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 few-shot learning, efficient training and rendering, end-to-end 3D reconstruction, semantic understanding, reasoning and interaction. My current research interests include:

- End-to-end 3D foundation model for spatial-aware reasoning, planning
- Semantic 3D modeling and scene understanding, and interaction
- Few-shot 3D learning: novel view synthesis, geometry reconstruction, and pose estimation
- Scalable 3D/4D asset generation and editing
- Efficient on-device 3D vision and SLAM
- Solving inverse problems in 3D and computational imaging

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 50 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 2,400 times** (single paper highest citation > 700), with an **h-index of 21** [Google Scholar].

Below are his selected publications: † **denotes Zhiwen as the project lead; NAME 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"

ASP-DAC 2023 [link]: Yimeng Zhang*, Akshay Karkal Kamath*, Qiucheng Wu*, **Zhiwen Fan***, Wuyang Chen, Zhangyang Wang, Shiyu Chang, Sijia Liu, Cong Hao, "Data-Model-Circuit Tri-Design for Ultra-Light Video Intelligence on Edge Devices"

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 NeurIPS 2024.

Preprint [link]: **Zhiwen Fan, etc. "`InstantSplat: Sparse-view SfM-free Gaussian Splatting in Seconds`"**, submitted to NeurIPS 2024.

SELECTED JOURNAL PUBLICATIONS

TIP 2019 [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** 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

Program Mentoring:

- **RAI for Ukraine**: We, together with several students from Ukraine, are developing a chat system called VRT-CHAT: Culturally-Sensitive Visual Stimulation and Reminiscence-Therapy Chatbots for Mental Health Support. I am mentoring students on the **3D vision** aspect, where we focus on creating 3D assets from text input or historical building images sourced from the internet, and integrating them into the chatbot.
- **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 (Undergrad @ UT Austin → PhD student @ UT Austin)
- Hanxue Liang (Master @ ETH → PhD Student @ Cambridge)
- Renjie Li (Graduate Student @ Tsinghua → PhD Student @ TAMU)
- Chenxin Li (Master @ XMU → PhD Student @ CUHK)
- Panwang Pan (Now Researcher at Pico)