Chuqin (Allen) Geng

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Research interests

Explainable AI; Mechanistic interpretability and circuits; Neuro-symbolic methods; Neural network robustness and verification.

Education

University of Toronto — Toronto, ON, CA
Visiting PhD candidate — *Jan* 2023 – Present
Advisor: Prof. Xujie Si

McGill University, Mila - Quebec AI Institute — Montreal, QC, CA
PhD in Computer Science — *Sep* 2021 – Present
Advisor: Prof. Xujie Si, *GPA: 4.0/4.0*

Georgia Institute of Technology — Atlanta, GA, USA
MSc in Computer Science, *GPA: 4.0/4.0* — *Sep* 2019 – *Apr* 2021

University of Reading — Reading, Berkshire, UK
MSc in Finance, *GPA: 4.0/4.0* — *Sep* 2016 – *Dec* 2017

University of Toronto — Toronto, ON, CA
Honours BSc in Math and Statistics — *Sep* 2021 – *Aug* 2015

Selected awards

Apple Scholars nomination (McGill University)	2023
Computer Science Top-up Award (McGill University)	2023
Grad Excellence Award (McGill University)	2021-2023
Academic Distinction Award (University of Reading)	2017
Second prize in mathematics competition (Shaanxi province, China)	2009

Publications

Beyond Message Passing: A Symbolic Alternative for Expressive and Interpretable Graph Learning
Chuqin Geng, Li Zhang, Haolin Ye, Ziyu Zhao, Yuhe Jiang, Tara Saba, Xinyu Wang, Xujie Si
in submission

Neural Proposals, Symbolic Guarantees: Neuro-Symbolic Graph Generation with Hard Constraints
Chuqin Geng, Li Zhang, Mark Zhang, Haolin Ye, Ziyu Zhao, Xujie Si
in submission

VisionLogic: From Neuron Activations to Causally Grounded Concept Rules for Vision Models
Chuqin Geng, Yuhe Jiang, Ziyu Zhao, Zhaoyue Wang, Haolin Ye, Anqi Xing, Li Zhang, Xujie Si
in submission

LogicXGNN: Grounded Logical Rules for Explaining Graph Neural Networks
Chuqin Geng, Ziyu Zhao, Zhaoyue Wang, Haolin Ye, Yuhe Jiang, Xujie Si
accepted to ICLR 2026 ***(Top 2.5%)***

Learning Minimal Neural Specifications
Chuqin Geng, Zhaoyue Wang, Haolin Ye, Xujie Si
accepted to NeuS 2025 ***(Oral)***

Towards Robust Saliency Maps
Nham Le, **Chuqin Geng**, Xujie Si , Arie Gurfinkel
accepted to ACML 2024

TorchProbe: Fuzzing Dynamic Deep Learning Compilers
Qidong Su, **Chuqin Geng**, Gennady Pekhimenko, Xujie Si
accepted to APLAS 2023

Scalar Invariant Networks with Zero Bias
Chuqin Geng, Xiaojie Xu, Haolin Ye, Xujie Si
accepted to NeurReps @ NeurIPS 2023

Towards Reliable Neural Specifications
Chuqin Geng, Nham Le, Xiaojie Xu, Zhaoyue Wang, Arie Gurfinkel, Xujie Si
accepted to ICML 2023 ***(Oral)***

Identifying Different Student Clusters in Functional Programming Assignments: From Quick Learners to Struggling Students
Chuqin Geng, Wenwen Xu, Yingjie Xu, Brigitte Pientka, Xujie Si
accepted to SIGCSE 2023 TS

Novice Type Error Diagnosis with Natural Language Models
Chuqin Geng, Haolin Ye, Yixuan Li, Tianyu Han, Brigitte Pientka, Xujie Si
accepted to APLAS 2022

SAT-DIFF: A Tree Diffing Framework Using SAT Solver
Chuqin Geng, Haolin Ye, Yihan Zhang, Brigitte Pientka, Xujie Si
preprint, arxiv.org/abs/2404.04731

Can ChatGPT Pass An Introductory Level Functional Language Programming Course?
Chuqin Geng, Yihan Zhang, Brigitte Pientka, Xujie Si
preprint, arxiv.org/abs/2305.02230

Research Experience

Explainable AI and Mechanistic Interpretability
Advisor: Prof. Xujie Si (University of Toronto) *May* 2025 – Present
Developed a novel framework to extract interpretable logic rules and circuits from deep learning models, including GNNs and CNNs.
Leveraged mechanistic interpretability to diagnose model failure modes and applied symbolic fixes to provide formal guarantees and improve robustness.

Neural network robustness and verification
Advisor: Prof. Xujie Si (University of Toronto) *Sep* 2022 – *May* 2025
Proposed new specifications for neural network verification. Explored novel methods to improve models' robustness and fairness.

Disproof of a conjecture in biometric security optimization
Mentors: Prof. Steven Rayan (University of Toronto) *Jan* 2015 – *Aug* 2015
Disproved a conjecture regarding optimal solutions for biometric privacy-security trade-offs, providing new bounds for secure system optimization.

Teaching experience

Head teaching assistant, McGill University Winter 2022
COMP 302: Programming Languages and Paradigms
Conducted weekly office hours and tutorials, designed and graded exams, developed auto-graders for assignments, implemented mutation testing, and utilized Moss for plagiarism detection.

Industry experience

FITFI Inc. Toronto, CA
Senior Data Scientist *Jan* 2018 – *Sep* 2019
Invented the patent *"System and method for automatically detecting and monitoring use of exercise equipment"*. Led algorithm team, secured demo opportunity at 2019 Collision Conference, and helped raise over 2 million CAD funding.

SHAREWIN SOFTWARE Beijing, China
Algorithm Engineer *Sep* 2015 – *Sep* 2016
Designed fault extraction algorithm with preprocessing, filtering, and ant tracking for accurate fault surface detection in 3D-seismic volumes.

Talks

Learning Minimal Neural Specifications *May* 2025
NeuS 2025

Towards Reliable Neural Specifications *Aug* 2023
ICML 2023

A study on student performance clusters *Mar* 2023
SIGCSE 2023, SPLICE Workshop

Novice Type Error Diagnosis with Natural Language Models *Dec* 2022
APLAS 2022

Service

I have consistently served as a reviewer for top-tier conferences, including:

- **Machine Learning:** ICML (2023–2026), ICLR (2024–2026), NeurIPS (2023–2025), AAAI (2024, 2025)
- **Computer Vision:** CVPR (2024, 2025), ECCV 2026
- **HCI & Education:** SIGCSE 2023, CHI 2023

Mentoring

Li Zhang, Ziyu Zhao, Haolin Ye, Yihan Zhang, Zhaoyue Wang, Xiaojie Xu