YUANHAO (HOWARD) WANG

yuanhao.wang1213@gmail.com ⋄ yuanhaowang1213.github.io ⋄ Authorized to work in the U.S.

SUMMARY

AI researcher with a strong foundation in neural rendering, generative diffusion models, and high-performance GPU computing. Proven ability to translate cutting-edge research into deployed solutions, including the commercial rollout of neural adaptive tomography (**Voxray GmbH**). Experienced in coordinating multi-stakeholder AI projects with a focus on code integrity, reproducibility, and responsible deployment—bridging research, engineering, and societal risk mitigation.

RESEARCH INTERESTS

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

SKILLS

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

EXPERIENCE

Washington University in St. Louis, St. Louis, MO   Sep 2024–Present
Postdoc Associate, Computational Imaging Group
Diffusion model for inverse problems [1, 2], │ *Python, C++, Libtorch, CUDA*

- Developed a unified diffusion unfolding network by decoupling the data-fidelity and prior terms, achieving significant speedup ($0.71s$ per 256×256 image) and enhanced performance across deblurring, super-resolution, and inpainting tasks.
- Implemented on C++/Libtorch/CUDA, achieving a 15% performance enhancement.
- Helped graduate students on deep learning research, specifically focusing on diffusion models for advanced 3D and temporal MRI sequence reconstructions.

KAUST, Thuwal, Saudi Arabia   Jun 2021–Sep 2023
Research Assistant at Visual Computing Center
Neural Representation on tomography [3, 4, 5, 6] │ *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–Jun 2021
Motion compensation and reconstruction of cryo-ET [7] │ *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*   Jun 2020–Jun 2022
Rethink ISP pipeline [8] │ *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 [9] │ *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   Jul 2014–Jul 2016
Research Assistant at School of Integrated Circuits
True Random Number Generator [10]│ *Verilog*

· 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   *Sep 2016–Nov 2023*
Ph.D. in Electrical and Computer Engineering   Advisor: Dr. Wolfgang Heidrich

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

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

SELECTED PUBLICATIONS

[1] **Yuanhao Wang,** Shirin Shoushtari and Ulugbek Kamilov, "Diff-unfolding: A model-based score learning framework for inverse problems," axriv.

[2] Shirin Shoushtari, Edward P. Chandler, **Yuanhao Wang**, M. Salman Asif and Ulugbek Kamilov, "Unsupervised detection of distribution shift in inverse problems using diffusion models," axriv.

[3] **Yuanhao Wang**, Ramzi Idoughi and Wolfgang Heidrich, "Learning adaptive tensorial density fields for clean cryo-et reconstruction," *NeurIPS 2023*. paper.

[4] **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.

[5] Darius Rückert, **Yuanhao Wang**, Rui Li, Ramzi Idoughi, and Wolfgang Heidrich, "NeAT: Neural Adaptive Tomography," *ACM Trans. Graph.*, vol. 41, July 2022. paper.

[6] Rui Li, Darius Rückert, **Yuanhao Wang** Ramzi Idoughi, and Wolfgang Heidrich, "Neural adaptive scene tracing (nascent)," *VMV 2022*. paper.

[7] **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.

[8] **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.

[9] **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.

[10] **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