

YUANHAO (HOWARD) WANG

yuanhao.wang1213@gmail.com \diamond yuanhaowang1213.github.io

SUMMARY

Postdoctoral researcher with expertise in neural rendering, generative diffusion models, and GPU-accelerated optimization. Proven track record of developing advanced algorithms into scalable tools, culminating in the commercialization of neural adaptive tomography at **Voxray GmbH**. Passionate about translating innovative research into impactful, high-performance applications.

RESEARCH INTERESTS

Generative Diffusion Models, Neural Rendering, 3D Reconstruction, Inverse Problems, Optimization, Deep Learning, Computational Photography, Computational Imaging, High-Performance Computing

EXPERIENCE

Washington University in St. Louis, St. Louis, MO

June 2024–Now

Postdoc Researcher, Computational Imaging Group

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

- Developed a diffusion unfolding network by decoupling the data-fidelity term and the prior term, significantly improving inference speed and capability for deblurring, super-resolution, and inpainting within a unified framework.
- Implemented on C++/Libtorch/CUDA, achieving a 15% performance enhancement.
- Collaborated directly with radiologists to fine-tune models on real-world medical imaging datasets.
- Mentored graduate students on deep learning research, specifically focusing on diffusion models for advanced 3D and temporal sequence reconstructions.

KAUST, Thuwal, Saudi Arabia

June 2021–Sept. 2023

Research Assistant at Visual Computing Center

Neural Representation on tomography [1, 2, 3, 4] | *C++, Libtorch, CUDA*

- Created differentiable models, which significantly enhance cryo-electron tomography reconstructions.
- Designed adaptive Density/Tensorial Density Fields capable of rapid 1K-resolution reconstructions (within an hour), extendable up to 4K.
- Utilized Avizo software for advanced volume visualization.
- **Impact:** This research contributed to the establishment of **Voxray GmbH**, demonstrating the practical viability of developed technologies.

KAUST — *Research Assistant at Visual Computing Center*

Mar. 2020–June 2021

Motion compensation and reconstruction of cryo-ET [5] | *C++, OpenMP*

- Incorporated beam-induced motion into the reconstruction pipeline to improve accuracy.
- Utilized a plug-and-play prior to address noise in the electron tomography data.

KAUST — *Research Assistant at Visual Computing Center*

June 2020–June 2022

Rethink ISP pipeline [6] | *Python, Pytorch*

- Proposed that the Denoising (DN) + Super-resolution (SR) \rightarrow Demosaicking (DM) consistently outperforms other ISP pipelines.
- Released PixelShift200 dataset for color channel sampling.

KAUST — *Research Assistant at Visual Computing Center*

Oct. 2019–Mar.2020

Stereo Event-Camera Particle Tracking Velocimetry [7] | *Matlab*

- 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.

Tsinghua University, Beijing, China
Research Assistant at School of Integrated Circuits
 True Random Number Generator [8] Verilog

July 2014–July 2016

- Designed a Cross Ring Oscillator based TRNG (CRTRNG). The CRTRNG generates **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, Thuwal, Saudi Arabia *Sept. 2016–Nov. 2023*
 Ph.D. in Electrical and Computer Engineering Advisor: Dr. Wolfgang Heidrich

Tsinghua University, Beijing, China *Sept. 2013–July 2016*
 M.S. in Electrical Engineering Advisor: Dr. Shuguo Li

Beijing University of Posts and Telecommunications, Beijing, China *Sept. 2009–July 2013*
 B.S. in Communication Engineering Advisor: Dr. Yitong Liu

SKILLS

Programming Languages: C++, Python, C, Verilog, Matlab
Frameworks: CUDA, Pytorch, Libtorch
Tools: Paraview, Blender, Avizo

SELECTED PUBLICATIONS

- [1] **Yuanhao Wang**, Ramzi Idoughi and Wolfgang Heidrich, “Learning adaptive tensorial density fields for clean cryo-et reconstruction,” *NeurIPS 2023*. [paper](#).
- [2] **Yuanhao Wang**, Ramzi Idoughi, Darius Rückert, Rui Li and Wolfgang Heidrich, “Adaptive differentiable grids for cryo-electron tomography reconstruction and denoising,” *Bioinformatics Advances*, 2023. [paper](#).
- [3] Darius Rückert, **Yuanhao Wang**, Rui Li, Ramzi Idoughi, and Wolfgang Heidrich, “NeAT: Neural Adaptive Tomography,” *ACM Trans. Graph.*, vol. 41, July 2022. [paper](#).
- [4] **Yuanhao Wang**, Ramzi Idoughi, and Wolfgang Heidrich, “Joint motion-correction and reconstruction in cryo-em tomography,” in *ICIP 2022 (Oral)*, pp. 1101–1105, IEEE, 2022. [paper](#).
- [5] **Yuanhao Wang***, Guocheng Qian*, Jinjin Gu, Chao Dong, Wolfgang Heidrich, Bernard Ghanem, and Jimmy Ren, “Rethinking learning-based demosaicing, denoising, and super-resolution pipeline,” in *ICCP 2022 (equal contribution)*, pp. 1–12, 2022. [paper](#).
- [6] **Yuanhao Wang**, Ramzi Idoughi, and Wolfgang Heidrich, “Stereo event-based particle tracking velocimetry for 3d fluid flow reconstruction,” in *ECCV 2020*, pp. 36–53, Springer, 2020. [paper](#).
- [7] Rui Li, Darius Rückert, **Yuanhao Wang** Ramzi Idoughi, and Wolfgang Heidrich, “Neural adaptive scene tracing (nascent),” *VMV 2022*. <https://arxiv.org/abs/2202.13664>.
- [8] **Yuanhao Wang** and Shuguo Li, “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