# Peiyang Song

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## Education

**6/2026 (expected)**    **California Institute of Technology**     Pasadena, CA

*B.S. in Computer Science & Minor in Robotics*

Advisors: Prof. Steven Low & Prof. Günter Niemeyer. GPA: **4.2/4.0**

## Research Interests

Neuro-Symbolic AI · LLM Reasoning · Neural Theorem Proving · AI for Math · Code Generation

## Work Experience

**6/2025 – Present**    **University of California, Berkeley**     Berkeley, CA

*Researcher @ Berkeley Artificial Intelligence Research (BAIR) Lab*

Advisors: Prof. Dawn Song (UCB), Dr. Jingxuan He (UCB)

**6/2024 – Present**    **Stanford University**     Palo Alto, CA

*Researcher @ Stanford AI Lab (SAIL) and Computation & Cognition Lab*

Advisors: Prof. Noah Goodman (Stanford), Dr. Gabriel Poesia (Harvard)

**2/2023 – 2/2025**    **California Institute of Technology**     Pasadena, CA

*Research Fellow @ Anima AI+Science Lab*

Advisors: Prof. Anima Anandkumar (Caltech), Dr. Kaiyu Yang (Meta)

**11/2022 – 6/2024**    **University of California, Santa Barbara**     Santa Barbara, CA

*Researcher @ Computer Architecture Lab (ArchLab)*

Advisors: Prof. Timothy Sherwood (UCSB), Dr. Jeremy Lau (Google)

## Selected Publications

**Preprint**    **Energy-Aware Temporal Function Approximation**

<u>Peiyang Song</u>, Rhys Gretsch, Jeremy Lau, and Timothy Sherwood

*In submission, manuscript available upon request*

Preprint    **A Survey on Large Language Model Reasoning Failures**

Peiyang Song*, Pengrui Han*, Noah Goodman (* Equal Contribution)

*ICML AI for Math (AI4MATH) Workshop, 2025*

Preprint    **Tracing Human-like Traits in LLMs: Origins, Real-World Manifestation, and Controllability**

Pengrui Han*, Rafal D. Kocielnik*, Peiyang Song, Ramit Debnath, Dean Mobbs, Anima Anandkumar, R. Michael Alvarez

*ICML Workshop on Models of Human Feedback for AI Alignment (MoFA), 2025*

Preprint    **LeanProgress: Guiding Search for Neural Theorem Proving via Proof Progress Prediction**

Suozhi Huang, Peiyang Song, Robert Joseph George, Anima Anandkumar

*ICLR VerifAI: AI Verification in the Wild Workshop, 2025*

IEEE Micro 2025    **Delay Space Arithmetic and Architecture**

Rhys Gretsch, Peiyang Song, Advait Madhavan, Jeremy Lau, Timothy Sherwood

*IEEE Micro, 2025*, **Top Picks**

ICLR 2025    **LeanAgent: Lifelong Learning for Formal Theorem Proving**

Adarsh Kumarappan*, Mo Tiwari*, Peiyang Song, Robert Joseph George, Chaowei Xiao, Anima Anandkumar

*International Conference on Learning Representations (ICLR), 2025*

NeuS 2025    **Lean Copilot: Large Language Models as Copilots for Theorem Proving in Lean**

Peiyang Song, Kaiyu Yang, Anima Anandkumar

*International Conference on Neuro-Symbolic Systems (NeuS), 2025*

**1.1k+ stars on Github, ranking 2nd after Mathlib4 among all Lean projects**

EMNLP 2024    **Creative and Context-Aware Translation of East Asian Idioms with GPT-4**

Kenan Tang*, Peiyang Song*, Yao Qin, Xifeng Yan (* Equal Contribution)

*Findings of Empirical Methods in Natural Language Processing (EMNLP), 2024*

EMNLP 2024    **In-Context Learning May Not Elicit Trustworthy Reasoning: A-Not-B Errors in Pretrained Language Models**

Pengrui Han*, Peiyang Song*, Haofei Yu, Jiaxuan You (* Equal Contribution)

*Findings of Empirical Methods in Natural Language Processing (EMNLP), 2024*

ASPLOS 2024 **Energy Efficient Convolution with Temporal Arithmetic**

Rhys Gretsch, <u>Peiyang Song</u>, Advait Madhavan, Jeremy Lau, Timothy Sherwood

*ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2024*

NeurIPS 2023 **LeanDojo: Theorem Proving with Retrieval-Augmented Language Models**

Kaiyu Yang, Aidan Swope, Alex Gu, Rahul Chalamala, <u>Peiyang Song</u>, Shixing Yu, Saad Godil, Ryan Prenger, Anima Anandkumar

*Neural Information Processing Systems (NeurIPS), 2023*, **Oral Presentation**

## Selected Awards

5/2025 **ICLR Notable Reviewer Award**

4/2025 **George W. Housner Student Discovery Fund**

2/2025 **IEEE Micro Top Picks Award**

8/2023 **Early Research Scholarship**

4/2023 **Caltech SURF Award**

## Selected Media

2024 **Mathematicians' Newest Assistants Are Artificially Intelligent**

*Scientific American*

2024 **LeanAgent: The First Life-Long Learning Agent for Formal Theorem Proving in Lean**

*MarkTechPost*

2024 **Lean Copilot: An AI Tool that Allows Large Language Models (LLMs) to be used in Lean for Proof Automation**

*MarkTechPost*

2023 **Can LLMs Generate Mathematical Proofs that can be Rigorously Checked?**

*MarkTechPost*

## Invited Talks & Tutorials

### Tutorial: Neuro-Symbolic Theorem Proving with Lean

9/2024    3rd Neuro-Symbolic AI Summer School (NSSS)

### Towards An AI Mathematician

12/2023    UC Santa Barbara NLP Lab
11/2023    CCS Research & Creative Activities Conference (RACA-CON)
8/2023    Caltech SURF Seminar Day

## Teaching Experience

Fall 2025    **ME/CS/EE 133A: Robotics – Kinematics**
*California Institute of Technology*

## Academic Services

**Reviewer**    Conference on Neural Information Processing Systems (NeurIPS)
International Conference on Learning Representations (ICLR)
Association for Computational Linguistics Rolling Review (ARR)
Annual Meeting of the Association for Computational Linguistics (ACL)
Conference on Empirical Methods in Natural Language Processing (EMNLP)
International Joint Conference on Natural Language Processing (IJCNLP)
Asia-Pacific Chapter of the Association for Computational Linguistics (AACL)

NeurIPS Mathematical Reasoning and AI (MATH-AI) Workshop
NeurIPS Workshop on Deep Learning for Code (DL4C)
NeurIPS Workshop on Behavioral Machine Learning
ICLR VerifAI: AI Verification in the Wild Workshop
ICLR Workshop on Representational Alignment (Re-Align)
ICML AI for Math (AI4MATH) Workshop
ICML Workshop on LLMs and Cognition (LLM-Cognition)
ICML Workshop on Assessing World Models
ICML Workshop on on Models of Human Feedback for AI Alignment (MoFA)

**Caltech**    Admissions Ambassador @ Caltech Undergraduate Admissions Office
First-Year Caltech Connector (FCC) @ Student & Family Engagement Office

**Organizing Staff**  Agentic AI Summit 2025 @ UC Berkeley

## Languages

Programming   Python, C++, Lean 4, Java, C, PASCAL, OCaml, C#

Natural   English (TOEFL 117/120), Chinese (Native)