decoding (e.g., non-canonical token encodings) and assessed the effects of various length-control strategies.
- Explored approaches for enabling **flexible-length generation**, drawing on insights from Block Diffusion, DreamOn, and other token-wise diffusion frameworks.
- Developed a strong understanding of discrete diffusion training, sampling, and token-level probabilistic modeling for diffusion LLMs.
- **A manuscript based on this work is in preparation and is planned for submission to ICML 2026.**

## Projects

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### Mytorch: A CUDA-Accelerated Neural Network Framework

*Sep. 2025 - Dec. 2025*

- Trained a classifier on MNIST using PyTorch as a reference baseline.
- Implemented **Tensor**, fully connected/conv layers, softmax, and cross-entropy in CUDA.
- Implemented an autograd engine supporting diverse computation graphs; built an SGD optimizer atop it.
- Packaged CUDA/C++ components via **pybind11** for parallelized training and evaluation.

## Skills

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- **Programming:** Python (with PyTorch), C/C++ (with CUDA)
- **Tools:** GitHub/Gitee, Hugging Face, LaTeX, Markdown
- **Dev Environments:** PyCharm, VS Code

- **Languages:** Chinese (native), English (TOEFL 104)

## Honors and Awards

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- **CMC** — The Chinese Mathematics Competitions
  - Provincial third prize in major group-A other than mathematics
- **PKUCPC** — Peking University Collegiate Programming Contest
  - Thrid prize in PKUCPC 2025
- **IM<sup>2</sup>C** — The International Mathematical Modeling Challenge
  - Meritorious in IMMC2019 China (Control Number: #19152089)

## Leadership & Activities

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<b>Student Union, College of Engineering, Peking University — Member, Arts and Sports Department</b>	<i>Sep. 2023 - Aug. 2024</i>
<b>Student Union, College of Engineering, Peking University — Head, Arts and Sports Department</b>	<i>Sep. 2024 - Aug. 2025</i>