

## RESEARCH INTERESTS

Neural Radiance Fields, 3D Reconstruction, Efficient Deep Learning, Panoptic Symbol Spotting & Segmentation.

## PREPRINT

**Preprint** [\[link\]](#): Zhiwen Fan\*, Chenxin Li\*, Brandon Y Feng\*, Zhangyang Wang, “StegaNeRF: Embedding Invisible Information within Neural Radiance Fields”

## SELECTED PUBLICATIONS

**CVPR 2023 (Highlight)** [\[link\]](#): Dejie 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, Dejie Xu, Zhangyang Wang, “NeRF-SOS: Any-View Self-supervised Object Segmentation from Complex Real-World Scenes”

**ASP-DAC 2023**: **Zhiwen Fan\***, Yimeng Zhang\*, Akshay Karkal Kamath\*, Qiucheng Wu\*, 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**: **Zhiwen Fan\***, Hanxue Liang\*, Rishov Sarkar, Ziyu Jiang, Tianlong Chen, Kai Zou, Yu Cheng, Cong Hao, Zhangyang Wang, “M<sup>3</sup>ViT: Mixture-of-Experts Vision Transformer for Efficient Multi-task Learning with Model-Accelerator Co-design”

**NeurIPS 2022**: Dejie 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, Dejie Xu, Zhangyang Wang, “Unified Implicit Neural Stylization”

**ECCV 2022** [\[link\]](#): Dejie 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”.

**IPMI 2019** [\[link\]](#): **Zhiwen Fan\***, Liyan Sun\*, Xinghao Ding, Yue Huang, John Paisley “Joint CS-MRI reconstruction and segmentation with a unified deep network”.

**ACM MM 2019** [\[link\]](#): **Zhiwen Fan\***, Huafeng Wu\*, Xueyang Fu, Yue Huang, Xinghao Ding “Residual-guide network for single image deraining”.

**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** [\[link\]](#): **Zhiwen Fan\***<sup>1</sup>, Liyan Sun\*, Yue Huang, Xinghao Ding, John Paisley “Compressed Sensing MRI Using a Recursive Dilated Network”.

<sup>1</sup>A marker \* denotes equal-contribution first authorship.

**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.

## SELECTED PROJECTS

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### Implicit Neural Representations

Sep. 2021 - Present

INR editing: In our *INS* paper, we conduct a pilot study for training stylized implicit representations (e.g., SIREN, NeRF, SDF). We obtain faithful stylizations and can interpolate between different styles to generate new mixed style. In our *INR-DSP* paper, we propose a theoretically grounded signal processing framework for Implicit Neural Representations (INR), which analytically manipulates INRs on the weight space through differential operators. In our *NeRF-SOS* paper, we propose a collaborative loss to distill the 2D feature and the density field, for self-supervised object segmentation.

Sparse view NeRF: In our *SinNeRF* paper, we propose thoughtfully designed semantic and geometry regularizations to train neural radiance field using only a single view.

NeRF augmentations: In our *Aug-NeRF* paper, we propose to augment NeRF with worst-case perturbations in three distinct levels with physical grounds. They effectively boost NeRF in both novel view synthesis (up to 1.5dB PSNR gain) and underlying geometry reconstruction.

### Efficient MVS and MTL

Jul. 2019 - Present

Efficient MVS: In our *Cas-MVSNet* paper, we propose a memory and run time efficient cost volume formulation which is built upon a standard feature pyramid encoding geometry and context at gradually finer scales. We obtain a 23.1% improvement on [\[DTU benchmark\]](#) (**1st place**), with **50.6% and 74.2%** reduction in GPU memory and run-time. It ranks 1st within all learning-based methods on [\[Tanks and Temples benchmark\]](#). Besides, we adapt GwcNet with our proposed cost volume design, and the accuracy ranking rises from 29<sup>th</sup> to 17<sup>th</sup> with 37.0% memory reduction on [\[KITTI 2015 test set\]](#).

Efficient MTL: In our *M<sup>3</sup>-ViT* paper, we propose to activate any task of interest, by integrating mixture-of-experts (MoE) layers into a ViT backbone, along with hardware-level innovations. M<sup>3</sup>-ViT reduce the memory by 2.4x, saving 9.23x energy, on PASCAL-Context and NYUD-v2 datasets.

### CAD Drawing Perception

Oct. 2020 - Present

[Project Page](#) & [Product Page](#)

We release the first large-scale real-world dataset of over 10,000 CAD drawings with line-grained annotations. It is used for architecture, engineering and construction (AEC) industries to accelerate the efficiency of 3D modeling. A new task-**panoptic symbol spotting** is proposed for evaluation the quality of panoptic symbol spotting quality.

PanCADNet: In our *FLoorPlanCAD* paper, we first propose a CNN-GCN method for semantic and instance symbol spotting respectively.

CADTransformer: In our *CADTransformer* paper, we present a Transformer-based framework by painlessly modifying existing vision transformer (ViT) to tackle the panoptic symbol spotting task.

## PROFESSIONAL EXPERIENCE

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### Google

May. 2022 - Present

Research Intern, Supervisor: [Sergio Orts Escolano](#) and [Alexander Koumis](#)

### The University of Texas at Austin

Aug. 2021 - Present

Research Assistant, Supervisor: [Prof. Zhangyang \(Atlas\) Wang](#)

### Alibaba Cloud

Jul. 2019 - Aug. 2021

Senior Algorithm Engineer, Supervisor: [Prof. Ping Tan](#), [Dr. Siyu Zhu](#)

**Xiamen University**  
Research Assistant, Supervisor: [Prof. Xinghao Ding](#)

Aug. 2016 - Jun. 2019

## EDUCATION

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

## HONORS

### Fellowship & Awards

- **Qualcomm Innovation Fellowship** [[Qualcomm News](#)] [[UT News](#)] Aug. 2022
- Professional Development Award of UT Austin Jul. 2022
- 3rd place of University Demo Best Demonstration at 59th Design Automation Conference Jul. 2022
- Outstanding Graduates of Xiamen University Jun. 2019
- The First Prize Scholarship of Xiamen University 2016-2018
- AAAI 2018 Travel Award Jan. 2018
- Outstanding Graduates of Shandong Province Jun. 2016

## INVITED TALKS

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- “Unified Implicit Neural Stylization” at Xiamen University and Kungfu.ai. Jul. 2022

## SERVICES

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**Journal Reviewer:** TPAMI, TIP, IJCV, Neurocomputing

**Conference Reviewer:** NeurIPS’22, ECCV’22, ICML’22, CVPR’22, ICCV’21, AAAI’21, ICME’19