

# 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

## SELECTED PUBLICATIONS

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### LLM-Guided Probabilistic Program Induction for POMDP Model Estimation

Aidan Curtis, Hao Tang, Thiago Veloso, Kevin Ellis, Joshua Tenenbaum, Tomás Lozano-Pérez, Leslie Pack Kaelbling

*Conference on Robot Learning (CoRL)*, 2025

### Programmatic Video Prediction Using Large Language Models

Hao Tang, Kevin Ellis, Suhas Lohit, Michael J Jones, Moitreyia Chatterjee

*ICLR Workshop World Models*, 2025

### 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

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

### 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†

*International Conference on Learning Representations (ICLR)*, 2025 & *Best Paper at ARCPrize*

### 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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PoE-World: Compositional World Modeling with Products of Programmatic Experts  
Wasu Top Piriyaikulij, Yichao Liang, **Hao Tang**, Adrian Weller, Marta Kryven, Kevin Ellis

## EMPLOYMENT

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**Research Intern** 05/25 - 08/25

Microsoft Research, WA, United States

- Efficient LLM-based reasoning by selective forgetting and summarization.

**Research Intern** 05/24 - 08/24

Mitsubishi Electric Research Laboratories, MA, United States

- Program synthesis for interpretable video understanding and prediction.

**Graduate Researcher** 08/21 - Present

Computer Science Department, Cornell University, NY, United States

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

**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%)