Fangzhou Mu (穆方舟)

Email: fmu2@wisc.edu | **Mobile:** +1 (608) 332-9265 | **Personal webpage** | **Google scholar** | **GitHub** | **LinkedIn**

SUMMARY

Research Interests: Foundation Models, Computer Vision, Machine Learning

- *Strong knowledge in multimodal foundation models, diffusion models, 3D vision, and video understanding.*
- *Extensive experience in the design, implementation, training, and performance optimization of deep models in PyTorch.*
- *Publication in top-tier vision and ML conferences (CVPR x6, ICLR x2, ICCV x1) and journals (TPAMI x1).*

EDUCATION

University of Wisconsin-Madison	**Madison, WI, USA**
Ph.D. in Computer Sciences	Advisor: Prof. Yin Li	Sept. 2018 – Dec. 2023
M.S. in Computer Sciences & M.S. in Pharmaceutical Sciences	Sept. 2014 – Jun. 2018
Awarded University of Wisconsin Distinguished Graduate Fellowship	

Zhejiang University (浙江大学)	**Hangzhou, China**
B.S. in Biological Sciences (GPA: 3.86/4.0, Ranking: 1/33)	Sept. 2010 – Jun. 2014
Awarded National Scholarship (top 3%)	

WORK EXPERIENCE

NVIDIA (AI Foundation Models)	**Santa Clara, CA, USA**
Senior Deep Learning Algorithms Engineer	Jan. 2024 – Present

Performance optimization of (multimodal) large language models

- *Build automation of NVIDIA Inference Microservices (NIM) for serving vision-language models (VLMs) in the cloud.*
- *Performance profiling and optimization of LLM and VLM inference engines for >10x higher generation throughput.*

University of Wisconsin-Madison	**Madison, WI, USA**
Graduate Research Assistant (Advisor: Prof. Yin Li)	Sept. 2018 – Dec. 2023

Thread 1: 3D vision with single-photon LiDAR sensors *(with Prof. Andreas Velten and Prof. Mohit Gupta)*

- *Invented NeRF-based deep models for high-speed imaging beyond the line of sight (ICCP/TPAMI 22).*
- *Developed learned spatiotemporal compression of SPAD* histograms for 3D imaging (ICCV 23, US patent filed).*
- *Developed 3D reconstruction method using distributed SPAD sensors and differentiable transient rendering (CVPR 24).*
  - *(* SPAD: single-photon avalanche diode, an emerging time-of-flight sensor for 3D imaging with single-photon light sensitivity and picosecond-scale time resolution.)*

Thread 2: Scalable and resource-adaptive video understanding

- *Proposed scalable Transformer design and efficient training techniques for action detection in long videos (CVPR 24).*
- *Won top prizes in prestigious video action detection challenges (1st prize: EPIC-Kitchens 2023, 2nd prize: Ego4D 2022 and 2023).*
- *Developed a latency-aware scheduler for resource-adaptive video object detection on mobiles (CVPR 22).*

Thread 3: Controllable text-to-image generation with Diffusion Models

- *Proposed a training-free method for the spatial control of Stable Diffusion with any conditions (CVPR 24).*
- *Introduced adapter-based fine-tuning of Stable Diffusion for grounded text-to-image generation. (CVPR 23).*

Other work: *Studied linearized and multi-task fine-tuning for adapting foundation models (ICLR 20, ICLR 24).*

OPPO US Research Center (Computational Photography Team)	**Palo Alto, CA, USA**
Research Intern (Manager: Dr. Yanli Liu)	Jun. 2023 – Aug. 2023

Personalization meets controllability in text-to-image diffusion

- *Develop methods for fast, one-shot personalization of Stable Diffusion without fine-tuning.*
- *Introduce object pose control and camera viewpoint control to personalized Stable Diffusion.*

Snap Research (Computational Imaging Team)	**New York, NY, USA**
Research Intern (Managers: Dr. Jian Wang and Dr. Yicheng Wu)	May 2022 – Aug. 2022

Image restoration for face captures in the wild

- *Developed StyleGAN inversion using spatially varying latent codes for improved facial identity preservation.*
- *Invented an image quality aware diffusion model with state-of-the-art face restoration capability.*

Snap Research (Computational Imaging Team)	**Remote**
Research Intern (Manager: Prof. Shree Nayar)	May 2021 – Aug. 2021

3D Photo Stylization *(CVPR 22 **oral**, mentored by Dr. Jian Wang and Dr. Yicheng Wu)*

- *Invented a method for novel view synthesis from a single image in an artistic style for creative 3D photo browsing.*
- *Proposed a point cloud stylization approach to facilitate multi-view consistency of stylized images.*
- *Implemented custom CUDA ops in PyTorch for differentiable 3D point cloud rasterization.*

University of Wisconsin-Madison / Morgridge Institute of Research	**Madison, WI, USA**

| Graduate Research Assistant (Advisor: Prof. Anthony Gitter) | May. 2018 – Aug. 2018 |

ML4BIO - Machine learning literacy for biologists
  - *Developed and delivered an AI4Science workshop to a broad audience (ISMB 22, GLBIO 19 and Software Carpentries).*
  - *Built open-source software with GUI to support interactive learning of sklearn ML models (pip install ml4bio).*

PUBLICATION

[15] Fangzhou Mu*, Carter Sifferman* (equal contribution), Sacha Jungerman, Yiquan Li, Zhiyue Han, Michael Gleicher, Mohit Gupta, Yin Li. **Towards 3D Vision with Low-Cost Single-Photon Cameras.** *CVPR 2024*

[14] Fangzhou Mu*, Sicheng Mo* (equal contribution), Yin Li. **SnAG: Scalable and Accurate Video Grounding.** *CVPR 2024*

[13] Sicheng Mo*, Fangzhou Mu* (equal contribution), Kuan Heng Lin, Yanli Liu, Bochen Guan, Yin Li, Bolei Zhou. **FreeControl: Training-Free Spatial Control of Any Text-to-Image Diffusion Model with Any Condition.** *CVPR 2024*.

