

# TANG, HAO

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## EDUCATION

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**Cornell University**, Ithaca, NY, United States *08/21 - Present*  
Ph.D. in Computer Science  
Advisor: Kevin Ellis

**Shanghai Jiao Tong University**, Shanghai, China *09/17 - 03/21*  
M.S. in Computer Science and Engineering (with honors)  
Advisor: Bao-Liang Lu

**Shanghai Jiao Tong University**, Shanghai, China *09/13 - 06/17*  
B.S. in Computer Science and Engineering (with honors)

## SELECTED TALKS

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Towards Sample Efficient Agents through Programmatic Inductive Biases  
@ *Microsoft Research Lab – Montréal*, May 2024  
@ *MIT Theory-RL Reading Group*, June 2024  
@ *Mitsubishi Electric Research Laboratories Computer Vision Reading Group*, July 2024  
@ *MIT Learning in Intelligent Systems (LIS) Group*, August 2024

LLM for (Nonlinear) Loop Invariant Synthesis  
@ *University of Toronto PLSE Group*, July 2024

From perception to programs: regularize, overparameterize, and amortize  
@ *PLDI Symposium on Machine Programming (PLDI-MAPS)*, June 2022

Towards Scale-Invariant Graph-related Problem Solving by Iterative Homogeneous GNNs  
@ *The 18th China Symposium on Machine Learning and Applications (MLA)*, November 2020

## PUBLICATIONS

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WorldCoder, a Model-Based LLM Agent: Building World Models by Writing Code and Interacting with the Environment  
**Hao Tang**, Darren Key, Kevin Ellis  
*Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2024

Code Repair with LLMs gives an Exploration-Exploitation Tradeoff  
**Hao Tang**, Keya Hu, Jin Peng Zhou, Sicheng Zhong, Wei-Long Zheng, Xujie Si, Kevin Ellis  
*Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2024

From perception to programs: regularize, overparameterize, and amortize  
**Hao Tang**, Kevin Ellis  
*International Conference on Machine Learning (ICML)*, 2023

Towards Scale-Invariant Graph-related Problem Solving by Iterative Homogeneous GNNs  
**Hao Tang**, Zhiao Huang, Jiayuan Gu, Bao-Liang Lu, Hao Su  
*Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2020

Refactoring Policy for Compositional Generalizability using Self-Supervised Object Proposals  
Tongzhou Mu\*, Jiayuan Gu\*, Zhiwei Jia, **Hao Tang**, Hao Su  
*Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2020

Belief Propagation Neural Networks

Jonathan Kuck, Shuvam Chakraborty, **Hao Tang**, Rachel Luo, J. Song, A. Sabharwal, Stefano Ermon  
*Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2020

Emotion Recognition using Multimodal Residual LSTM Network

Jiaxin Ma\*, **Hao Tang\***, Wei-Long Zheng, Bao-Liang Lu

*ACM International Conference on Multimedia (ACM Multimedia)*, 2019

Multimodal emotion recognition using deep neural networks

**Hao Tang**, Wei Liu, Wei-Long Zheng, Bao-Liang Lu

*International Conference on Neural Information Processing (ICONIP)*, 2017

## PREPRINTS

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Learning Abstract World Models with Neuro-Symbolic Predicates for Robot Planning

Yichao Liang, Nishanth Kumar, **Hao Tang**, Adrian Weller, Joshua B Tenenbaum, Tom Silver, João F Henriques, Kevin Ellis

Combining Induction and Transduction for Abstract Reasoning

Wen-Ding Li\*, Keya Hu\*, Carter Larsen, Yuqing Wu, Simon Alford, Caleb Woo, Spencer M. Dunn, **Hao Tang**, Michelangelo Naim, Dat Nguyen, Wei-Long Zheng, Zenna Tavares, Yewen Pu†, Kevin Ellis†

## EMPLOYMENT

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### Graduate Researcher

08/21 - Present

Computer Science Department, Cornell University, NY, United States

- Neuro-Symbolic Program Synthesis, Model-based LLM Agents.

### Research Intern

05/24 - 08/24

Mitsubishi Electric Research Laboratories, MA, United States

- Program synthesis for interpretable video understanding and prediction.

### Remote Research Assistant

03/20 - 12/20

Stanford University, CA, United States

- Learning to learn, Learn better belief propagation with GNNs.

### Visiting Graduate

07/19 - 03/20

University of California, San Diego, CA, United States

- Generalizable GNNs w.r.t. graph scales by encoding iterative programmatic structure.

### Research Intern

12/18 - 05/19

OMRON SINIC X Corporation, Tokyo, Japan

- Differentiable structured attentions, Structured sparsity, Graph representation learning.

### Research Assistant

06/16 - 03/21

Shanghai Jiao Tong University, Shanghai, China

- State-of-the-arts on EEG-based multimodal emotion recognition.

### Research Intern

07/15 - 09/15

Information Technology R&D Center of Mitsubishi Electric, Fujisawa, Japan

- Developed a Chinese intention understanding module for the dialog system in rice cookers.

## OPEN SOURCE CONTRIBUTIONS

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**Pytorch:** contributor, 4 commits

**Tensorflow:** contributor, 1 commit

**Pytorch-Geometric** (Pytorch-Scatter backend): contributor, 2 commits

**gfl** (graph-fused lasso solver): contributor, 4 commits

**parallel-cut-pursuit** (minimizes functionals structured over a weighted graph): contributor, 1 commit

## HONORS AND AWARDS

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- Top Reviewer of NeurIPS
- Outstanding Graduate of Shanghai Jiao Tong University (1%)