

Minghao Guo

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Education

MIT

Ph.D. Student in CSAIL, Electrical Engineering and Computer Science

MA, USA

Aug. 2021 – Present

The Chinese University of Hong Kong

M.Phil. in Information Engineering

Hong Kong, China

Aug. 2019 – July 2021

Tsinghua University

B.Eng. in Automation

Beijing, China

Aug. 2014 – July 2018

Initiatives

(* indicates equal contribution, † indicates corresponding author)

[1] Peter Yichen Chen†, **Minghao Guo**†, Hanspeter Pfister, Ming Lin, William Freeman, Qixing Huang, Han-Wei Shen, Wojciech Matusik, “Graphics4Science: Computer graphics for scientific impacts,” *SIGGRAPH Courses* 2025.

Conference & Journal Publications

[1] Haixu Wu, **Minghao Guo**, Yuezhou Ma, Yuanxu Sun, Jianmin Wang, Wojciech Matusik, Mingsheng Long, “FlashBias: Fast Computation of Attention with Bias,” in *Conference on Neural Information Processing Systems (NeurIPS)* 2025.

[2] Kevin Tirta Wijaya, Michael Sun, **Minghao Guo**, Hans-Peter Seidel, Wojciech Matusik, Vahid Babaei, “Post Hoc Regression Refinement via Pairwise Rankings,” in *Conference on Neural Information Processing Systems (NeurIPS)* 2025.

[3] Chunru Lin, Haotian Yuan, Yian Wang, Xiaowen Qiu, Tsun-Hsuan Wang, **Minghao Guo**, Bohan Wang, Yashraj Narang, Dieter Fox, Chuang Gan, “RobotSmith: Generative Robotic Tool Design for Acquisition of Complex Manipulation Skills,” in *Conference on Neural Information Processing Systems (NeurIPS)* 2025.

[4] Xinyi Yang, Bohan Wang, Víctor Riera Naranjo, **Minghao Guo**, Olivia Rivera, Leonid Sopitzhenko, Shucong Li, William Freeman, Wojciech Matusik, Bolei Deng, “Electronic-Free Particle Robots Communicate through Architected Tentacles,” in *Advanced Intelligent Systems* 2025.

[5] **Minghao Guo***, Bohan Wang*, Kaiming He, Wojciech Matusik, “TetSphere Splatting: Representing High-Quality Geometry with Lagrangian Volumetric Meshes,” in *International Conference on Learning Representations (ICLR)* 2025 ([oral](#) paper, acceptance rate 1.8%).

[6] Michael Sun, Alston Lo, **Minghao Guo**, Jie Chen, Connor W. Coley, Wojciech Matusik, “Procedural Synthesis of Synthesizable Molecules,” in *International Conference on Learning Representations (ICLR)* 2025.

[7] **Minghao Guo**, Bohan Wang†, Pingchuan Ma, Tianyuan Zhang, Crystal Elaine Owens, Chuang Gan, Joshua B. Tenenbaum, Kaiming He, Wojciech Matusik, “Physically Compatible 3D Object Modeling from a Single Image,” in *Conference on Neural Information Processing Systems (NeurIPS)* 2024 ([spotlight](#) paper).

[8] **Minghao Guo***, Bohan Wang*, Wojciech Matusik, “Medial Skeletal Diagram: A Generalized Medial Axis Approach for Compact 3D Shape Representation,” in *SIGGRAPH Asia 2024 (Journal Track)*.

