Zhiwen Fan

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RESEARCH INTERESTS

My research focuses on advancing *spatial intelligence* through the development of innovative *3D generalist models*, which unifies key innovations in multi-view geometry, few-shot and self-supervised 3D learning, and hardware-software co-design. My current research interests include:

- 3D reconstruction, 3D perception, and spatial reasoning

- End-to-end 3D generalist models across multiple domains

- Few-shot, zero-shot, and self-supervised learning for 3D models

- Generation and editing of 3D/4D assets using generative AI

- Hardware-software co-design for on-device ML and SLAM systems

- Computational imaging and inverse problem-solving

EDUCATION

The University of Texas at Austin (UT Austin)	Aug. 2021 - Present
Ph.D. Student, Electrical and Computer Engineering	Advisor: Prof. Zhangyang "Atlas" Wang
Xiamen University	Sep. 2016 - Jun. 2019
Master, Electronic and Communication Engineering	Advisor: Prof. Xinghao Ding
Shandong Agriculture University	Sep. 2012 - Jun. 2016
Bachelor, Electronic Information Science and Technology	

PROFESSIONAL EXPERIENCE

Meta Reality Lab	May. 2024 - Present
Research Intern, Managers: Dr. Dilin Wang, Dr. Vikas Chandra	
NVIDIA Research	Feb. 2024 - May. 2024
Research Intern, Managers: Prof. Yue Wang, Prof. Marco Pavone	
Google AR	May. 2022 - Aug. 2022
Research Intern, Managers: Dr. Sergio Orts-Escolano	
Alibaba Group (Full Time)	Jul. 2019 - Aug. 2021
Senior ML Algorithm Engineer, Managers: Prof. Ping Tan, Dr. Siyu Zhu	

SELECTED CONFERENCE PUBLICATIONS

Zhiwen Fan has co-authored over 40 papers in top-tier computer vision and machine learning venues (`NeurIPS`, `ICML`, `ICLR`, `CVPR`, `ICCV`, `ECCV`, `TPAMI`, `TIP`, `AAAI`, `IROS`, etc.). As of August 2024, his works have been **cited over 2,600 times** (single paper highest citation > 700), with an **h-index of 22** [Google Scholar].

Below are his selected publications: † **denotes Zhiwen as the project lead;** <u>NAME</u> **denotes the author as his mentee; and** * **indicates an equal contribution.**

NeurIPS 2024 [link]: **Zhiwen Fan***†, Jian Zhang*, Wenyan Cong, Peihao Wang, Renjie Li, Kairun Wen, Shijie Zhou, Achuta Kadambi, Zhangyang Wang, Danfei Xu, Boris Ivanovic, Marco Pavone, Yue Wang "`Large Spatial Model:End-to-end Unposed Images to Semantic 3D`"

NeurIPS 2024 (Spotlight) [link]: **Zhiwen Fan***†,Kevin Wang*, Kairun Wen, Dejia Xu, Zehao Zhu, Zhangyang Wang, "`LightGaussian:  Unbounded 3D Gaussian Compression with 15x Reduction and 200+ FPS`"

NeurIPS 2024 [link]: Hezhen Hu, **Zhiwen Fan**, Tianhao Wu, Yihan Xi, Seoyoung Lee, Georgios Pavlakos, Zhangyang Wang "`Expressive Gaussian Human Avatars from Monocular RGB Video`"

ECCV 2024 [link]: **Zhiwen Fan***†,Zehao Zhu*, Yifan Jiang, Zhangyang Wang, Suya You, Zhangyang Wang, Achuta Kadambi "`FSGS: Real-Time Few-shot View Synthesis using Gaussian Splatting`"

ECCV 2024 [link]: Shijie Zhou*, **Zhiwen Fan***, Dejia Xu*, Haoran Chang, Pradyumna Chari, Tejas Bharadwaj, Suya You, Zhangyang Wang, Achuta Kadambi "`DreamScene360: Unconstrained Text-to-3D Scene Generation with Panoramic Gaussian Splatting`"

ECCV 2024 [link]: Renjie Li, **Zhiwen Fan***†, Bohua Wang, Peihao Wang, Zhangyang Wang, Xi Wu "`VersatileGaussian: Real-time Neural Rendering for Versatile Tasks using Gaussian Splatting`"

IROS 2024 [link]: Lisong C Sun, Neel P Bhatt, Jonathan C Liu, **Zhiwen Fan**, Zhangyang Wang, Todd E Humphreys, Ufuk Topcu "`MM3DGS SLAM: Multi-modal 3D Gaussian Splatting for SLAM Using Vision, Depth, and Inertial Measurements`"

CVPR 2024 [link]: Mukund Varma T, Peihao Wang, **Zhiwen Fan**, Zhangyang Wang, Hao Su, Ravi Ramamoorthi "`Lift3D: Zero-Shot Lifting of Any 2D Vision Model to 3D`"

CVPR 2024 [link]: Peihao Wang, Dejia Xu, **Zhiwen Fan**, Dilin Wang, Sreyas Mohan, Forrest Iandola, Rakesh Ranjan, Yilei Li, Qiang Liu, Zhangyang Wang, Vikas Chandra "`Taming Mode Collapse in Score Distillation for Text-to-3D Generation`"

