

Education

Massachusetts Institute of Technology (MIT)	CAMBRIDGE, MA USA
PhD student in Electrical Engineering and Computer Science (EECS)	2019 – present
Advisor: Prof. Frédo Durand.	
MIT Presidential Fellow (2019) and Takeda Fellow (2022).	
Tsinghua University	BEIJING, CHINA
Master of Engineering in Control Science and Engineering [with Distinction]	2016 – 2019
Advisor: Prof. Qionghai Dai. I also worked with Prof. Jinli Suo.	
Master's Thesis: Space-time Reciprocal Computational Imaging. [Thesis Award of Tsinghua University]	
Tsinghua University	BEIJING, CHINA
Bachelor of Engineering in Automation [with Distinction]	2012 – 2016
Thesis advisor: Prof. Qionghai Dai. GPA 92/100, ranking 3/136.	

Research Interests

Computational Imaging and Photography: Imaging and sensing beyond human vision (in terms of dimensionality and visibility) by joint design of hardware (optics) and software (AI algorithms). Typical topics that I am interested in are high-dimensional visual computing from low-dimensional samplings, such as high-throughput imaging, single-pixel imaging, and non-line-of-sight imaging with macro- and micro-scale applications from consumer photography to microscopy.

Generative AI and AI for Health: Structured visual synthesis using large pretrained diffusion models for controllable and consistent image generation, e.g., few-headshot CG-to-Real 3D avatar photorealism enhancement. I am broadly enthusiastic about artificial intelligence for addressing social demands (structured visual generation large visual-language models; revealing imaging privacy threats from an ambient light sensor; and robust error correction and recognition system for COVID-19 vaccine record), and building novel tools for scientific discovery (high-throughput microscopes for neural activities and cell biology). [spotlight by MIT CSAIL]

Publications [[†]Equal contributions; [✉]Corresponding author(s)]

Journal and Conference Articles

12. Yang Liu[✉], Gregory W. Wornell, William T. Freeman, and Frédo Durand[✉]. Imaging Privacy Threats from an Ambient Light Sensor. *Science Advances*, **10** (2), eadj3608, DOI: [10.1126/sciadv.adj3608](https://doi.org/10.1126/sciadv.adj3608) (2024).
11. Jooli Han[†], Maria Kanelli[†], Yang Liu, John Daristotle, Apurva Pardeshi, Timothy Forster, Ari Karchin, Brandon Folk, Lukas Murmann, Lisa Tostanoski, Sebastian Carrasco, Linzixuan Zhang, Behnaz Eshaghi, Shahad Alsaiani, Sydney Pyon, Collin Perkinson, Mounqi Bawendi, Dan Barouch, Frédo Durand, Robert Langer[✉], Ana Jaklenec[✉]. Deep Learning-assisted On-patient Medical Record and mRNA Therapeutics Delivery using Microneedles. *Nature Materials* [accepted] (2024). [Manuscript PDF]
10. Xin Yuan[†], Yang Liu[†], Jinli Suo, Frédo Durand, and Qionghai Dai. Plug-and-Play Algorithms for Video Snapshot Compressive Imaging. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, **44** (10), 7093–7111, DOI: [10.1109/TPAMI.2021.3099035](https://doi.org/10.1109/TPAMI.2021.3099035) (2022).
9. Zhihong Zhang[†], Chao Deng[†], Yang Liu, Xin Yuan, Jinli Suo[✉], and Qionghai Dai. Ten-mega-pixel snapshot compressive imaging with a hybrid coded aperture. *Photonics Research*, **9** (11), 2277–2287, DOI: [10.1364/PRJ.435256](https://doi.org/10.1364/PRJ.435256) (2021).
8. Siming Zheng[†], Yang Liu[†], Ziyi Meng, Mu Qiao, Zhishen Tong, Xiaoyu Yang, Shensheng Han, and Xin Yuan. Deep Plug-and-Play Priors for Spectral Snapshot Compressive Imaging. *Photonics Research*, **9** (2), B18–B29, DOI: [10.1364/PRJ.411745](https://doi.org/10.1364/PRJ.411745) (2021).
7. Meng Li, Liheng Bian[✉], Guoan Zheng, Andrew Maiden, Yang Liu, Yiming Li, Jinli Suo, Qionghai Dai, and Jun Zhang. Single-Pixel Ptychography. *Optics Letters*, **46** (7), 1624–1627, DOI: [10.1364/OL.417039](https://doi.org/10.1364/OL.417039) (2021).