- [9] Michael Sun, **Minghao Guo**, Weize Yuan, Veronika Thost, Crystal Elaine Owens, Aristotle Franklin Grosz, Sharvaa Selvan, Katelyn Zhou, Hassan Mohiuddin, Benjamin J Pedretti, Zachary P Smith, Jie Chen, Wojciech Matusik, “Representing Molecules as Random Walks Over Interpretable Grammars,” in *International Conference on Machine Learning (ICML) 2024* (**spotlight** paper).
- [10] Pingchuan Ma, Tsun-Hsuan Wang, **Minghao Guo**, Zhiqing Sun, Joshua B. Tenenbaum, Daniela Rus, Chuang Gan, Wojciech Matusik, “LLM and Simulation as Bilevel Optimizers: A New Paradigm to Advance Physical Scientific Discovery,” in *International Conference on Machine Learning (ICML) 2023*.
- [11] **Minghao Guo**, Veronika Thost, Samuel Song, Adithya Balachandran, Payel Das, Jie Chen, Wojciech Matusik, “Hierarchical Grammar-Induced Geometry for Data-Efficient Molecular Property Prediction,” in *International Conference on Machine Learning (ICML) 2023*.
- [12] Yu Wang, **Minghao Guo**, Justin Solomon, “Variational Quasi-harmonic Maps for Computing Diffeomorphisms,” in *SIGGRAPH 2023 (ACM Transactions on Graphics)*.
- [13] **Minghao Guo**, Veronika Thost, Beichen Li, Payel Das, Jie Chen, Wojciech Matusik, “Data-Efficient Graph Grammar Learning for Molecular Generation,” in *International Conference on Learning Representations (ICLR) 2022* (**oral** paper, acceptance rate 1.6%).
- [14] Liane Makatura, **Minghao Guo**, Adriana Schulz, Justin Solomon, Wojciech Matusik, “Pareto Gamuts: Exploring Optimal Designs Across Varying Contexts,” in *SIGGRAPH 2021 (ACM Transactions on Graphics)*.
- [15] **Minghao Guo**, Liane Makatura, Wan Shou, Timothy Erps, Michael Foshey, Wojciech Matusik, “PolyGrammar: A Parametric Context Sensitive Grammar for Polymer Representation and Generation,” in *Advanced Science*.
- [16] Zhaoyang Lyu, **Minghao Guo**, Tong Wu, Guodong Xu, Kehuan Zhang, Dahua Lin, “Towards Evaluating and Training Verifiably Robust Neural Networks,” in *Conference on Computer Vision and Pattern Recognition (CVPR) 2021*.
- [17] Rui Xu, **Minghao Guo**, Jiaqi Wang, Xiaoxiao Li, Bolei Zhou, Chen Change Loy, “Texture Memory-Augmented Deep Patch-Based Image Inpainting,” in *Transactions on Image Processing (TIP)*.
- [18] **Minghao Guo***, Yuzhe Yang*, Rui Xu, Ziwei Liu, Dahua Lin, “When NAS Meets Robustness: In Search of Robust Architectures against Adversarial Attacks,” in *Conference on Computer Vision and Pattern Recognition (CVPR) 2020*.
- [19] Chen Lin*, **Minghao Guo***, Chuming Li, Xin Yuan, Wei Wu, Junjie Yan, Dahua Lin, Wanli Ouyang, “Online Hyper-parameter Learning for Auto-Augmentation Strategy,” in *International Conference on Computer Vision (ICCV) 2019*.
- [20] Chuming Li, Xin Yuan, Chen Lin, **Minghao Guo**, Wei Wu, Junjie Yan, Wanli Ouyang, “AM-LFS: AutoML for Loss Function Search,” in *International Conference on Computer Vision (ICCV) 2019*.
- [21] **Minghao Guo**, Zhao Zhong, Wei Wu, Dahua Lin, Junjie Yan, “IRLAS: Inverse Reinforcement Learning for Architecture Search,” in *Conference on Computer Vision and Pattern Recognition (CVPR) 2019*.
- [22] **Minghao Guo**, Jiwen Lu, Jie Zhou, “Dual-Agent Deep Reinforcement Learning for Deformable Face Tracking,” in *European Conference on Computer Vision (ECCV) 2018* (**oral** paper, acceptance rate 2.4%).
- [23] Hao Liu, Jiwen Lu, **Minghao Guo**, Suping Wu, Jie Zhou, “Learning Reasoning-Decision Networks for Robust Face Alignment,” *Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*.

[24] Haitian Zheng, **Minghao Guo**, Haoqian Wang, Yebin Liu, Lu Fang, “Reference-based Light Field Super-resolution Using a Hybrid Imaging System,” in *International Conference on Computer Vision Workshops (ICCVW) 2017*.

Other Publications

[25] Siyuan Chen*, **Minghao Guo***†, Caoliwen Wang, Anka He Chen, Yikun Zhang, Jingjing Chai, Yin Yang, Wojciech Matusik, Peter Yichen Chen†, “Physically Valid Biomolecular Interaction Modeling with Gauss-Seidel Projection,” in *arXiv*.

