Yang Liu

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Education

Massachusetts Institute of Technology (MIT) — Cambridge, MA USA
Ph.D. in Electrical Engineering and Computer Science (EECS) — *2019 – 2025*
Advisor: Prof. Frédo Durand.
Thesis: Seeing Beyong Limits with Physics-Informed Priors. (Committee: Bill Freeman, Kaiming He)
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 (2024).
11. Jooli Han†, Maria Kanelli†, Yang Liu, John L. Daristotle, Apurva Pardeshi, Timothy A. Forster, Ari Karchin, Brandon Folk, Lukas Murmann, Lisa H. Tostanoski, Sebastian E. Carrasco, Shahad K. Alsaiari, Erika Yan Wang, Khanh Tran, Linzixuan Zhang, Behnaz Eshaghi, Lauren Levy, Sydney Pyon, Charles Sloane, Stacey Qiaohui Lin, Alicia Lau, Collin F. Perkinson, Moungi G. Bawendi, Dan H. Barouch, Frédo Durand, Robert Langer✉, and Ana Jaklenec✉. On-patient Medical Record and mRNA Therapeutics Delivery using Microneedles. ***Nature Materials***, 24, 794–803, DOI: 10.1038/s41563-024-02115-4 (2025).
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 (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 (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 (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 (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 (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 (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 (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 (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 (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 (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 (2023).

Talks

MIT Optics and Quantum Electronics (OQE) Seminar (Host: Sophia Duan, Dirk Englund) *Aug 2025*

Caltech Vision and Imaging Group Meeting [*virtual*] (Host: Katie Bouman) *May 2025*

HKUST ISD Special Seminar (Host: Ross Murch) *May 2025*

HKU EEE Special Seminar [*virtual*] (Host: Kaibin Huang) *May 2025*

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

CMS, California Institute of Technology (Caltech) — Pasadena, CA USA
Postdoctoral Fellow — *Sep 2025 – present*
Working on revealing invisible visual vibration signals from commodity sensors. Host: Prof. Katie Bouman.

CSAIL, Massachusetts Institute of Technology (MIT) — Cambridge, MA USA
Research Assistant — *Sep 2019 – Aug 2025*
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 – Jan 2025*
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 Božić, 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, partically designing a 2D error-corretion 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), Timothy Yu (Stanford undergrad, summer 2025).

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; 12×), Transactions on Neural Networks and Learning Systems (TNNLS), Journal of Selected Topics in Signal Processing (JSTSP); Optica Publishing Group (previously known as OSA; 17×) **Optica***, Photonics Research, Optics Express (OE), Optics Letters (OL), Biomedical Optics Express (BOE), Applied Optics (AO); **ACM SIGGRAPH 2025**. [**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? *by Kurt Knutsson, CyberGuy*

Forbes 2024.01
Jaw-Dropping New Hack Turns Your Phone Screen Into Covert Spy Camera *by Davey Winder*

WIRED 2024.01
Data From Ambient Light Sensors in Screens and Smart Devices Could Pose Privacy Risk *by Security News*

Ars Technica 2024.01
Ambient light sensors can reveal your device activity. How big a threat is it? *by Dan Goodin*

IEEE Spectrum 2024.01
Your Tablet's Light Sensor Can Spy On You *by Edd Gent*

MIT News 2024.01
Study: Smart devices' ambient light sensors pose imaging privacy risk *by Alex Shipps and Rachel Gordon*
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 *Cited as Security and Privacy Considerations*

MIT News 2023.01
2022-23 Takeda Fellows: Leveraging AI to positively impact human health *School of Engineering, MIT*

MIT CSAIL Spotlight 2022.04
CSAIL Alliances Student Spotlight: Yang Liu *by Matt Busekroos and Nate Caldwell*

Personal Interests

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

Hobbies: Landscape photography, design, making, and LaTeXing.

References

Prof. Frédo Durand, Professor
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Prof. William T. Freeman, Professor
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Prof. Gregory W. Wornell, Professor
Department of Electrical Engineering and Computer Science (EECS), MIT, Cambridge, MA 02139, USA
gww@mit.edu

Prof. Qionghai Dai, Professor
Department of Automation, Tsinghua University, Beijing 100084, China
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Dr. Ana Jaklenec, Principal Research Scientist
David H. Koch Institute for Integrative Cancer Research, MIT, Cambridge, MA 02139, USA
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