6. Xin Yuan, **Yang Liu**, Jinli Suo, and Qionghai Dai. Plug-and-Play Algorithms for Large-scale Snapshot Compressive Imaging. in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) [Oral]*, 1447–1457, DOI: [10.1109/CVPR42600.2020.00152](https://doi.org/10.1109/CVPR42600.2020.00152) (2020).
5. **Yang Liu**[†], Xin Yuan[†], Jinli Suo, David J. Brady, and Qionghai Dai[✉]. Rank Minimization for Snapshot Compressive Imaging. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 41 (12), 2990–3006, DOI: [10.1109/TPAMI.2018.2873587](https://doi.org/10.1109/TPAMI.2018.2873587) (2019).
4. Xukang Wang, **Yang Liu**, Xiaofei Han, Jinli Suo, and Qionghai Dai. Snapshot Compressive Volumetric Light-Sheet Microscopy. in *OSA Biophotonics Congress [Oral]*, BODA, JW5A.5, DOI: [10.1364/BODA.2019.JW5A.5](https://doi.org/10.1364/BODA.2019.JW5A.5) (2019).
3. **Yang Liu**, Jinli Suo, Yuanlong Zhang, and Qionghai Dai. Single-Pixel Phase and Fluorescence Microscope. *Optics Express*, 26 (25), 32451–32462, DOI: [10.1364/OE.26.032451](https://doi.org/10.1364/OE.26.032451) (2018).
2. **Yang Liu**, Jinli Suo, Yuanlong Zhang, and Qionghai Dai. Simultaneous Fluorescence and Quantitative Phase Microscopy with Single-Pixel Detectors. in *Proc. SPIE 10503, Quantitative Phase Imaging IV*, 105032K, DOI: [10.1117/12.2286757](https://doi.org/10.1117/12.2286757) (2018).
1. Yuwang Wang, **Yang Liu**, Jinli Suo, Guohai Situ, Chang Qiao, and Qionghai Dai. High Speed Computational Ghost Imaging via Spatial Sweeping. *Scientific Reports*, 7, 45325, DOI: [10.1038/srep45325](https://doi.org/10.1038/srep45325) (2017).

US Patents

- P1. Sai Bi, **Yang Liu**, Zexiang Xu, Fujun Luan, and Kalyan Sunkavalli. Generating Three-Dimensional Representations for Digital Objects Utilizing Mesh-based Thin Volumes. [US20230360327A1](https://patents.google.com/patent/US20230360327A1) (2023).

Honors and Awards

Honors and Distinctions

ESI Highly Cited Paper — Top 1% in Engineering	2024
Rank Minimization for Snapshot Compressive Imaging, IEEE TPAMI 2019. [cited by 384 papers, 2024/11]	
Oral Presentation (335/6424; ~5%) in IEEE/CVF CVPR	2020
Plug-and-Play Algorithms for Large-scale Snapshot Compressive Imaging, CVPR 2020.	
Outstanding Master's Thesis of Tsinghua University	2019
Outstanding Postgraduate of Tsinghua University and Automation Department	2019
Special Honor of Automation Department for Postgraduate Students (3/~600)	2018
Outstanding Graduate of Beijing and Tsinghua University	2016

Scholarships and Fellowships

Takeda Fellowship from MIT-Takeda Program	2022
MIT Stata Family Presidential Fellowship	2019
Jiang Nanxiang Scholarship (finalist of Top-10 Graduate Scholarship, 30/~30,000)	2018
Samvo-Chan Shung Fai Scholarship	2014
National Endeavor Scholarship	2013 & 2015
Cyrus Tang Scholarship and HAGE Scholarship	2013, 2014 & 2015

Competitions: Second Prize in the 33-th Challenge Cup of Tsinghua University (2015), Honorable Mention in Mathematical Contest in Modeling (2015), and Second Prize in Contemporary Undergraduate Mathematical Contest in Modeling (2014).

Research Experience

CSAIL, Massachusetts Institute of Technology (MIT)

CAMBRIDGE, MA USA

Research Assistant

Sep 2019 – present

Working on structured visual generation large visual-language models based on Stable Diffusion as well as imaging and sensing beyond human vision, specifically passive non-line-of-sight imaging and sensing with ubiquitous non-imaging devices. Advisor: Prof. Frédo Durand. Working closely with Prof. Bill Freeman and Prof. Greg Wornell on imaging topics.

Meta Reality Labs

SAUSALITO, CA USA

Research Scientist Intern / Part-time Researcher

May 2024 – present

Working on few-headshot CG-to-Real avatar photorealism enhancement using diffusion models, as a way to bridge the gap between virtual world (CG avatars on VR/AR headsets) and physical world (photorealism in real life). Mentor: Dr. Stéphane Grabli. Peers: Dr. Aljaž Božič, Dr. Yuanlu Xu, Dr. Nikolaos Sarafianos, Dr. Olivier Maury, and Dr. Doug Roble.

CSAIL and Chemical Engineering, MIT

CAMBRIDGE, MA USA

Research Assistant

Apr 2021 – Apr 2023

Worked on COVID-19 vaccine record system, partially designing a 2D error-correction and privacy-preserving subdermal barcode while maximizing the information capacity and a robust deep-learning-based recognition system. Advisors: Dr. Ana Jaklenec, Prof. Robert Langer, and Prof. Frédo Durand. Working closely with Dr. Jooli Han.