CVPR 2024 (Highlight) [link]: Shijie Zhou, Haoran Chang, Sicheng Jiang, **Zhiwen Fan**, Zehao Zhu, Dejia Xu, Pradyumna Chari, Suya You, Zhangyang Wang, Achuta Kadambi "`Feature 3DGS: Supercharging 3D Gaussian Splatting to Enable Distilled Feature Fields`" (Press Release by UCLA News)

3DV 2024 [link]: **Zhiwen Fan** *†, Panwang Pan*, Brandon Y Feng, Peihao Wang, Chenxin Li, Zhangyang Wang "`Learning to Estimate 6DoF Pose from Limited Data: A Few-Shot, Generalizable Approach using RGB Images`"

ICCV 2023 [link]: Chenxin Li*, Brandon Y Feng*, **Zhiwen Fan***†, Zhangyang Wang, "`StegaNeRF: Embedding Invisible Information within Neural Radiance Fields`"

ICCV 2023 [link]: Wenyan Cong, Hanxue Liang, Peihao Wang, **Zhiwen Fan**, Tianlong Chen, Mukund Varma, Yi Wang, Zhangyang Wang, "`Enhancing NeRF akin to Enhancing LLMs: Generalizable NeRF Transformer with Mixture-of-View-Experts`"

CVPR 2023 (Hightlight) [link]: Dejia Xu, Yifan Jiang, Peihao Wang, **Zhiwen Fan**, Yi Wang, Zhangyang Wang, "`NeuralLift-360: Lifting An In-the-wild 2D Photo to A 3D Object with 360 Views`"

ICLR 2023 [link]: **Zhiwen Fan**, Peihao Wang, Xinyu Gong, Yifan Jiang, Dejia Xu, Zhangyang Wang, "`NeRF-SOS: Any-View Self-supervised Object Segmentation from Complex Real-World Scenes`"

NeurIPS 2022 [link]: Hanxue Liang*, **Zhiwen Fan***, Rishov Sarkar, Ziyu Jiang, Tianlong Chen, Kai Zou, Yu Cheng, Cong Hao, Zhangyang Wang, "`M`^{3}`ViT: Mixture-of-Experts Vision Transformer for Efficient Multi-task Learning with Model-Accelerator Co-design`" (Its hardware prototype won 3rd place for "*University Demo Best Demonstration*" at DAC 2022)

NeurIPS 2022 [link]: Dejia Xu, Peihao Wang, Yifan Jiang, **Zhiwen Fan**, Zhangyang Wang, "`Signal Processing for Implicit Neural Representations`"

ECCV 2022 [link]: **Zhiwen Fan***, Yifan Jiang*, Peihao Wang*, Xinyu Gong, Dejia Xu, Zhangyang Wang, "`Unified Implicit Neural Stylization`"

ECCV 2022 [link]: Dejia Xu*, Yifan Jiang*, Peihao Wang, **Zhiwen Fan**, Humphrey Shi, Zhangyang Wang, "`SinNeRF: Training Neural Radiance Fields on Complex Scenes from a Single Image`"

ECCV 2022 [link]: Hanxue Liang , Hehe Fan, **Zhiwen Fan**, Yi Wang, Tianlong Chen, Yu Cheng, Zhangyang Wang, "`Point Cloud Domain Adaptation via Masked Local 3D Structure Prediction`"

ICML 2022 [link]: Peihao Wang, **Zhiwen Fan**, Tianlong Chen, Zhangyang Wang, "`Neural Implicit Dictionary Learning via Mixture-of-Expert Training`".

CVPR 2022(Oral) [link]: **Zhiwen Fan**, Tianlong Chen, Peihao Wang, Zhangyang Wang, "`CADTransformer: Panoptic Symbol Spotting Transformer for CAD Drawings`".

CVPR 2022 [link]: Tianlong Chen, Peihao Wang, **Zhiwen Fan**, Zhangyang Wang, "`Aug-NeRF: Training Stronger Neural Radiance Fields with Triple-Level Physically-Grounded Augmentations`".

3DV 2021 [link]: Rakesh Shrestha, **Zhiwen Fan**, Qingkun Su, Zuozhuo Dai, Siyu Zhu, Ping Tan, "`MeshMVS: Multi-View Stereo Guided Mesh Reconstruction`".

ICCV 2021 [link]: **Zhiwen Fan***, Lingjie Zhu*, Honghua Li, Xiaohao Chen, Siyu Zhu, Ping Tan, "FloorPlanCAD: A Large-Scale CAD Drawing Dataset for Panoptic Symbol Spotting".

CVPR 2020(Oral) [link]: **Zhiwen Fan***, Xiaodong Gu*, Siyu Zhu, Zuozhuo Dai, Feitong Tan, Ping Tan "Cascade Cost Volume for High-Resolution Multi-View Stereo and Stereo Matching".

ECCV 2018 [link]: **Zhiwen Fan***, Liyan Sun*, Xinghao Ding, Yue Huang, Congbo Cai, John Paisley, "A Segmentation-aware Deep Fusion Network for Compressed Sensing MRI".

