

# YUANHAO WANG

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## SUMMARY

Postdoctoral researcher with expertise in neural rendering, generative diffusion models, and GPU-accelerated optimization. Demonstrated success in translating advanced algorithms into scalable, production-ready tools—culminating in the commercialization of neural adaptive tomography at Voxray GmbH. Passionate about bridging research and real-world impact through high-performance solutions.

## RESEARCH INTERESTS

**Neural Rendering, Generative Diffusion Models, 3D Reconstruction, Inverse problems, Computational Photography, Computational Imaging, High-Performance Computing, Optimization**

## EXPERIENCE

### Washington University in St. Louis

Postdoc Collaborator: Dr. Ulugbek Kamilov

*Diffusion model for inverse problems*, | Python, C++, Libtorch, CUDA

June 2024-Now

- Designed a diffusion unfolding network for image restoration, achieving faster inference and better quality across multiple tasks (e.g., deblurring, super-resolution, inpainting) in a single training pipeline.
- Implemented on C++/Libtorch/CUDA, improving the performance by 15%.
- Collaborated with radiologists to optimize model for real captured dataset.
- Supervised 2 students working on 3D and time-sequence diffusion model research.

### Visual Computing Center, KAUST

Ph.D student with Dr. Wolfgang Heidrich

*Neural Representation on tomography [2, 7, 5, 1]* | C++, Libtorch, CUDA

June 2021-Sept. 2023

- Formulated differentiable models and designed relevant priors using C++ and Libtorch.
- Developed an adaptive Density /Tensorial Density Field for efficient and large cryo-ET dataset.
- Implemented an Isotropic Fourier Prior to effectively mitigate peak patterns in the reconstruction.
- Visualized the reconstructed volumes with Avizo.
- Impact:** This research contributed to the establishment of **Voxray GmbH**, demonstrating the commercialization potential of neural adaptive tomography.

### Visual Computing Center, KAUST

Ph.D student with Dr. Wolfgang Heidrich

*Motion compensation and reconstruction of cryo-ET [6]* | C++, OpenMP

Mar. 2020-June 2021

- Considered beam-induced motion during the reconstruction.
- Utilized a plug-and-play prior to address noise in the electron tomography data.

### Visual Computing Center, KAUST

Ph.D student with Dr. Wolfgang Heidrich

*Rethink ISP pipeline [3]* | Python, Pytorch

June. 2020-June 2022

- Proposed a Denoising(DN) → Super-resolution(SR) → Demosaicking(DM) worked best in all sequential pipelines.
- Released PixelShift200 dataset for color channel sampling.

### Visual Computing Center, KAUST

Ph.D student with Dr. Wolfgang Heidrich

*Stereo Event-Camera Particle Tracking Velocimetry [4]* | Matlab

Oct. 2019-Mar.2020

- Developed the first event-camera-based stereo-PTV setup for measuring time-resolved fluid flow.
- Proposed an optimization framework to retrieve dense fluid velocity field from the event data.

### Institute of Microelectronics, Tsinghua University

Research assistant with Dr. Shuguo Li

*True Random Number Generator [8]* | Verilog

July 2014 - July 2016

- Designed a Cross Ring Oscillator based TRNG (CRTRNG). The CRTRNG gains **240Mbps** random number, while consuming only about **3000** logic elements on Altera Cyclone IV.

- Developed a **1Gbps** Cross Ring Oscillator based TRNG circuits based on SMIC 65nm.

## EDUCATION

**King Abdullah University of Science and Technology**  
**Ph.D. in Electrical and Computer Engineering**

*Sept. 2016-Nov. 2023*  
 Advisor: Dr. Wolfgang Heidrich

**Tsinghua University**  
**M.Eng. in Integrated Circuits Engineering**

*Sept. 2013-July 2016*  
 Advisor: Dr. Shuguo Li

**Beijing University of Posts and Telecommunications**  
**B.Eng. in Communication Engineering**

*Sept. 2009-July 2013*  
 Advisor: Dr. Yitong Liu

## SKILLS

C++, Libtorch, CUDA, Python, PyTorch, C, Matlab, Verilog, Paraview, Blender, Avizo

## SELECTED PUBLICATIONS

- [1] **Wang, Yuanhao** and Idoughi, Ramzi and Heidrich, Wolfgang, “Learning adaptive tensorial density fields for clean cryo-et reconstruction,” *NeurIPS 2023*, [paper](#).
- [2] D. Rückert and **Wang, Yuanhao** and Li, Rui and Idoughi, Ramzi and Heidrich, Wolfgang, “NeAT: Neural Adaptive Tomography,” *ACM Trans. Graph.*, vol. 41, no. 4, Jul. 2022, [paper](#).
- [3] G. Qian\* and **Wang, Yuanhao\*** and Gu, Jinjin and Dong, Chao and Heidrich, Wolfgang and Ghanem, Bernard and Ren, Jimmy S, “Rethinking learning-based demosaicing, denoising, and super-resolution pipeline,” in *ICCP 2022 (equal contribution)*, [paper](#).
- [4] **Wang, Yuanhao** and Idoughi, Ramzi and Heidrich, Wolfgang, “Stereo event-based particle tracking velocimetry for 3d fluid flow reconstruction,” in *ECCV 2020*, 2020, pp. 36–53, [paper](#).
- [5] **Wang, Yuanhao** and Idoughi, Ramzi and Rückert, Darius and Li, Rui and Heidrich, Wolfgang, “Adaptive differentiable grids for cryo-electron tomography reconstruction and denoising,” *Bioinformatics Advances*, 2023, [paper](#).
- [6] **Wang, Yuanhao** and Idoughi, Ramzi and Heidrich, Wolfgang, “Joint motion-correction and reconstruction in cryo-em tomography,” in *ICIP 2022 (Oral)*, 2022, pp. 1101–1105, [paper](#).
- [7] R. Li, D. Rückert, and **Wang, Yuanhao** and Idoughi, Ramzi and Heidrich, Wolfgang, “Neural adaptive scene tracing (nascent),” *VMV 2022*, <https://arxiv.org/abs/2202.13664>.
- [8] **Wang, Yuanhao** and Li, Shuguo, “A high-speed digital true random number generator based on cross ring oscillator,” *IEICE Trans. on Fund.of Elec., Com. and Com. Sci.*, vol. 99, no. 4, pp. 806–818, 2016, [paper](#).

## ACADEMIC SERVICES

Reviewer CVPR, ECCV, ICCV, NeurIPS, IEEE TVCG, IEEE TCI., PTL, IEEE OJSP.  
 Experiments in Fluids, Magnetic resonance in medicine