# SHUN ZHANG

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**Research interests:** Reinforcement learning; large language models; automatic code generation.

## EXPERIENCE

**Research Scientist**, *MIT-IBM Watson AI Lab*                          Jun. 2022 - Present
**Postdoctoral Researcher**, *MIT-IBM Watson AI Lab*                     Oct. 2021 - Jun. 2022
**Postdoctoral Researcher**, *IBM-NJIT*                                  Aug. 2020 - Oct. 2021

- Research and publish academic papers on **reinforcement learning** and **large language models**, with a focus on the applications of competitive-level code generation and AI for electric circuit design automation.

**Graduate Research Assistant**, *University of Michigan* (Ann Arbor, MI)     Sep. 2015 - Apr. 2020

- Conducted research and published papers on **preference elicitation** and **AI safety in reinforcement learning**.
- Designed active learning algorithms to improve a learning agent's performance and guarantee safety in domains with uncertain objectives.

**Software Development Engineer Intern**, *Amazon* (Seattle, WA)             Jun. - Aug. 2014

- Created a WebRTC-related internal tool to resolve cross-departmental communication issues.

**Software Development Engineer Intern**, *Semantic Designs* (Austin, TX)      Jun. - Aug. 2013

- Created a user interface for a programming language analysis tool for better visualization.

## EDUCATION

**Ph.D. in Computer Science and Engineering**, *University of Michigan*      Sep. 2015 - Apr. 2020

- Dissertation: Efficiently Finding Approximately-Optimal Queries for Improving Policies and Guaranteeing Safety
- Advisors: Satinder Singh, Edmund H. Durfee

**M.S. in Computer Science**, *University of Texas at Austin*                    Aug. 2015

- Master Thesis: Parameterized Modular Inverse Reinforcement Learning
- Committee members: Dana Ballard, Peter Stone

**B.S. in Computer Science**, *University of Texas at Austin*                    May 2014

## PUBLICATIONS

- **Planning with Large Language Models for Code Generation**
  **Shun Zhang**, Zhenfang Chen, Yikang Shen, Mingyu Ding, Joshua B. Tenenbaum, and Chuang Gan
  *International Conference on Learning Representations (ICLR), 2023*
  paper

- **Hyper-Decision Transformer for Efficient Online Policy Adaptation**
  Mengdi Xu, Yuchen Lu, Yikang Shen, **Shun Zhang**, Ding Zhao, and Chuang Gan

*International Conference on Learning Representations (ICLR), 2023*
paper

- **Prompting Decision Transformer for Few-shot Policy Generalization**
  Mengdi Xu, Yikang Shen, **Shun Zhang**, Yuchen Lu, Ding Zhao, Joshua B. Tenenbaum, and Chuang Gan
  *International Conference on Machine Learning (ICML), 2022*
  paper

- **Power Converter Circuit Design Automation using Parallel Monte Carlo Tree Search**
  Shaoze Fan, **Shun Zhang**, Jianbo Liu, Ningyuan Cao, Xiaoxiao Guo, Jing Li, and Xin Zhang
  *ACM Transactions on Design Automation of Electronic Systems (TODAES), 2022*
  paper

- **From Specification to Topology: Automatic Power Converter Design via Reinforcement Learning**
  Shaoze Fan, Ningyuan Cao, **Shun Zhang**, Jing Li, Xiaoxiao Guo, and Xin Zhang
  *International Conference on Computer Aided Design (ICCAD), 2021*
  paper

- **Efficiently Finding Approximately-Optimal Queries for Improving Policies and Guaranteeing Safety**
  **Shun Zhang**
  *Ph.D. Dissertation, 2020*
  paper

- **Querying to Find a Safe Policy Under Uncertain Safety Constraints in Markov Decision Processes**
  **Shun Zhang**, Edmund H. Durfee, and Satinder Singh
  *AAAI Conference on Artificial Intelligence (AAAI), 2020*
  paper

- **Minimax-Regret Querying on Side Effects for Safe Optimality in Factored Markov Decision Processes**
  **Shun Zhang**, Edmund H. Durfee, and Satinder Singh
  *International Joint Conference on Artificial Intelligence (IJCAI), 2018*
  paper

- **Approximately-Optimal Queries for Planning in Reward-Uncertain Markov Decision Processes**
  **Shun Zhang**, Edmund H. Durfee, and Satinder Singh
  *International Conference on Automated Planning and Scheduling (ICAPS), 2017*
  paper

- **Modeling Sensory-Motor Decisions in Natural Behavior**
  Ruohan Zhang, **Shun Zhang**, Matthew H. Tong, Yuchen Cui, Constatin A. Rothkopf, Dana H. Ballard, and Mary M. Hayhoe
  *PLoS Computational Biology, 2018*
  paper

- **Determining Placements of Influencing Agents in a Flock**
  Katie Genter, **Shun Zhang**, and Peter Stone
  *Autonomous Agents and Multiagent Systems (AAMAS), 2015*
  paper

- **Autonomous Intersection Management for Semi-Autonomous Vehicles**
  Tsz-Chiu Au, **Shun Zhang**, and Peter Stone
  *Handbook of Transportation, 2015*
  paper

## SKILLS

**Research**

Reinforcement learning, optimization, deep learning, large language models, active learning, learning and planning under uncertainty.

**Programming languages**

Proficient in Python (numpy, PyTorch). Experienced in Java, C++, C, Matlab.