AAAI 2018 [link]: Liyan Sun*, **Zhiwen Fan***, Yue Huang, Xinghao Ding, John Paisley, "Compressed Sensing MRI Using a Recursive Dilated Network".

PREPRINTS

Preprint [link]: Renjie Li, Panwang Pan, Dejia Xu, Shijie Zhou, Xuanyang Zhang, Zeming Li, Achuta Kadambi, Zhangyang Wang, **Zhiwen Fan** "4K4DGen: Panoramic 4D Generation at 4K Resolution", submitted to ICLR 2025.

Preprint [link]: **Zhiwen Fan, etc.** "InstantSplat: Sparse-view SfM-free Gaussian Splatting in Seconds", submitted to CVPR 2025.

SELECTED JOURNAL PUBLICATIONS

TPAMI 2023 [link]: Wenqing Zheng, SP Sharan, **Zhiwen Fan**, Kevin Wang, Yihan Xi, Zhangyang Wang, "Symbolic visual reinforcement learning: A scalable framework with object-level abstraction and differentiable expression search", Transactions on Pattern Analysis and Machine Intelligence.

TIP 2020 [link]: Liyan Sun, **Zhiwen Fan**, Xueyang Fu, Yue Huang, Xinghao Ding, John Paisley, "A deep information sharing network for multi-contrast compressed sensing MRI reconstruction", Transactions on Image Processing.

MRI 2019 [link]: Liyan Sun, **Zhiwen Fan**, Xinghao Ding, Yue Huang, John Paisley, "Region-of-interest undersampled MRI reconstruction: A deep convolutional neural network approach", Magnetic Resonance Imaging.

MRI 2019 [link]: Liyan Sun, **Zhiwen Fan**, Xinghao Ding, Congbo Cai, Yue Huang, John Paisley "A divide-and-conquer approach to compressed sensing MRI", Magnetic Resonance Imaging.

HONORS

- **Qualcomm Innovation Fellowship** [Qualcomm News] [UT News]   Aug. 2022
- Professional Development Award, UT Austin   Jul. 2022
- 3rd place, "Best University Demo" Competition, Design Automation Conference (DAC)   Jul. 2022
- Outstanding Graduates of Xiamen University   Jun. 2019
- AAAI 2018 Travel Award   Jan. 2018

INVITED TALKS

- "Empowering Machines to Understand 3D" @ **Stanford, ASU, JHU, Yale**   Oct. 2024
- "3D Computer Vision" @ **TAMU Guest Lecture**   Oct. 2024
- "From Efficient 3D Learning to 3D Foundation Models" @ **UCLA&CalTech**   Oct. 2024
- "Towards Universal, Real-Time 3D Construction and Interaction" @ **TAMU AI Lunch** Sep. 2024
- "Spatial Intelligence via Reconstruction, Distillation, and Generation" @ **Shanghai AI Lab** July. 2024
- "Streamlined 3D/4D: From Hours to Seconds to Millisecond" @ **Google Research**   May. 2024
- "Streamlined 3D/4D: From Hours to Seconds to Millisecond" @ VALSE Webinar   May. 2024
- "Real-Time Few-shot View Synthesis w/ Gaussian Splatting" @ **IARPA WRIVA Workshop** Apr. 2024
- "Data-efficient and Rendering-efficient Neural Rendering" @ **IFML Workshop on Gen AI** Nov. 2023
- "Unified Implicit Neural Stylization" @ **Xiamen University; Kungfu.ai.**   Jul. 2022

SERVICES AND MENTORING

Reviewer: TPAMI, TIP, NeurIPS, ICML, ICLR, CVPR, ICCV, ECCV, SIGGRAPH, SIGGRAPH Asia, AAAI

Project/Program Mentoring:

- **RAI for Ukraine**: Together with several students from Ukraine, we are developing a 3D-interactive chat system called VRT-CHAT: Culturally-Sensitive Visual Stimulation and Reminiscence-Therapy Chatbot for Mental Health Support. In this project, I am mentoring students on the **3D vision** component, where our focus is on generating 3D assets from text inputs or historical building images sourced from the internet and integrating these assets into the chatbot's 3D interface to enhance user interaction.

- **WRIVA Program**: I manage and lead our IARPA project, "Walk-Through Rendering From Images of Varying Altitudes" (WRIVA), a four-year, multi-institution effort. In WRIVA, I work with junior Ph.D. students to coordinate tasks, conduct experiments, prepare reports, and meet with program directors.

Student Mentoring:

- Kevin Wang (Undergraduate Student @ UT Austin → PhD student @ UT Austin)

- Hanxue Liang (Graduate Student @ ETH → PhD Student @ Cambridge)

- Renjie Li (Graduate Student @ Tsinghua → PhD Student @ TAMU)

- Chenxin Li (Graduate Student @ XMU → PhD Student @ CUHK)

- Wenyan Cong (PhD student @ UT Austin)

- Yanbin Lin (PhD student @ Florida Atlantic University)

- Panwang Pan (Now Researcher at Pico)