[12] Zhuoyan Xu, Zhenmei Shi, Junyi Wei, Fangzhou Mu, Yin Li, Yingyu Liang. **Towards Few-Shot Adaptation of Foundation Models via Multitask Finetuning.** *ICLR 2024*

[11] Yimeng Dou, Fangzhou Mu, Yin Li, Tomy Varghese. **Sensorless End-to-End Freehand Ultrasound with Physics-Inspired Network.** *IUS 2023*

[10] Felipe Gutierrez-Barragan, Fangzhou Mu, Andrei Ardelean, Atul Ingle, Claudio Bruschini, Edoardo Charbon, Mohit Gupta, Yin Li, Andreas Velten. **Learned Compressive Representations for Single-Photon 3D Imaging.** *ICCV 2023*

[9] Yuheng Li, Haotian Liu, Qingyang Wu, Fangzhou Mu, Jianwei Yang, Jianfeng Gao, Chunyuan Li, Yong Jae Lee. **GLIGEN: Open-set Grounded Text-to-image Generation.** *CVPR 2023*

[8] Fangzhou Mu, Sicheng Mo, Jiayong Peng, Xiaochun Liu, Ji Hyun Nam, Siddeshwar Raghavan, Andreas Velten, Yin Li. **Physics to the Rescue: Deep Non-line-of-sight Reconstruction for High-speed Imaging.** *ICCP/TPAMI 2022*

[7] Chris S Magnano, Fangzhou Mu, Rosemary S Russ, Milica Cvetkovic, Debora Treu, Anthony Gitter. **An Approachable, Flexible, and Practical Machine Learning Workshop for Biologists.** *ISMB/Bioinformatics 2022*

[6] Fangzhou Mu, Jian Wang†, Yicheng Wu†, Yin Li† (co-corresponding authors). **3D Photo Stylization: Learning to Generate Stylized Novel Views from a Single Image.** *CVPR 2022 (oral presentation)*

[5] Ran Xu, Fangzhou Mu, Jayoung Lee, Preeti Mukherjee, Somali Chaterji, Saurabh Bagchi, Yin Li. **SmartAdapt: Multi-branch Object Detection Framework for Videos on Mobiles.** *CVPR 2022*

[4] Yin Li, Runyu L Greene, Fangzhou Mu, Yu Hen Hu, Robert G Radwin. **Towards Video-based Automatic Lifting Load Prediction.** *HFES 2020*

[3] Fangzhou Mu, Yingyu Liang, Yin Li. **Gradients as Features for Deep Representation Learning.** *ICLR 2020*

[2] Tingting Liang, Qi Zhao, Shan He, Fangzhou Mu, Wei Deng, Bingnan Han. **Modeling Analysis of Potential Target of Dolastatin 16 by Computational Virtual Screening.** *Chemical and Pharmaceutical Bulletin 2018*

[1] Robyn Umans, Hannah Henson, Fangzhou Mu, Chaithanyarani Parupalli, Bensheng Ju, Jennifer Peters, Kevin Lanham, Jessica Plavicki, Michael Taylor. **CNS angiogenesis and barriergenesis occur simultaneously.** *Developmental Biology 2017*

PATANTS

[1] **P210037US02 – Movement Monitoring System.** Robert Radwin, Yin Li, Runyu Greene, Fangzhou Mu, Yu Hen Hu

AWARDS

Research Competitions
  1st Prize, EPIC-Kitchens Action Detection 2023 Challenge
  2nd Prize, Ego4D Moment Queries 2023 Challenge
  2nd Prize, Ego4D Moment Queries and Natural Language Queries 2022 Challenge

Conference Awards
  CVPR 2023 Outstanding Reviewer Award (among 232 of >7,000 reviewers)
  ICLR 2020 Student Travel Award

PROFESSIONAL SERVICES

Journal Reviewer: TPAMI, TNNLS, TIP, The Visual Computers (TVCJ), Ad Hoc Networks

Conference Reviewer: CVPR, ECCV, ICCV, WACV, NeurIPS, ICML, ICLR

TEACHING AND MENTORSHIP

Lead Developer and Instructor: Machine Learning for Biology (ml4bio) workshop (2018, 2019)
  Taught machine learning best practices and biological applications to >20 Ph.D. students and postdocs.

Graduate Teaching Assistant: Deep learning for Computer Vision, Operating Systems, Advanced Bioinformatics

Research Mentorship: Yiquan Li (M.S. student), Shashank Verma (M.S. student), Siddeshwar Raghavan (M.S. student), Abrar Majeedi (M.S. student), Alex Huang (undergrad), Sicheng Mo (undergrad), Evelin Yin (undergrad)