

Gabriel Guo

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Email: gzg2104@columbia.edu **Web:** gabeguo.github.io **GitHub:** github.com/gabeguo
Google Scholar: <https://scholar.google.com/citations?user=3yn4k9IAAAAJ&hl=en&oi=ao>

Research Interests Computational materials science, biometrics, representation learning, robot learning

Education **Columbia University** New York, NY, USA
B.S. in Computer Science (Intelligent Systems) 09/2020 – 05/2024
Advisors: Prof. Hod Lipson, Prof. Tony Dear *GPA: 4.07/4.33*

SUNY Buffalo Buffalo, NY, USA
Credits in Computer Science and Math 06/2016 – 07/2019
Dual Enrollment Programs for Gifted Youth *GPA: 4.00/4.00*

Publications **Unveiling Intra-Person Fingerprint Similarity via Deep Contrastive Learning**
Gabe Guo, Aniv Ray, Miles Izydorczak, Judah Goldfeder, Hod Lipson, Wen Yao Xu.
<https://www.science.org/doi/10.1126/sciadv.adi0329>
Science Advances, Vol. 10, Issue 2, 2024.

MSLife: Digital Behavioral Phenotyping of Multiple Sclerosis Symptoms in the Wild Using Wearables and Graph-Based Statistical Analysis
Gabriel Guo, Hanbin Zhang, Liuyi Yao, Huining Li, Chenhan Xu, Zhengxiong Li, Wen Yao Xu.
PACM IMWUT, 2021.

PDLens: Smartphone Knows Drug Effectiveness among Parkinson's via Daily-Life Activity Fusion
Hanbin Zhang, Gabriel Guo, Chen Song, Chenhan Xu, Kevin Cheung, Jasleen Alexis, Huining Li, Dongmei Li, Kun Wang, Wen Yao Xu
ACM MobiCom, 2020.

RehabPhone: A Software-Defined Tool using 3D Printing and Smartphones for Personalized Home-based Rehabilitation
Hanbin Zhang, Gabriel Guo, Emery Comstock, Baicheng Chen, Xingyu Chen, Chen Song, Jerry Ajay, Jeanne Langan, Sutanuka Bhattacharjya, Lora A Cavuoto, Wen Yao Xu
ACM MobiSys, 2020.

Demo Abstract: BIGHand - A Bilateral, Integrated, and Gamified Hand-grip Stroke Rehabilitation System for Independent at-Home Exercise

Emery Comstock, Gabriel Guo, Wenyao Xu

ACM SenSys, 2019.

ARMove: A Smartphone Augmented Reality Exergaming System for Upper and Lower Extremities Stroke Rehabilitation: Demo Abstract

Gabriel Guo, Joshua Segal, Hanbin Zhang, Wenyao Xu.

ACM SenSys, 2019.

In Progress

DeepCollide: Scalable Data-Driven High DoF Configuration Space Modeling using Implicit Neural Representations

Gabriel Guo, Judah Goldfeder, Aniv Ray, Tony Dear, Hod Lipson.

<https://arxiv.org/abs/2305.15376>

Under review at *IEEE Transactions on Robotics*, 2023.

End-to-End Structure Prediction from X-Ray Diffraction Data Using Generative AI

Gabe Guo, Judah Goldfeder, Ling Lan, Aniv Ray, Albert Hanming Yang, Boyuan Chen, Simon JL Billinge, Hod Lipson.

<https://arxiv.org/abs/2312.15136>

Submitted to *Nature Communications*, 2024.

Research Experience

Creative Machines Lab (Columbia University)

Mentor: Professor Hod Lipson

06/2022 – Present

Led research projects in: contrastive learning for cross-finger biometric recognition (patent pending), learning-based configuration space approximation, and deep 3D generative modeling for crystallography. More interesting ideas coming soon!

NSF REU in Biometrics

Mentor: Professor Wenyao Xu

05/2021 – 08/2021

Led deep learning research project in which we were the first in the world to discover the intra-person fingerprint correlation.

Embedded Sensors and Computing Lab (SUNY Buffalo)

Mentor: Professor Wenyao Xu

05/2018 – 04/2021

Various research projects in smart health, ubiquitous computing, and HCI. Started as a high school student.

Teaching Experience

Head Teaching Assistant, Computer Science (Columbia University)

Mentor: Professor Tony Dear

09/2023 – Present

Created homeworks and exams, coordinated TA team, and organized weekly recitations for Discrete Mathematics, in addition to typical TA responsibilities.

Teaching Assistant, Computer Science (Columbia University)

Mentor: Professor Tony Dear 09/2021 – 05/2023

Hosted office hours, graded homeworks, and taught recitations. Classes include: COMS 3251 (Computational Linear Algebra), COMS 3203 (Discrete Mathematics), COMS 4701 (Artificial Intelligence).

Industry Experience

Oliver Wyman New York, NY, USA
Consulting Intern Summer 2023

L3Harris Palm Bay, FL, USA
Software Engineering Intern Summer 2022

G Squared Web Development Buffalo, NY, USA
Self-Employed 2018 – 2022

Skills

Programming

Proficient in: Python (and associated libraries), Java.

Familiar with: C, C#, HTML, CSS, JavaScript, PHP, SQL, Bash.

Community Service

Columbia Engineering Student Council New York, NY, USA
Vice President 05/2022 – Present
Representative 09/2021 – 05/2022
Organized and led various school spirit events attended by thousands of students. Spearheaded communications to student body. Collaborated with admins to improve schoolwide policies, including expanded fitness center hours, 24-hour dining hall service, and pass-fail grading.

Invited Talks

The New Era of Fingerprint Biometrics: Revealing Cross-Digit Similarity via Deep Contrastive Learning, CSE 709 (Graduate Seminar on IoT and Biometrics), University at Buffalo, Buffalo, NY, USA, November 3, 2023

Selected Press

CNN “Are fingerprints unique? Not really, AI-based study finds”
BBC “Our fingerprints may not be unique, claims AI”
BBC Science Focus “Your fingerprints aren’t unique after all, discovers AI”
The Times “AI can now link two separate fingerprints from same person”
The Sun “AI YOU KIDDING?”
The Register “AI flips the script on fingerprint lore”
Metro “AI smashes the idea that all fingerprints are unique”
EuroNews “Could AI improve forensics?”
New Scientist “AI can tell if prints from two different fingers”
The Naked Scientists “AI fingerprint breakthrough could aid future forensics”
Courthouse News “AI disproves differences between same-hand fingerprints”
The Messenger “Shocking New Fingerprints Study Could Solve Cold Cases”

IFLScience “AI Overturns Claim That Every Human Fingerprint Is Unique”
Biometric Update “AI innovates in forensic biometrics”
The Financial Express “Our fingerprints may not be unique, claims AI”
Business Day “AI discovers that not every fingerprint is unique”
WION “US university uses AI to prove our fingerprints are not unique”
WBAY Action 2 “3 BRILLIANT MINUTES: A.I. for doctors and detectives”
iHeartRadio Krime Podcast “AI Discovers Fingerprints are Not Unique”

Other Interests

Music composition, film production, strength training.