YUANHAO WANG

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RESEARCH INTERSETS

AI and Deep Learning Algorithms, Optimization and Performance Tuning, High-Performance Computing, 3D Reconstruction and Computational Imaging, Generative AI

WORK EXPERIENCE

Washington University in St. Louis *Nov. 2023-Present*
Postdoc in Electronical and System Engineering Collaborator: Dr. Ulugbek Kamilov
Key Projects: Developed advanced algorithms for AI/DL and machine learning applications. Optimized AI solutions for high-performance implementations using C++, CUDA, and libtorch.

EDUCATION

King Abdullah University of Science and Technology *Sept. 2016-Sept. 2023*
Ph.D. in Electronical and Computer Engineering Advisor: Dr. Wolfgang Heidrich

Tsinghua University *Sept. 2013-July 2016*
M.Eng. in Integrated Circuits Engineering Advisor: Dr. Shuguo Li

Beijing University of Posts and Telecommunications *Sept.2009-July 2013*
B.Eng. in Communication Engineering Advisor: Dr. Yitong Liu

SOFTWARE SKILLS

Programming C++, Libtorch, CUDA, Python, PyTorch, C, Matlab, Verilog
Tools & APIs: Paraview, Blender, Avizo

SELECTED PUBLICATIONS

[1] **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.

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

[3] **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.

[4] 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.

[5] 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.

[6] 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.

[7] **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.

[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.

RESEARCH EXPERIENCE

Neural representation of cryo-ET [1, 2] | C++, Libtorch, CUDA June 2021-Sept. 2023
Visual Computing Center, KAUST

· Developed an adaptive Density Field/Tensorial Density Field for efficient and large cryo-ET dataset.
· Implemented an Isotropic Fourier Prior to effectively mitigate peak patterns in the reconstruction.

Motion compensation and reconstruction of cryo-ET [3] | C++, OpenMP Mar. 2020-June 2021
Visual Computing Center, KAUST

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

Neural Adaptive tomography [4, 5] | C++, Libtorch June 2021-Feb. 2022
Visual Computing Center, KAUST

· Formulated differentiable models and designed relevant priors using C++ and Libtorch.
· Visualized the reconstructed volumes with Avizo.

Rethink ISP pipeline [6] | Python, Pytorch June. 2020-June 2022
Visual Computing Center, KAUST

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

Stereo Event-Camera Particle Tracking Velocimetry [7] | Matlab Oct. 2019-Mar.2020
Visual Computing Center, KAUST

· 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.

True Random Number Generator [8]| Verilog July 2014 - July 2016
Institute of Microelectronics, Tsinghua University

· 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.

ACADAMIC SERVICE

Reviewer CVPR, ECCV, TVCG, TCI, MRM

AWARDS

The Second Prize in China Undergraduate Mathematical Contest in Modeling (2012)

Honorable Mention of Interdisciplinary Contest in Modeling(2012)

JDSU special Awards (aimed at the innovative programs, 2012)