Adobe Research [remote]

SAN JOSE, CA USA

Research Intern

May 2021 – Aug 2021

Worked on efficient neural rendering using a mesh-guided thin volume/shell representation. Mentors: Dr. Sai Bi, Dr. Zexiang Xu, and Dr. Kalyan Sunkavalli.

Department of Automation, Tsinghua University

BEIJING, CHINA

Research Assistant

Sep 2015 – Jul 2019

At Broadband and Digital Media Laboratory, I emphasize on computational imaging and microscopy by joint design of optics and compressive sensing algorithms. My interests include high-throughput imaging, imaging through scattering media, and single-pixel imaging. Advisor: Prof. Qionghai Dai.

Chemical and Biological Engineering, University of British Columbia

VANCOUVER, BC CANADA

Research Intern

Jun 2015 – Aug 2015

At Data Analytics and Intelligent Systems Laboratory, I worked on estimation and optimal control of Li-ion batteries. Advisors: Prof. Bhushan Gopaluni and Prof. Brian Wetton (UBC Math).

Teaching Experience

Digital and Computational Photography 6.815/6.865 lectured by Prof. Frédo Durand

MIT

Teaching Assistant

Fall 2020

Problem sets, online Q&A, and office hours [virtual]. MIT TA Evaluation: 7.0/7.0.

Computer Language and Programming (using C) lectured by Prof. Jinli Suo

TSINGHUA UNIVERSITY

Teaching Assistant

Fall 2018

Deploy and maintain an online judge system, design problem sets, and review the solutions of midterm and final exams.

Mentoring Experience

MIT (co-advising with Prof. Frédo Durand): Jinha Kim (UROP, fall 2024).

Tsinghua University (co-advising with Prof. Jinli Suo and Prof. Qionghai Dai): Zhihong Zhang (intern, summer 2018; PhD, 2019; [9]), Xukang Wang (PhD, 2019; [4]), Menghao Guo (intern, summer 2018), Bo Zhang (PhD, 2018-2019).

MIT EECS Graduate Application Assistance Program (GAAP): Two students in under-represented groups applying for EECS PhD programs in Fall 2024.

Academic Service

Co-Organizer of MIT Graphics Seminars (weekly lunch format) with Karima Ma

2023 – 2024

Organizer of MIT Vision and Graphics Seminars (bi-weekly graphics side)

2022 – 2023

Co-Organizer of the first MIT Visual Computing Workshop – topic “Failures” in Research

2021.02

Invited Reviewer for IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*,

Transactions on Computational Imaging (TCI; 10×), Transactions on Neural Networks and Learning Systems (TNNLS), Journal of Selected Topics in Signal Processing (JSTSP), and Optica Publishing Group (previously known

as OSA; 14×) **Optica**^{*}, Photonics Research, Optics Express (OE), Optics Letters (OL), Biomedical Optics Express (BOE), Applied Optics (AO). [**declined due to author conflict*]

Student Participation for MIT EECS Faculty Search Committee (2022 & 2023), MIT CSAIL METEOR Postdoctoral Fellowship Review Committee (2022), MIT EECS PhD Application Review Committee (2021).

Press Coverage and Broader Impact

Fox News	2024.04
Is your smartphone spying on you without you even knowing it?	<i>by Kurt Knutsson, CyberGuy</i>
Forbes	2024.01
Jaw-Dropping New Hack Turns Your Phone Screen Into Covert Spy Camera	<i>by Davey Winder</i>
WIRED	2024.01
Data From Ambient Light Sensors in Screens and Smart Devices Could Pose Privacy Risk	<i>by Security News</i>
Ars Technica	2024.01
Ambient light sensors can reveal your device activity. How big a threat is it?	<i>by Dan Goodin</i>
IEEE Spectrum	2024.01
Your Tablet's Light Sensor Can Spy On You	<i>by Edd Gent</i>
MIT News	2024.01
Study: Smart devices' ambient light sensors pose imaging privacy risk	<i>by Alex Shipps and Rachel Gordon</i>
Additional 30+ Press Mentions listed in CSAIL News (homepage highlight). Also highlighted on EECS News as weekly cover.	
World Wide Web Consortium (W3C)	2024.01
Working Draft on Ambient Light Sensor	<i>Cited as Security and Privacy Considerations</i>
MIT News	2023.01
2022-23 Takeda Fellows: Leveraging AI to positively impact human health	<i>School of Engineering, MIT</i>
MIT CSAIL Spotlight	2022.04
CSAIL Alliances Student Spotlight: Yang Liu	<i>by Matt Busekroos and Nate Caldwell</i>

Personal Interests

Sports: Tennis, snowboarding, climbing, backpacking / camping.

Hobbies: Landscape photography, design, making, and \LaTeX ing.

References

Prof. Frédo Durand, Professor

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Prof. William T. Freeman, Professor

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Department of Automation, Tsinghua University, Beijing 100084, China
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Dr. Ana Jaklenec, Principal Research Scientist

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