[26] **Minghao Guo**, Victor Zordan, Sheldon Andrews, Wojciech Matusik, Maneesh Agrawala, Hsueh-Ti Derek Liu, “Kinematic Kitbashing for Modeling Functional Articulated Objects,” in *arXiv*.

[27] Pingchuan Ma, Benjamin Tod Jones, Tsun-Hsuan Wang, **Minghao Guo**, Michal Piotr Lipiec, Chuang Gan, Wojciech Matusik, “Newton to Einstein: Axiom-Based Discovery via Game Design,” in *arXiv*.

[28] **Minghao Guo**, “Integrating Domain-specific Knowledge to Automated Machine Learning,” *M.Phil. Thesis*.

Other Research Experience

Roblox , San Mateo, CA <i>Research Intern mentored by Dr. Hsueh-Ti Derek Liu</i>	May 2024 – Aug. 2024
Meta Platforms, Inc. , Burlingame, CA <i>Research Intern mentored by Dr. Christian Häne and Dr. Tong Xiao</i>	June 2023 – Sep. 2023
MultiMedia Lab (MMLab) , The Chinese University of Hong Kong <i>M.Phil. Student supervised by Prof. Dahua Lin and Prof. Ziwei Liu</i>	Aug. 2019 – July 2021
Fundamental Research Group , SenseTime <i>Research Intern of Model Team</i>	Aug. 2018 – July 2019
Intelligent Vision Group (IVG) , Tsinghua University <i>Advised by Prof. Jiwen Lu</i>	Mar. 2017 – July 2018
Broadband Network & Digital Media Lab , Tsinghua University <i>Advised by Prof. Yebin Liu</i>	Aug. 2016 – Feb. 2017

Teaching

6.S978 Deep Generative Models , Teaching Assistant, MIT <i>Teaching assistant for the <u>inaugural, newly developed</u> graduate subject for Prof. Kaiming He.</i>	Fall Term, 2024
Summer Geometry Institute , Project Mentor, MIT <i>Mentored four students over a two-week period on two research projects in mesh processing.</i>	Summer, 2024
6.4400 Computer Graphics , Teaching Assistant, MIT <i>Teaching assistant for the undergrad subject for Prof. Mina Konaković Luković</i>	Fall Term, 2023
Electronic Circuit Design Laboratory , Teaching Assistant, CUHK	Term 1, 2019-2020
Linear Algebra and Vector Calculus for Engineers , Teaching Assistant, CUHK	Term 2, 2019-2020
Electronic Circuit Design Laboratory , Teaching Assistant, CUHK	Term 1, 2020-2021

Software

libpgo: Library for Physically based Simulation (P), Geometric Shape Modeling (G), and Optimization (O)
Bohan Wang, **Minghao Guo**
A C++/Python framework for physically based simulation, geometric modeling, and numerical optimization.

Invited Talks

Neural Generative Design: Grounding Generative Models with Hollywood Physics

ByteDance Seed Team , <i>hosted by Dr. Wen Yan</i>	Nov. 2025
Boston University , <i>hosted by Prof. Boqing Gong</i>	Nov. 2025
Boston Diffusion Day , <i>Harvard</i>	Oct. 2025
Google DeepMind , <i>hosted by Dr. Deqing Sun</i>	July 2025

Awards & Honors

MathWorks Fellowship , \$105,000	2023-2024
Roblox Fellowship , <i>Final List</i>	2024-2025
Meshy AI Fellowship , <i>Outstanding Prize</i>	2023-2024

Reviewing

ACM SIGGRAPH North America
ACM SIGGRAPH Asia
Pacific Graphics
International Conference on Learning Representations (ICLR)
International Conference on Machine Learning (ICML)
Conference on Neural Information Processing Systems (NeurIPS)
Conference on Computer Vision and Pattern Recognition (CVPR)
International Conference on Computer Vision (ICCV)
European Conference on Computer Vision (ECCV)

Industry Collaborations

Foundry BioSciences <i>Physically valid protein structure prediction and design</i>	2025-Present
XtalPi <i>Computer graphics for protein modeling</i>	2025-Present
Meta <i>Neural simulation for collision handling</i>	2024-Present
Amazon Robotics <i>Differentiable actuator modeling for motor torque control</i>	2025-Present
IBM Research <i>Graph grammar-based molecule design</i>	2021-2023